mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: JAPIES RUS MINERALE (PTY) LTD
(hereinafter referred to as 'JRM')
TEL NO: 053 861 1765
FAX NO: 086 636 0731
POSTAL ADDRESS: P.O. BOX 2473, KIMBERLEY, 8300
PHYSICAL ADDRESS: 36 WILLIAM STREET, KESTELLHOF, KIMBERLEY, 8301
FILE REFERENCE NUMBER SAMRAD: (NC) 30/5/1/2/2/10112 MR

IMPORANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

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

a) determine the policy and legislative context within which the proposed activity is located and document how the activity complies with and responds to the policy and legislative context;
b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternative focusing aon the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
d) determine the:
    (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to inform identified preferred alternatives; and
    (ii) the degree to which these impacts:-
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be managed, avoided or mitigated;
e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
g) identify suitable measure to manage, avoid or mitigate identified impacts; and
h) identify residual risks that need to be managed and monitored.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

Contact Person and correspondence address:

a) Details of:

i) The EAP who prepared the report:

Name of the Practitioner: Ms. R.H. Oosthuizen
Tel No: 084 208 9088
Fax No: 086 510 7120
E-Mail address: roosthuizen950@gmail.com
Physical Address: 4 Mullin Street, Hadison Park, Kimberley, 8301
Postal Address: P.O. Box 110823, Hadison Park, Kimberley, 8306

(i) Expertise of the EAP:

(1) The qualifications of the EAP:
(With evidence attached as Appendix 1)

Masters in Environmental Management (UFS)
B.Com. in Human and Industrial- Psychology (NWU)

(2) Summary of the EAP's past experience:
(Attach the EAP's curriculum vitae as Appendix 2)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans / Programmes / Reports, Performance Assessments, Rehabilitation Progress Assessments, Environmental Liability Assessments, Environmental Compliance Monitoring, Scoping Reports, etc.

b) Description of the property:

Farm Name:	Portion 1 of the Farm Magoloring 668 Portion 6 (a portion of Portion 2) of the Farm Magoloring 668 (Hereinafter collectively referred to as 'Japiesrus')
Application area (Ha)	1 466.6668 Hectares
Magisterial district:	Kuruman
Distance and direction from nearest town	Japiesrus is situated approximately 50km north-west of the town of Daniëlskuil, approximately 40km south of the town of Kathu, approximately 30km south-east of the town of Olifantshoek and approximately 25 north-west of the town of Postmasburg, in the Northern Cape Province. Access to the site is via a secondary gravel road turning from the R385 between Postmasburg and Olifantshoek.
21 digit Surveyor General Code for each farm portion	C04100000000066800001 C04100000000066800006

c) Locality Map:

(show nearest town, scale not smaller than 1:250 000 attached as Appendix 3)

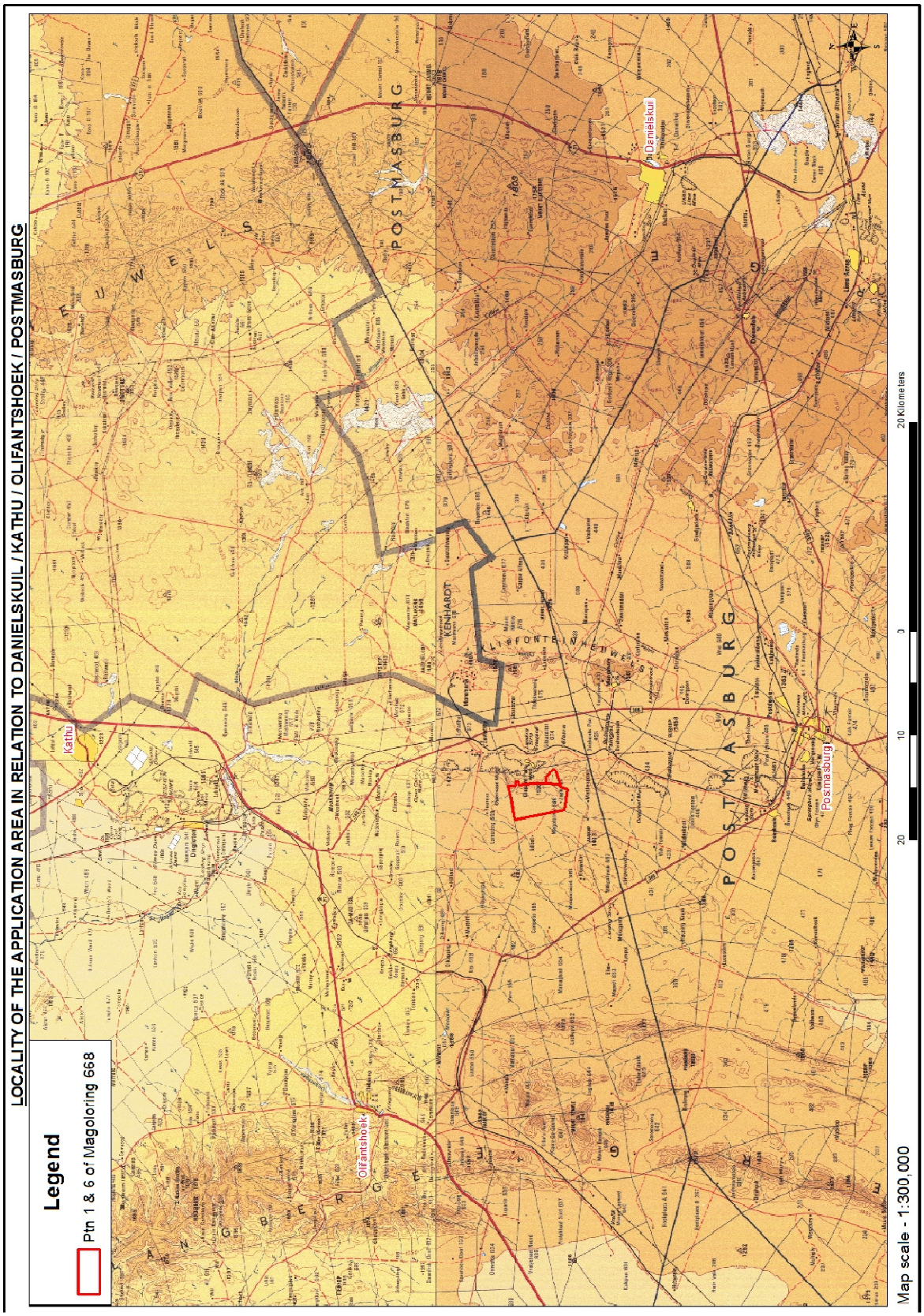


Figure 1 – Locality Map

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

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

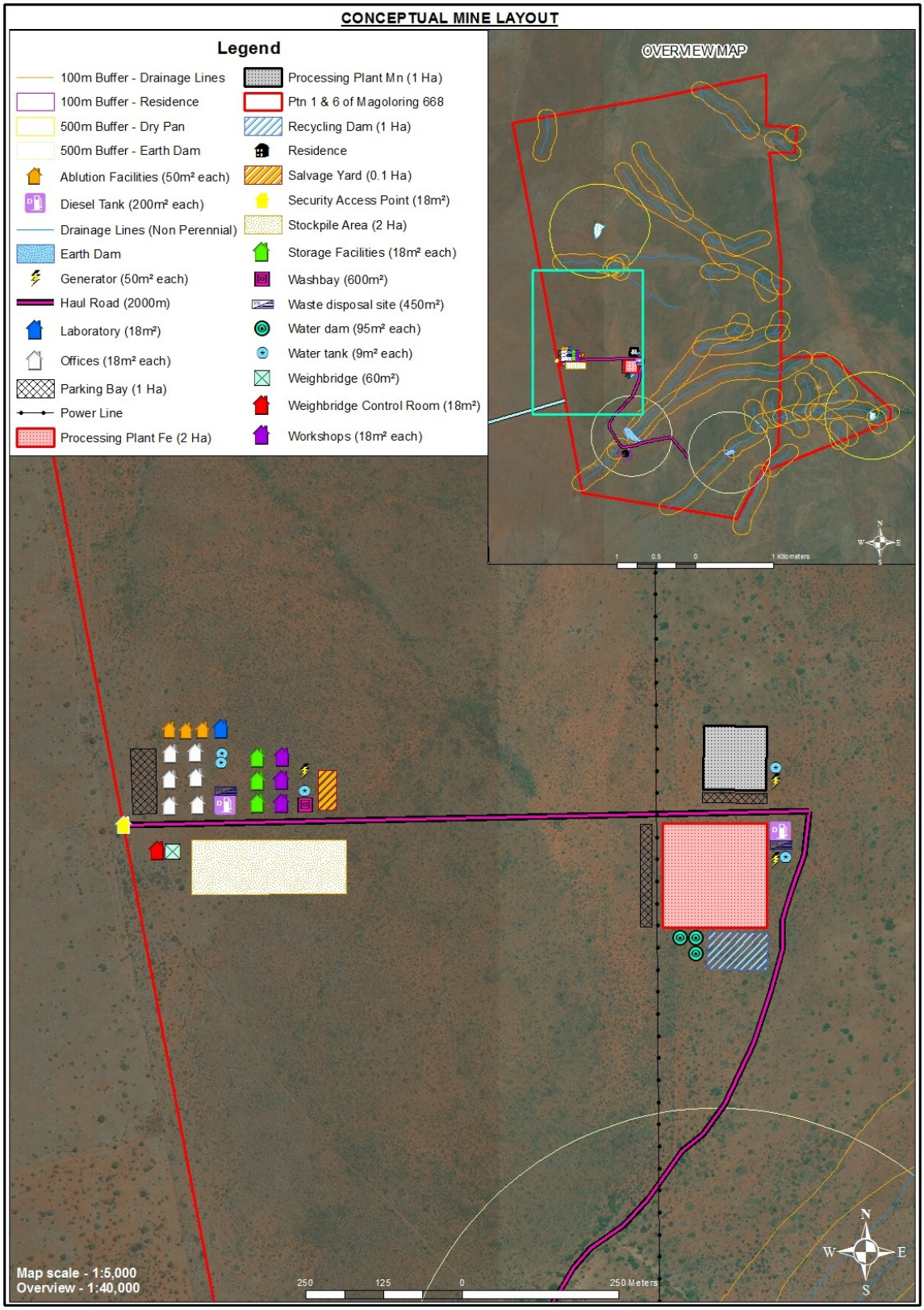


Figure 2 – Conceptual site layout plan

i) Listed and specified activities:

Name of activity (e.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)		Aerial extent of the activity (Ha or m²)	Listed Activity (mark with an X where applicable or affected)	Applicable Listing Notice (GNR544, GNR545 or GNR546 / Not listed)
1	Ablution Facilities: Provision is made for four ablution facilities on the site. Each one of these facilities will have a 2 500 litre polyethylene conservancy tank (underground).	50m² each 4 x 50m² = 200m²	X	GNR704 GNR984: Activity 17
2	Blasting: Approximately 120kg of explosives is placed in one blast hole. It is anticipated that JRM will blast two times per month. Approximately 24 tons of explosives will be utilized per month, working on an average of 100 boreholes per blast.	The size of the blasts will be directly affected by the geology of the deposit.	X	GNR633: Activity 11 GNR704 GNR983: Activity 19 GNR983: Activity 27 GNR983: Activity 30 GNR984: Activity 15 GNR984: Activity 17
3	Boreholes: There are a number of boreholes (some existing and some to be drilled after granting of the mining right) at the site which will be utilized for groundwater abstraction and monitoring purposes.	1m² each (surface disturbance)	X	GNR704 GNR983: Activity 9 GNR984: Activity 17
4	Brake Test Ramp: There will be a number of brake test ramps at the site, which will be established, and utilized, in terms of the Mine, Health and Safety Act.	Provision is made for a maximum footprint of 1 000m² for brake test ramps at any given time.	X	GNR984: Activity 17
5	Chemical Toilets: Mobile chemical toilets will be utilized at the site at various locations which are situated too far from the ablution facilities. It is anticipated that the operation will use a maximum of ten	6m² each 10 x 6m² = 60m²	X	GN704 GNR984: Activity 17

	chemical toilets at any given time.			
6	Clean and Dirty Water System: The operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.	The size and length of the berms and trenches will be directly affected by the topography of the area and the locality of the active mining areas (excavations and waste rock dumps) and infrastructure.	X	GNR983: Activity 12 GNR983: Activity 19 GNR984: Activity 17
7	Control Room: There will be a number of control rooms at the site which are to be utilized for the processing plants. It is anticipated that the operation will use a maximum of ten control rooms at any given time.	18m² each 10 x 18m² = 180m²	X	GNR984: Activity 17 GNR984: Activity 21
8	Diesel Tanks: The combined capacity of the diesel tanks at the site will not exceed 80m³. Each tank will be placed in a bund wall, with a capacity of 1.5 times the volume of the tank. A concrete floor must be established at the re-fuelling points.	200m² each	X	GNR704 GNR984: Activity 17 GNR985: Activity 10
9	Electricity: JRM will apply for Eskom power points for use in the mining operation after granting of the mining right.	Not applicable: transformer mounted on Eskom Power Line pole	X	GNR704 GNR984: Activity 19 GNR984: Activity 21
10	Excavations: Removal of ore and waste rock from the open excavations.	Provision is made for a maximum footprint of 10 hectares open excavations at any given time.	X	GNR633: Activity 11 GNR704 GNR983: Activity 19 GNR983: Activity 27 GNR984: Activity 15 GNR984: Activity 17

11	Explosive Magazine: A fenced explosive magazine area (800m² vegetation clearance) will be established, in which area two TS3 magazines will be placed on concrete blocks.	6m² each (concrete block) 2 x 6m² = 12m² 800m² (vegetation clearance)	X	GNR704 GNR984: Activity 17
12	Generator: There will be a number of generators (various sizes) at the site. The generators will be placed in brick buildings with concrete floors. It is anticipated that the operation will use a maximum of ten generators at any given time.	50m² each 10 x 50m² = 500m²	X	GNR704 GNR984: Activity 17 GNR984: Activity 21
13	Haul Roads (Loading & Hauling): Material will be hauled from the open excavations to the respective end destinations at the site on a number of haul roads. It is not anticipated that the footprint of the operation's haul roads will exceed two hectares at any given time.	(2 000m x 10m wide roads) = 2 Ha	X	GNR983: Activity 24 GNR983: Activity 27 GNR983: Activity 56 GNR984: Activity 17 GNR984: Activity 27
14	Office: There will be a number of mobile containers that will be utilized as offices at the site.	18m² each	X	GNR984: Activity 17
15	Parking: There will be a number of parking bays at the site. It is not anticipated that the footprint of the operation's parking bays / areas will exceed one hectare at any given time.	1 Ha	X	GNR983: Activity 27 GNR984: Activity 17
16	Processing Plant (Iron Ore): • Dry crushing and screening of ore: - Modular crushing and screening plant • Wet processing of ore: - Scrubber Plant	Provision is made for a maximum footprint of 2 hectares plant area at any given time.	X	GNR704 GNR984: Activity 15 GNR984: Activity 17 GNR984: Activity 21

	- JIG Plant - DMS Plant			
17	Processing Plant (Manganese Ore): • Dry crushing and screening of ore: - Modular crushing and screening plant	Provision is made for a maximum footprint of 1 hectares plant area at any given time.	X	GNR704 GNR984: Activity 15 GNR984: Activity 17 GNR984: Activity 21
18	Rapid Reloading Area (Explosives): The demarcated area will be large enough to accommodate three (3) twenty (20) meter tankers (horse and semi-trailer), as well as accommodating the movement of one (1) Mobile Manufacturing Unit within the demarcated area.	50m x 20m = 1 000m²	X	GNR704 GNR984: Activity 17
19	Recycling Dam: The wet processing of ore requires water. Water will be recycled through a number of recycling dams at the site. It is not anticipated that the combined footprint of the operation's recycling dams will exceed one hectare at any given time.	1 Ha	X	GNR704 GNR983: Activity 9 GNR983: Activity 10 GNR983: Activity 12 GNR983: Activity 13 GNR983: Activity 27 GNR984: Activity 17 GNR984: Activity 21
20	Safety Berms: There will be a number of safety berms at the site, which will be established, and utilized, in terms of the Mine, Health and Safety Act.	Provision is made for a maximum footprint of 0.2 hectares for safety berms at any given time.	X	GNR983: Activity 27 GNR984: Activity 17
21	Salvage Yard: There will be a fenced salvage yard at the site.	1 000m²	X	GNR984: Activity 17
22	Security Access Control Point: A mobile container will be utilized as an office at the security	18m²	X	GNR984: Activity 17

	access control point. An independent security company will control access to the site.			
23	Stockpile Area The vegetation will be cleared at the stockpile area. It is not anticipated that the footprint of the operation's stockpile area will exceed two hectares at any given time.	2 Ha	X	GNR983: Activity 27 GNR984: Activity 17
24	Storage Facility: There will be a number of mobile containers that will be utilized as storage at the site. It is anticipated that the operation will use a maximum of twenty containers at any given time for storage.	18m² each	X	GNR984: Activity 17
25	Stormwater Dam: A stormwater dam will be constructed.	20m x 50m = 0.1 Ha	X	GNR984: Activity 17
26	Topsoil Dumps: There will be a number of temporary topsoil dumps at the site. These dumps are to be continuously utilized for rehabilitation purposes. It is not anticipated that the footprint of the temporary topsoil dumps will exceed 0.5 ha at any given time.	0.5 Ha	X	GNR633: Activity 11 GNR983: Activity 27 GNR984: Activity 15 GNR984: Activity 17
27	Tyre Bay: There will be one tyre bay at the site.	200m²	X	GNR984: Activity 17
28	Wash Bay: The washbay will be a built structure, with a concrete floor and flow-off trench. Dirty water will flow into a 2 500 liter polyethylene conservancy tank (underground).	600m²	X	GNR704 GNR984: Activity 17
29	Waste Storage Site: There will be a number of waste storage areas at the site. These areas will all have a concrete floor and bund wall. The following types of waste will be stored in these areas until it is removed from the site for disposal:	50m² each	X	GNR704 GNR984: Activity 17

	• Small amounts of low level hazardous waste in suitable receptacles (i.e. old oil). • Domestic waste. • Industrial waste.			
30	Waste Rock Dumps: There will be a number of waste rock dumps at the site. Some of the waste rock dumps will be permanent in nature, whilst some will be continuously utilized for rehabilitation purposes. It is not anticipated that the footprint of the waste rock dumps will exceed three hectares at any given time.	3 Ha	X	GNR633: Activity 11 GNR983: Activity 27 GNR984: Activity 17
31	Water Dam: It is anticipated that the operation will establish a number of 200 000 litre zinc dams with a radius of 5.5m and a height of 2.4m at the site.	95m² each	X	GNR704 GNR983: Activity 9 GNR983: Activity 10 GNR983: Activity 12 GNR983: Activity 13 GNR983: Activity 27 GNR984: Activity 17 GNR984: Activity 21
32	Water Distribution Pipeline: A number of pipelines will be utilized at the site to distribute clean / recycled water to the respected areas of use. It is not anticipated that the distance of the pipelines will exceed 1 000m at any given time.	1 000m	X	GNR983: Activity 9 GNR983: Activity 10 GNR984: Activity 17 GNR984: Activity 21
33	Water Tank: There will be a number of JoJo tanks, of various sizes, at the site. The water stored in these tanks will be utilized at the ablution facilities and for potable water.	4m² each	X	GNR984: Activity 17

34	Weighbridge	60m²	X	GNR984: Activity 17
35	Weighbridge Control Room: A mobile container will be utilized as the weighbridge control room.	18m²	X	GNR984: Activity 17
36	Workshop: A number of mobile containers will be utilized as boilermaker / electrical workshops. A brick workshop, with concrete floor, will be built at the site. This workshop will be utilized for maintenance of vehicles and equipment.	1 000m²	X	GNR984: Activity 17

Full description of listed activities applied for:	
GNR633 Activity 11	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008); Category B: 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).
GNR704	Regulations published on 4 June 1999 in terms of the National Water Act, 1998 (Act No. 36 of 1998).
GNR983 Activity 9	The development of infrastructure exceeding 1 000 meters in length for the bulk transportation of water or storm water:- i) with an internal diameter of 0.36 meters or more; or ii) with a peak throughput of 120 litres per second or more.
GNR983 Activity 10	The development and related operation of infrastructure exceeding 1 000 meters 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 meters or more; or ii) with a peak throughput of 120 litres per second or more.
GNR983 Activity 12	The development of:- i) canals exceeding 100 square meters in size; ii) channels exceeding 100 square meters in size; iii) bridges exceeding 100 square meters in size; iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square meters in size; v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square meters in size; vi) bulk storm water outlet structures exceeding 100 square meters in size; vii) buildings exceeding 100 square meters in size; or viii) infrastructure or structures with a physical footprint of 100 square meters 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 meters of a watercourse, measured from the edge of the watercourse.
GNR983 Activity 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more.
GNR983 Activity 19	The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic meters from:- i) a watercourse ii) the seashore; or iii) the littoral active zone, an estuary or a distance of 100 meters inland of the high-water mark of the sea or an estuary, whichever distance is the greater.
GNR983 Activity 24 (ii)	The development of:- (ii) a road with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 meters.
GNR983 Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for:- i) the undertaking of a linear activity; or ii) maintenance purposes undertaken in accordance with a maintenance management plan.
GNR983 Activity 30	Any process or activity identified in terms of Section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
GNR983 Activity 56 (ii)	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre:- i) where the existing reserve is wider than 13.5 meters; or ii) where no reserve exists, where the existing road is wider than 8 meters;
GNR984 Activity 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.
GNR984 Activity 17	Any activity including the operation of that activity which requires a mining right as contemplated in Section 22 of the MPRDA, including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of Section 106 of the MPRDA.
GNR984 Activity 21	Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case Activity 6 of this Notice applies.
GNR984	The development of:-

Activity 27	i) A national road as defined in Section 4 of the SANRAL and NRA Acts. ii) A road administered by a provincial authority iii) A road with a reserve wider than 30 meters iv) A road catering for more than one lane of traffic in both directions.
GNR985 Activity 10	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters.

(ii) Description of the activities to be undertaken:

(Describe methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity.)

a. Mining Method:

Mining will be done by the conventional opencast mining method. It is designed based on the nature of the ore-bodies on the mine, which proposes that each resource area be treated as a separate pit (selective mining). Mining can be done on two ore bodies at any one time.

Where present vegetated soil overlying the planned mining area is stripped prior to mining and stockpiled on a dedicated (temporary) dump to be used for rehabilitation purposes at a later stage.

A haul road network provides access to the opencast mining areas, to the dry (modular) crushing & screening plants (Fe & Mn) and to the wet (modular) scrubber / JIG / DMS plants (Fe).

The mining process is initiated by drilling, then blasting and is then followed by loading and hauling of both ore and waste to their respective destinations on the mine site. The mine will be operational 24 hours per day / 7 days a week to achieve the targeted production.

b. Processing Method:

- Iron Ore:

  The Run of Mine (ROM) is hauled to the dry crushing and screening plant where it is stockpiled in 'A-grade' and 'B-grade' stockpiles. An excavator with a hydraulic hammer attachment is used to break down the +500mm ore.

  - A-Grade process:

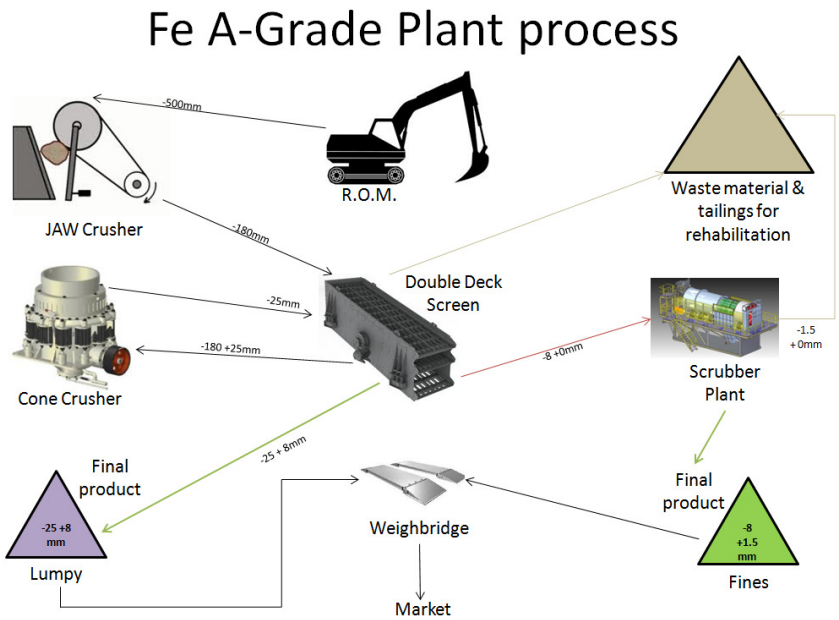


Figure 3a - Processing method; A-grade iron ore

A-grade ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The

crushed ore is then fed to a double deck screen which screens the ore into three sizes:

- +25mm (oversize);
- -25mm+8mm (lumpy); and
- -8mm+1.5mm (fines)

- Oversize:
  The +25mm oversize material is fed to the Cone crusher where the ore is re-crushed to -25mm before it is fed into the double deck screen again to repeat the screening process.

- Lumpy:
  The -25mm +8mm lumpy ore is hauled to the shipping yard, ready for the market.

- Fines:
  The -8mm +0mm fines ore is hauled to the scrubber plant. The ore is washed and any material -1.5mm is removed and discarded as waste material. The -8mm +1.5mm ore is then hauled to the shipping yard, ready for the market.

  All waste material is hauled to temporary tailings / waste rock dumps to be used for rehabilitation purposes at a later stage.

- B-Grade process:

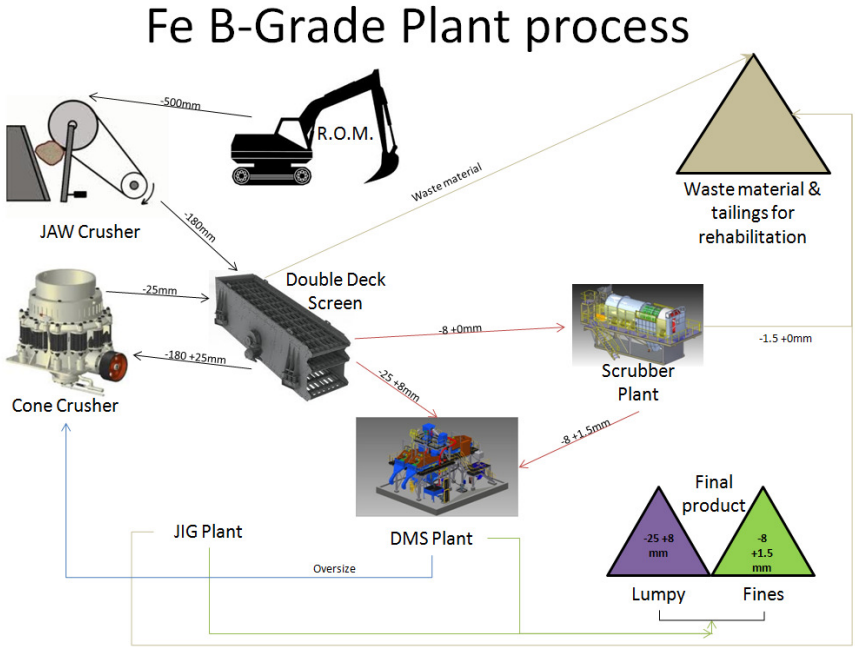


Figure 3b - Processing method; B-grade iron ore

B-grade ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The crushed ore is then fed to a double deck screen which screens the ore into three sizes:

- +25mm (oversize);
- -25mm+8mm (lumpy); and
- -8mm+1.5mm (fines)

- Oversize:
  The +25mm oversize material is fed to the Cone crusher where the ore is re-crushed to -25mm before it is fed into the double deck screen again to repeat the screening process.

- Lumpy:
  The -25mm +8mm lumpy ore is hauled to the DMS plant. Water for the plant is recycled continuously through the settling / recycling dam.

  The -25mm + 8mm ore is fed to the DMS Plant, where the pre-screen discard all the +25mm material on a stockpile. This +25mm material is transported to the Cone crusher for secondary crushing to -25mm.

  The -25mm +8mm ore is processed in the DMS Plant and impurities (floats) are removed and discarded as waste material.

  The on-grade product (-25mm +8mm) ore is hauled to the shipping yard, ready for the market.

- Fines:
  The -8mm +0mm fines ore is hauled to the scrubber plant. The ore is washed and any material -1.5mm is removed and discarded as waste material.

  The -8mm +1.5mm ore is then fed to the DMS plant where it is processed. Impurities (floats) are being separated and discarded as waste, and the on-grade product is hauled to the shipping yard, ready for the market.

- Manganese Ore:

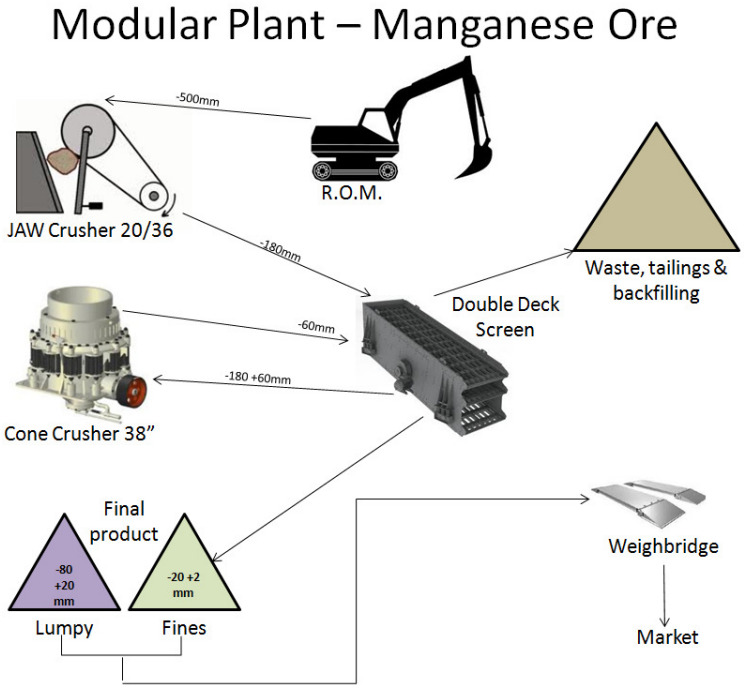


Figure 4 – Processing method Manganese

The Run of Mine (ROM) is hauled to the dry crushing and screening plant. An excavator with a hydraulic hammer attachment is used to break down the +500mm ore.

The ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The crushed ore is then fed to a double deck screen which screens the ore into two sizes:

- +20mm -80mm (lumpy); and
- -20mm +2mm (fines)

The resultant product is accumulated into a product stockpile and waste is loaded, hauled and dumped at waste dumps/ backfilling/road making. The final product is transported by road to the market.

c. Production:

JRM plans to reach full production of 100 000 tonnes iron ore per month and 30 000 tonnes manganese ore per month. First production, iron ore, is expected in month seven of the mining operation. First production, manganese ore, is expected in the first quarter of year four.

d. Employment

The entire workforce, including contractors, will consist of 100 - 200 employees at full production.

e. Water Use License

JRM will apply for an Integrated Water Use License for the following water uses at the site:

- Section 21(a) of the National Water Act: Taking water from a water resource.
- Section 21(b) of the National Water Act: Storing water.
- Section 21(c) of the National Water Act: Impeding or diverting the flow of water in a watercourse.
- Section 21(g) of the National Water Act: Disposing of waste in a manner which may detrimentally impact on a water resource.
- Section 21(i) of the National Water Act: Altering the bed, banks, course or characteristics of a watercourse

e) Policy and Legislative Context:

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied
Atmospheric Pollution Prevention Act (Act 45 of 1964) and Regulations	- Sections 27 – 35: Dust control - Sections 36 – 40: Air pollution by fumes emitted by vehicles.
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations	- Section 6: Implementation of control measures for alien and invasive plant species.
Constitution of South Africa (Act 108 of 1996)	- Chapter 2: Bill of Rights - Section 24: Environmental rights - Section 25: Rights in Property
Environment Conservation Act (Act 73 of 1989) and Regulations	- Section 19 and 19A: Prevention of littering by employees and sub-contractors during construction and maintenance phases of the proposed project. - Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities. - Section 28A: Exemptions.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.
Hazardous Substances Act (Act 15 of 1973) and Regulations	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- The Act
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations	- The Act
Mineral and Petroleum Resources Development Act (Act 49 of 2008)	- The Act

National Environmental Management Act (Act 107 of 1998) as amended and Environmental Impact Assessment Regulations, 2014	- Section 2: Strategic environmental management goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care.
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species.
National Environmental Management: Protected Areas Act (Act 57 of 2003)	- The Act
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities
National Forest Act (Act 84 of 1998) and Regulations	- Section 7: No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under Section 7(4) or Section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette. - Sections 12 – 16: Deals with protected trees, with the Minister having the power to declare a particular tree, a group of trees, a particular woodland, or trees belonging to a certain species, to be a protected tree, group of trees, woodland or species. - Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.
National Heritage Resources Act (Act 25 of 1999) and Regulations	- Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site.

	- Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority 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 forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process.
National Water Act (Act 36 of 1998) and Government Notice No. 704 of 1991	- Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents.
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.
Northern Cape Nature Conservation Act (Act 9 of 2009)	- Addresses protected species in the Northern Cape and the permit application process related thereto.
Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees.
Road Traffic Act (Act 93 of 1997) and Regulations	- The Act
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa.
Basic Conditions of Employment Act (Act 3 of 1997)	- To control employment aspects
Basic Conditions of Employment Amendment Act (Act 11 of 2002)	- Amendments to BCEA
Community Development (Act 3 of 1966)	- To promote community development
Development Facilitation (Act 67 of 1995)	- To provide for planning and development
Development Facilitation (GN24, PG329, 24/07/1998)	- Regulations re Northern Cape LDO's
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59
Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)
Land Survey Act (Act 8 of 1997)	- To control land surveying, beacons etc.
Land Survey Act (GNR1130, GG18229, 29/08/1997)	- Agriculture, land survey S10
National Veld and Forest Fire Act (Act 101 of 1998)	- To regulate law on veld and forest fires

National Veld and Forest Fire Act (GN1775, GG22527, 01/08/2001))	- Draft Regulations S21
Municipal Ordinance, 20/1974	- To control pollution, sewers etc.
Municipal Ordinance, PN955, 29/08/1975	- Nature conservation Regulations
Cape Land Use Planning Ordinance, 15/85	- To control land use planning
Cape Land Use Planning Ordinance, PN1050, 05/12/1988	- Land use planning Regulations
Planning and Development Act (Act 7 of 1998)	- To control planning and development

f) Need and desirability of the proposed activities:

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location.)

- Need:

  As the main raw ingredient of steel, iron ore is considered one of the most important commodities, providing the backbone of skyscrapers, bridges and other infrastructure. The $225-billion-a-year market for iron ore is bigger than that of any other commodity, with the exclusion of oil and gas.

  About 98% of the world's mined iron ore is used for making steel, as a result, demand for the commodity closely mirrors that of the metal.

- Desirability:

No	Description	Yes/No
1	Does the proposed land use / development fit the surrounding area?	Yes
2	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	Yes
3	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	Yes
4	Will the proposed land use / development impact on the sense of place?	Yes
5	Will the proposed land use / development set a precedent?	No
6	Will any person's rights be affected by the proposed land use / development?	Yes
7	Will the proposed land use / development compromise the "urban edge"?	No

- Benefits:

No	Description	Yes/No
1	Will the land use / development have any benefits for society in general?	Yes
2	Will the land use / development have any benefits for the local communities where it will be located?	Yes

g) Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site:

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

(i) Details of the development footprint alternatives considered:

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) The property on which or location where it is proposed to undertake the activity:

Farm Name	District	Title Deed	In Extent
Portion 1 of the Farm Magoloring 668	Kuruman	T4732/2005	1 350.1492 Ha
Portion 6 (a portion of Portion 2)	Kuruman	T4732/2005	116.5176 Ha

of the Farm Magoloring 668			

Alternatives considered:-
No alternatives were considered as JRM has conducted prospecting activities under a valid Prospecting Right and Prospecting Right Renewal, with DMR reference number (NC) 171 PR & (NC) 10169 PR-R and Protocol number 243/2014, over the abovementioned properties.

(b) The type of activity to be undertaken:

The type of activity to be undertaken at the site is opencast mining for Iron Ore and Manganese Ore.

Alternatives considered:-
The only alternative land use is livestock and game farming; however the applicant's main economic activity is mining and for this reason does not favour any other alternative land use.

(c) The design or layout of the activity:

The following infrastructure will be established at the site:

- Ablution facilities;
- Boreholes;
- Brake test ramps;
- Chemical toilets;
- Clean and dirty water system;
- Control rooms;
- Diesel tanks;
- Eskom power line point;
- Explosives Magazine (two TS3 magazines in a fenced area);
- Generators;
- Haul roads;
- Offices;
- Parking Bays;
- Processing Plant
    - Modular crushing & screening plants (dry process); and
    - Modular scrubber plant, JIG plants and DMS plants (wet process)
- Rapid reloading area (explosives);
- Recycling dams;
- Safety berms;
- Salvage yard;
- Security access point;
- Stockpile areas;
- Storage facilities;
- Stormwater dam;
- Tyre bay;
- Washbay;
- Waste storage sites;
- Water dams;
- Water distribution pipelines;
- Water tanks;
- Weighbridge
- Weighbridge control room;

- Workshops;

The locality of the above infrastructure was decided upon after taking into account of the following:-

- Locality of the ore bodies;
- Topography of the area;
- Environmental features;
- Operational requirements; and
- Discussions with the legal occupant.

Alternatives considered:-
The only alternative considered was the locality of the infrastructure on the site.

(d) The technology to be used in the activity:

- Iron Ore:
  The Run of Mine (ROM) is hauled to the dry crushing and screening plant where it is stockpiled in 'A-grade' and 'B-grade' stockpiles. An excavator with a hydraulic hammer attachment is used to break down the +500mm ore.

  - A-Grade process:
    A-grade ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The crushed ore is then fed to a double deck screen which screens the ore into three sizes:
    - +25mm (oversize);
    - -25mm+8mm (lumpy); and
    - -8mm+1.5mm (fines)

    - Oversize:
      The +25mm oversize material is fed to the Cone crusher where the ore is re-crushed to -25mm before it is fed into the double deck screen again to repeat the screening process.

    - Lumpy:
      The -25mm +8mm lumpy ore is hauled to the shipping yard, ready for the market.

    - Fines:
      The -8mm +0mm fines ore is hauled to the scrubber plant. The ore is washed and any material -1.5mm is removed and discarded as waste material. The -8mm +1.5mm ore is then hauled to the shipping yard, ready for the market.

      All waste material is hauled to temporary tailings / waste rock dumps to be used for rehabilitation purposes at a later stage.

  - B-Grade process:
    B-grade ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The crushed ore is then fed to a double deck screen which screens the ore into three sizes:
    - +25mm (oversize);

- -25mm+8mm (lumpy); and
- -8mm+1.5mm (fines)

- Oversize:
  The +25mm oversize material is fed to the Cone crusher where the ore is re-crushed to -25mm before it is fed into the double deck screen again to repeat the screening process.

- Lumpy:
  The -25mm +8mm lumpy ore is hauled to the DMS plant. Water for the plant is recycled continuously through the settling / recycling dam.

  The -25mm + 8mm ore is fed to the DMS Plant, where the pre-screen discard all the +25mm material on a stockpile. This +25mm material is transported to the Cone crusher for secondary crushing to -25mm.

  The -25mm +8mm ore is processed in the DMS Plant and impurities (floats) are removed and discarded as waste material.

  The on-grade product (-25mm +8mm) ore is hauled to the shipping yard, ready for the market.

- Fines:
  The -8mm +0mm fines ore is hauled to the scrubber plant. The ore is washed and any material -1.5mm is removed and discarded as waste material.

  The -8mm +1.5mm ore is then fed to the DMS plant where it is processed. Impurities (floats) are being separated and discarded as waste, and the on-grade product is hauled to the shipping yard, ready for the market.

- Manganese Ore:
  The Run of Mine (ROM) is hauled to the dry crushing and screening plant. An excavator with a hydraulic hammer attachment is used to break down the +500mm ore.

  The ore (-500mm) is fed into the VGF which then feeds the JAW crusher. The JAW crushes the ore down to -180mm. The crushed ore is then fed to a double deck screen which screens the ore into two sizes:
  - +20mm -80mm (lumpy); and
  - -20mm +2mm (fines)

  The resultant product is accumulated into a product stockpile and waste is loaded, hauled and dumped at waste dumps/ backfilling/road making. The final product is transported by road to the market.

<u>Alternatives considered:-</u>
The only alternative considered was the processing of ore only using a dry processing method. Taking into consideration the drilling results, it was decided to incorporate the wet processing to ensure grade.

(e) The operational aspects of the activity:

Mining will be done by the conventional opencast mining method. It is designed based on the nature of the ore-bodies on the mine, which proposes that each resource area be treated as a separate pit (selective mining). Mining can be done on two ore bodies at any one time.

Where present vegetated soil overlying the planned mining area is stripped prior to mining and stockpiled on a dedicated (temporary) dump to be used for rehabilitation purposes at a later stage.

A haul road network provides access to the opencast mining areas, to the dry (modular) crushing & screening plants (Fe & Mn) and to the wet (modular) scrubber / DMS plants (Fe).

The mining process is initiated by drilling, then blasting and is then followed by loading and hauling of both ore and waste to their respective destinations on the mine site. The mine will be operational 24 hours per day / 7 days a week to achieve the targeted production.

Alternatives considered:-
The conventional opencast drill-blast-load-haul-mining method has been proven to be the most cost effective mining method in the Northern Cape Province and for this reason no viable alternatives were identified.

(f) The option of not implementing the activity:

Mining forms an integrated part of the social and economical growth of South Africa and more specifically the Northern Cape Province.

The following positive impacts will be lost if the proposed mining project is not developed:

- Equipment and infrastructure development will amount to approximately R50 million. This will enable JRM to have a sustainable long term positive economical impact both locally and regionally.
- Employment: The entire workforce will consist of approximately 200 employees.
- Payroll income - The gross remuneration of employees in terms of salaries and wages.
- Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
- Revenue - The total value of sales arising from business activity at the mine.
- South Africa is currently the 7th largest producer of iron ore in the world. The iron ore mined in South Africa is mostly exported. Foreign revenue earned by these sales has a huge positive economical impact both locally and regionally. TAX and VAT obligations to SARS have an additional positive impact on the Government's income.

Rank	Country	Iron ore production (thousand tonnes)	year
	World	3,320,000	2015
1	China	1,380,000[1]	2015
2	Australia	824,000	2015
3	Brazil	428,000	2015
4	India	129,000	2015
5	Russia	112,000	2015
6	Ukraine	68,000	2015
7	South Africa	80,000	2015
8	United States	43,000	2015
9	Canada	39,000	2015
10	Sweden	37,000	2015

Figure 5 – List of Iron Ore producers

(ii) Details of the Public Participation Process Followed:

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

The following interested and / or affected parties were identified:

Interested and / or Affected Party	Description	Interest in Project
Surface Owner	**Owner**	**Description**
PMG Mining Investment (Pty) Ltd	Portion 1 of the Farm Magoloring 668	Surface owner
PMG Mining Investment (Pty) Ltd	Portion 6 (a portion of Portion 2) of the Farm Magoloring 668	Surface owner
Legal Occupant of the properties		
Ms. De Bruin		Legal occupant of properties
Adjacent Surface Owner		
Mr. C.C. and Mrs. C.J. Claassens	Remaining Extent of the Farm Magoloring 668	Surrounding owner
Mr. C.C. and Mrs. C.J. Claassens	Remaining Extent of Portion 2 of the Farm Magoloring 668	Surrounding owner
Mr. C.C. and Mrs. C.J. Claassens	Portion 3 of the Farm Magoloring 668	Surrounding owner
Assmang (Pty) Ltd	Portion 4 (a portion of Portion 1) of the Farm Magoloring 668	Surrounding owner
Assmang (Pty) Ltd	Portion 5 (a portion of Portion 2) of the Farm Magoloring 668	Surrounding owner
Koorzen & Koorzen CC	Portion 1 of the Farm Lomoteng 669	Surrounding owner
Municipality		
Tsantsabane Local Municipality	-	Local Municipality
ZF Mgcawu District Municipality	-	District Municipality
Infrastructure		
ESKOM	-	Parastatal
SANRAL	-	National Agency
Transnet	-	Parastatal
Government Department		
Department of Agriculture and Land Reform	-	Government Department
Department of Public Works	-	Government Department
Department of Rural Development and Land Reform	-	Government Department
Department of Water Affairs	-	Government Department
Water User Association		
Tshiping Water User Association	-	Water User Association
Surrounding Mining Operation		
Huatian S.A. Mining & Investment	-	MR Holder on adjacent land (Lomoteng)
Community		
Maremane Communal Property Association	-	Nearest Community

Identified interested and/or affected parties were notified as follows:

- Notification letters were sent to identified and registered interested and / or affected parties on the 2nd of December 2016. Attached to each of these letters was a Background Information Document.
- A newspaper advert was placed in the 'Die Ghaap' local newspaper on the 15th of December 2016.
- A newspaper advert was placed in the 'Volksblad' regional newspaper on the 7th of December 2016.
- A notice board was placed at the entrance of the site.

Proof of notification is attached as Appendix '5a'.

Consultation:
A meeting was held with the legal occupant of the properties on the 11th of January 2017. Proof of consultation (minutes of meeting) is attached as Appendix '5b'.

No other 'one-on-one' consultation meetings have been requested to date.

Responses:
A number of responses were received. These have all been included in the table below. The responses have been appended as Appendix '5c'.

Public Meeting:
A public meeting was held on the 25th of April 2017. The following is appended hereto:
Appendix '6a' – Invites to the public meeting
Appendix '6b' – Attendance register and minutes of the meeting
Appendix '6c' – Responses received after the public meeting. These responses have also been incorporated into the table below.

The consultation process has been recorded in this EIA/EMPR document until the 25th of May 2017.

(iii) Summary of issues raised by I&AP's

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

Interested and Affected Parties List the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted.		Date comments received	Issues raised	EAPs response to the issue of the I&AP	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s	X				
PMG Mining Investment (Pty) Ltd		N/A	No meeting has been held with PMG Mining Investment (Pty) Ltd to date.	No meeting has been held with PMG Mining Investment (Pty) Ltd to date.	N/A
Lawful occupier/s of the land					
Ms. De Bruin & Mr. Fourie	X	11/01/2017	- Access to the site - Compensation for loss of grazing land - Public meeting to be held	- Access to the site will be arranged with Mr. Fourie. - A surface use agreement will be negotiated after granting of the mining right. - A public meeting will be held.	N/A
Landowners or lawful occupiers on adjacent properties	X				
Claassens (Mr. L., Ms. A., Ms. C, Mr. C. and Mr. K)	X	25/04/2017 Public Meeting	Access Road: - Fencing of access road - Dust on access road - 24 Hour operation a concern (proximity of residences) - Damage to access road by mine vehicles Blasting - Vibrations will damage residences	Refer to Minutes of the Meeting appended as Appendix '6b'.	Various

			Flora: - Dust will have an impact on grazing potential. Groundwater: - How much water will be used by mine and what will the impact be on the groundwater. Contamination: - Will any chemicals be used during processing? - Will any hydrocarbons be used during the drilling of blast holes?		
Assmang (Pty) Ltd	X	N/A	To date no comment has been received from Assmang.	N/A	N/A
Koorzen & Koorzen CC (Mr. M. Koorzen)	X	09/01/2017 25/04/2017 Public Meeting	- Access road - Water supply - Dust - Security and boundaries - Electricity supply Mr. Koorzen provided a document listing a number of requests and concerns. Refer to this letter under Appendix '6b' and under Appendix '6c'.	- Access to the site will be negotiated with the surface owner / tenant. - Water use license will be applied for. - Dust monitoring programme to be implemented. - Security will be placed at the entrance of the mine site. - Generators to be used until such time that JRM applies for electricity from Eskom. Refer to Minutes of the Meeting appended as Appendix '6b'.	Various Various
Municipal Councillor	X				
Tsantsabane Local Municipality	X	N/A	To date no comment has been received from the Municipality.	N/A	N/A

Municipality	X				
Z.F. Mgcawu District Municipality	X	N/A	To date no comment has been received from the Municipality.	N/A	N/A
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA, etc.)					
Eskom	X	N/A	To date no comment has been received from Eskom.	N/A	N/A
SANRAL	X	10/01/2017	No impact.	N/A	N/A
Transnet	X	23/01/2017	No impact.	N/A	N/A
Communities					
Maremane Communal Property Association	X	N/A	To date no comment has been received from the CPA.	N/A	N/A
Department of Land Affairs					
Department of Rural Development and Land Reform	X	N/A	To date no comment has been received from this Department.	N/A	N/A
Traditional Leaders					
Not applicable: There are no communities, with Traditional Leaders, in the immediate vicinity of the mining right area.					N/A
Department of Environmental Affairs					
The Department of Environmental Affairs is a competent authority in this application process.					
Other Competent Authorities					
Department of Agriculture	X	N/A	To date no comment has been received from this Department.	N/A	N/A
Department of Public Works	X	N/A	To date no comment has been received from this Department.	N/A	N/A
Department of Water & Sanitation	X	N/A	To date no comment has been received from this Department.	N/A	N/A
OTHER AFFECTED PARTIES					
Huatian S.A. Mining and Investment	X	N/A	To date no comment has been received from Lomoteng Mine.	N/A	N/A
Tshiping Water User	X	N/A	To date no formal comment has been	N/A	N/A

Association			received on the EIA/EMPR.		
INTERESTED PARTIES					
Mr. Kgaswane	X	10/05/2017	- Date that mining operation will commence - Water	- Mine can only start after granting and execution of the mining right. - In the process of applying for a water use license. Refer to e-mails under Appendix '6c'.	N/A
Mr. D.J. Koorzen	X	25/04/2017	- Fencing - Water - Storm water	Refer to Minutes of the Meeting appended as Appendix '6b' and the completed response sheet under Appendix '6c'.	Various
Mr. W. Uys	X	25/04/2017 Public Meeting	Mr. Koorzen provided a document listing a number of requests and concerns on behalf of Mr. Uys during the public meeting. Refer to this letter under Appendix '6b' and under Appendix '6c'.	Refer to Minutes of the Meeting appended as Appendix '6b'.	Various

The consultation process has been captured until 25 May 2017.

(iv) The Environmental attributes associated with the alternatives:

(The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects.)

(1) Baseline Environment:

(a) Type of environment affected by the proposed activity:

(its current geographical, physical, biological, socio-economic and cultural character.)

- **Air quality:**

While many factors affect the precipitation rate, the main factors are related to wind velocity, air humidity, particulate size and dynamic shape, and prevailing ground cover.

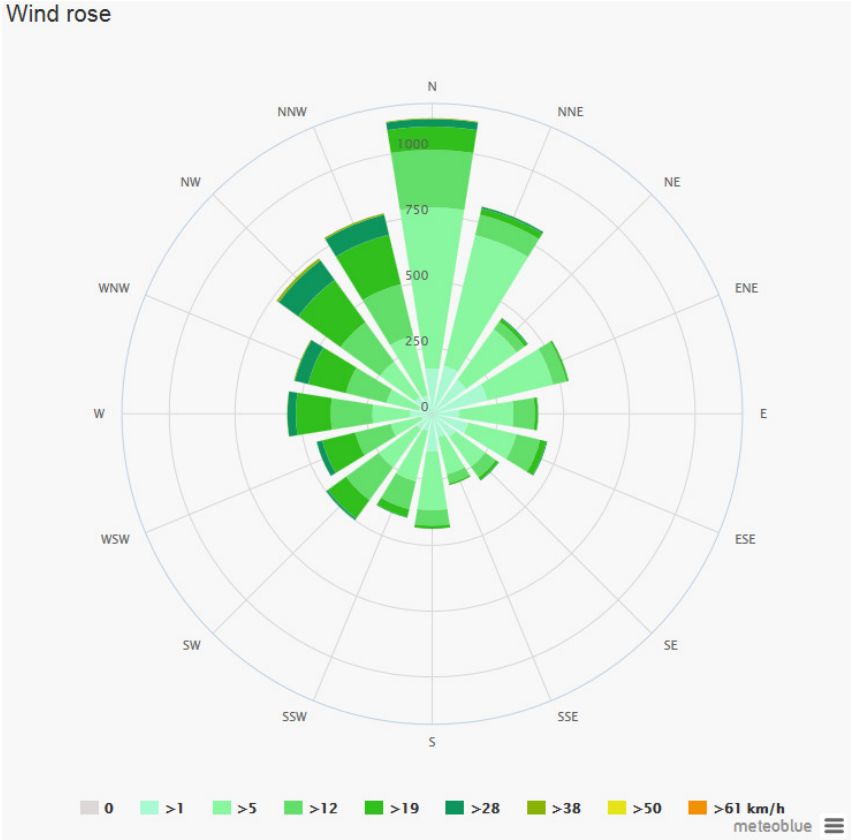


Figure 6 – Wind rose for the Postmasburg area

The wind rose for Postmasburg shows how many hours per year the wind blows from the indicated direction. Example SW: Wind is blowing from South-West (SW) to North-East (NE).

The diagram for Postmasburg shows how many days within one month can be expected to reach certain wind speeds. Monsoons create steady strong winds from December to April, but calm winds from June to October.

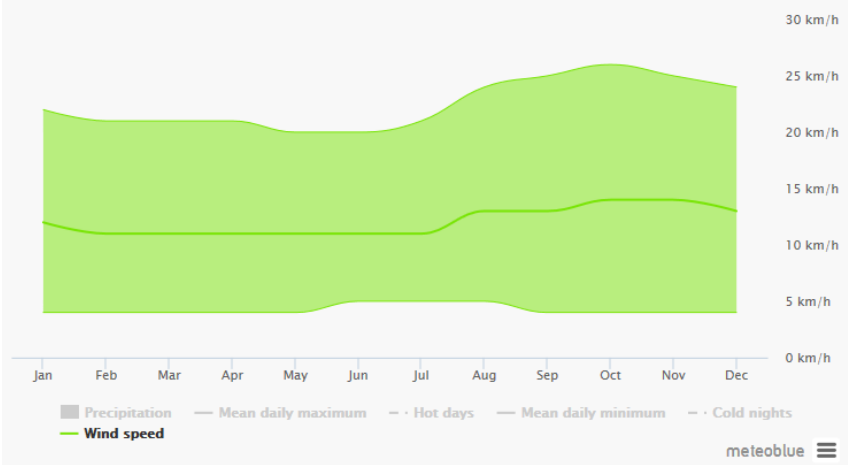


Figure 7 – Wind speed in the Postmasburg area

A baseline, single bucket, dust monitoring assessment was conducted at the site. The dust buckets was changed bi-weekly (every 14 days). Find attached hereto as Appendix '7' the baseline dust fall-out report of Dustwatch.

The focus of the survey was to measure the fall-out dust on the area immediately surrounding Japiesrus, which stands to be affected by the proposed mining activities. The four main wind directions were used for guidance regarding placement of the single bucket dust monitoring points and the final monitoring points were decided upon after access roads to the different areas was determined.

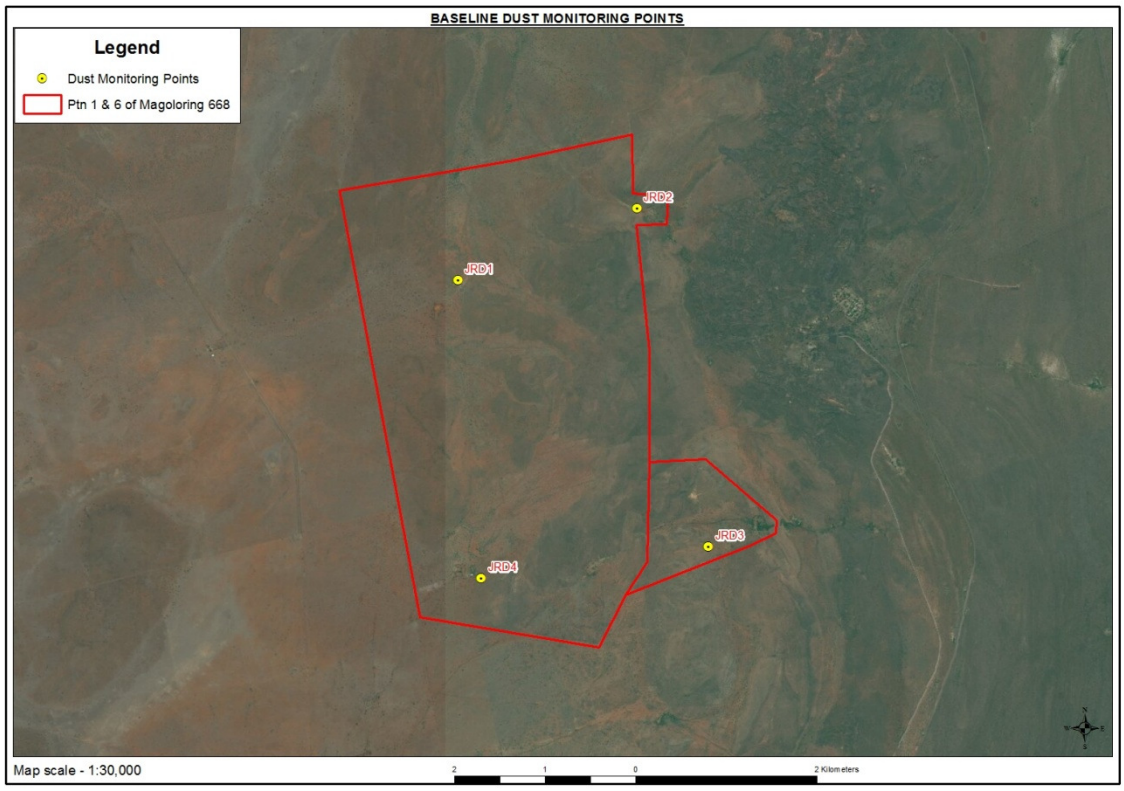


Figure 8 - Dust monitoring points

The monitoring results for the assessment period are:

Date From / To	Residential or Non-residential Area	UNIT 1	UNIT 2	UNIT 3	UNIT 4	Applicable Compliance - Dustfall rate (D) (mg/m^2/day) – averaged over 30 days.	Non-compliant or compliant. Two within a year, not sequential months.*
02/02/2017 16/02/2017	Non-residential	98	-	106	52	600 < D < 1200	All Compliant
16/02/2017 02/03/2017	Non-residential	91	34	74	-	600 < D < 1200	All Compliant
02/03/2017 16/03/2017	Non-residential	102	132	200	329	600 < D < 1200	All Compliant

Current sources of air pollution in the area stems mainly from:

- Glosam Mine
- Lomoteng Mine
- Prospecting activities on adjacent and nearby properties.
- Dust from the secondary (public) and gravel (farm) roads transecting the properties.
- Dust induced by wind and wind gusts.

- **Archaeological, cultural & heritage environment:**

  Mr. Stephan Gaigher of G&A Heritage Management Consultants conducted a site visit on the 27th of January 2017 and compiled a Phase 1 Archaeological Impact Assessment Report.

  The findings of the site visit are as follows:
  "Several small microliths of the Late Stone Age is found scattered over the higher lying regions of the property. Large areas of the study area are covered in red Kalahari sand. Some LSA tools of banded iron stone was also identified. None of these stone tool scatters can be considered a stone age site. Very few cores and no reworking flakes were observed. Some of the small tools were manufactured from volcanic glass (obsidian) – type stone, the exact type could not be determined, however it was obvious that these materials were brought into the study area from an unknown source. Furthermore, two modern burial sites were identified as well as abandoned mining activities and agricultural structures."

  The full report is annexed as Appendix '8'.

- **Climate:**

  The area is located in a semi-arid region, receiving on average about 250mm of rain per annum. The rainfall is largely due to showers and thunderstorms falling in the summer months October to march. The peak of the rainy season is normally March or February. The summers are very hot with cool winters.

  The meteoblue climate diagrams are based on 30 years of hourly weather model simulations and available for every place on Earth. They give good indications of typical climate patterns and expected conditions (temperature, precipitation, sunshine and wind). The simulated weather data have a spatial resolution of approximately 30 km and may not reproduce all local weather effects, such as thunderstorms, local winds, or tornadoes.

  The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Postmasburg. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

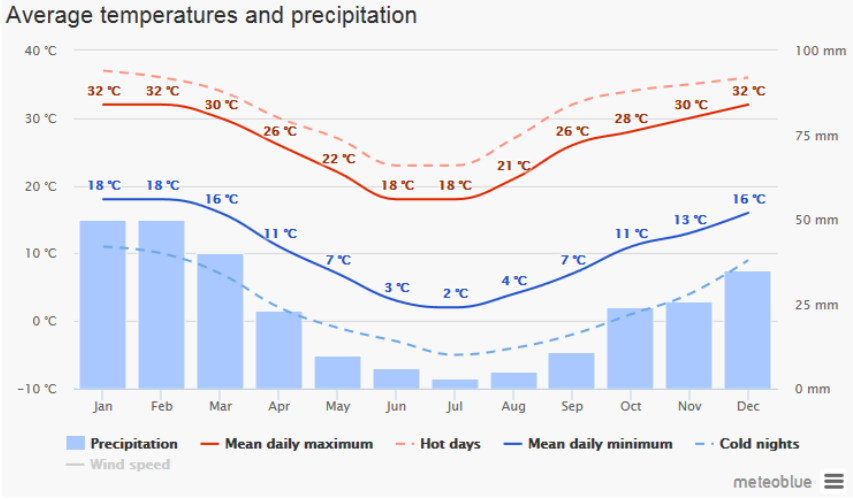


Figure 9 – Average temperatures and precipitation

The graph shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

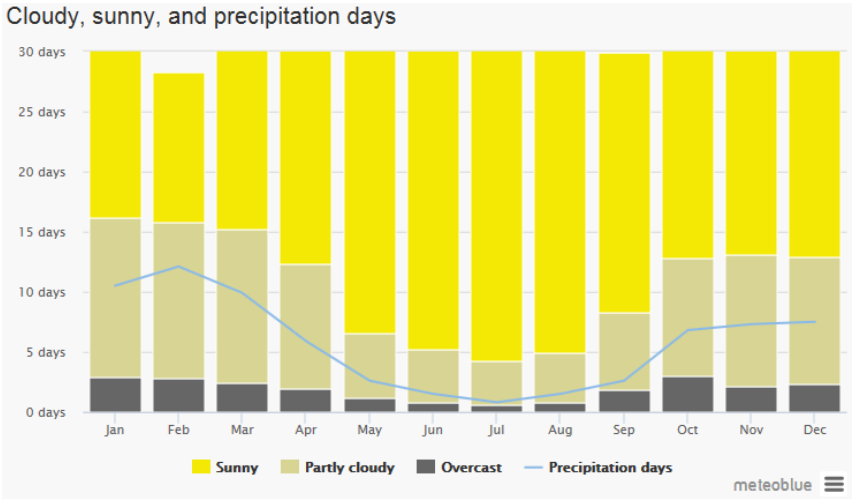


Figure 10 - Cloudy, sunny and precipitation days

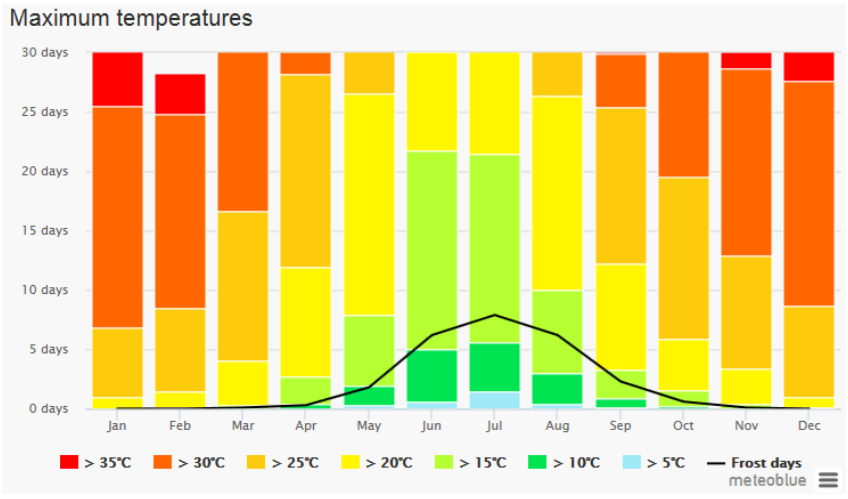


Figure 11 - Maximum temperatures of the Postmasburg area

The maximum temperature diagram for Postmasburg displays how many days per month reach certain temperatures.

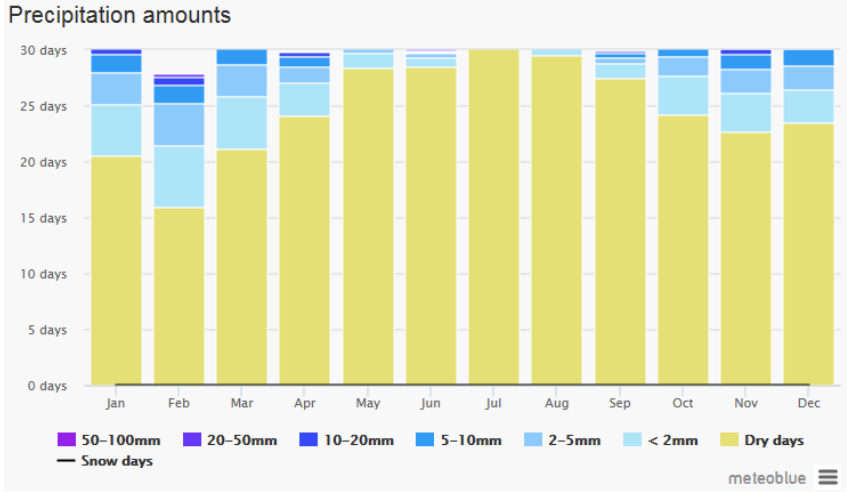


Figure 12 - Precipitation amounts for the Postmasburg area

The precipitation diagram for Postmasburg shows on how many days per month, certain precipitation amounts are reached.

- **Fauna:**

Dr. Natalie Birch of Ecological Management Services conducted a site visit on 1 March 2017 and compiled a Biodiversity Survey Report.

The report findings are summarized as follows:
Owing to farming practices and past mining activity the faunal population has been disturbed. It was not possible to compile a complete list of species present on the property during the field survey as it is important to note that many species that potentially occur on-site may not have been present / active when the survey was undertaken. However some observations were made during the site visit but emphasis was placed on the habitat in order to determine potential occurrence of species.

- Reptiles Species of Conservation Concern
  No red data terrapin, tortoises, snakes or lizards were identified as occurring in the quarter degree square, based on the distribution maps available.

- Amphibians of Conservation Concern
  No red data amphibians were identified as occurring in the quarter degree squares, based on the distribution maps available.

- Birds of Conservation Concern
  A list of all red data bird species occurring in the quarter degree square, was extracted from the SABAP 1 and SABAP 2 databases and Birdlife South Africa's Important Bird Areas and from the Red Data Book of Birds with the distribution being confirmed. Based on an evaluation of the habitat requirements

for these red data species, the potential of these species occurring either on-site or within 500m of the property boundary is provided in the table below.

Common Name	Scientific Name	Conservation Status (Regional, *Global*)	Suitable Habitat requirements	Potential for Occurrence On-site
Martial Eagle	*Polemaetus bellicosus*	Endangered, *Vulnerable*	Woodland, savannah or grassland with clumps of large trees or power pylons for nest sites	High – nesting habitat in the Mixed Savannah
Kori Bustard	*Ardeotis kori*	Near Threatened *Near Threatened*	Dry thornveld grassland, arid scrub requires the cover of some trees	Medium – Moderate to high shrub density throughout the site
African Whitebacked Vulture	*Gyps africanus*	Endangered *Endangered*	Savannah and bushveld. Nest in tall trees (Vachellia erioloba).	High – No nest sites were recorded within the planned development area. However the presence of large Vahellia erioloba trees presents ideal nesting habitat for these birds.

- Mammals of Conservation Concern
  A list of all red data mammal species occurring in the quarter degree squares, was extrapolated from the Red Data Book for Mammals and the MammalMAP, the Mammal Atlas of Africa database. Based on an evaluation of the habitat requirements for these red data species, the potential of these species occurring either on-site or within 500m of the property boundary is provided in the table below.

Common Name	Scientific Name	Conservation Status	Suitable Habitat requirements	Potential for Occurrence On-site
Southern African Hedgehog	*Atelerix frontalis*	Near threatened	High – Require ample groundcover and dry places for nesting.	High to Medium – Suitable habitat available.
Sundevall's leaf-nosed bat	*Hipposideros caffer*	Data deficient	Low – Generally associated with savannah woodland availability of surface water essential.	Low – limited suitable habitat, presence of surface water fluctuates.

Bushveld Gerbil	*Gerbilliscus leucogaster*	Data deficient	Moderate – Associated with light sandy soils, independent of one type of vegetation association.	High to Medium – Suitable habitat available
Honey badger	*Mellivora capensis*	Near threatened	High – As they are catholic in habitat requirements, they are likely to occur on-site.	High – Suitable habitat within the study area.
Dent's Horseshoe Bat	*Rhinolophus denti*	Near threatened	Limited – Requires substantial cover such as caves and rock crevices.	Low – Roosting habitat in the form of rock crevices may be available in the old mining area adjacent to the site. However suitable roosting habitat is limited for this species, it is unlikely that this species would have colonised the study site.
Geoffroy's horseshoe bat	*Rhinolophus clivosus*	Near threatened	Limited – Geoffroy's Horseshoe Bat is predominantly a savannah woodland species, but occurs on forest fringes and even in deserts. They are a gregarious species and roost in caves, rock crevices, mine adits, or hanging on roves and walls in small clusters. At night they establish feeding sites hanging from branches of trees.	Low – No caves hoever the old mining areas in the greater area may offer some suitable habitat.

The full report is attached hereto as Appendix '9'.

- **Flora:**

  Dr. Natalie Birch of Ecological Management Services conducted a site visit on 1 March 2017 and compiled a Biodiversity Survey Report.

  The report findings are summarized as follows:
  The site consists of a mixture of vegetation that displays various slight structural changes and dominance in woody vegetation. Five broad vegetation communities could be identified within the study area.

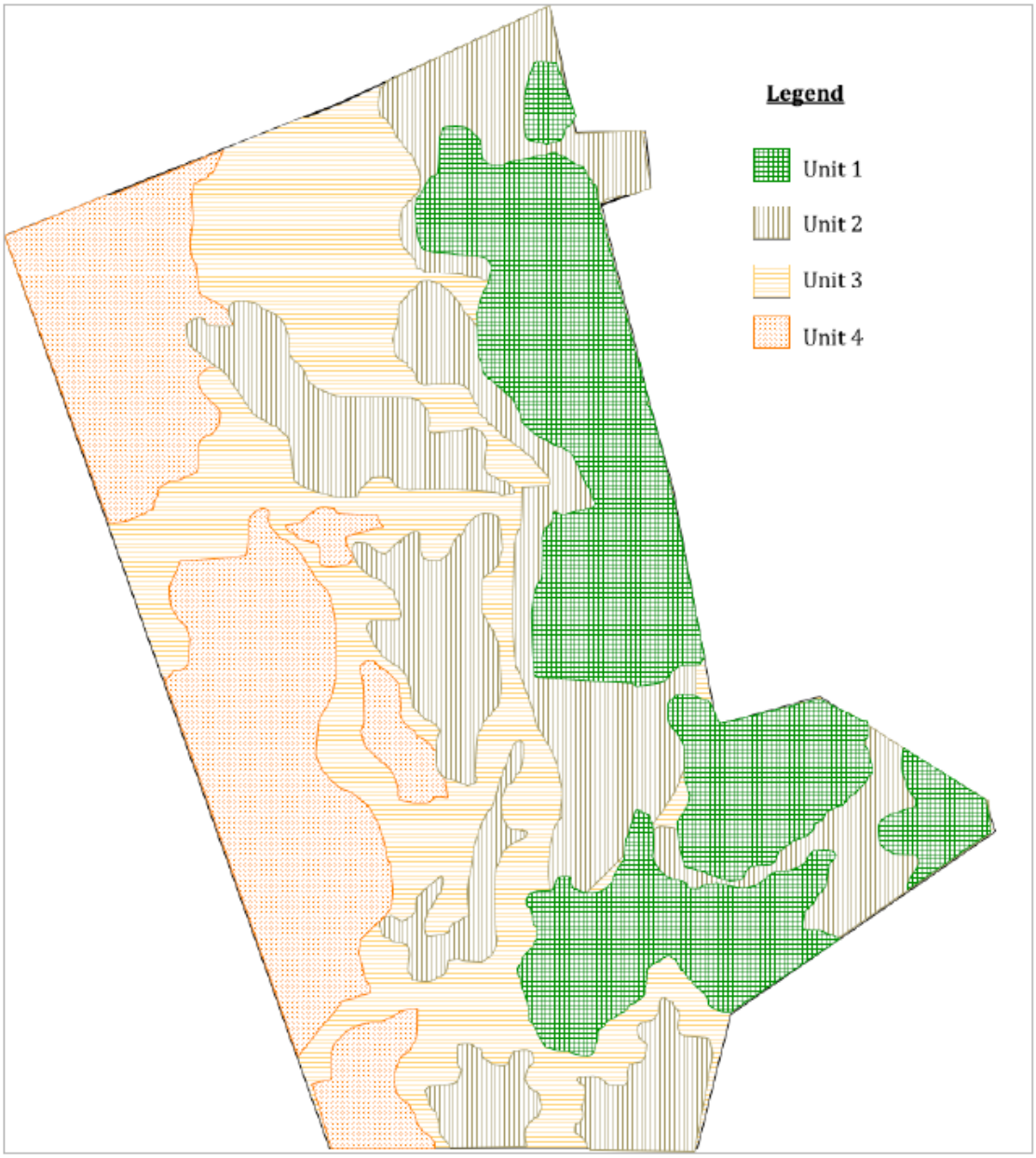


Figure 13 – Vegetation unit distribution map

- Vegetation unit 1: *Lebeckia macrantha – Searsia ciliate* Shrubland
  This vegetation type occurs on the rocky hills. It forms a low open shrubland with a rock substrate. The grass layer is moderately developed, interspersed with herbaceous species, and some succulents. The plant community is dominated by *Lebeckia macrantha* and *Searsia ciliate* other common species included, *Euclea undulate*, *Senegalia mellifera*, *Andropogon schirensis*, *Anthephora pubescens*, Aristida congesta, *Melinis repens* and *Helichrysum zeyheri*.

- Vegetation unit 2: Tarchonanthus camphorates – Grewia flava Scrub
  This vegetation community was found on the low lying rocky slopes. It is characterized by a short shrub layer, between 1-1.5m tall with a moderately developed grass sword. Some areas have been invaded quite extensively by *Senegalia mellifera*, to form patches of thicket. *Tarchonanthus camphoratus* and *Grewia flava* dominate most of the shrub layer, however species such as *Gymnosporia buxifolia, Senegalia mellifera* and *Lycium hirsutum* were common. Species such as *Aristida meridionalis, Aristida stipitata* subsp. *Stipitata, Eragrostis lehmanniana* and *Gnidia polycephala* were noted.

- Vegetation unit 3: Vachellia erioloba – Aristida meridionalis Savannah
  This vegetation unit occurs on the flat sandy areas of the study area. Three vegetation strata are evident a tree layer with trees over 4m tall, a shrub layer between 1.5m and 2m and a herbaceous and grass layer. The substrate is characteristically red sandy soil. *Vachellia erioloba* dominates the tree layer, although species such as *Ziziphus mucronata* and *Terminalia sericea* were noted within this layer. Other species recorded included, *Vachellia luederitzii, Gymnosporia buxifolia*, and *Senegalia mellifera*.

- Vegetation unit 4: Boscia albitrunca – Tarchonanthus camphorates shrubland
  This vegetation type was found on the western portion of the study area. It has a tall shrub layer which varies in density. Some areas are open with a well developed grass layer while other areas, have a higher shrub density and the grass layer is patchy. Species such as *Boscia albitrunca, Tarchonanthus camphoratus*, *Rhigozum obovatum, Putterlickia saxatilis, Cenchrus ciliaris, Aristida congesta, Brachiaria serrata, Digitaria eriantha, Melinis repens, Schmidtia pappophoroides, Stipagrostis uniplumis, Lycium pilifolium* and *Lycium cinereum* were noted.

- Drainage lines:
  A number of ill-defined and highly seasonal drainage lines occur on the study area. These areas are not always obvious in terms of vegetation composition, but are sometime only perceptible owing to a slight depression in the topography. In general they tend to have a slightly higher percentage cover in terms of the grass layer, but are generally not defined in terms of a diagnostic species composition.

The full report is attached hereto as Appendix '9'.

- **Geology:**

Superior-type banded iron formation (BIF) of the Transvaal Supergroup crop out along the western margin of the Kaapvaal craton in the Northern Cape Province of South Africa. These iron formations can be traced as a prominent range of hills in a broken arc for some 400km from Prieska in the south to Pomfret in the north.

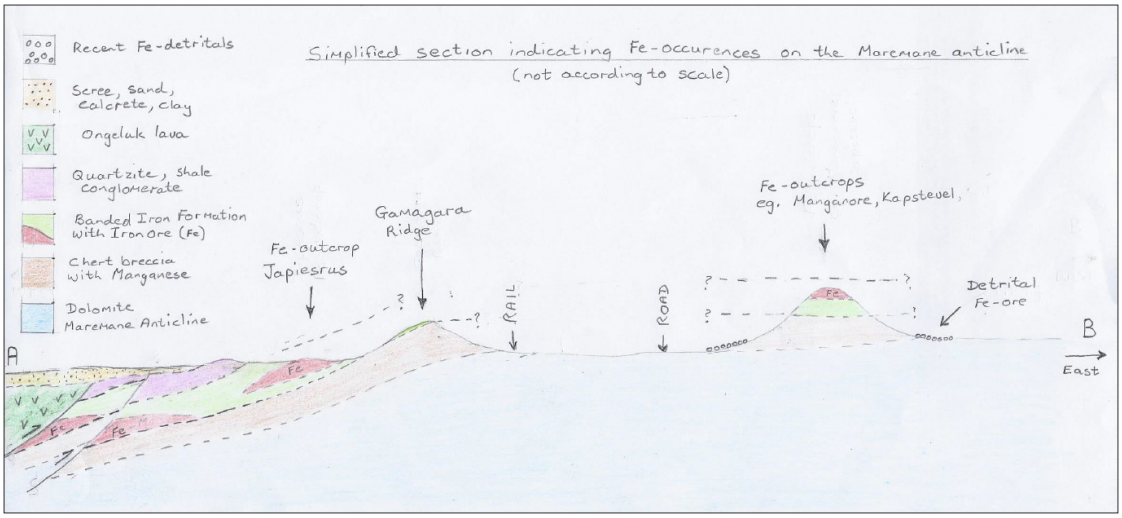


Figure 14 - Simplified, schematic section across the western portion of the Maremane anticline, showing the potential Fe-occurrences on the farm Japiesrus

The bulk of the hematite or is found in the vicinity of Postmasburg and Sishen. Within this sub region, iron ore and associated lithologies of the Transvaal and Olifantshoek Supergroups crop out intermittently along an arcuate belt (the Maremane anticline) for 60km.

Sishen Iron Ore Mine is located at the northern end of the anticline. At this locality, the bulk of the hematite ores lies buried beneath younger cover lighologies. Similarly, there is very little outcrop of iron ore at the Kolomela mine area, which is situated at the southern end of the same structure.

The Gamagara rand forms a prominent line of west dipping outcrops between Sishen and Postmasburg. Localised occurrences of high grade hematite ore (associated with the

Kuruman Hills Banded Iron Ore Formations) are also found along this ridge. There is a definite potential for buried iron ore deposits similar to Sishen, Khumani, Beeshoek and Kolomela to the west of the Gamagara rand.

The Japiesrus deposit, situated on the western edge of the Gamagara rand, is such a deposit.

- **Groundwater:**
  Mr. Chris Esterhuyse of SRK Consulting conducted a site visit on 7 February 2017 and compiled a Baseline Groundwater Assessment. Attached hereto, as Appendix '10', is the complete Report.

  - Aquifer characteristics:
    Groundwater in the study area occurs in two main aquifer systems, namely, the unconfined to semi-confined primary aquifer system, consisting of calcrete and windblown sands, and the secondary (or fractured-rock) aquifer system. A karst aquifer, formed by leaching of dolomitic rocks, occurs east of the site and east of the prominent N-S striking ridge formed by the Gamagara Formation.

    The primary aquifer is usually developed on the contact between the calcrete and underlying formations, or localised pebble horizons, within the calcrete horizon. Although relatively low yields occur in this aquifer, it is an important and reliable source of water supply in the low lying areas where groundwater levels are shallow (<10 mbgl). However, groundwater levels at the site are generally >20 mbgl and therefore this aquifer is considered to be of minor importance at the site.

    The secondary aquifers are formed by jointing and fracturing of the otherwise solid bedrock. Joints and fractures are formed by faulting, cooling of magma outflows, intrusion of dolerite dykes, folding and other geological forces. Generally the harder rocks (BIF, quartzite, chert and dolerite) fracture more easily under stress (to form superior aquifers), compared to the softer sediments like shale, which deform rather than fracture under stress. Joints and fractures in the dolomitic rocks were leached by slightly acidic rainwater over long periods of time to form solution cavities in these rocks. These cavities can collapse due to a significant drop in the groundwater level (e.g. mine dewatering), which reduces the groundwater pressure therein, or when the roof becomes too weak to sustain the weight of the overlying rocks. Some of the vertical leached zones (along dykes and fractures) have been partially blocked with windblown sand and rubble, and

during intense rainfall events, the backfilled material becomes saturated and slumps further into the structure to form sinkholes. The recent sinkhole that formed on the R31 near Daniëlskuil after heavy rains, is a prime example of this.

According to the 1:500 000 Hydrogeological map sheet of Kimberley (DWS, 2005), the central and western parts of the site are situated on an intergranular and fractured aquifer, with expected yields of successful boreholes ranging between 0.1 – 0.5 L/s. This area is underlain by the Makganyene Formation. The far eastern part of the site, which is underlain by the Gamagara Formation, is located on a fractured aquifer, with expected yields of successful boreholes ranging between 0.5 – 2.0 L/s.

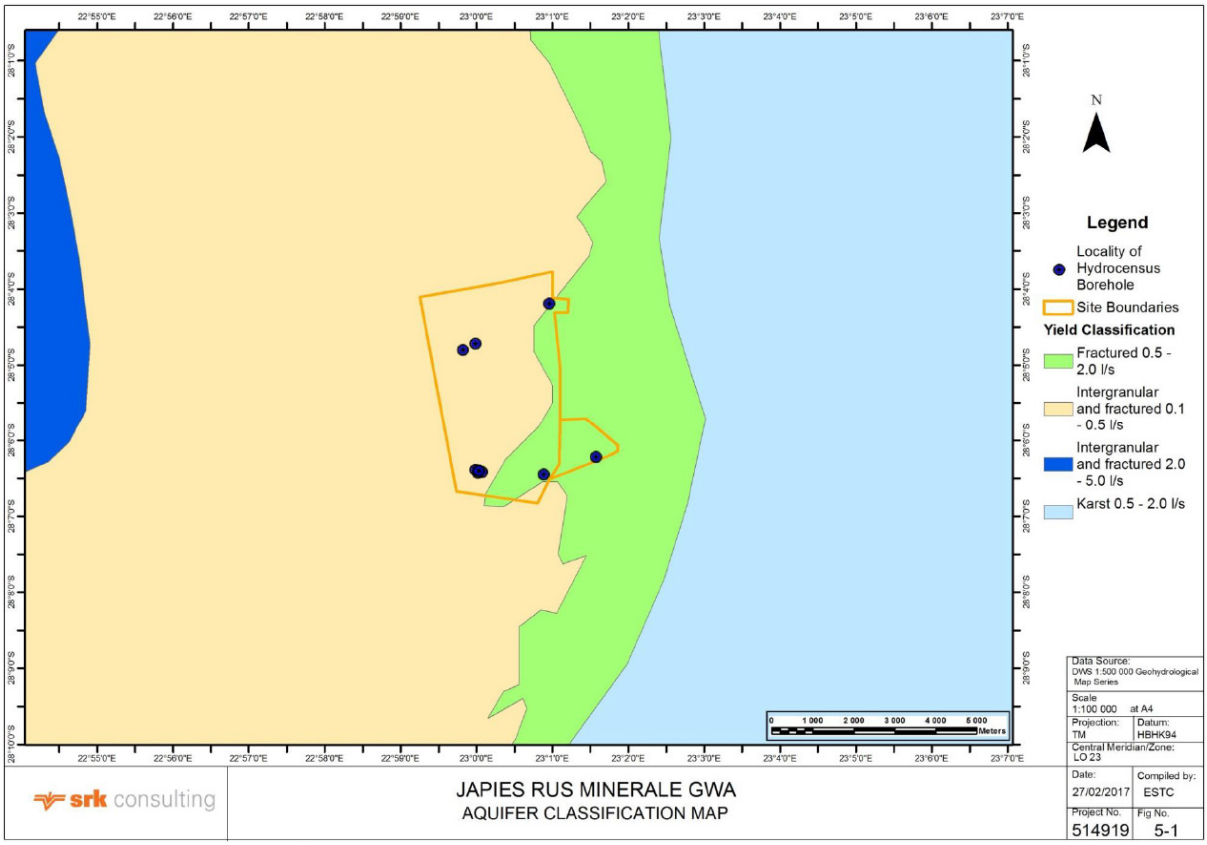


Figure 15 - Aquifer classification map

Figure 16 indicates that groundwater in the southwestern part of the site is of a good quality with EC values of <70 mS/m. Therefore, this groundwater is suitable for human consumption according to the SANS 241:2015 Drinking Water Guidelines (which limit EC to ≤170 mS/m for drinking). Although the EC values for the rest of the site are indicated as >70 mS/m, field measured EC's during the hydrocensus were all below 70 mS/m.

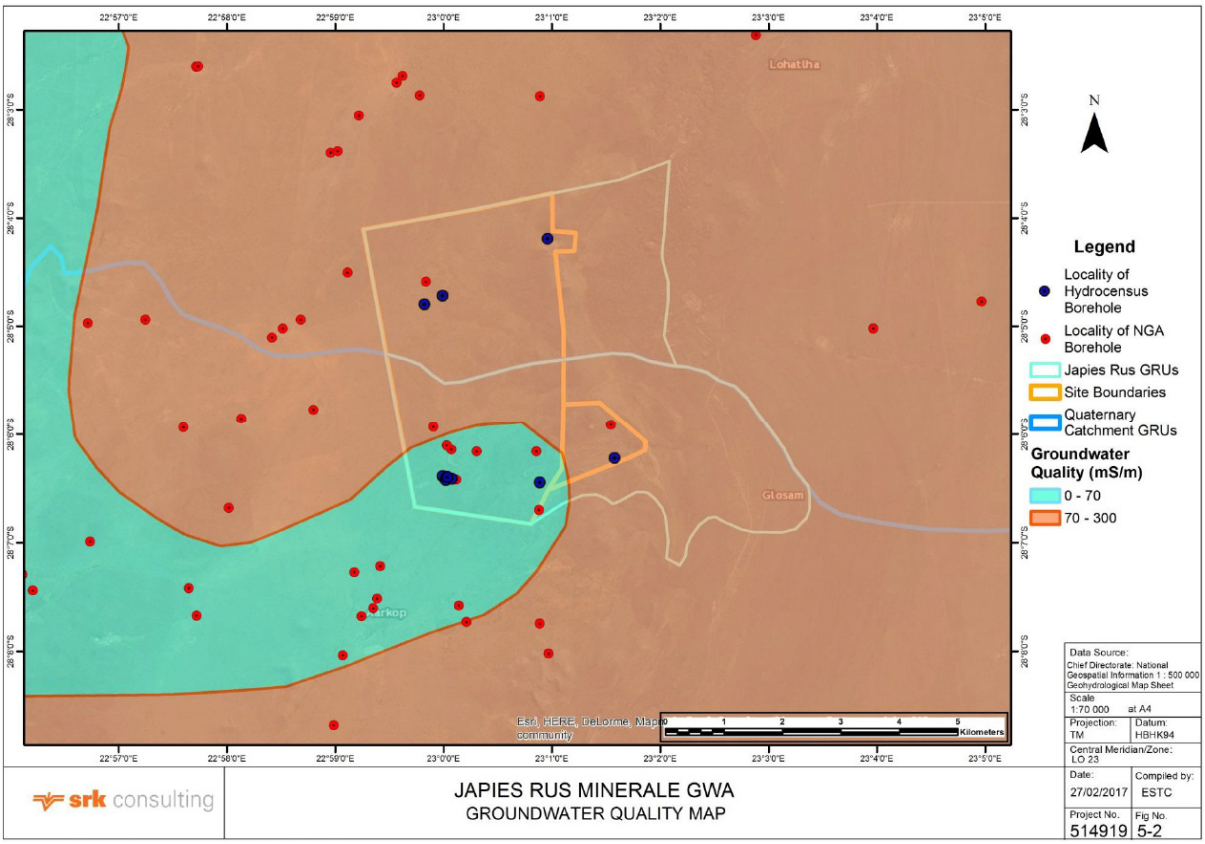


Figure 16 – Groundwater quality map

The aquifer vulnerability of the site is indicated in figure 17. The vulnerability is determined by evaluating seven parameters, namely:

- Depth to groundwater;
- Recharge;
- Aquifer media;
- Soil media;
- Topography;
- Impact on vadose zone; and
- Hydraulic conductivity.

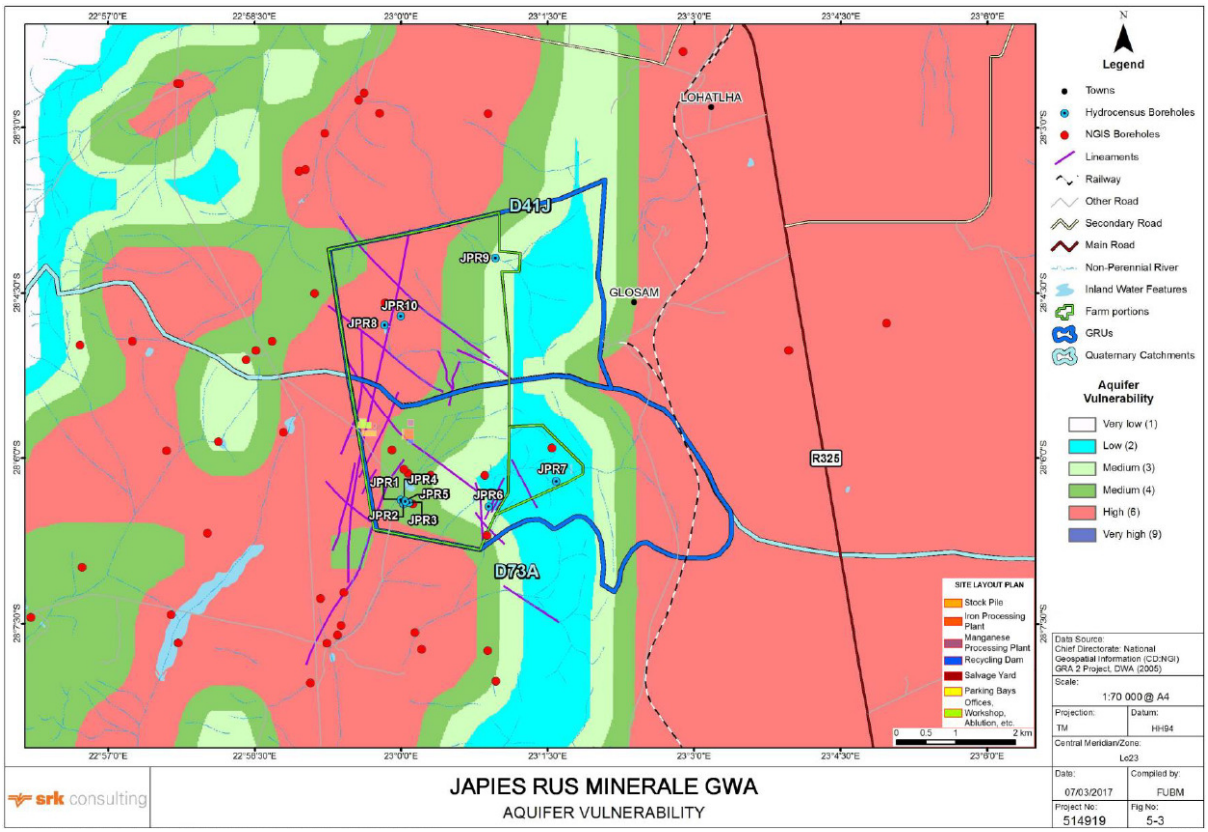


Figure 17 – Aquifer vulnerability map

Aquifer vulnerability is defined as the likelihood for contamination to reach a specified position in the groundwater system after being introduced at some point above the uppermost aquifer. Figure 17 indicates that the groundwater vulnerability to contamination from surface sources varies from low, in the extreme eastern part of the site, to high in the western and north-western part thereof. The proposed locality of the offices, workshop, ablution block and stock pile area fall in an area where this classification is high. However, the relatively deep groundwater level in this area may decrease the aquifer vulnerability locally, as it is more difficult for contaminants to reach the groundwater. The proposed localities of the processing plants and recycling dam fall in an area where groundwater is less vulnerable to surface contamination (medium vulnerability).

The mean annual recharge for the site decreases from northwest to southeast, ranging from 8.0 mm/a in the southwest to 9.5 mm/a in the extreme northeast of the property.

- Hydrocensus:
  The hydrocensus was conducted on 7 February 2017. Mr Jacques Fourie, the lessor of the property, accompanied Mrs Lize van Zyl of SRK and indicated the borehole localities.

  Ten boreholes, located on the site, were surveyed. Very little geohydrological information could be obtained from the surveyed boreholes, and therefore it is difficult to recommend any borehole for testing, as prospective water supply boreholes to the proposed mining activities. The only borehole considered worthwhile yield testing is borehole JPR2, although the measured pumping water level likely indicates a relative low yield (groundwater level >10 m deeper than the rest water level measured in nearby borehole JPR1).

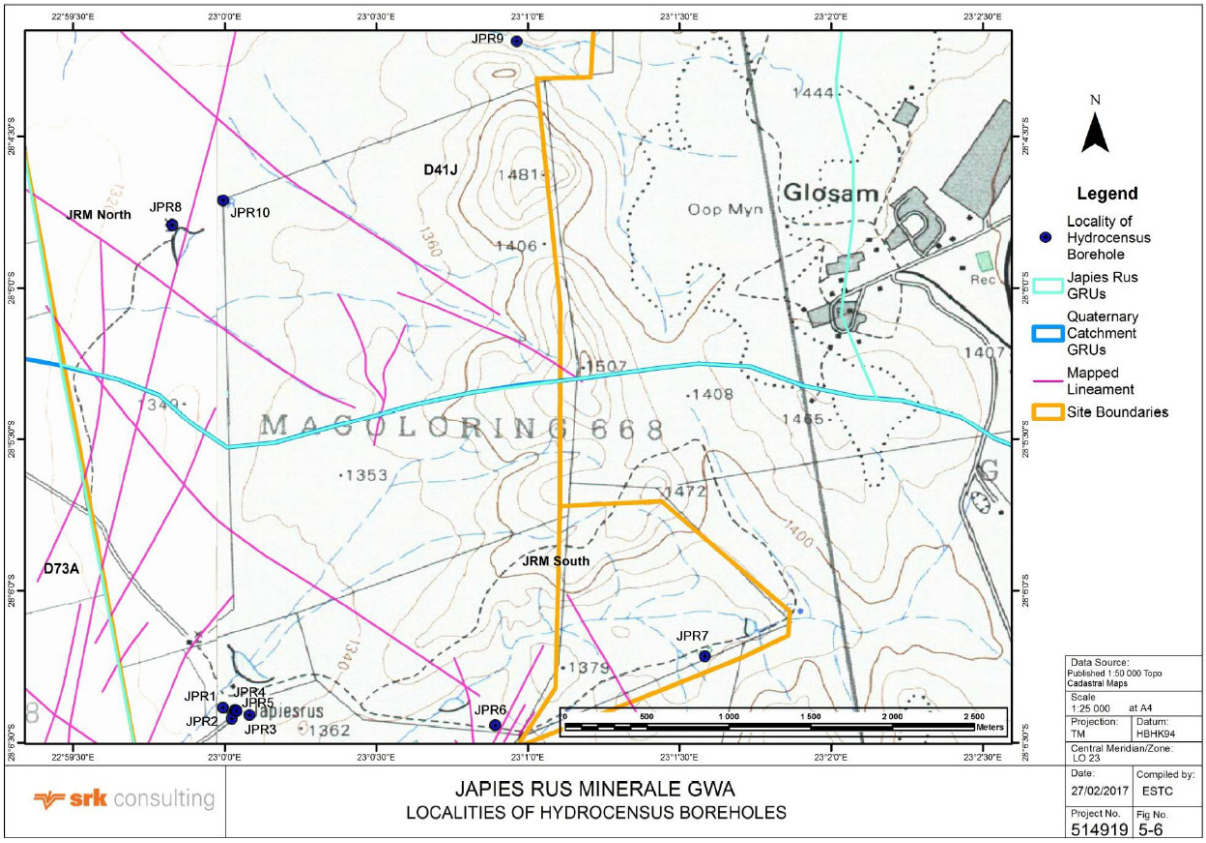


Figure 18 – Locality of hydrocensus boreholes

Groundwater levels at the site vary generally between 20 and 40 below ground level (mbgl). A shallower water level was recorded at borehole JPR9 (10.45 mbgl). However, this borehole is located at a relative high elevation compared to some other surveyed boreholes characterised with deeper groundwater levels. This discrepancy is difficult to explain with the current limited information available, but is likely to

be linked to a perched groundwater system on a shale layer of the Gamagara Formation. According to Mr Fourie, the water level of this borehole has always been much shallower than other boreholes on the property. The average groundwater level for the surveyed boreholes is 28.9 mbgl.
Electrical Conductivity (EC) values measured during the hydrocensus vary between 21 and 51 mS/m. These low EC values are characteristic of groundwater near recharge areas. These values are also significantly lower than the published average values for Quaternary GRUs D73A and D41J which include the site.

The NGA data for this area indicate that the average borehole yield for the successful boreholes drilled in this area is 2.1 L/s, whilst the median yield is 0.9 L/s. This suggests that the mean value is skewed by a few higher yielding boreholes, and therefore the median yield is a more realistic indication of the expected yield of successful boreholes drilled in this area. The average borehole depth is *c.*63 m with an average groundwater level of 22.4 mbgl. Both these values are also skewed by a few outliers as indicated by the median values of *c.*46 mbgl and *c.*18.6 mbgl, respectively. The average groundwater level of the surveyed boreholes is approximately 29% deeper than the mean of the NGA boreholes, and approximately 55% deeper than the median of these boreholes. This phenomenon is explained by the fact that the surveyed boreholes are located in higher lying areas near the recharge zones and close to surface watersheds. No current irrigation exists in the area, and groundwater from boreholes is exclusively abstracted for domestic use and stock watering purposes.

Satellite image lineament mapping was carried out for the area to ascertain if there are any faults or dykes near or beneath the site, which may form conduits for movement of contaminants into the aquifer. A few lineaments which may be good yielding water structures cross the site, although sufficient data is not available to confirm this. Nonetheless, this is a potential concern, and the proposed mining activity must employ proper mitigation measures (e.g. a groundwater

- Groundwater flow direction:
  The hydrocensus data and data from the NGA were used to compile a groundwater elevation map with inferred groundwater flow directions. This map is presented below.

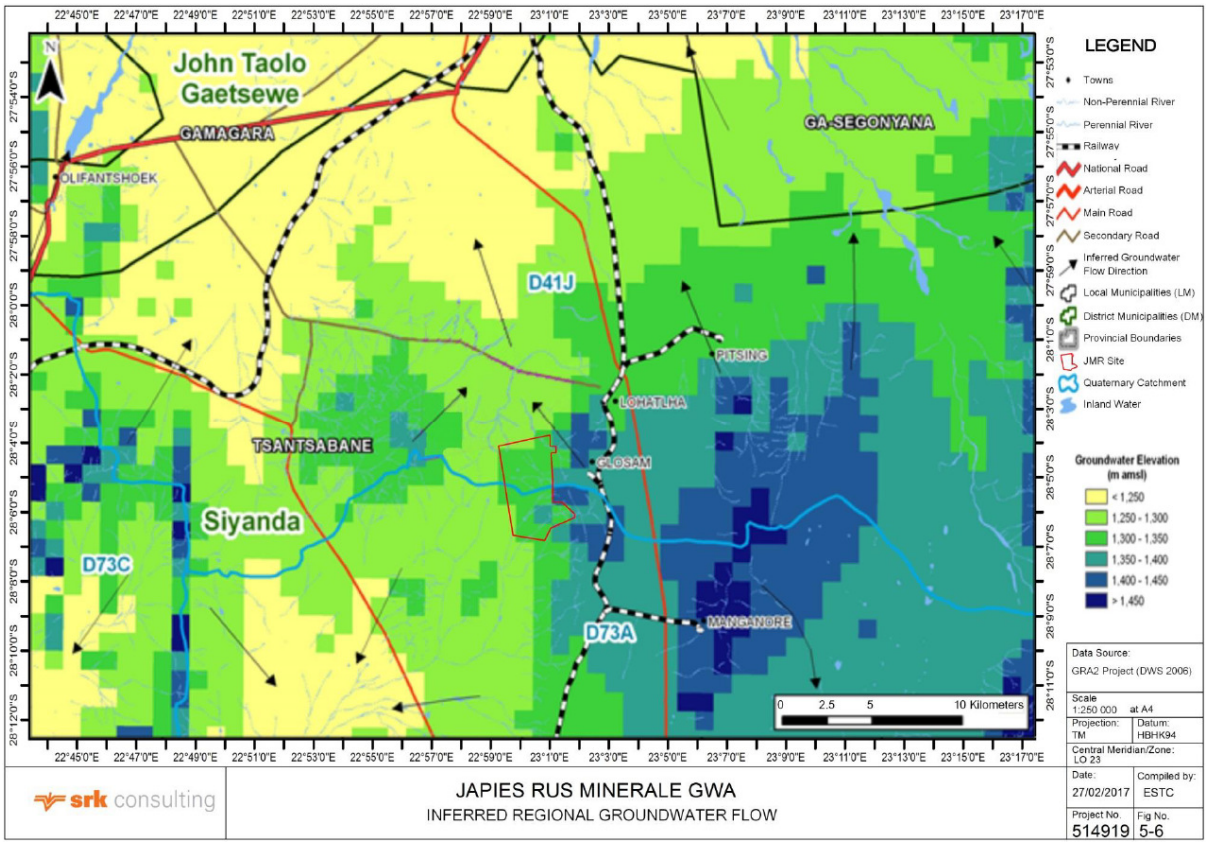


Figure 19 - Groundwater flow direction

Regionally, the map indicates that groundwater (Quaternary Catchments D73A and D41J) generally flows from the northern part of the site northwards towards the Gamagara River, and from the southern part of the site southwestwards towards the Groenwaterspruit, which drains to the Orange River. Recharge occurs in the hilly area east of the site, and groundwater in this area has the highest local elevation (in mamsl).

- Groundwater balance:
  The site straddles Quaternary Catchments D73A and D41J. Mean annual precipitation for the property was derived from the World Bank data. These values, together with data derived from the DWAF's GRA2 dataset (DWAF, 2005), were used to determine the mean annual potential recharge (MAPR) and recharge based mean annual groundwater exploitation potential (RGEP). Subsequently, the groundwater balance was calculated using the GRA2 data. These calculations are summarized in the table below. Groundwater abstraction from the hydrocensus data was used to determine current abstraction. Two sub-GRUs (JRM North and JRM South) were defined for the site based on surface drainage.

Quaternary Catchment	Area	Exploitability Factor	Mean Annual Contribution to River Baseflow	Annual Abstraction	Mean Annual Potential Recharge (MAPR)				Recharge Based Groundwater Resource Potential		Recharge Based Groundwater Exploitation Potential	
					m^3/a				m^3/a		m^3/a	
	km^2		$m^3/km^2/a$	m^3/a	Normal (Mean)		Dry Season		Normal	Dry Season	Normal	Dry Season
		Ef	Bf	At	Re	% of MAP	Re (dry)	% of MAP	RGRP	RGRP (dry)	RGEP	RGEP (dry)
D41J	3 874	0.4084	0	1 924 240	27 606 700	2.0%	23 555 139	1.7%	25 682 460	21 630 899	10 488 717	8 834 059
D73A	3 235	0.4267	0	3 084 160	27 823 300	2.7%	17 746 143	1.7%	24 739 140	14 661 983	10 556 191	6 256 268
Japiesrus North	12.470	0.5000	0	900	112 230	2.2%	85 856	1.7%	111 330	84 956	55 665	42 478
Japiesrus South	14.477	0.5000	0	6 600	130 293	2.2%	99 674	1.7%	123 693	93 074	61 847	46 537

The results indicate that the average Recharge Based Groundwater Exploitation Potential (RBGEP) is approximately 55 700 m3/a for the northern part of the site, and 61 800 m3/a for the southern part thereof. These calculations allow for the fact that all recharged groundwater cannot be intersected by boreholes, as some boreholes will have insufficient yields to be used as production boreholes. Therefore, an exploitability factor was used. However, the exploitability factor may vary within GRUs due to variable concentrations and geometries of fractures throughout GRUs. (*Note: Both higher concentration of fractures and well-developed fractures will improve the likelihood to intersect useable volumes of groundwater, and hence a higher exploitability factor.*)

Beeshoek, Kolomela and several other smaller mines in the Postmasburg area, abstract groundwater on a large scale form Quaternary Catchment D73A, whilst Sishen, Mamathwane and Hotazel mines abstract groundwater from Quaternary Catchment D41J. Therefore, these GRUs are under stress, and declining groundwater levels are observed near these mining areas. However, the site is located on the boundary between these two GRUs, and relatively far away from the above-mentioned mines' dewatering influences. Numerous dolerite dykes intersect the area, and these form groundwater barriers. Therefore, groundwater abstraction at the site will probably not have any negative effects on the surrounding properties.

- **Noise:**

  A baseline noise assessment was conducted at the site.

  The focus of the survey was to measure the fall-out dust on the area immediately surrounding Japiesrus, which stands to be affected by the proposed mining activities. The four main wind directions were used for guidance regarding placement of the single bucket dust monitoring points and the final monitoring points were decided upon after access roads to the different areas was determined.

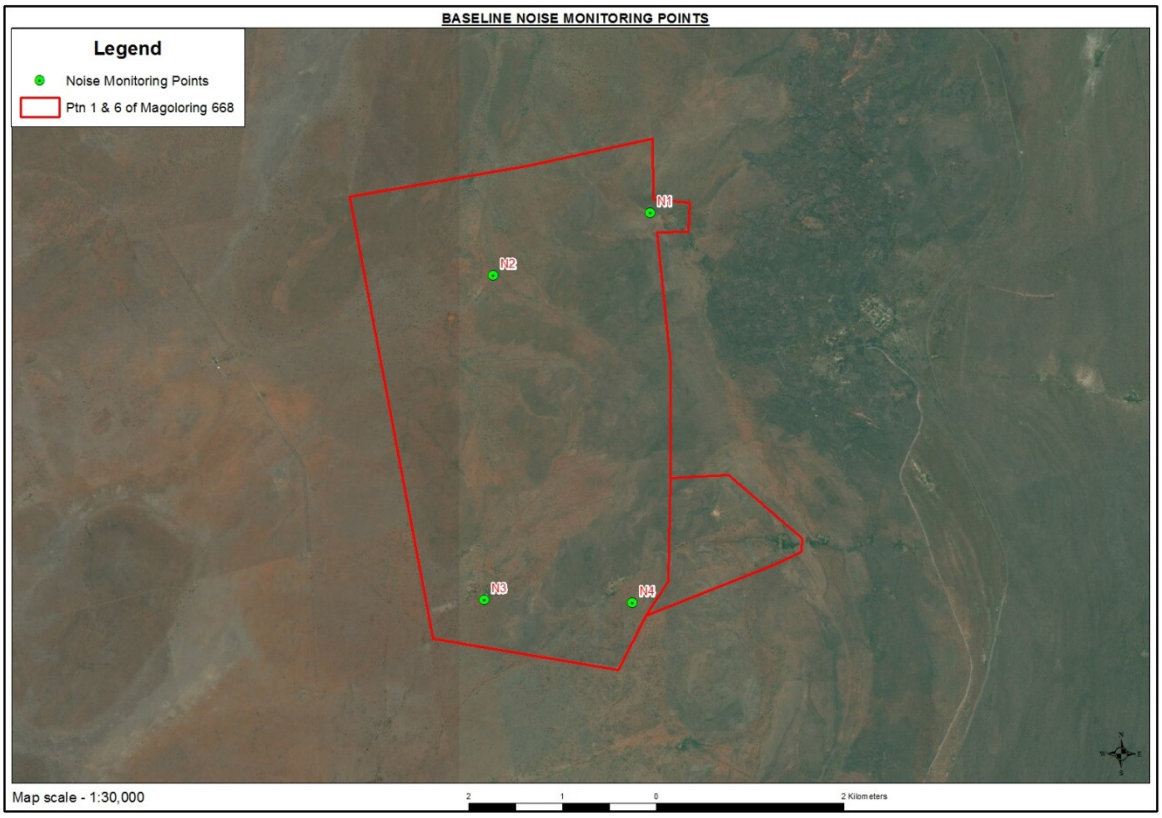


Figure 20 - Noise monitoring points

The newest noise monitoring result is showed below.

Monitoring Point	Ambient noise - Average level dBA			
	$L_{Aeq,d}$			
SANS 10103 Guidelines				
D_1 - Rural Districts	45dB			
D_2 - Suburban little traffic	50dB			
D_3 - Urban	55dB			
Industrial districts	70dB			
Survey				
Description	**N1**	**N2**	**N3**	**N4**
Day Average	42.66dBA	36.81dBA	40.06dBA	41.27dBA
Night Average	38.06dBA	32.87dBA	34.18dBA	35.90dBA

Find attached hereto as Appendix '11' the baseline noise report.

- **Sensitive landscapes:**

  "Sensitive environments" that have statutory protection are the following:
  - Limited development areas (section 23 of the Environment Conservation Act, 1989 (Act 73 of 1989).
  - Protected natural environments and national heritage sites.
  - National, provincial, municipal and private nature reserves.
  - Conservation areas and sites of conservation significance.
  - National monuments and gardens of remembrance.

- Archaeological and palaeontological sites.
- Graves and burial sites
- Lake areas, offshore islands and the admiralty reserve.
- Estuaries, lagoons, wetlands and lakes.
- Streams and river channels, and their banks.
- Dunes and beaches.
- Caves and sites of geological significance.
- Battle and burial sites.
- Habitat and /or breeding sites of Red Data Book species.
- Areas or sites of outstanding natural beauty.
- Areas or sites of special scientific interest.
- Areas or sites of special social, cultural or historical interest.
- Declared national heritage sites
- Mountain catchment areas.
- Areas with eco-tourism potential

In terms of the 'environments' listed above the following sensitive environments exist within the mining right application area:

- A number of dry pans;
- A number of non-perennial drainage lines;
- Two modern burial sites;
- Historical agricultural structures (Kraal);
- A number of protected trees (Camel Thorn & Shepard's Tree); and
- Habitat of a number of fauna species of conservation concern.

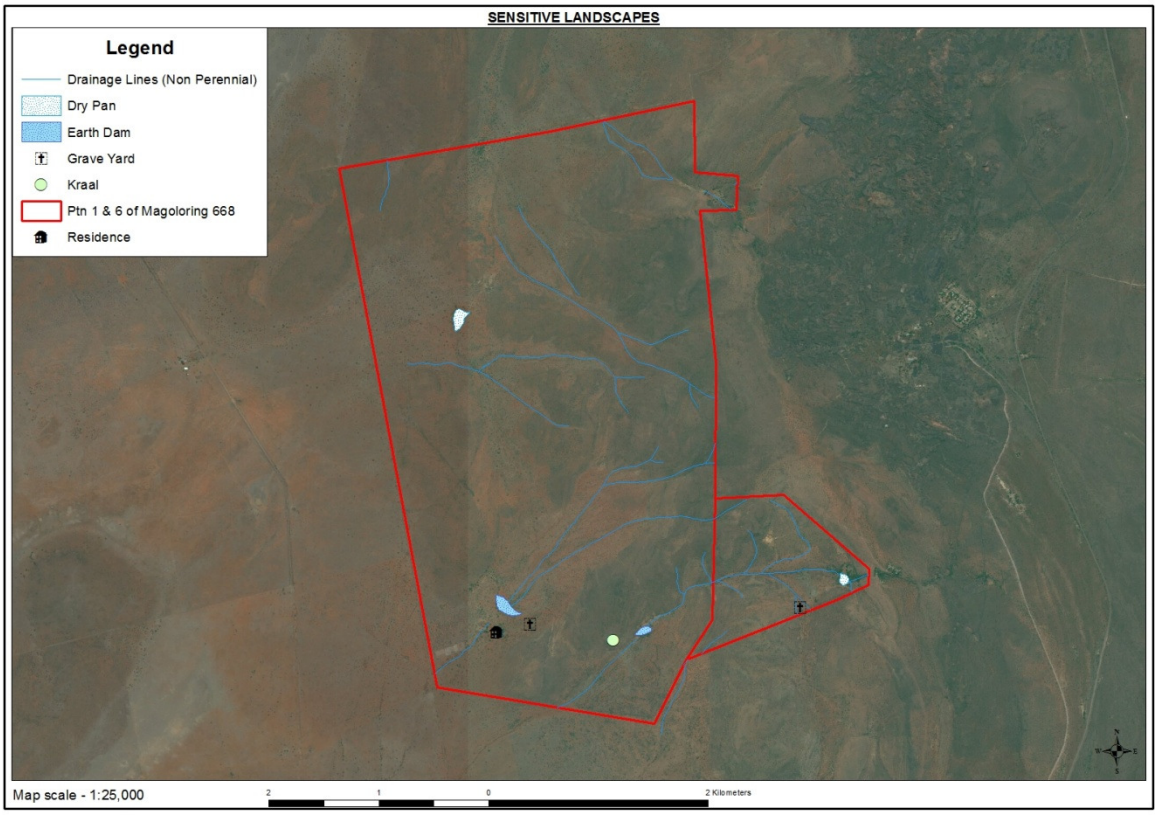


Figure 21 - Sensitive landscapes

- **Socio-Economic:**

The application area is owned by PMG Mining Investment (Pty) Ltd. The two farm properties are leased to Ms. De Bruin who utilizes the farm for livestock and game farming activities. There are a number of farm workers who reside on the farm permanently.

The last Census was held in 2011. The following section was compiled using data from Census 2001 and 2011. A Community Survey was done in 2016, however the information provided on the Stats SA site in this regard is not as comprehensive as the Census data.

The Tsantsabane Local Municipality is located within the north-eastern parts of the Northern Cape Province, and falls within the boundaries of the Siyanda District Municipality. The nearest business centre is Kimberley, which is about 200km away. The municipality's main town is Postmasburg. Three main traffic routes provide access to other cities, namely Johannesburg via Kuruman and the Kalahari and Cape Town via Kimberley. The rest of the Tsantsabane Municipality area comprises of Boichoko, Postdene, New Town, Stasie, Groen Water, Skyfontein, Jenn Haven, Glosam, the new established settlement brought about by the land redistribution called Maremane, and the well-known Lohatlha Army Base.

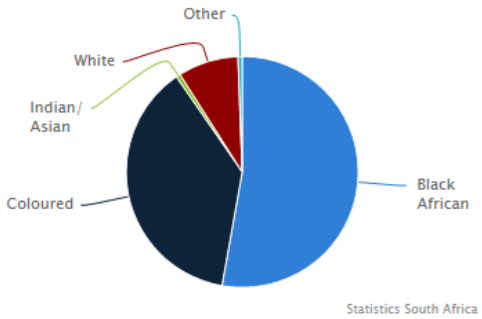
Economically Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing and farming sectors. Tsantsabane has reinvented itself over the years as one of the leading investment hotspots in the Northern Cape.

Key statistics:

Description	Census 2011	Census 2001
Total population	35 093	27 082
Young (0 – 14)	27.9%	31.4%
Working age (15 – 64)	67.6%	67.6%
Elderly (65+)	4.4%	4.7%
Dependency ratio	47.8%	56.4%
Growth rate	2.59%	0.38%
Population density	2 persons / km²	-
Unemployment rate	26.1%	33.9%
Youth unemployment rate	32.3%	43.1%
No schooling aged 20+	13.7%	24.2%
Higher education aged 20+	6.3%	4.1%
Matric aged 20+	25.3%	16.7%
Number of households	9 839	6 800
Average household size	3.5	3.9
Female headed household	31.3%	33.1%
Formal dwellings	71.8%	81.4%
Housing owned/paying off	44.7%	53.9%
Flush toilet connected to sewerage	66.7%	61.7%

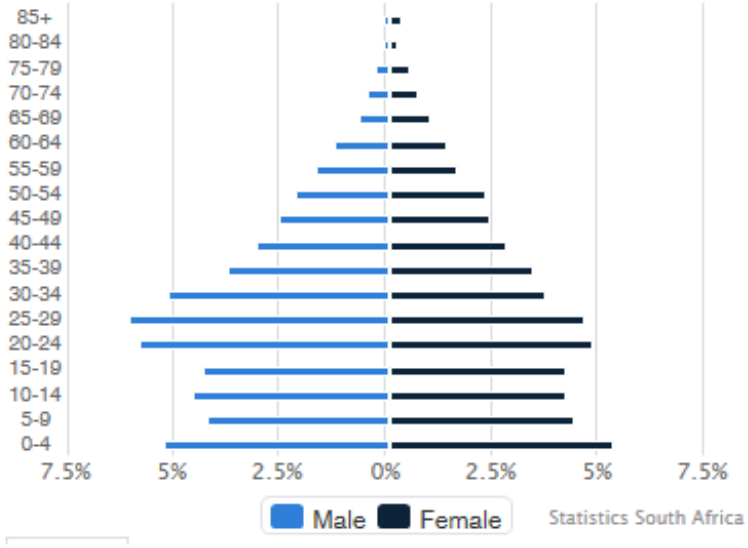
Weekly refuse removal	57.4%	67.5%
Piped water inside dwelling	45.3%	35.5%
Electricity for lighting	83.5%	74.4%

- People
  - Population groups:
    According to Census 2011 there are 35 093 people in the Municipality. Of these, 52.8% are African black, 37.6% are coloured and 8.4% are white. Other population groups make up the remaining 1.2% of the population.



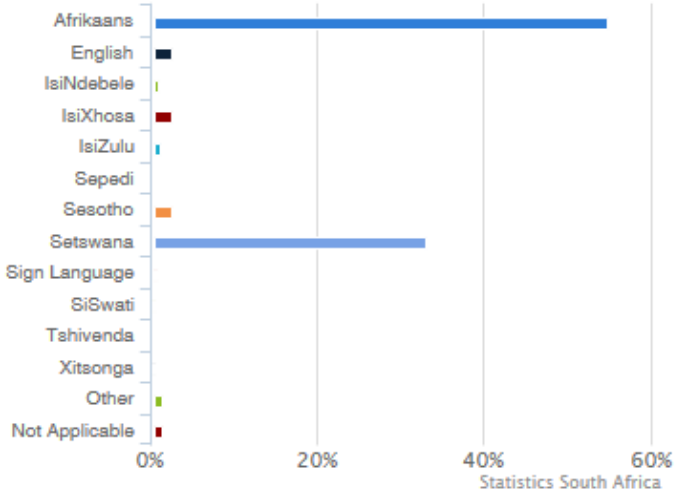
Group	Percentage
Black African	52,8%
Coloured	37,6%
Indian/Asian	0,6%
White	8,4%
Other	0,6%

  - Sex and age distribution:



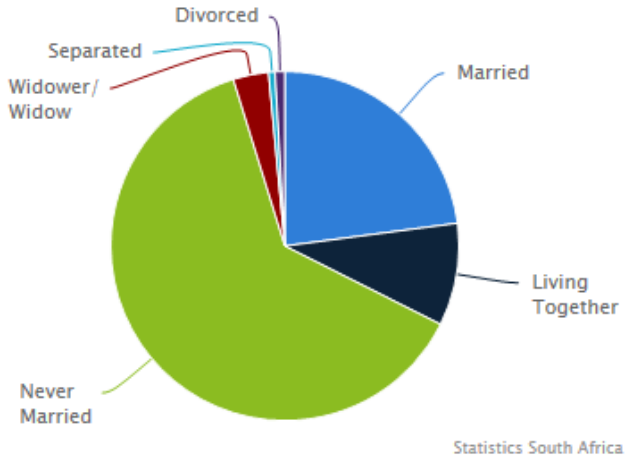
Age	Males	Females
0-4	5,3%	5,3%
5-9	4,3%	4,4%
10-14	4,6%	4,2%
15-19	4,4%	4,2%
20-24	5,9%	4,8%
25-29	6,1%	4,6%
30-34	5,2%	3,7%
35-39	3,8%	3,4%
40-44	3,1%	2,8%
45-49	2,6%	2,6%
50-54	2,2%	2,3%
55-59	1,7%	1,6%
60-64	1,3%	1,4%
65-69	0,7%	1%
70-74	0,5%	0,7%
75-79	0,3%	0,5%
80-84	0,1%	0,2%
85+	0,1%	0,3%

- Languages:



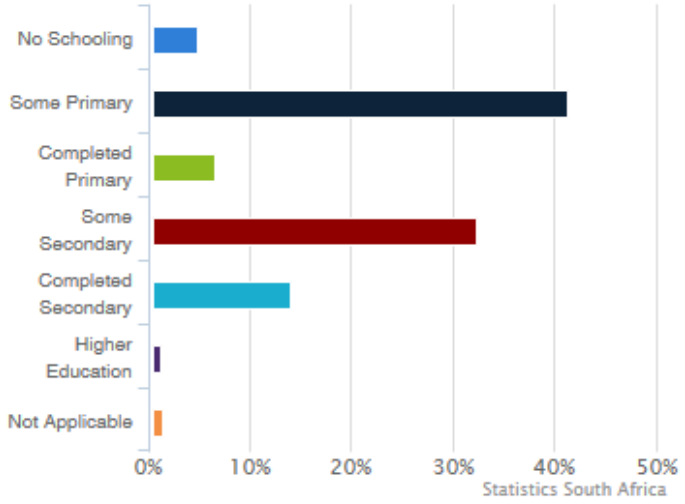
Language	Percentage
Afrikaans	54,5%
English	2,3%
IsiNdebele	0,7%
IsiXhosa	2,4%
IsiZulu	1,1%
Sepedi	0,4%
Sesotho	2,3%
Setswana	32,8%
Sign Language	0,5%
SiSwati	0,1%
Tshivenda	0,3%
Xitsonga	0,2%
Other	1.3%
Not Applicable	1,3%

- Marital status:



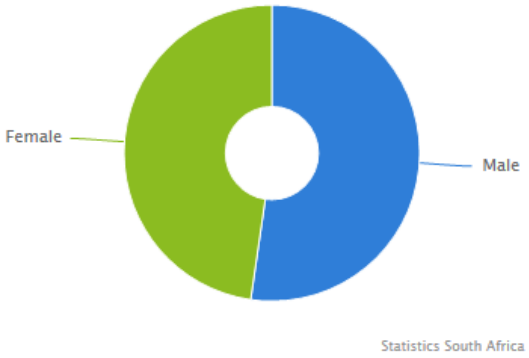
Group	Percentage
Married	22,9%
Living together like married partners	9,5%
Never married	62,8%
Widower/Widow	3,3%
Separated	0,6%
Divorced	0,9%

- Highest education levels:
  Of those aged 20 years and older, 13.9% had some primary schooling, 5.3% had completed primary, 35.4% had some secondary and 25.4% had matric. Only 6.4% had a higher qualification and 13.7% no form of schooling.



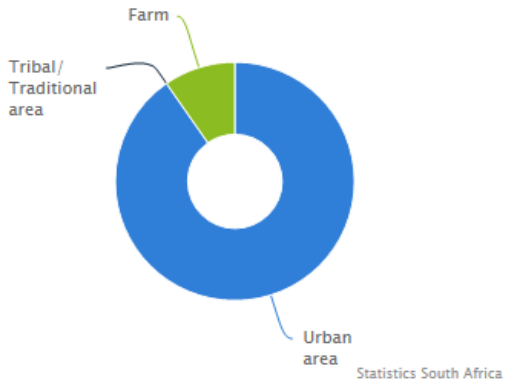
Group	Percentage
No Schooling	4,6%
Some Primary	41%
Completed Primary	6,4%
Some Secondary	32,1%
Completed Secondary	13,7%
Higher Education	1%
Not Applicable	1,2%

- Sex:



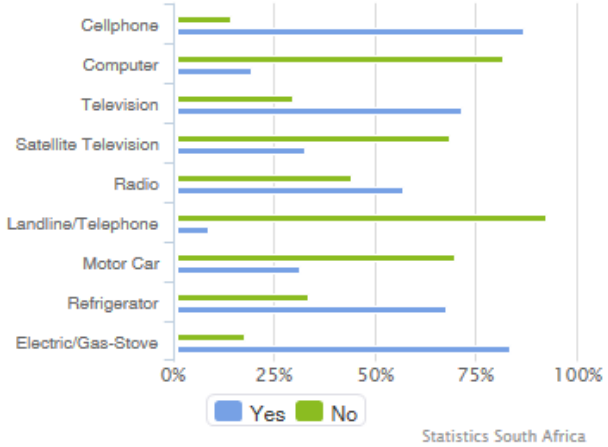
Sex	Percentage
Female	47,7%
Male	52,3%

- Living conditions
  - Settlement type



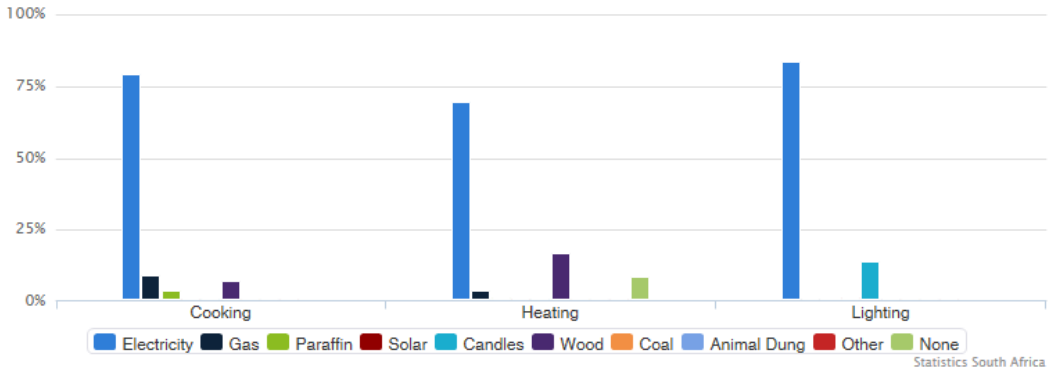
Area	Percentage
Urban	90,3%
Tribal/Traditional	0%
Farm	9,7%

- Household goods



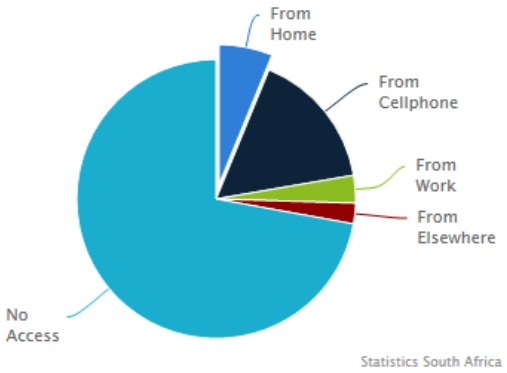
Item	Yes	No
Cellphone	86,1%	13,9%
Computer	18,8%	81,2%
Television	71%	29%
Satellite Television	32%	68%
Radio	56,4%	43,6%
Landline / Telephone	8,2%	91,8%
Motor Car	30,9%	69,1%
Refrigerator	67,1%	32,9%
Electric / Gas-Stove	82,7%	17,3%

- Energy or fuel for cooking, heating & lighting



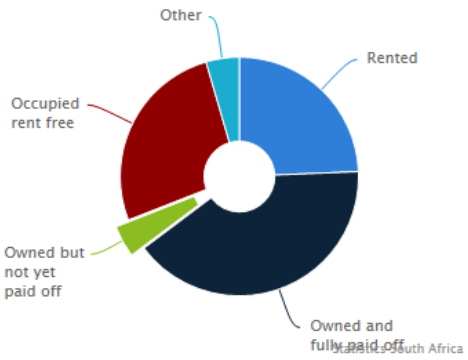
Energy Source	Cooking	Heating	Lighting
Electricity	79,1%	69,1%	83,5%
Gas	8,7%	3,4%	0,4%
Paraffin	3,8%	1,4%	0,7%
Solar	0,3%	0,4%	1,3%
Candles	0%	0%	13,8%
Wood	7,1%	16,6%	0%
Coal	0,1%	0,3%	0%
Animal Dung	0%	0,1%	0%
Other	0,1%	0%	0%
None	0,9%	8,6%	0,5%

- Access to internet



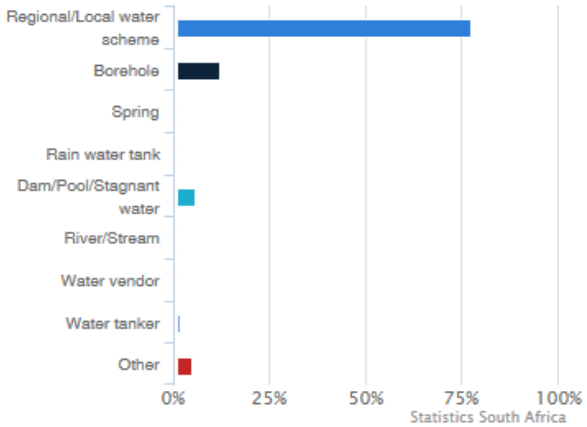
Access	Percentage
From Home	6,2%
From Cellphone	16,1%
From Work	3,2%
From Elsewhere	2,4%
No Access	72,2%

- Tenure status



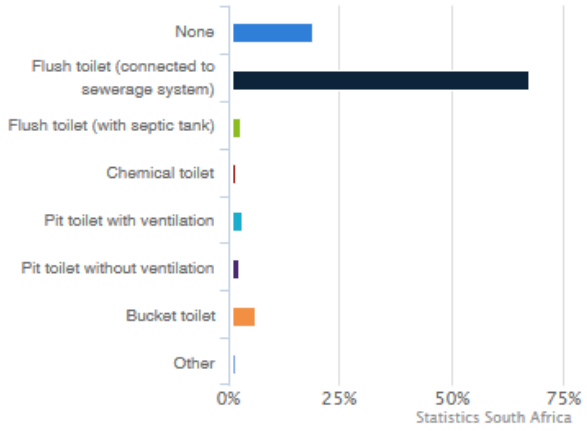
Tenure Status	Percentage
Rented	24,3%
Owned and fully paid off	40,4%
Owned but not yet paid off	4,3%
Occupied rent free	26,4%
Other	4,5%

- Source of water



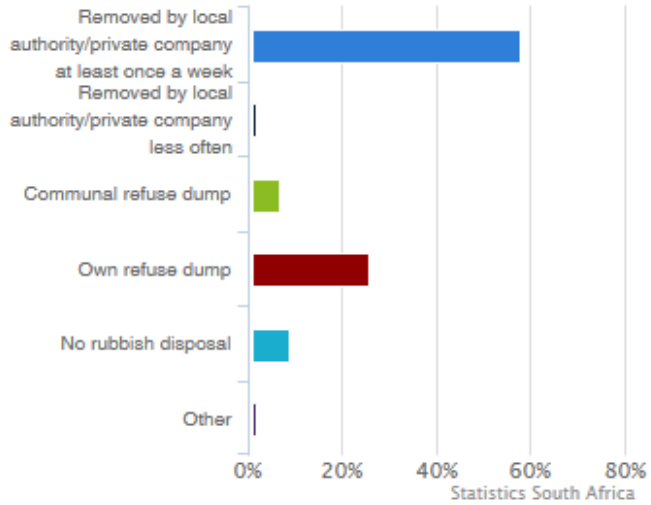
Source of water	Percentage
Regional/Local water scheme (operated by municipality or other water services provider)	76,7%
Borehole	11,7%
Spring	0,1%
Rain water tank	0,1%
Dam/Pool/Stagnant water	5,1%
River/Stream	0,1%
Water vendor	0,2%
Water tanker	1,5%
Other	4,4%

- Toilet facilities



Toilet Facility	Percentage
None	18,3%
Flush toilet (connected to sewerage system)	66,7%
Flush toilet (with septic tank)	2,2%
Chemical toilet	1,2%
Pit toilet with ventilation	2,6%
Pit toilet without ventilation	2%
Bucket toilet	5,6%
Other	1,4%

- Refuse disposal



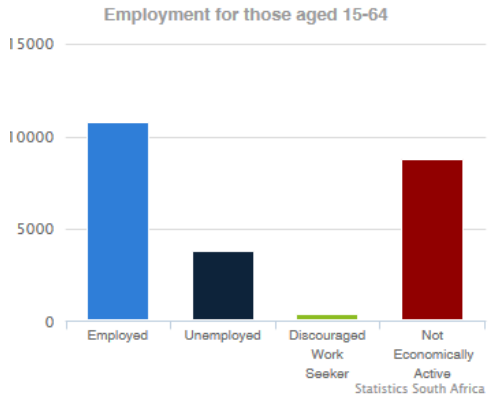
Refuse Disposal	Percentage
Removed by local authority/private company at least once a week	57,4%
Removed by local authority/private company less often	1,3%
Communal refuse dump	6,4%
Own refuse dump	25,4%
No rubbish disposal	8,3%
Other	1,3%

- Economy

  Economically Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing and farming sectors. Tsantsabane has reinvented itself over the

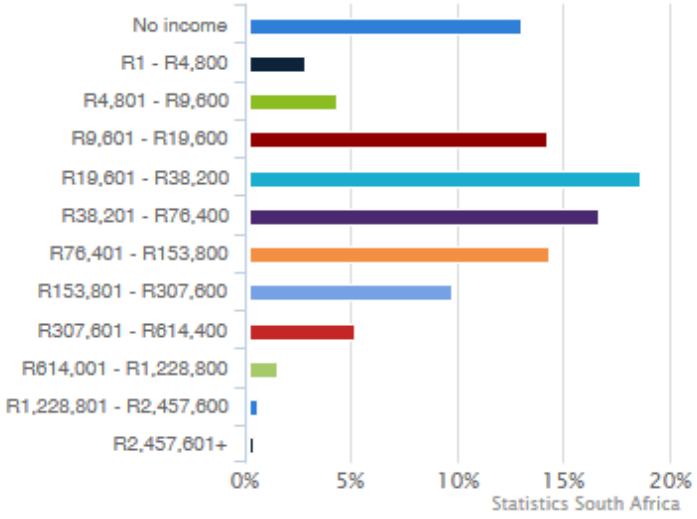
years as one of the leading investment hot spots in the Northern Cape.

- Employment



Employment Status	Number
Employed	10760
Unemployed	3795
Discouraged Work Seeker	419
Not Economically Active	8764

- Average household income



Income	Percentage
None income	12,9%
R1 - R4,800	2,7%
R4,801 - R9,600	4,2%
R9,601 - R19,600	14,1%
R19,601 - R38,200	18,5%
R38,201 - R76,4000	16,5%
R76,401 - R153,800	14,2%
R153,801 - R307,600	9,6%
R307,601 - R614,400	5,1%
R614,001 - R1,228,800	1,4%
R1,228,801 - R2,457,600	0,5%
R2,457,601+	0,3%

Find attached hereto as Appendix '12' the baseline socio-economic report.

- **Soil:**
  Mr. Gerrit Stemmet conducted a site visit on 2 February 2017 and compiled a report on the soil found on the properties. Herewith a summary of the abovementioned report. The full report is attached hereto as Appendix '13'.

NAME	TOTAL DEPTH	TOPSOIL DEPTH	UNDERLYING MATERIAL	COLOUR	CLAY % TOPSOIL	STRENGHT OF STRUCTURE	FORM	FAMILY	DESCRIPTION
PH1	120cm	35cm	Loose rocks	Dark red	20	Relative	Shortlands	Roedtan	- Orthic A Horizon - Red Structured B Horizon - Eutrophic Non-luvic medium/coarse angular B1 Horizon
PH2	85cm	25cm	Loose rocks	Dark red	20	Relative	Shortlands	Roedtan	- Orthic A Horizon - Red Structured B Horizon - Eutrophic Non-luvic medium/coarse angular B1 Horizon
PH3	75cm	15cm	Solid rock	Red	15	Good	Hutton	Stella	- Orthic A Horizon - Red Apedal B Horizon - Eutrophic Non-luvic B1 Horison
PH4	120cm	30cm	Solid rock	Light red	15	Good	Hutton	Stella	- Orthic A Horizon - Red Apedal B Horizon - Eutrophic Non-luvic B1 Horison
PH5	120cm	30cm	Solid rock	Light red	15	Good	Hutton	Stella	- Orthic A Horizon - Red Apedal B Horizon - Eutrophic Non-luvic B1 Horison
PH6	120cm	40cm	Solid rock	Red	20	Good	Hutton	Stella	- Orthic A Horizon - Red Apedal B Horizon - Eutrophic Non-luvic B1 Horison
PH7	80cm	10cm	Loose rocks	Dark red	20	Relative	Shortlands	Roedtan	- Orthic A Horizon - Red Structured B Horizon - Eutrophic Non-luvic medium/coarse angular B1 Horizon

The following is evident from the survey results:

- That there are two types of soil that dominate; Shortlands and Hutton; and
- That there is virtually no topsoil in the higher lying areas and limited topsoil in the lower lying areas of the study area.

- **Surface water:**

The application area falls in two quaternary catchment areas, D41J and D73A - part of the Lower Vaal Management Area. The mining area falls in catchment area 10.

There are a number of dry pans and non-perennial drainage lines within the application area.

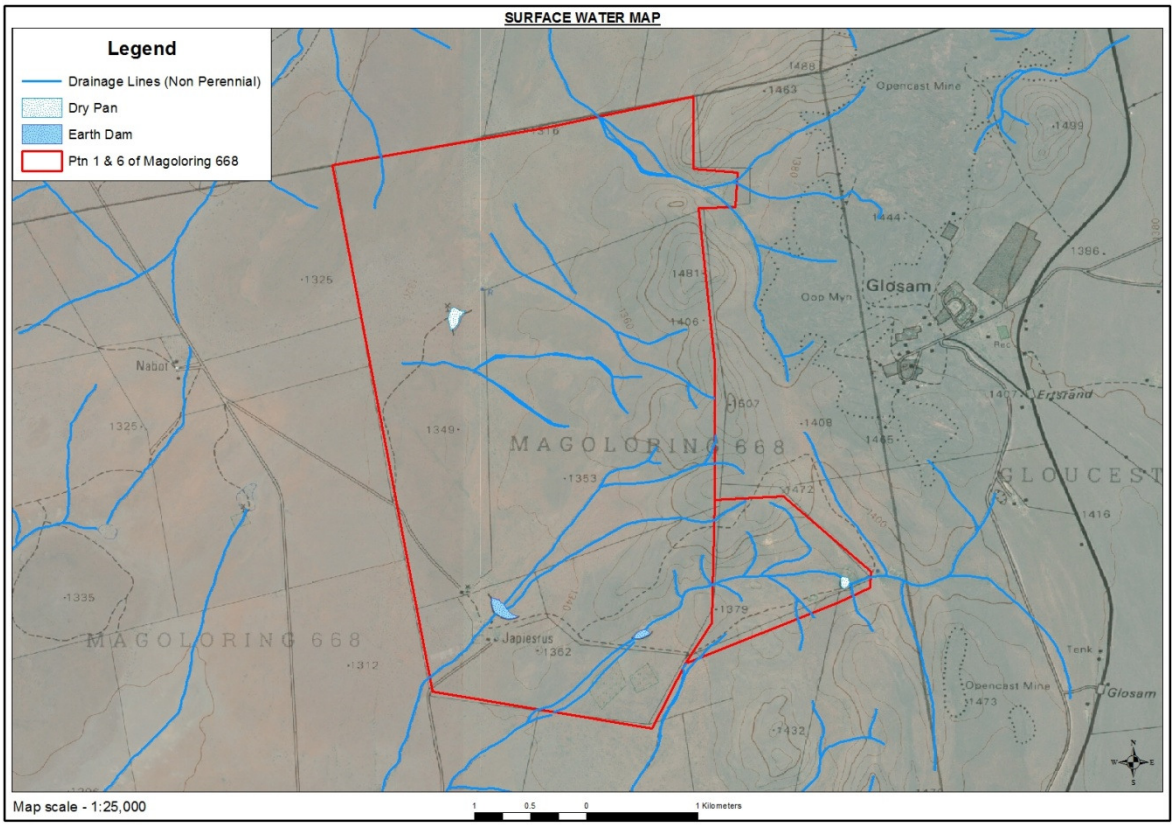


Figure 22 - Surface water map

- **Topography:**

The application area and where the mining will take place varies in altitude from about 1 473meters above sea level in the higher lying areas to about 1 323 meters above sea level in the lower lying areas. The surface topography is relatively flat in the lower lying areas.

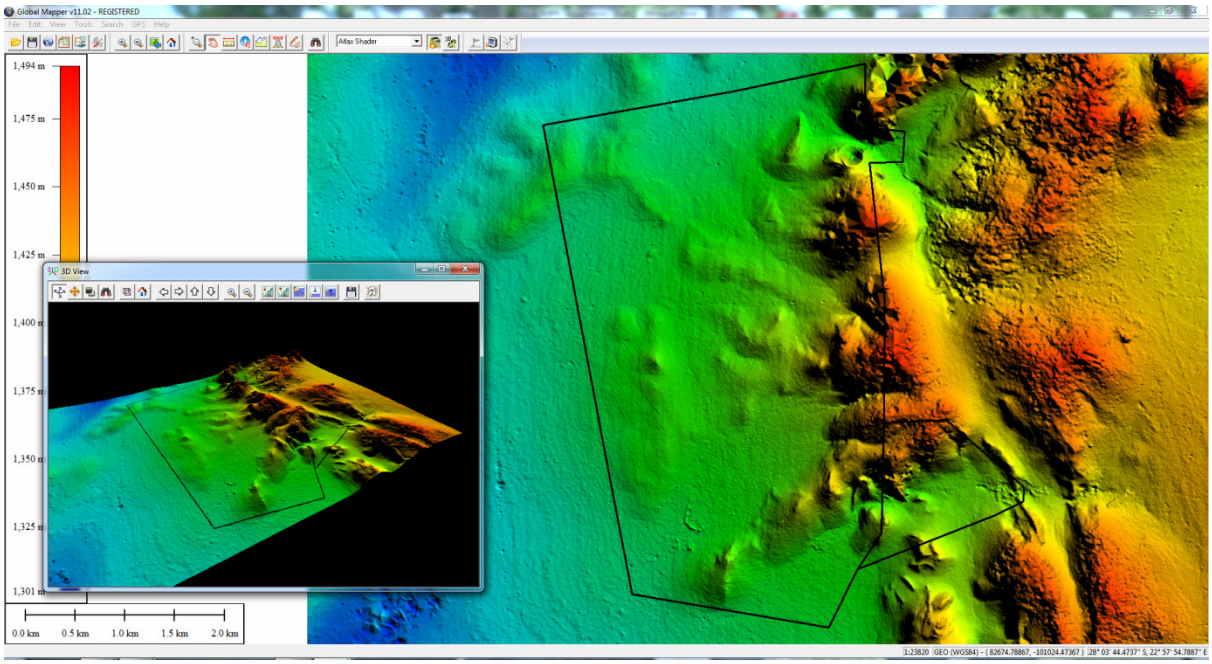


Figure 23 – 3D view of mining right application area

(b) Description of the current land uses.

The two properties are currently utilized by the legal occupant for livestock and game farming activities.

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

- Environmental:
  - A number of dry pans;
  - A number of non-perennial drainage lines;
  - A number of protected trees (Camel Thorn & Shepard's Tree); and
  - Habitat of a number of fauna species of conservation concern.

- Heritage:
  - Two modern burial sites;
  - Historical agricultural structures (Kraal);

- Infrastructure (Non-Mining):
  - Agricultural features such as windmills and livestock troughs;
  - Border fences;
  - Power Line;
  - Farm roads;
  - Residence and associated infrastructure.

(d) Environmental and current land use map:

(Show all environmental and current land use features.)

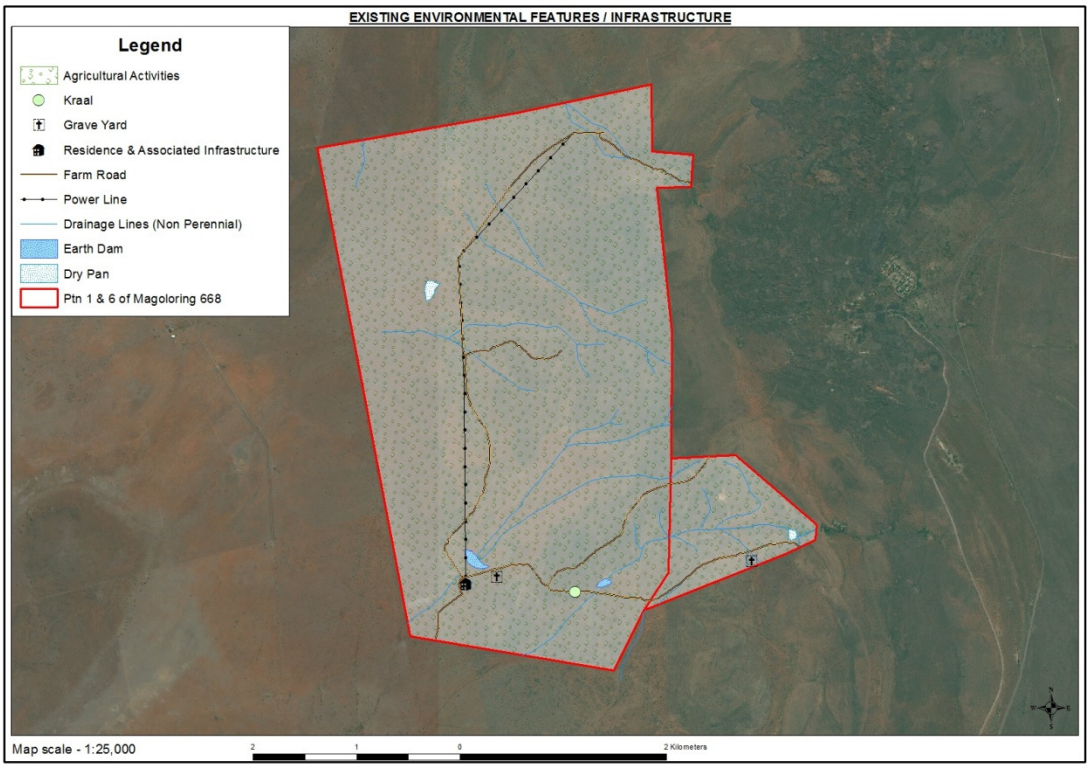


Figure 24 – Current land use and environmental map

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

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

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Air quality	• Nuisance dust on roads will be created by the mining equipment hauling material between the open excavation areas, the plant area, stockpile areas and waste dump areas on the mine site. • Nuisance dust will be created by the mining equipment during excavation activities. • Nuisance dust will be created by the drilling and blasting activities. • Vehicle and equipment emissions in workshop, stores and office areas. • Nuisance dust will be created at the processing plant. • Nuisance dust will be created in the residue deposition site, topsoil storage site, stockpile and waste dump areas when the material is dumped. • Nuisance dust will be created when new infrastructure is established. • Nuisance dust from the roads transecting the properties and surrounding area. • Dust created by surrounding prospecting and mining activities. • Fumes and noxious gases generated by blasting. • Emmissions from vehicles utilizing the road network in the area immediately surrounding the mine.	Negative	Regional	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Archaeological, cultural & heritage	• Disturbance and/or destruction of archaeological artefacts • Disturbance and/or destruction of burial grounds and graves • Disturbance and/or destruction of buildings and structures older than sixty years	Negative	Local	Permanent	High	Improbable	High	Potential impact can be avoided.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Fauna	• Where new haulage roads will be created the natural habitat of the animals will be disturbed and/or destroyed. • Road kills. • Where the firebreak will be created the natural habitat of the animals will be disturbed and/or destroyed. • Where new excavations will be created the natural habitat of the animals will be disturbed and/or destroyed. • The natural habitat of the animals will be disturbed and/or destroyed where buildings and infrastructure will be built / established. • The natural habitat of the animals will be disturbed and/or destroyed where the processing plant will be established. • The natural habitat of the animals will be disturbed and/or destroyed where the residue deposition site, topsoil storage site, stockpile and waste dump areas will be established. • The natural habitat of the animals will be disturbed and/or destroyed where new infrastructure will be established. • Hunting & Snaring of animals	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Flora	• Where new haulage roads will be created the vegetation will be disturbed and/or destroyed. • Where the firebreak will be created the vegetation will be disturbed and/or destroyed. • Where new excavations will be created the vegetation will be disturbed and/or destroyed. • The vegetation cover will be disturbed and / or destroyed in the areas where the buildings and infrastructure will be built / established. • The vegetation cover will be disturbed and / or destroyed where the processing plant will be established. • The vegetation cover will be disturbed and / or destroyed where the residue deposition site, topsoil storage site, stockpile and waste dump areas will be established. • The vegetation cover will be disturbed and / or destroyed where new infrastructure will be established. • Runaway veld fires.	Negative	Site	Long term	High	Definite	High	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Groundwater	• Possible hydrocarbon spills which could infiltrate to groundwater. • Abstraction of groundwater for use in the mining activities.	Negative	Regional	Long term	Low	Definite	Low	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Noise	• Noise from the mining equipment on the haulage roads. • Noise from the mining equipment and vehicles during excavations activities. • Noise from drilling and blasting activities. • A high noise impact is expected inthe immediate vicinity of the processing plant. • Noise created by traffic on surrounding road network.	Negative	Regional	Long term	Medium	Definite	Medium	Potential impact can be avoided, managed and mitigated.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management
Sensitive landscapes	• Ephemeral Pans • Non-Perennial drainage lines	Negative	Regional	Long term	Medium	Definite	Medium	Potential impact can't be avoided, but can be managed and mitigated.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Soil	• Compaction of soil is expected on the roads that are used by the mining operation and at the infrastructure areas. • Possible hydrocarbon spills. • Removal and disturbance of soil structure by excavation activities. • Disturbance of soil structure where buildings and infrastructure will be built / established. • Disturbance of soil structure where the residue deposition sites, topsoil storage sites, stockpile and waste dump sites will be created. • Disturbance of soil structure where new infrastructure will be established.	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Surface water	• If roads are not properly maintained, water erosion after thunder storms can occur. • Possible contamination of surface water by hydrocarbon spills during a rain event. • Collection of water in open excavations during and after thunderstorms.	Negative	Regional	Long term	Medium	Probable	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Topography	• Changing of natural slopes will take place. The hill areas will be completely mined out, altering the topography permanently. • Temporary stockpiles, topsoil storage sites and waste rock dumps will be created, temprarily altering the topography. • Permanent waste rock dumps will be created.	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = No

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Visual	• The mining operation will be visible to some extent from the immediate surroundings. • Changing of natural aesthetic view of environment could take place from mining activities and relating infrastructure. • Breaking of natural skyline.	Negative	Site	Long term	Low	Definite	Low	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = No

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact
Vibrations	• Ground vibrations due to blasting activities	Negative	Site	Long term	Low	Definite	Low	Can be managed.

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

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

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

Nature of impact

This is an appraisal of the type of effect the activity would have on the affected environmental component. Its description should include what is being affected, and how.

Extent

The physical and spatial size of the impact. This is classified as follows:

- **Local**
  The impacted area extends only as far as the activity, e.g. a footprint.
- **Site**
  The impact could affect the whole, or a measurable portion of the property.
- **Regional**
  The impact could affect the area including the neighbouring farms, transport routes and the adjoining towns.

Duration

The lifetime of the impact which is measured in the context of the lifetime of the proposed phase (i.e. construction or operation).

- **Short term**
  The impact will either disappear with mitigation or will be mitigated through natural process in a short time period.
- **Medium term**
  The impact will last up to the end of the mining period, where after it will be entirely negated.
- **Long term**
  The impact will continue or last for the entire operational life of the mine, but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent**
  The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

Intensity

This describes how destructive, or benign, the impact is. Does it destroy the impacted environment, alter its functioning, or slightly alter it. These are rated as:

- **Low**
  This alters the affected environment in such a way that the natural processes or functions are not affected.
- **Medium**
  The affected environment is altered, but function and process continue, albeit in a modified way.

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

  This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

Probability
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:

- **Improbable**
  The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
- **Probable**
  There is a possibility that the impact will occur to the extent that provisions must be made therefore.
- **Highly probable**
  It is most likely that the impacts will occur at some or other stage of the development.
- **Definite**
  The impact will take place regardless of any preventative plans, and mitigation measures or contingency plans will have to be implemented to contain the impact.

Determination of significance
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The classes are rated as follows:

- **No significance**
  The impact is not likely to be substantial and does not require any mitigatory action.
- **Low**
  The impact is of little importance, but may require limited mitigation.
- **Medium**
  The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
- **High**
  The impact is of great importance. Failure to mitigate, with the objective to reduce the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

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

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

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and stockpiles/dumps will alter the topography by adding features to the landscape. Topsoil removal and excavations will unearth the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and excavations, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly affected if any deep excavations reach the primary aquifers. Furthermore, if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources (pans and drainage lines) during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Any excavations within the pans or drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the

concentration of suspended solids and sedimentation. Furthermore, species eggs/seeds that usually remain dormant due to their adaptations to ephemerality, will be lost when the top biological layer of the pans are removed during excavations.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. It is likely that the pristine vegetation and any protected species will be destroyed during the operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Associated infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected populations genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the roads, activities on the farm and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining activities especially with blasting can be substantial.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through

areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local farm residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

(viii) The possible mitigation measures that could be applied and the level of risk:

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

Impact	Mitigation	Risk
Air quality	• Speed limits; • Spraying of surfaces with water; • Avoidance of unnecessary removal of vegetation; • Re-vegetation; • Monitoring; • Backfilling and rehabilitation of disturbed areas; and • Controlled drilling and blasting operations, preferably on wind-free days.	Medium
Archaeological, cultural & heritage	• Buffer zones to be established and implemented.	High
Fauna	• Speed limits; • Continuous backfilling of open excavations; • Low angle access ramp in excavations; • Continuous rehabilitation of disturbed areas; • Snares & traps removed and destroyed; and • Maintenance of firebreaks.	Medium

Flora	• Continuous backfilling of open excavations; • Continuous rehabilitation of disturbed areas; • Maintenance of firebreaks; • No trees felled for firewood; • Obtain relevant permit before removal of protected tree or plant species; and • Re-seeding where necessary.	High
Ground water	• Immediate removal of any hydrocarbon spill; • Maintenance in dedicated area; • Re-fuelling in dedicated area; • Drip pans; • Storage of hydrocarbons in dedicated areas; • Monitoring of groundwater abstraction and quality; and • Clean & Dirty water system. • Maintenance of conservancy tanks and chemical toilets.	Low
Noise	• Hearing protection; • Non-metallic washers to join infrastructure; • Controlled drilling & blasting operations; • Silencers on equipment and vehicles; • Acoustic enclosure for generators; and • Distance from residence of surface owner.	High
Sensitive landscapes	• Buffer zones to be established and implemented.	High
Soil	• Continuous backfilling of open excavations; • Continuous rehabilitation of disturbed areas; • Ripping of compacted areas; • Replacing layer of topsoil over backfilled areas; • Maintenance & refuelling in dedicated areas; • Drip pans; • Storage of hydrocarbons in dedicated areas; and • Immediate removal of any hydrocarbon spill.	Medium
Surface water	• Storm water control; • Immediate removal of any hydrocarbon spill; • Maintenance & re-fuelling in dedicated areas; • Drip pans; • Storage of hydrocarbons in dedicated areas;	Low

	• Clean & dirty water plan.	
Topography	• Continuous backfilling of open excavations; • Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; and • Sloping of topsoil dumps, stockpiles and waste rock dumps.	Medium
Visual	• Continuous backfilling of open excavations; • Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Sloping of topsoil dumps, stockpiles and waste rock dumps; and • Removal of all infrastructure upon mine closure.	Low

(ix) Motivation where no alternative sites were considered:

No alternatives were considered as JRM has conducted prospecting activities under a valid Prospecting Right and Prospecting Right Renewal, with DMR reference number (NC) 171 PR & (NC) 10169 PR-R and Protocol number 243/2014, over the abovementioned properties.

(x) Statement motivating the alternative development location within the overall site:
(Provide a statement motivating the final site layout that is proposed.)

The conceptual locality of the infrastructure was decided upon after taking into account of the following:-

- Locality of the ore bodies;
- Topography of the area;
- Environmental features;
- Operational requirements; and
- Discussions with the legal occupant.

The final design and layout of the infrastructure can only be decided upon by the management team after granting and execution of the Mining Right and during the construction phase.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout plan) through the life of the activity.
(Including (i) a description of all environmental issues and risks that were identified during the environmental assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

The methodology for the predication and assessment of impacts has been in accordance with *DEA Guideline 5: Assessment of Alternatives and Impacts*. Potential impacts have been rated in terms of the direct, indirect and cumulative impacts.

Criteria taken into account:

- Spatial extent – The size of the area that will be affected by the impact.
- Intensity –The anticipated severity of the impact.
- Duration –The timeframe during which the impact will be experienced.

Using the criteria above, the impacts have further been assessed in terms of the following:

- Probability –The probability of the impact occurring.
- Significance – Will the impact cause a notable alteration of the environment?
- Status - Whether the impact on the overall environment will be positive, negative or neutral.
- Confidence – The degree of confidence in predictions based on available information and specialist knowledge.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Air quality	• Nuisance dust on roads will be created by the mining equipment hauling material between the open excavation areas, the plant area, stockpile areas and waste dump areas on the mine site. • Nuisance dust will be created by the mining equipment during excavation activities. • Nuisance dust will be created by the drilling and blasting activities. • Vehicle and equipment emissions in workshop, stores and office areas. • Nuisance dust will be created at the processing plant. • Nuisance dust will be created in the residue deposition site, topsoil storage site, stockpile and waste dump areas when the material is dumped. • Nuisance dust will be created when new infrastructure is established. • Nuisance dust from the roads transecting the properties and surrounding area. • Dust created by surrounding prospecting and mining activities. • Fumes and noxious gases generated by blasting. • Emmissions from vehicles utilizing the road network in the area immediately surrounding the mine.	Negative	Regional	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Speed limits • Spraying of surfaces with water • Avoidance of unnecessary removal of vegetation. • Re-vegetation • Monthly monitoring & reporting • Backfilling and rehabilitation • Controlled drilling & blasting operations

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Archaeological, cultural & heritage	• Disturbance and/or destruction of archaeological artefacts • Disturbance and/or destruction of burial grounds and graves • Disturbance and/or destruction of buildings and structures older than sixty years	Negative	Local	Permanent	High	Improbable	High	Potential impact can be avoided.	• Buffer zones to be established and implemented.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Fauna	• Where new haulage roads will be created the natural habitat of the animals will be disturbed and/or destroyed. • Road kills. • Where the firebreak will be created the natural habitat of the animals will be disturbed and/or destroyed. • Where new excavations will be created the natural habitat of the animals will be disturbed and/or destroyed. • The natural habitat of the animals will be disturbed and/or destroyed where buildings and infrastructure will be built / established. • The natural habitat of the animals will be disturbed and/or destroyed where the processing plant will be established. • The natural habitat of the animals will be disturbed and/or destroyed where the residue deposition site, topsoil storage site, stockpile and waste dump areas will be established. • The natural habitat of the animals will be disturbed and/or destroyed where new infrastructure will be established. • Hunting & Snaring of animals	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Speed limits • Continuous backfilling of open excavations (where possible) • Continuous rehabilitation of disturbed areas • Snares & traps removed and destroyed • Low angle escape ramp in excavations • Maintenance of firebreaks

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Flora	• Where new haulage roads will be created the vegetation will be disturbed and/or destroyed. • Where the firebreak will be created the vegetation will be disturbed and/or destroyed. • Where new excavations will be created the vegetation will be disturbed and/or destroyed. • The vegetation cover will be disturbed and / or destroyed in the areas where the buildings and infrastructure will be built / established. • The vegetation cover will be disturbed and / or destroyed where the processing plant will be established. • The vegetation cover will be disturbed and / or destroyed where the residue deposition site, topsoil storage site, stockpile and waste dump areas will be established. • The vegetation cover will be disturbed and / or destroyed where new infrastructure will be established. • Runaway veld fires.	Negative	Site	Long term	High	Definite	HIgh	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Backfilling of open excavations • Rehabilitation of disturbed areas • Re-seeding where necessary • Maintenance of firebreaks • No trees will be felled for firewood • Relevant permits will be obtained before removal of protected tree and/or plant species

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Groundwater	• Possible hydrocarbon spills which could infiltrate to groundwater. • Abstraction of groundwater for use in the mining activities.	Negative	Regional	Long term	Low	Definite	Low	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Immediate removal of any hydrocarbon spill • No possibility for acid mine drainage • Maintenance & re-fuelling in dedicated areas • Drip pans • Storage of hydrocarbons in dedicated areas • Monitoring of groundwater abstraction • Monitoring of groundwater quality • Clean & Dirty Water System

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Noise	• Noise from the mining equipment on the haulage roads. • Noise from the mining equipment and vehicles during excavations activities. • Noise from drilling and blasting activities. • A high noise impact is expected inthe immediate vicinity of the processing plant. • Noise created by traffic on surrounding road network.	Negative	Regional	Long term	Medium	Definite	Medium	Potential impact can be avoided, managed and mitigated.	• Hearing protection • Non-metallic washers to join infrastructure • Working hours • Controlled drilling & blasting operations • Use of PU screen panels on screen plant. • Use of good quality and good condition silencer in equipment and vehicles • Acoustic enclosure for generators.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management	Action
Sensitive landscapes	• Ephemeral Pans • Non-Perennial drainage lines	Negative	Regional	Long term	Medium	Definite	Medium	Potential impact can't be avoided, but can be managed and mitigated.	• Buffer zones to be established and implemented.

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Soil	• Compaction of soil is expected on the roads that are used by the mining operation and at the infrastructure areas. • Possible hydrocarbon spills. • Removal and disturbance of soil structure by excavation activities. • Disturbance of soil structure where buildings and infrastructure will be built / established. • Disturbance of soil structure where the residue deposition sites, topsoil storage sites, stockpile and waste dump sites will be created. • Disturbance of soil structure where new infrastructure will be established.	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Continuous rehabilitation of disturbed areas • Continuous rehabilitation of open excavation areas (where possible) • Ripping of compacted areas • Replacing layer of topsoil over backfilled areas • Maintenance & re-fuelling in dedicated areas • Drip pans • Storage of hydrocarbons in dedicated areas • Immediate removal of any hydrocarbon spill

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Surface water	• If roads are not properly maintained, water erosion after thunder storms can occur. • Possible contamination of surface water by hydrocarbon spills during a rain event. • Collection of water in open excavations during and after thunderstorms.	Negative	Regional	Long term	Medium	Probable	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = Yes	• Storm water control • Immediate removal of any hydrocarbon spill • Maintenance & re-fuelling in dedicated areas • Drip pans • Storage of hydrocarbons in dedicated areas • Clean & Dirty Water System

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Topography	• Changing of natural slopes will take place. The hill areas will be completely mined out, altering the topography permanently. • Temporary stockpiles, topsoil storage sites and waste rock dumps will be created, temprarily altering the topography. • Permanent waste rock dumps will be created.	Negative	Site	Long term	Medium	Definite	Medium	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = No	• Backfilling of open excavations with dumps (after resource has been mined out in a specific area) • Replacing layer of topsoil over backfilled areas • Sloping of topsoil dumps, stockpiles and waste rock dump

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Visual	• The mining operation will be visible to some extent from the immediate surroundings. • Changing of natural aesthetic view of environment could take place from mining activities and relating infrastructure. • Breaking of natural skyline.	Negative	Site	Long term	Low	Definite	Low	Avoided = Yes Cause irreplaceable loss of resource = No Managed = Yes Mitigated = Yes Reversed = No	• Backfilling of open excavations with dumps (after resource has been mined out in a specific area) • Replacing layer of topsoil over backfilled areas • Sloping of topsoil dumps, stockpiles and waste rock dump • Removal of all mine infrastructure upon mine closure

Impact	Description	Nature	Extent	Duration	Intensity	Probability	Significance	Management of impact	Action
Vibrations	• Ground vibrations due to blasting activities	Negative	Site	Long term	Low	Definite	Low	Can be managed.	• Monitoring of blast by competent person.

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

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

ACTIVITY Whether listed or not listed. (e.g. excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc…)	**POTENTIAL IMPACT** (Including the potential impacts for cumulative impacts) (e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…)	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated. (e.g. Construction, commissioning, operational, decommissioning, closure, post-closure)	**SIGNIFICANCE** If not mitigated	**MITIGATION TYPE** modify, remedy, control or stop through: (e.g. noise control measures, stormwater control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc…etc…) (e.g. modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.)	**SIGNIFICANCE** If mitigated
Ablution Facilities	• Soil contamination • Groundwater contamination	Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	Low	• Maintenance of ablution facilities / conservancy tanks on regular basis. • Removal of ablution facilities upon closure.	Very Low
Blasting	• Dust • Fly-rock • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance • Surface water contamination	Air quality Fauna Flora Noise Surface water Topography Safety	Operational	High	• Dust control and monitoring • Noise control and monitoring • Access control. • Continuous rehabilitation. • Stormwater run-off control.	Medium
Boreholes	• Impact on the groundwater table.	Groundwater	Operational Decommissioning	Low	• Monitoring of abstraction.	Very Low

Brake test ramp	• Dust • Soil contamination	Air quality Soil	Construction Commissioning Operational Decommissioning Closure	Low	• Dust control. • Speed limits. • Maintenance of ramps. • Maintenance of vehicles.	Very Low
Chemical toilets	• Soil contamination • Groundwater contamination	Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	Low	• Maintenance of toilets on regular basis. • Removal of toilets upon closure.	Very low
Clean & Dirty water system	• Surface disturbance • Groundwater contamination • Soil contamination • Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Maintenance of berms and trenches. • Groundwater levels and quality monitoring. • Oil traps used in relevant areas. • Drip trays used. • Immediately clean hydrocarbon spill.	Low
Control Room	• Surface disturbance	Soil Fauna Flora	Construction Commissioning Operational Decommissioning Closure	Low	• Removal of control rooms upon closure.	Very Low
Diesel tanks	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Maintenance of diesel tanks and bund walls. • Oil traps. • Groundwater quality monitoring. • Drip tray at re-fuelling point. • Immediately clean hydrocarbon spill.	Low
Electricity (Line	• Fire hazard	Flora	Construction	Low	• Maintenance of line	Very Low

points)		Fauna	Commissioning Operational Decommissioning Closure		points	
Excavations	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	Air quality Fauna Flora Groundwater Noise Soil Surface water Topography Safety	Operational Decommissioning Closure	High	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Continuous rehabilitation • Stormwater run-off control • Immediately clean hydrocarbon spill • Drip trays • Rock stability control and monitoring • Erosion control	Medium
Explosives magazine	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	Groundwater Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Low	• Access control • Maintenance of magazines and fence. • Groundwater quality monitoring • Stormwater run-off control • Immediately clean spill	Very low
Generator	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural	Air quality Groundwater Noise Soil	Construction Commissioning Operational Decommissioning	High	• Access control • Maintenance of generator and bund walls	Medium

	habitat of fauna • Soil contamination • Surface disturbance	Surface water Safety	Closure		• Noise control and monitoring • Oil traps • Groundwater quality monitoring • Immediately clean hydrocarbon spill	
Haul Roads (Loading and Hauling)	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Noise Soil	Operational	Low	• Maintenance of roads • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Speed limits • Stormwater run-off control. • Erosion control • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Very Low
Office – mobile container	• Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Fauna Flora Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	Low	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Very low
Parking bay	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna	Air quality Fauna Flora Groundwater Noise Soil	Construction Commissioning Operational Decommissioning Closure	Medium	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring	Low

	• Surface disturbance	Surface water			• Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	
Processing plant	• Dust • Noise • Groundwater usage • Potential groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	High	• Access control • Maintenance of processing plant • Dust control and monitoring • Groundwater quality and level monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Medium
Rapid reloading area (explosives)	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off	Low

					control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	
Recycling Dam	• Abstraction and usage of groundwater • Potential contamination of groundwater	Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	• Groundwater quality and abstraction monitoring	Very Low
Roads	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Maintenance of roads • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Speed limits • Stormwater run-off control. • Erosion control • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Low
Safety berms	• Dust • Soil contamination	Air quality Soil	Construction Commissioning Operational Decommissioning Closure	Low	• Dust control. • Speed limits. • Maintenance of berms.	Very Low
Salvage yard	• Groundwater contamination • Removal and disturbance of	Fauna Flora	Construction Commissioning	Medium	• Access control • Maintenance of fence.	Low

	vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	Groundwater Soil Surface water	Operational Decommissioning Closure		• Groundwater quality monitoring • Stormwater run-off control • Immediately clean hydrocarbon spill	
Security access control point – mobile container	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	Medium	• Access control • Maintenance of boom gates and container. • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Low
Stockpile area	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Commissioning Operational Decommissioning Closure	Medium	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Low

Storage facility – mobile containers	• Removal and disturbance of vegetation cover and natural habitat of fauna • Groundwater contamination • Soil contamination • Surface disturbance	Fauna Flora Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Low	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Very low
Stormwater dam	• Surface disturbance • Groundwater contamination • Soil contamination • Surface water contamination	Fauna Flora Groundwater Surface water	Commissioning Operational Decommissioning Closure	Medium	• Maintenance of dam walls. • Groundwater levels and quality monitoring.	Low
Topsoil storage area	• Dust • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil disturbance • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Commissioning Operational Decommissioning Closure	Medium	• Dust control and monitoring • Stormwater run-off control. • Continuous rehabilitation • Rip disturbed areas to allow re-growth of vegetation cover • Backfilling of topsoil during rehabilitation	Low
Tyre Bay	• Noise • Potential contamination of groundwater through hydrocarbon spills. • Contamination of soil	Noise Soil Groundwater	Operational	Low	• Maintenance of vehicles. • Drip trays	Very low
Washbay	• Groundwater contamination and usage • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Groundwater quality and level monitoring • Concrete floor with oil/water separator • Stormwater run-off control • Immediately clean	Low

					hydrocarbon spills	
Waste storage site	• Groundwater contamination • Contamination of soil • Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Storage of waste within receptacles • Storage of hazardous waste on concrete floor with bund wall • Removal of waste on regular intervals.	Low
Waste rock dumps	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Topography	Commissioning Operational Decommissioning Closure	Medium	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Stormwater run-off control. • Rip disturbed areas to allow re-growth of vegetation cover	Low
Water dam	• Groundwater abstraction and usage • Surface disturbance	Fauna Flora Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Low	• Line dam • Maintenance of dam walls. • Groundwater levels and quality monitoring.	Very Low
Water distribution pipeline	• Groundwater abstraction and usage	Groundwater	Operational Decommissioning Closure	Low	• Maintenance of pipeline. • Groundwater levels and quality monitoring.	Very Low
Water tank	• Groundwater abstraction and usage • Surface disturbance	Fauna Flora Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Low	• Maintain water tanks and structures. • Groundwater levels and quality monitoring.	Very Low
Weighbridge	• Dust • Groundwater contamination	Air quality Fauna	Construction Commissioning	Medium	• Access control • Maintenance of	Low

	• Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Flora Groundwater Noise Soil Surface water	Operational Decommissioning Closure		weighbridge • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	
Weighbridge control room – mobile container	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Fauna Flora Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Low	• Access control • Maintenance of weighbridge control room • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Very Low
Workshop	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	• Access control • Concrete floor with oil/water separator • Maintenance of mobile containers • Noise control and monitoring	Low

					• Groundwater quality monitoring • Immediately clean hydrocarbon spill	

j) Summary of specialist reports.
(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Air Quality Report	○ Avoidance of unnecessary removal of vegetation. ○ Routine spraying of unpaved site areas and roads utilized by the mining operation with water. ○ Speed limits of vehicles inside the application area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used. ○ Continuous backfilling and rehabilitation of disturbed areas. ○ All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust. ○ Drilling and blasting activities preferably to take place on wind-free days.	X	PART 1 – EIA: Under Section I)
Archaeological Report	• All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered. • All construction in the immediate vicinity (50m radius of the site) should cease. • The heritage practitioner should be informed as soon as possible.	X	PART 1 – EIA: Under Section I)

	• In the event of obvious human remains the SAPS should be notified. • Mitigation measures (such as refilling) should not be attempted. • The area in a 50m radius of the find should be cordoned off with hazard tape. • Public access should be limited. • The area should be placed under guard. • No media statement should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.		
Fauna & Flora Report	• The impact of the loss of vegetation and consequently habitat from an area can be mitigated through the process of a comprehensive rehabilitation programme. To be effective the rehabilitation process must result in a landscape that is similar to its pre-mining state.	X	PART 1 – EIA: Under Section I)
Groundwater Assessment	• Groundwater levels and water quality must be measured monthly. • Rainfall must be recorded. • Minimise waste water and water usage through appropriate engineering design and re-use where possible. • SOP for storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order. • Place oil traps under stationary machinery, only re-fuel at fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only. • Groundwater monitoring system. • Any sewage tanks must e constructed far away	X	PART 1 – EIA: Under Section I)

	from significant aquifer systems. • Ensure good housekeeping rules.		
Noise	• No plant must be established within 1.5km from any residential area. • All vehicles in operation must be in good working order and adhere to the relevant noise requirements in terms of the Road Traffic Act, 1997 (Act No. 93 of 1997). • Every vehicle in operation must be equipped with a silencer on its exhaust system. • Safety measures which generate noise, such as the reverse gear alarms on large vehicles, must be appropriately calibrated or adjusted. • Appropriate non-metallic washers/insulation must be used with any joining apparatus to join screens such as corrugated iron to other structures and to each other. Such screens (if not mobile units) must be maintained in a fixed position. • When the equivalent noise exposure, as defined in the South African Bureau of Standards code of Practice for the Measurement and Assessment of occupational Noise for Hearing Conservation Purposes, SABS 083 was amended, at or in any operation or works where persons may travel or work, exceeds 85 dB, the holder will take the necessary steps to reduce the noise below this level. • Hearing protection will be made available to all employees where attenuation cannot be implemented. • Controlled drilling and blasting activities by an authorised person. • Noise levels to be monitored at regular intervals	X	PART 1 – EIA: Under Section I)

	and the results compiled into monthly reports and submitted to the relevant authority.		
Soil	• In all places of development the first 300mm of loose or weathered material found must be classified as a growth medium. • Vegetated soil overlying the planned mining area must be stripped prior to mining and stockpiled on a dedicated dump to be used for rehabilitation purposes at a later stage. • In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters. • The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability. • If any soil is contaminated during the life of the mining activity, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company. • Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site. • Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads. • The stored topsoil must be adequately protected from being blown away or being eroded. • Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure	X	PART 1 – EIA: Under Section I)

	phases of the operation in order to establish a growth medium for vegetation. • Vehicle movement must be confined to established roads for as far as practical in order to prevent the compaction of soils.		

Attach copies of Specialist Reports as appendices.

k) Environmental impact statement

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

- Ablution facilities may have a very low impact on groundwater and soil after mitigation.
- Blasting may have a medium impact on air quality, fauna, flora, noise, surface water and topography after mitigation.
- Boreholes may have a very low impact on the groundwater table.
- Brake test ramps may have a very low impact on air quality and soil after mitigation.
- The chemical toilets may have a very low impact on groundwater and soil after mitigation.
- The clean & dirty water system will have a low impact on groundwater, soil and surface water after mitigation.
- The control rooms may have a very low impact on fauna, flora and soil after mitigation.
- The diesel tanks may have a low impact on groundwater, soil and surface water after mitigation.
- The electricity line points may have a very low impact on flora and fauna in the case of a fire.
- The excavations may have a medium impact on air quality, fauna, flora, groundwater, noise, soil, surface water and topography after mitigation.
- The explosives magazine may have a very low impact on groundwater, soil and surface water after mitigation.
- The generator may have a medium impact on air quality, groundwater, noise, soil and surface water after mitigation.
- Haul roads (Loading and hauling) may have a very low impact to air quality, noise and soil after mitigation.
- The office (mobile container) may have a very low impact on fauna, flora, groundwater and soil after mitigation.
- The parking bay may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- The processing plant may have a medium impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- Rapid re-loading area may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- The recycling dam may have a very low impact on groundwater after mitigation.
- The roads may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- Safety berms may have a very low impact on air quality and soil after mitigation.
- The salvage yard may have a low impact on fauna, flora, groundwater, soil and surface water after mitigation.
- The security access point (mobile container) may have a low impact on air quality, fauna, flora, groundwater and soil after mitigation.
- The stockpile area may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- The storage facility (mobile container) may have a very low impact on air quality, fauna, flora, groundwater, soil and surface water after mitigation.
- The stormwater dam may have a low impact on fauna, flora, groundwater and surface water after mitigation.

- The topsoil storage site may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- The tyre bay may have a very low impact on noise, groundwater and soil after mitigation.
- The washbay may have a low impact on groundwater, soil and surface water after mitigation.
- The waste storage site may have a low impact on groundwater, soil and surface water after mitigation.
- The waste rock dumps may have a low impact on air quality, fauna, flora, groundwater, noise, soil, surface water and topography after mitigation.
- The water dam may have a very low impact on fauna, flora, groundwater and surface water after mitigation.
- The water distribution pipeline may have a very low impact on groundwater after mitigation.
- The water tank may have a very low impact on fauna, flora, groundwater and surface water after mitigation.
- The weighbridge may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water after mitigation.
- The weighbridge control room may have a very low impact on fauna, flora, groundwater, soil and surface water after mitigation.
- The workshop (mobile containers) may have a low impact on air quality, fauna, flora, groundwater, noise, soil and surface water.

(ii) Final Site Map

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

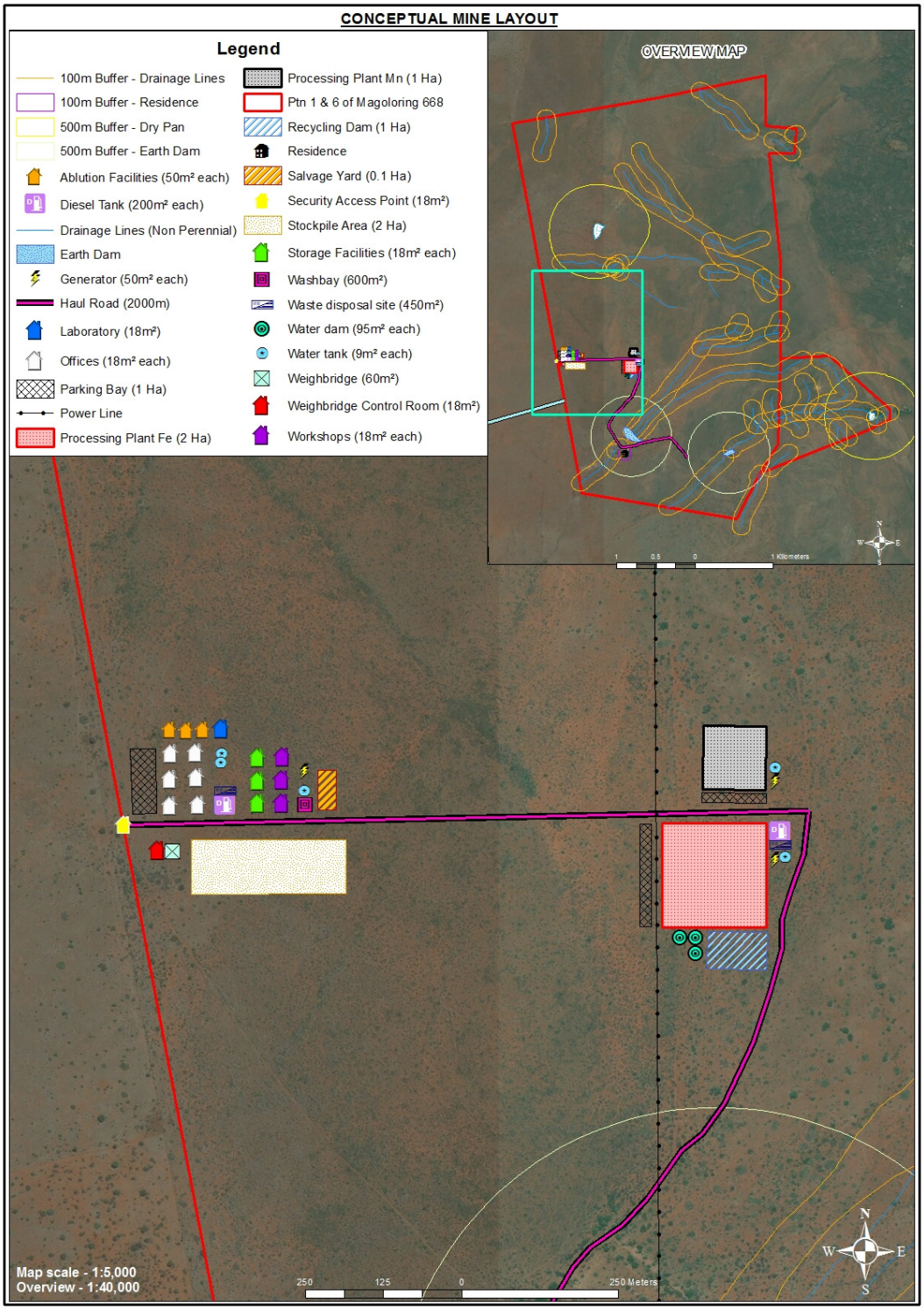


Figure 25 – Site layout with buffer zones

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

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and stockpiles/dumps will alter the topography by adding features to the landscape. Topsoil removal and excavations will unearth the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and excavations, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly affected if any deep excavations reach the primary aquifers. Furthermore, if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources (pans and drainage lines) during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.
Any excavations within the pans or drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation. Furthermore, species eggs/seeds that usually remain dormant due to their adaptations to ephemerality, will be lost when the top biological layer of the pans are removed during excavations.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. It is likely that the pristine vegetation and any protected species will be destroyed during the operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Associated infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected populations genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the roads, activities on the farm and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining activities especially with blasting can be substantial.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local farm residents. During the decommissioning and at closure of the site, staff will most

likely be retrenched, resulting in people being unable to find new employment for a long period of time.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

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

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

- Air quality:
  To limit the creation of nuisance dust the following management guidelines must be followed:
  - Avoidance of unnecessary removal of vegetation.
  - Routine spraying of unpaved site areas and roads utilized by the mining operation with water.
  - Speed limits of vehicles inside the mining right area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
  - Continuous backfilling and rehabilitation of disturbed areas.
  - All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.
  - Drilling and blasting activities preferably to take place on wind-free days.

- Archaeology:
  - All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
    - All construction in the immediate vicinity (50m radius of the site) should cease.
    - The heritage practitioner should be informed as soon as possible.
    - In the event of obvious human remains the SAPS should be notified.
    - Mitigation measures (such as refilling) should not be attempted.
    - The area in a 50m radius of the find should be cordoned off with hazard tape.
    - Public access should be limited.
    - No media statement should be release until such time as the heritage practitioner has had sufficient time to analyze the finds.

- Fauna:
  To ensure a minimum of impact to animals the following management guidelines will be followed:
  - Speed limits of vehicles inside the mining right area must be strictly controlled to avoid road kills.
  - Continuous backfilling of open excavations (created by the bulk sampling activities).

- Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
- No hunting (snares) must be allowed at the mining right area or in the surrounding area.
- All mining and access roads must be fenced.

- Flora
  - No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.
  - Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - "The plants will be uprooted, felled or cut off and can be destroyed completely."
    - "The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide."
  - Valid permits from DAFF must be obtained before any protected plant species are removed or damaged.
  - Valid permits from Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation.
  - Continuous backfilling of open excavations (created by bulk sampling activities) and spreading of previously stored topsoil over the rehabilitated areas.
  - All rehabilitated areas, where applicable and possible, must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced, if the natural succession of vegetation is unacceptably slow.
  - Fires may only be allowed in facilities or equipment specially constructed for this purpose. A firebreak must be cleared around the perimeter of the site.
  - The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

- Groundwater
  - Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
  - The following procedure must be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area.
    - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
    - All efforts must be made to move the broken down vehicle or piece of equipment to the maintenance area.
    - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
  - No repairs may be allowed outside the maintenance area except for emergencies.
  - Equipment used as part of the proposed operation must be adequately maintained so as to ensure that oil, diesel, grease or hydraulic fluid does not leak during operation.
  - Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).

- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine. Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- Conservancy tanks must be adequately maintained.
- Groundwater levels and water quality must be measured monthly.
- Rainfall must be recorded.
- Data must be analysed by a qualified hydrogeologist annually.
- SOP for storage, handling and transport of different hazardous materials.
- Place oil traps (drip trays) under stationary vehicles, only re-fuel at fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

- Noise
  - As a minimum, ambient noise levels emanating from the mining activities may not exceed 45dBA at the site boundary.
  - JRM must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
  - JRM must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
  - The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
  - When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABS 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
  - Hearing protection must be provided to all employees where attenuation cannot be implemented.
  - A buffer zone of 1.5km must be placed around all residential areas, in which buffer zone no plant may be established.
  - If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
  - Blasting noise and vibrations must be monitored during each blast.

  Mechanical equipment:
  - All mechanical equipment must be in good working order and vehicles must adhere to the relevant noise requirements of the Road Traffic Act.
  - All vehicles in operation must be equipped with a silencer on its exhaust system.
  - Safety measures, which generate noise such as reverse gear alarms on large vehicles, must be appropriately calibrated / adjusted.

  Screening / Migration control:
  - Appropriate measures must specifically be installed and / or employed at the plant to act as screen and to reflect/reduce the noise.
  - Appropriate non-metallic washers/insulation must be used with any joining of apparatus made from materials such as corrugated iron. Such apparatus must be maintained in a fixed position.

- Safety
  - No employees may reside on the active mining site. Transport must be arranged for employees on a daily basis from Postmasburg to the mine site.
  - Access and haul roads must be maintained.
  - Security access point to ensure monitoring of access to the site.

- Soil
  - In all places of development the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed, where possible, from all areas where physical disturbance of the surface will occur.
  - In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
  - The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
  - If any soil is contaminated during the life of the mining area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
  - Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
  - Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
  - The stored topsoil must be adequately protected from being blown away or being eroded.
  - Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
  - Vehicle movement must be confined to established roads for as far as practical in order to prevent the compaction of soils.

- Surface water
  - The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
  - All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encouraged in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste storage area.
  - All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
  - Erosion and storm water control measures must be implemented.
  - An application for an Integrated Water Use License must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
  - Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.
  - Re-fuelling must only take place in the re-fuelling area. If this is found not be practical, drip trays must be used whenever re-fuelling takes place outside of this area.

  - During rehabilitation the applicant must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
  - Buffer zones must be placed around all non-perennial drainage lines and dry pans in which no mining activities may take place.

- Topography
  - All open excavations must be backfilled if and when possible and made safe so as to reflect as far as possible the pre-mining topography of the area.
  - Permanent waste rock dumps must be sloped.
  - All temporary features, e.g. plant, containers and stockpiling, must be removed and handled in the prescribed manner during rehabilitation.

- Visual
  - Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night.
  - Open excavations must be subject to progressive backfilling and made safe (including the re-establishment of vegetation).
  - Permanent structures or features that are part of the proposed mining operation must be kept neat and well presented.
  - Waste material of any description must be removed from the mining area on a regular basis and be disposed of at a recognized landfill facility.

m) Final proposed alternatives.

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.)

The locality of the infrastructure was decided upon after taking into account of the following:-

- Locality of the ore bodies;
- Topography of the area;
- Environmental features;
- Operational requirements; and
- Discussions with the legal occupant.

n) Aspects for inclusion as conditions of Authorisation.

(Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation.)

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorisation.

o) Descriptions of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed.)

The abovementioned mitigation measures are tried and tested over many years in the iron ore and manganese ore mining industry. JRM must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is hereby assumed that the above assumptions are adequate and that the information provided is in the region of 85% - 95% correct.

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

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

Mining forms an integrated part of the social and economical growth of South Africa and more specifically the Northern Cape Province.

The following positive impacts will be lost if the proposed mining project is not developed:

- South Africa is currently the 7th largest producer of iron ore in the world. The iron ore mined in South Africa is mostly exported. Foreign revenue earned by these sales has a huge positive economical impact both locally and regionally. TAX and VAT obligations to SARS have an additional positive impact on the Government's income.
- Equipment and infrastructure development will amount to approximately R50 million. This will enable The Company to have a sustainable long term positive economical impact both locally and regionally.
- Employment: The entire workforce will consist of approximately 50 - 100 employees when fully operational.
- Payroll income - The gross remuneration of employees in terms of salaries and wages.
- Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
- Revenue - The total value of sales arising from business activity at the mine.

It is recommended that the activity should be authorized for the above reasons.

ii) Conditions that must be included in the authorisation

(1) Specific conditions to be included into the compilation and approval of EMPr:

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorisation.

(2) Rehabilitation requirements:

The applicant must provide to the DMR, before execution of the Mining Right, a financial rehabilitation guarantee to the amount as calculated in terms of the Financial Quantum Guideline and approved by the DMR.

q) Period for which the Environmental Authorisation is required.

Thirty Years

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

JRM's undertaking to meet the requirements of the Environmental Impact Assessment and Environmental Management Programme Report is attached at the end of the EMPr and is applicable to both documents.

s) Financial Provision

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

R6 977 496.97

(i) Explain how the aforesaid amount was derived.

Calculation method:

No	Description	Quantity
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines) Provision is made for a plant footprint area of 1 500m² x 5m average height	7 500m³
2(A)	Demolition of steel buildings and structures - Control rooms (mobile containers) - Offices (mobile containers) - Security control room (mobile containers) - Storage (mobile containers) - Weighbridge - Weighbridge control room (mobile container) - Workshops (mobile containers)	 180m² 180m² 18m² 360m² 60m² 18m² 180m² 996m²
2(B)	Demolition of reinforced concrete buildings and structures Not applicable – There are no reinforced concrete buildings or structures planned for the Japiesrus project	0
3	Rehabilitation of access roads	20 000m²
4(A)	Demolition and rehabilitation of electrified railway lines There are no electrified railway lines at Japiesrus.	0
4(B)	Demolition and rehabilitation of non-electrified railway lines There are no non-electrified railway lines at Japiesrus.	0
5	Demolition of housing and/or administration facilities - Ablution	 200m²

	- Diesel tank (bund wall) - Explosive magazine (concrete floor) - Generator building - Washbay - Waste storage (bund wall)	400m² 12m² 500m² 600m² 200m² 1 912m²
6	Opencast rehabilitation including final voids and ramps Provision is made for a maximum of 10 hectares opencast excavations at any time	10Ha
7	Sealing of shafts adits and inclines There are no shafts, adits or inclines on the mine.	0
8(A)	Rehabilitation of overburden and spoils - Brake test ramp - Safety berms - Topsoil dumps - Tyre bay - Waste rock dumps	 0.10Ha 0.20Ha 0.50Ha 0.02Ha 3.00Ha 3.82Ha
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential) - Recycling dam	1Ha
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential) There are no processing waste deposits and evaporation ponds on site that have a polluting potential	0
9	Rehabilitation of subsided areas There are no subsided areas at Japiesrus	0
10	General surface rehabilitation • Parking • Processing plant (iron ore) • Processing plant (manganese ore) • Rapid reloading area • Salvage yard • Stockpile area	 1.0Ha 2.0Ha 1.0Ha 0.1Ha 0.1Ha 2.0Ha 6.2Ha
11	River diversions There are no rivers at Japiesrus	0

12	Fencing Provision is made for 1 000m	<u>1 000m</u>
13	Water management - Stormwater dam - Water dam (zinc) - Pipeline (1 000m x 100mm diameter=100m²) - Water point (borehole)	0.100Ha 0.095Ha 0.010Ha <u>0.001Ha</u> <u>0.206Ha</u>
14	2 to 3 years maintenance and aftercare Provision is made for 2 hectares aftercare and maintenance	2Ha
15 (A) & 15(B)	Specialist study Al specialist studies have been conducted and paid	0

The calculations above were used to calculate the quantum of outstanding environmental rehabilitation.

The annual inflation rates were obtained from Stats SA and are as follows:

Table B2 – CPI headline year-on-year rates[3]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1969	2,8	2,5	2,8	2,9	3,4	3,2	2,6	2,0	2,0	3,9	3,5	3,7	3,0
1970	3,6	3,9	4,1	5,6	5,4	5,8	6,1	6,4	6,6	5,3	5,1	5,0	5,3
1971	5,4	5,2	5,4	5,2	5,7	6,1	6,3	6,3	6,3	6,5	6,8	6,9	6,0
1972	6,7	7,0	6,7	5,5	5,7	5,4	5,7	6,4	7,2	7,3	7,0	7,3	6,5
1973	8,3	8,9	9,9	10,2	9,9	10,0	9,8	9,3	8,9	9,3	10,2	10,0	9,5
1974	8,9	9,4	9,7	9,6	9,7	11,2	12,0	13,2	13,8	13,6	13,6	14,1	11,6
1975	15,2	14,7	13,7	14,6	14,8	14,2	13,7	13,0	12,2	12,2	12,3	11,7	13,5
1976	11,4	10,9	11,5	11,3	11,6	11,1	10,9	11,2	11,4	11,1	10,4	10,8	11,1
1977	10,7	11,9	11,8	11,5	11,1	11,0	11,3	11,3	11,3	11,2	11,4	11,1	11,3
1978	11,3	10,6	9,9	9,7	9,5	9,2	12,5	11,7	11,7	11,7	11,5	11,6	10,9
1979	11,6	11,3	12,6	12,8	12,8	13,5	12,9	13,9	14,3	14,2	14,2	14,0	13,2
1980	13,8	14,3	13,1	13,4	14,1	14,6	12,2	11,9	12,8	14,4	14,9	15,8	13,8
1981	15,5	16,0	16,2	15,5	15,0	14,5	15,5	16,1	15,6	14,5	14,4	13,9	15,2
1982	13,9	13,6	15,4	16,5	16,5	16,1	14,4	13,8	14,1	14,3	14,2	13,8	14,7
1983	14,4	14,9	13,6	12,6	12,8	12,4	12,1	12,2	10,9	10,7	10,6	11,0	12,4
1984	10,3	10,0	10,2	11,0	11,0	11,7	12,4	11,8	12,2	12,5	13,3	13,3	11,6
1985	13,3	16,0	15,1	15,8	16,1	16,4	15,9	16,4	16,6	16,8	16,9	18,4	16,1
1986	20,7	18,1	18,9	18,6	17,5	16,9	18,2	18,7	19,7	19,2	19,2	18,1	18,7
1987	16,1	16,3	16,8	16,2	17,3	17,2	16,3	16,3	15,8	15,8	15,0	14,7	16,1
1988	14,2	13,7	13,4	13,3	12,9	12,4	12,4	12,3	12,4	12,3	12,4	12,5	12,9
1989	13,3	13,5	13,8	14,0	14,9	15,7	13,5	15,5	14,9	14,8	14,9	15,3	14,7
1990	15,1	14,9	14,9	14,6	13,9	13,6	13,3	13,6	14,3	14,0	15,3	14,6	14,4
1991	14,3	15,0	15,7	15,6	15,2	15,2	15,8	15,6	15,4	16,8	15,5	16,2	15,3
1992	15,8	15,8	15,7	15,6	14,8	15,1	14,6	14,3	13,5	11,7	11,0	9,6	13,9
1993	9,7	9,0	9,7	11,0	10,6	10,0	9,9	9,3	9,1	9,4	9,2	9,5	9,7
1994	9,9	9,9	9,0	7,1	7,2	7,5	8,2	9,4	10,1	9,8	9,9	9,9	9,0
1995	9,6	9,9	10,2	11,0	10,8	10,0	9,0	7,5	6,4	6,3	6,4	6,9	8,7
1996	6,9	6,5	6,3	5,5	5,9	6,9	7,1	7,5	8,4	9,1	9,2	9,4	7,4
1997	9,4	9,8	9,6	9,9	9,5	8,8	9,1	8,7	8,0	7,5	6,8	6,1	8,6
1998	5,6	5,4	5,4	5,0	5,1	5,2	6,6	7,6	9,1	9,0	9,4	9,0	6,9
1999	8,9	8,6	7,9	7,7	7,1	7,3	4,9	3,2	1,9	1,7	1,9	2,2	5,1
2000	2,6	2,4	3,4	4,6	5,1	5,1	5,9	6,8	6,8	7,1	7,1	7,0	5,3
2001	7,1	7,8	7,4	6,5	6,4	6,3	5,3	4,6	4,4	4,0	4,3	4,6	5,7
2002	5,0	5,9	6,2	7,4	7,8	8,0	9,6	10,4	11,2	13,0	12,9	12,4	9,2
2003	11,6	10,3	10,2	8,8	7,8	6,7	5,2	5,1	3,7	1,5	0,4	0,3	5,8
2004	0,2	0,7	0,4	0,2	0,6	1,2	1,6	1,0	1,3	2,4	3,7	3,4	1,4
2005	3,0	2,6	3,0	3,4	3,3	2,8	3,4	3,9	4,4	4,0	3,4	3,6	3,4
2006	4,0	3,9	3,4	3,3	3,9	4,9	5,0	5,4	5,3	5,4	5,4	5,8	4,7
2007	6,0	5,7	6,1	7,0	6,9	7,0	7,0	6,7	7,2	7,9	8,4	9,0	7,1
2008	9,3	9,8	10,6	11,1	11,7	12,2	13,4	13,7	13,1	12,1	11,8	9,5	11,5
2009	8,1	8,6	8,5	8,4	8,0	6,9	6,7	6,4	6,1	5,9	5,8	6,3	7,1
2010	6,2	5,7	5,1	4,8	4,6	4,1	3,7	3,5	3,2	3,4	3,6	3,5	4,3
2011	3,7	3,7	4,1	4,2	4,6	5,0	5,3	5,3	5,7	6,0	6,1	6,1	5,0
2012	6,3	6,1	6,0	6,1	5,7	5,5	4,9	5,0	5,5	5,6	5,6	5,7	5,6
2013	5,4	5,9	5,9	5,9	5,6	5,5	6,3	6,4	6,0	5,5	5,3	5,4	5,7
2014	5,8	5,9	6,0	6,1	6,6	6,6	6,3	6,4	5,9	5,9	5,8	5,3	6,1
2015	4,4	3,9	4,0	4,5	4,6	4,7	5,0	4,6	4,6	4,7	4,8	5,2	4,6
2016	6,2	7,0											

[3] Rates shown in Table B2 show the official inflation rates as published in the monthly CPI release. Differences due to rounding off may occur when using the rebased indices in Table B1 to calculate the rates of change.

CALCULATION OF THE QUANTUM

Applicant: **JAPIES RUS MINERALE (PTY) LTD** **Ref No:** **NC 10112 MR**
Date: **APRIL 2017**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	7 500.00	14.12	1	1	105 879.76
2 (A)	Demolition of steel buildings and structures	m2	996.00	196.65	1	1	195 862.04
2(B)	Demolition of reinforced concrete buildings and structures	m2	0.00	289.80	1	1	0.00
3	Rehabilitation of access roads	m2	20 000.00	35.19	1	1	703 795.10
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0.00	341.55	1	1	0.00
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0.00	186.30	1	1	0.00
5	Demolition of housing and/or administration facilities	m2	1 912.00	393.30	1	1	751 984.36
6	Opencast rehabilitation including final voids and ramps	ha	10.000	200 167.61	1	1	2 001 676.06
7	Sealing of shafts adits and inclines	m3	0.00	105.57	1	1	0.00
8 (A)	Rehabilitation of overburden and spoils	ha	3.820	133 307.07	1	1	509 233.01
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	1.00	171 187.81	1	1	171 187.81
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0.00	497 210.54	1	1	0.00
9	Rehabilitation of subsided areas	ha	0.00	115 091.20	1	1	0.00
10	General surface rehabilitation	ha	6.20	108 881.24	1	1	675 063.70
11	River diversions	ha	0.00	108 881.24	1	1	0.00
12	Fencing	m	1 000.00	124.20	1	1	124 199.14
13	Water management	ha	0.21	41 399.71	1	1	8 528.34
14	2 to 3 years of maintenance and aftercare	ha	2.00	14 489.90	1	1	28 979.80
15 (A)	Specialist study	Sum	0.00			1	0.00
15 (B)	Specialist study	Sum	0.00			1	0.00
					Total of 1 - 15 above		**5 276 389.12**

weighting factor 2
1

		Subtotal 1	**5 276 389.12**
1	Preliminary and General	316 583.35	316 583.35
2	Contingencies	527 638.91	527 638.91
		Subtotal 2	**6 120 611.38**
		VAT (14%)	856 885.59
		Grand Total	**6 977 496.97**

Please note that an escalation at inflation cost per annum of the master rate was calculated from 2004 to 2017 according to the Consumer Price Index as is published on Stats SA.

The calculations according to the DMR guidelines require Japies Rus Minerale (Pty) Ltd to provide an amount of R6 977 496.97 for rehabilitation and closure.

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

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

Provision has been made in the 10 Year cashflow forecast in the Mining Work Programme for environmental rehabilitation.

JRM undertakes to, upon request of DMR, provide an financial guarantee, as per the quantum calculations to the amount of R6 977 496.97 to cover the financial costs related to rehabilitation.

t) Deviations from the approved scoping report and plan of study:

i) Deviations from the methodology used in determining the significance of potential environmental impacts and risks
(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation.)

Not applicable – No deviations from the methodology proposed in the Scoping Report.

ii) Motivation for the deviation

Not applicable – No deviations from the methodology proposed in the Scoping Report.

u) Other information required by the competent Authority:

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

(1) Impact on the socio-economic conditions of any directly affected person.
(Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix and confirm that the applicable mitigation is reflected in this document.)

- Impact on landowner:
  Positive: Compensation of land lost to mining.
  Negative: Loss of grazing land.

- Impact on other I&AP:
  - South Africa is currently the 7th largest producer of iron ore in the world. The iron ore mined in South Africa is mostly exported. Foreign revenue earned by these sales has a huge positive economical impact both locally and regionally. TAX and VAT obligations to SARS have an additional positive impact on the Government's income.
  - Equipment and infrastructure development will amount to approximately R50 million. This will enable JRM to have a sustainable long term positive economical impact both locally and regionally.
  - Employment: The entire workforce consists of approximately 200 employees.
  - Payroll income - The gross remuneration of employees in terms of salaries and wages.
  - Operating expenditure and maintenance (OPEX) - The total amount spent locally by businesses on goods and services, excluding salaries and wages as well as rents or interest.
  - Revenue - The total value of sales arising from business activity at the mine.

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

Mr. Stephan Gaigher of G&A Heritage Management Consultants conducted a site visit on the 27th of January 2017 and compiled a Phase 1 Archaeological Impact Assessment Report. The full report is annexed as Appendix '8'.
The findings of the site visit are as follows:

"Several small microliths of the Late Stone Age is found scattered over the higher lying regions of the property. Large areas of the study area are covered in red Kalahari sand. Some LSA tools of banded iron stone was also identified. None of these stone tool scatters can be considered a stone age site. Very few cores and no reworking flakes were observed. Some of the small tools were manufactured from volcanic glass (obsidian) – type stone, the exact type could not be determined, however it was obvious that these materials were brought into the study area from an unknown source. Furthermore, two modern burial sites were identified as well as abandoned mining activities and agricultural structures."

Relevant no-mining buffer zones shall be placed around each of the burial sites and agricultural structures and thus no impact to the heritage environment is expected.

v) Other matters required in terms of Sections 24(4)(a) and (b) of the Act.

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

No alternatives were considered as JRM has conducted prospecting activities under a valid Prospecting Right and Prospecting Right Renewal, with DMR reference number (NC) 171 PR & (NC) 10169 PR-R and Protocol number 243/2014, over the abovementioned properties.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

a) Details of the EAP

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

Refer to Part A, page 4 of this document for the details of EAP, Ms. Oosthuizen.

b) Description of the Aspects of the Activity

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

The aspects of the activity have been included in Part A.

c) Composite Map

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

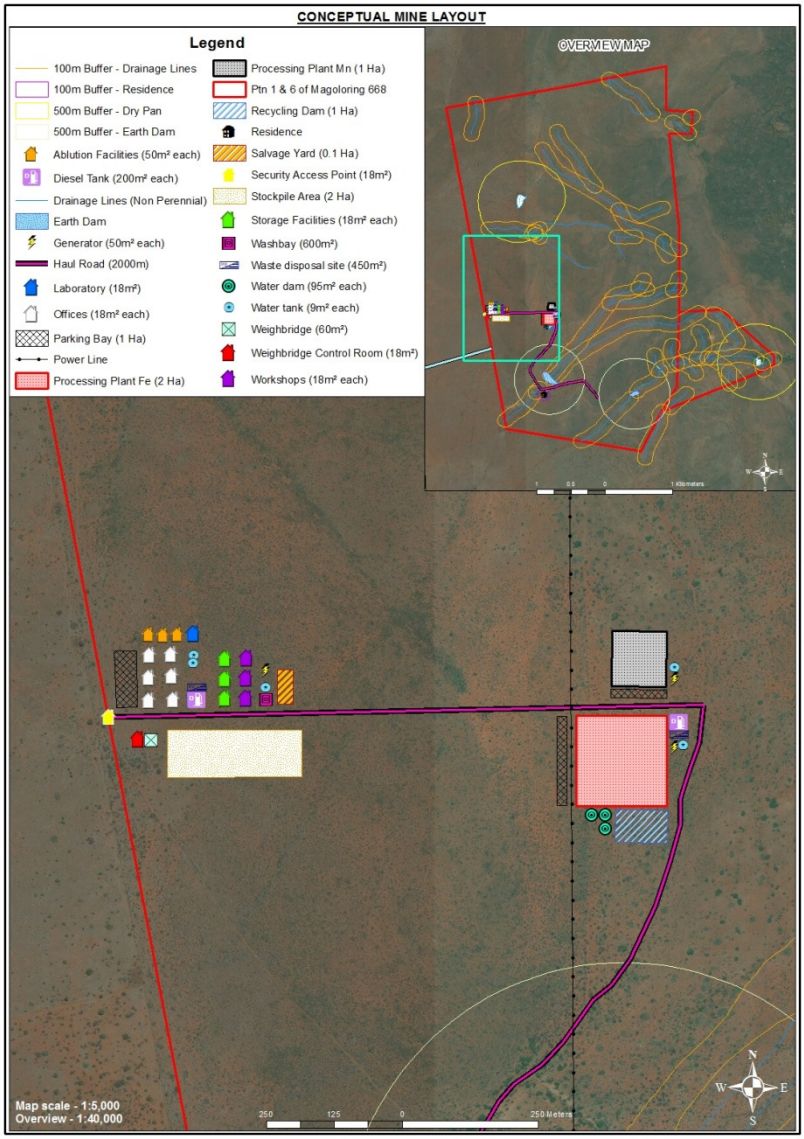


Figure 26 – Site layout, including buffer zones (See Appendix '4')

d) Description of Impact Management Objectives including management statements

(i) Determination of closure objectives

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

The main closure objectives of JRM's planned mining operation are:

- To restore the site to its pre-mining land capability in a sustainable matter.
- To prevent the sterilization of any ore reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained, when a closure certificate is issued.
- To establish a stable and self sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the mining activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the mining operation efficiently, cost effectively and in accordance with Government Policy.

(ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity:

Environmental management on the mine site must be conducted in terms of JRM's Environmental Management System. This system must be used to develop and implement its environmental policy. The environmental policy must:

- be in line with the nature, scale and environmental impacts of the organizations activities;
- include a commitment to continual improvement and prevention of pollution;
- include a commitment to comply with applicable legal requirements or other codes of good practice;
- provide a framework for setting and reviewing environmental objectives and targets;
- be documented, implemented, maintained an reviewed at least annually,
- be available to the public;
- establish, maintain and implement procedures to identify the environmental aspects of future or planned new developments or modified activities;
- establish, maintain, and implement a procedure to identify and have access to applicable legal and other requirements to which the organization subscribes related to its environmental aspects;
- establish and maintain documented environmental objectives and targets; establish, maintain and implement a programme for achieving the objectives and targets by designating responsibilities and setting timeframes, and provide the necessary evidence that the said targets and objectives have been achieved;
- ensure the availability of resources;
- document and communicate defined roles, responsibilities and authorities;
- provide training and awareness;
- establish and maintain communication procedures;
- keep record of all EMS documentation;
- identify and plan those operations that are associated with the identified significant environmental aspects consistent with the environmental policy, objectives and targets;

- establish, implement and maintain a procedure for emergency preparedness and response;
- establish, implement and maintain a procedure for dealing with actual and potential nonconformities, taking corrective and preventative action;
- conduct internal audits at planned intervals; and
- review the EMS at planned intervals.

(iii) Potential risk of Acid Mine Drainage:
(Indicate whether or not the mining can result in acid mine drainage.)

Mining will not result in acid mine drainage.

(iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage:

The mineral Pyrite, with a chemical composition of iron disulfide (FeS_2), is the most common sulphide mineral which causes acid mine drainage. It is highly unlikely that this occurs in the geological formation of the mining right area. However, should this mineral be found (in minimal quantities at most), the very low rainfall of the Postmasburg area will not be sufficient to cause the chemical reaction of the mineral which causes mine acid drainage.

(v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage:

Not applicable

(vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage:

Not applicable

(vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

According to the Baseline Groundwater Assessment conducted by SRK Consulting the average recharge based groundwater exploitation potential for the northern part of the site is approximately 55 700m³/annum and 61 800m³/annum for the southern part thereof. JRM's water uses shall adhere to these volumes.

(viii) Has a water use license been applied for?

JRM will apply for an Integrated Water Use License for the following water uses at the site:

- Section 21(a) of the National Water Act: Taking water from a water resource.
- Section 21(b) of the National Water Act: Storing water.
- Section 21(c) of the National Water Act: Impeding or diverting the flow of water in a watercourse.
- Section 21(g) of the National Water Act: Disposing of waste in a manner which may detrimentally impact on a water resource.
- Section 21(i) of the National Water Act: Altering the bed, banks, course or characteristics of a watercourse

(ix) Impacts to be mitigated in their respective phases

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

ACTIVITY (e.g. For prospecting – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access rout etc…etc…etc e.g. For mining - excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc…)	**PHASE** Of operation in which activity will take place State: Planning and design, pre-construction, construction, operational, rehabilitation, closure, post-closure	**SIZE AND SCALE of disturbances** Volumes, tonnages and hectares or m²)	**MITIGATION MEASURES** (describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants.)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to rehabilitation, therefore state either: - Upon cessation of the individual activity, or - Upon cessation of the mining, bulk sampling or alluvial diamond prospecting as the case may be.
Ablution facilities	Construction Commissioning Operational Decommissioning Closure	50m² each	• Maintenance of ablution facilities / conservancy tanks on regular basis. • Removal of ablution facilities upon closure.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff	Removal of ablution facilities upon closure of mining right.
Blasting	Operational	The size of the blasts will be directly affected by the geology of the deposit.	• Dust control and monitoring • Noise control and monitoring • Access control. • Continuous		Upon cessation of the individual activity.

			rehabilitation. • Stormwater run-off control.	must be trained to understand the contents of these documents, and to adhere to thereto. • Environmental Awareness Training must be provided to employees. • The operation must have a rehabilitation and closure plan. Management and staff must be trained to understand the contents of these documents, and to adhere to thereto. • Annual Performance Assessment Reports and Quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR & EMPr documents.	
Boreholes	Operational Decommissioning	1m² each	• Monitoring of abstraction.		Boreholes will remain after mine closure.
Brake test ramp	Construction Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of 1 000m² for brake test ramps at any given time.	• Dust control. • Speed limits. • Maintenance of ramps. • Maintenance of vehicles.		Removal of brake test ramps upon closure of mining right.
Chemical toilets	Construction Commissioning Operational Decommissioning Closure	6m² each	• Maintenance of toilets on regular basis. • Removal of toilets upon closure.		Removal of toilets upon closure of mining right.
Clean and Dirty Water System	Construction Operational Decommissioning Closure	The size and length of the berms and trenches will be directly affected by the topography of the area and the locality of the mining activities	• Maintenance of berms and trenches.		Removal of all clean and dirty water system features upon closure of the operation.
Control room	Construction Commissioning Operational Decommissioning Closure	18m² each	• Removal of control rooms upon closure.		Removal of control rooms upon closure of mining right.
Diesel tanks	Construction Commissioning Operational Decommissioning	200m² each	• Maintenance of diesel tanks and bund walls. • Oil traps. • Groundwater quality		Removal of diesel tanks upon closure of mining right.

	Closure		monitoring. • Drip tray at re-fuelling point. • Immediately clean hydrocarbon spill.		
Electricity	Construction Commissioning Operational Decommissioning Closure	Not applicable: transformer mounted on Eskom power line pole	• Maintenance of line points		The line points shall remain after mine closure.
Excavations	Operational Decommissioning Closure	Provision is made for a maximum footprint of 10 hectares open excavations at any given time.	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Continuous rehabilitation • Stormwater run-off control • Immediately clean hydrocarbon spill • Drip trays • Rock stability control and monitoring • Erosion control		Upon cessation of the individual activity (continuous rehabilitation).
Explosives magazine	Construction Commissioning Operational Decommissioning Closure	6m² each (concrete block) 2 x 6m² = 12m²	• Access control • Maintenance of magazines and fence. • Groundwater quality monitoring • Stormwater run-off control		Removal of explosive magazines upon closure of mining right.

			• Immediately clean spill		
Generator	Construction Commissioning Operational Decommissioning Closure	50m² each	• Access control • Maintenance of generator and bund walls • Noise control and monitoring • Oil traps • Groundwater quality monitoring • Immediately clean hydrocarbon spill		Removal of generator and generator building upon closure of mining right.
Haul roads (Loading & Hauling)	Operational	2 Ha	• Dust control and monitoring. • Speed limits. • Immediately clean hydrocarbon spill		Ripping of roads upon closure of mining right.
Office – mobile container	Construction Commissioning Operational Decommissioning Closure	18m² each	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		Removal of container upon closure of mining right.
Parking bay	Construction Commissioning Operational Decommissioning Closure	1 Ha	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills		Ripping of parking bay upon closure of the mining right.

			• Rip disturbed areas to allow re-growth of vegetation cover		
Processing plant	Construction Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of 3 hectares plant area at any given time.	• Access control • Maintenance of processing plant • Dust control and monitoring • Groundwater quality and level monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover		Removal of processing plant and ripping of compacted area upon closure of mining right.
Rapid reloading area (explosives)	Construction Commissioning Operational Decommissioning Closure	1 000m²	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of		Ripping of rapid reloading area upon closure of the mining right.

			vegetation cover		
Recycling dam	Construction Commissioning Operational Decommissioning Closure	1 Ha	• Groundwater quality and abstraction monitoring • Maintenance of dam walls.		Backfilling of dam, levelling of dam walls and sloping of area upon closure of mining right.
Safety berms	Construction Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of 0.2 hectare for safety berms at any given time.	• Dust control. • Speed limits. • Maintenance of berms.		Levelling of berms upon closure of mining right.
Salvage yard	Construction Commissioning Operational Decommissioning Closure	1 000m²	• Access control • Maintenance of fence. • Groundwater quality monitoring • Stormwater run-off control • Immediately clean hydrocarbon spill		Removal of fence of salvage yard and ripping of salvage yard upon closure of mining right.
Security access control point – mobile container	Construction Commissioning Operational Decommissioning Closure	18m²	• Access control • Maintenance of boom gates and container. • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		Removal of container upon closure of mining right.

Stockpile area	Commissioning Operational Decommissioning Closure	2 Ha	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover		Ripping of stockpile area upon closure of mining right.
Storage facility – mobile containers	Construction Commissioning Operational Decommissioning Closure	18m² each	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		Removal of container upon closure of mining right.
Stormwater Dam	Construction Commissioning Operational Decommissioning Closure	0.1 Ha	• Maintenance of dam walls.		Backfilling of dam, levelling of dam walls and sloping of area upon closure of mining right.
Topsoil storage area	Commissioning Operational Decommissioning Closure	0.5 Ha	• Dust control and monitoring • Stormwater run-off control. • Continuous rehabilitation • Rip disturbed areas to allow re-growth of vegetation cover • Backfilling of topsoil		Spreading of all stored topsoil on rehabilitated areas and ripping of storage area upon closure of mining right.

			during rehabilitation		
Tyre Bay	Operational	200m²	• Maintenance of vehicles. • Drip trays		Levelling of tyre bay walls and sloping of area upon closure of mining right.
Washbay	Construction Commissioning Operational Decommissioning Closure	600m²	• Groundwater quality and level monitoring • Concrete floor with oil/water separator • Stormwater run-off control • Immediately clean hydrocarbon spills		Removal of washbay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.
Waste storage site	Construction Commissioning Operational Decommissioning Closure	50m² each	• Storage of waste within receptacles • Storage of hazardous waste on concrete floor with bund wall • Removal of waste on regular intervals.		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.
Waste rock dumps	Commissioning Operational Decommissioning Closure	3 Ha	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Stormwater run-off control. • Rip disturbed areas to allow re-growth of vegetation cover		Backfilling of waste rock into open excavations. Ripping of disturbed areas upon closure of mining right.
Water dam	Construction Commissioning	95m² each	• Line dam • Maintenance of dam		Removal of lining and levelling of dam

	Operational Decommissioning Closure		walls. • Groundwater levels and quality monitoring.		walls upon closure of mining right.
Water distribution pipeline	Operational Decommissioning Closure	1 000m	• Maintenance of pipeline. • Groundwater levels and quality monitoring.		Removal of water distribution pipeline upon closure.
Water tank	Construction Commissioning Operational Decommissioning Closure	4m² each	• Maintain water tanks and structures. • Groundwater levels and quality monitoring.		Removal of water tank and steel structure upon closure of mining right.
Weighbridge	Construction Commissioning Operational Decommissioning Closure	60m²	• Access control • Maintenance of weighbridge • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		Removal of weighbridge and ripping of disturbed area upon closure of mining right.
Weighbridge control room – mobile container	Construction Commissioning Operational Decommissioning Closure	18m²	• Access control • Maintenance of weighbridge control room • Dust control and monitoring		Removal of container upon closure of mining right.

			• Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		
Workshop	Construction Commissioning Operational Decommissioning Closure	1 000m²	• Access control • Concrete floor with oil/water separator • Maintenance of mobile containers • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill		Removal of container and demolishing of building upon closure of mining right.

e) Impact Management Outcomes

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

ACTIVITY (whether listed or not listed) (e.g. excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc…)	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts) (e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…)	ASPECTS AFFECTED	PHASE In which impact is anticipated. (e.g. Construction, commissioning, operational, decommissioning, closure, post-closure)	MITIGATION TYPE modify, remedy, control or stop through: (e.g. noise control measures, stormwater control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc…etc…) (e.g. modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.)	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives etc.)
Ablution facilities	• Soil contamination • Groundwater contamination	Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	• Maintenance of ablution facilities / conservancy tanks on regular basis. • Removal of ablution facilities upon closure.	• Minimize the potential for a sewage spill on soil, which could infiltrate to groundwater.
Blasting	• Dust • Fly-rock • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance • Surface water contamination	Air quality Fauna Flora Noise Surface water Topography Safety	Operational	• Dust control and monitoring • Noise control and monitoring • Access control. • Continuous rehabilitation. • Stormwater run-off control.	• Dust levels minimized. • Noise levels minimized. • Safety ensured. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Boreholes	• Impact on the groundwater	Groundwater	Operational	• Monitoring of	• Minimize the potential

	table.		Decommissioning	abstraction.	to have an impact on groundwater table.
Brake test ramp	• Dust • Soil contamination	Air quality Soil	Construction Commissioning Operational Decommissioning Closure	• Dust control. • Speed limits. • Maintenance of ramps. • Maintenance of vehicles.	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater.
Chemical toilets	• Soil contamination • Groundwater contamination	Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	• Maintenance of toilets on regular basis. • Removal of toilets upon closure.	• Minimize the potential for a chemical spill on soil, which could infiltrate to groundwater.
Clean & Dirty water system	• Surface disturbance • Groundwater contamination • Soil contamination • Surface water contamination	Groundwater Soil Surface water	Construction Operational Decommissioning Closure	• Maintenance of berms and trenches.	• Maintenance of berms and trenches. • Groundwater levels and quality monitoring. • Oil traps used in relevant areas. • Drip trays used. • Immediately clean hydrocarbon spill.
Control room	• Surface disturbance	Soil Fauna Flora	Construction Commissioning Operational Decommissioning Closure	• Removal of control rooms upon closure.	• Rehabilitation standards and closure objectives met.
Diesel tanks	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Maintenance of diesel tanks and bund walls. • Oil traps. • Groundwater quality monitoring. • Drip tray at re-fuelling	• Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met.

				point. • Immediately clean hydrocarbon spill.	
Electricity (Line points)	• Fire hazard	Flora Fauna	Construction Commissioning Operational Decommissioning Closure	• Maintenance of line points	• Minimize potential for fire hazard.
Excavations	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	Air quality Fauna Flora Groundwater Noise Soil Surface water Topography Safety	Operational Decommissioning Closure	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Continuous rehabilitation • Stormwater run-off control • Immediately clean hydrocarbon spill • Drip trays • Rock stability control and monitoring • Erosion control • Low angle access ramp for fauna.	• Safety ensured. • Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Explosives magazine	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Groundwater Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of magazines and fence. • Groundwater quality monitoring	• Safety ensured. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation

	• Surface water contamination			• Stormwater run-off control • Immediately clean spill	standards and closure objectives met. • Erosion potential minimized.
Generator	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Groundwater Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of generator and bund walls • Noise control and monitoring • Oil traps • Groundwater quality monitoring • Immediately clean hydrocarbon spill	• Safety ensured. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met.
Haul roads (Loading & Hauling)	• Dust • Noise • Soil contamination through hydrocarbon spills.	Air quality Noise Soil	Operational	• Dust control and monitoring. • Speed limits. • Immediately clean hydrocarbon spill	• Minimize dust. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized.
Office – mobile container	• Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Fauna Flora Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	• Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met.
Parking bay	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural	Air quality Fauna Flora Groundwater Noise	Construction Commissioning Operational Decommissioning Closure	• Dust control and monitoring • Groundwater quality monitoring • Noise control and	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater.

	habitat of fauna • Surface disturbance	Soil Surface water		monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	• Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Processing plant	• Dust • Noise • Groundwater usage • Potential groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of processing plant • Dust control and monitoring • Groundwater quality and level monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	• Safety ensured. • Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Rapid reloading area (explosives)	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation

				• Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	standards and closure objectives met. • Erosion potential minimized.
Recycling dam	• Abstraction and usage of groundwater • Potential contamination of groundwater	Groundwater	Construction Commissioning Operational Decommissioning Closure	• Groundwater quality and abstraction monitoring	• Minimize potential of groundwater contamination.
Roads	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Maintenance of roads • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Speed limits • Stormwater run-off control. • Erosion control • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Safety berms	• Dust • Soil contamination	Air quality Soil	Construction Commissioning Operational Decommissioning Closure	• Dust control. • Speed limits. • Maintenance of berms.	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater.

Salvage yard	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	Fauna Flora Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of fence. • Groundwater quality monitoring • Stormwater run-off control • Immediately clean hydrocarbon spill	• Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Security access control point – mobile container	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Soil	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of boom gates and container. • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	• Safety ensured. • Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Stockpile area	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Commissioning Operational Decommissioning Closure	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential

				• Rip disturbed areas to allow re-growth of vegetation cover	minimized.
Storage facility – mobile containers	• Removal and disturbance of vegetation cover and natural habitat of fauna • Groundwater contamination • Soil contamination • Surface disturbance	Fauna Flora Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	• Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met.
Stormwater dam	• Surface disturbance • Groundwater contamination • Soil contamination • Surface water contamination	Fauna Flora Groundwater Soil Surface water	Commissioning Operational Decommissioning Closure	• Maintenance of dam walls. • Groundwater levels and quality monitoring.	• Minimize potential for dirty water to leave the site.
Topsoil storage area	• Dust • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil disturbance • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Commissioning Operational Decommissioning Closure	• Dust control and monitoring • Stormwater run-off control. • Continuous rehabilitation • Rip disturbed areas to allow re-growth of vegetation cover • Backfilling of topsoil during rehabilitation	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Tyre bay	• Noise • Potential contamination of groundwater through hydrocarbon spills. • Contamination of soil	Noise Soil Groundwater	Operational	• Maintenance of vehicles. • Drip trays	• Minimize potential for hydrocarbon spills to infiltrate into groundwater.
Washbay	• Groundwater contamination and usage • Removal and disturbance of	Groundwater Soil Surface water	Construction Commissioning Operational	• Groundwater quality and level monitoring • Concrete floor with	• Minimize potential for hydrocarbon spills to infiltrate into

	vegetation cover and natural habitat of fauna • Soil contamination		Decommissioning Closure	oil/water separator • Stormwater run-off control • Immediately clean hydrocarbon spills	groundwater. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Waste storage site	• Groundwater contamination • Contamination of soil • Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Storage of waste within receptacles • Storage of hazardous waste on concrete floor with bund wall • Removal of waste on regular intervals.	• Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Rehabilitation standards and closure objectives met.
Waste rock dumps	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water Topography	Commissioning Operational Decommissioning Closure	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Stormwater run-off control. • Rip disturbed areas to allow re-growth of vegetation cover	• Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Water dam	• Groundwater abstraction and usage • Surface disturbance	Fauna Flora Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	• Line dam • Maintenance of dam walls. • Groundwater levels and quality monitoring.	• Safety ensured. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Water distribution pipeline	• Groundwater abstraction and usage	Groundwater	Operational Decommissioning Closure	• Maintenance of pipeline. • Groundwater levels	• Minimize the potential to have an impact on groundwater table.

				and quality monitoring.	
Water tank	• Groundwater abstraction and usage • Surface disturbance	Fauna Flora Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	• Maintain water tanks and structures. • Groundwater levels and quality monitoring.	• Safety ensured. • Rehabilitation standards and closure objectives met.
Weighbridge	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of weighbridge • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	• Safety ensured. • Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.
Weighbridge control room – mobile container	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Fauna Flora Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Access control • Maintenance of weighbridge control room • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas	• Safety ensured. • Dust levels minimized. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.

				to allow re-growth of vegetation cover	
Workshop	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	• Access control • Concrete floor with oil/water separator • Maintenance of mobile containers • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill	• Safety ensured. • Minimize potential for hydrocarbon spills to infiltrate into groundwater. • Noise levels minimized. • Rehabilitation standards and closure objectives met. • Erosion potential minimized.

f) Impact Management Actions

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

ACTIVITY (whether listed or not listed) (e.g. excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc…)	**POTENTIAL IMPACT** (e.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc…etc…)	**MITIGATION TYPE** (modify, remedy, control, or stop through e.g. noise control measures, stormwater control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc.)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to rehabilitation, therefore state either: - Upon cessation of the individual activity, or - Upon cessation of the mining, bulk sampling or alluvial diamond prospecting as the case may be.	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed management standards or practices that have been identified by Competent Authorities.)
Ablution facilities	• Soil contamination • Groundwater contamination	• Maintenance of ablution facilities / conservancy tanks on regular basis. • Removal of ablution facilities upon closure.	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Blasting	• Dust • Fly-rock • Noise • Removal and disturbance of	• Dust control and monitoring • Noise control and monitoring • Access control.	Upon cessation of the individual activity.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts;

	vegetation cover and natural habitat of fauna • Surface disturbance • Surface water contamination	• Continuous rehabilitation. • Stormwater run-off control.		○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Boreholes	• Impact on the groundwater table.	• Monitoring of abstraction.	N/A – Boreholes will remain after mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Brake test ramp	• Dust • Soil contamination	• Dust control. • Speed limits. • Maintenance of ramps. • Maintenance of vehicles.	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of

				these documents, and to adhere to thereto.
Chemical toilets	• Soil contamination • Groundwater contamination	• Maintenance of toilets on regular basis. • Removal of toilets upon closure.	Removal of toilets upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Clean & Dirty water system	• Surface disturbance • Groundwater contamination • Soil contamination • Surface water contamination	• Maintenance of berms and trenches • Groundwater levels and quality monitoring. • Oil traps used in relevant areas. • Drip trays used. • Immediately clean hydrocarbon spill.	Backfilling of trenches and levelling of berms upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Control room	• Surface disturbance	• Removal of control rooms upon closure.	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts;

				○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Diesel tanks	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	• Maintenance of diesel tanks and bund walls. • Oil traps. • Groundwater quality monitoring. • Drip tray at re-fuelling point. • Immediately clean hydrocarbon spill.	Removal of diesel tanks upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Electricity (line points)	• Fire hazard	• Maintenance of line points	N/A – Line points will remain after cessation of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of

				these documents, and to adhere to thereto.
Excavations	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Continuous rehabilitation • Stormwater run-off control • Immediately clean hydrocarbon spill • Drip trays • Rock stability control and monitoring • Erosion control	Upon cessation of the individual activity (continuous rehabilitation).	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Explosives magazine	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	• Access control • Maintenance of magazines and fence. • Groundwater quality monitoring • Stormwater run-off control • Immediately clean spill	Removal of explosive magazines upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Generator	• Groundwater contamination • Noise	• Access control • Maintenance of generator and bund walls	Removal of generator upon closure of mining right.	The following must be placed at the site and is applicable to all activities:

	• Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	• Noise control and monitoring • Oil traps • Groundwater quality monitoring • Immediately clean hydrocarbon spill		○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Haul roads (Loading & Hauling)	• Dust • Noise • Soil contamination through hydrocarbon spills.	• Dust control and monitoring. • Speed limits. • Immediately clean hydrocarbon spill	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Office – mobile container	• Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Removal of container upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff

				must be trained to understand the contents of these documents, and to adhere to thereto.
Parking bay	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Ripping of parking bay upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Processing plant	• Dust • Noise • Groundwater usage • Potential groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance	• Access control • Maintenance of processing plant • Dust control and monitoring • Groundwater quality and level monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of	Removal of processing plant upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.

		vegetation cover		
Rapid reloading area (explosives)	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Access control • Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Ripping of rapid reloading area upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Recycling dam	• Abstraction and usage of groundwater • Potential contamination of groundwater	• Groundwater quality and abstraction monitoring	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Safety berms	• Dust • Soil contamination	• Dust control. • Speed limits. • Maintenance of berms.	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation;

				○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Salvage yard	• Groundwater contamination • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination • Surface disturbance • Surface water contamination	• Access control • Maintenance of fence. • Groundwater quality monitoring • Stormwater run-off control • Immediately clean hydrocarbon spill	Removal of fence of salvage yard and ripping of salvage yard upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Security access control point – mobile container	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Access control • Maintenance of boom gates and container. • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean	Removal of container upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to

		hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover		understand the contents of these documents, and to adhere to thereto.
Stockpile area	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Dust control and monitoring • Groundwater quality monitoring • Noise control and monitoring • Drip trays • Stormwater run-off control. • Immediately clean hydrocarbon spills • Rip disturbed areas to allow re-growth of vegetation cover	Ripping of stockpile area upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Storage facility – mobile containers	• Removal and disturbance of vegetation cover and natural habitat of fauna • Groundwater contamination • Soil contamination • Surface disturbance	• Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Removal of container upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Stormwater dam	• Surface disturbance • Groundwater	• Maintenance of dam walls.	Upon cessation of mining.	The following must be placed at the site and is

	contamination • Soil contamination • Surface water contamination	• Groundwater levels and quality monitoring.		applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Topsoil storage area	• Dust • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil disturbance • Surface disturbance	• Dust control and monitoring • Stormwater run-off control. • Continuous rehabilitation • Rip disturbed areas to allow re-growth of vegetation cover • Backfilling of topsoil during rehabilitation	Spreading of all stored topsoil on rehabilitated areas and ripping of storage area upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Tyre bay	• Noise • Potential contamination of groundwater through hydrocarbon spills. • Contamination of soil	• Maintenance of vehicles. • Drip trays	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's

				Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Washbay	• Groundwater contamination and usage • Removal and disturbance of vegetation cover and natural habitat of fauna • Soil contamination	• Groundwater quality and level monitoring • Concrete floor with oil/water separator • Stormwater run-off control • Immediately clean hydrocarbon spills	Removal of washbay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Waste storage site	• Groundwater contamination • Contamination of soil • Surface water contamination	• Storage of waste within receptacles • Storage of hazardous waste on concrete floor with bund wall • Removal of waste on regular intervals.	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Waste rock dumps	• Dust • Groundwater	• Dust control and monitoring	Backfilling of waste rock into open excavations. Ripping of	The following must be placed at the site and is

	contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Groundwater quality monitoring • Noise control and monitoring • Stormwater run-off control. • Rip disturbed areas to allow re-growth of vegetation cover	disturbed areas upon closure of mining right.	applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Water dam	• Groundwater abstraction and usage • Surface disturbance	• Line dam • Maintenance of dam walls. • Groundwater levels and quality monitoring.	Removal of lining and levelling of dam walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Water distribution pipeline	• Groundwater abstraction and usage	• Maintenance of pipeline. • Groundwater levels and quality monitoring.	Upon cessation of mining.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's

				Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Water tank	• Groundwater abstraction and usage • Surface disturbance	• Maintain water tanks and structures. • Groundwater levels and quality monitoring.	Removal of water tank and steel structure upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Weighbridge	• Dust • Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Access control • Maintenance of weighbridge • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	Removal of weighbridge and ripping of disturbed area upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Weighbridge control	• Dust	• Access control	Removal of container upon	The following must be

room – mobile container	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Maintenance of weighbridge control room • Dust control and monitoring • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill • Rip disturbed areas to allow re-growth of vegetation cover	closure of mining right.	placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.
Workshop– mobile containers	• Groundwater contamination • Noise • Removal and disturbance of vegetation cover and natural habitat of fauna • Surface disturbance	• Access control • Concrete floor with oil/water separator • Maintenance of mobile containers • Noise control and monitoring • Groundwater quality monitoring • Immediately clean hydrocarbon spill	Removal of containers upon closure of mining right.	The following must be placed at the site and is applicable to all activities: ○ Relevant Legislation; ○ Acts; ○ Regulations; ○ COP's; and ○ SOP's Management and staff must be trained to understand the contents of these documents, and to adhere to thereto.

g) Financial Provision

(1) Determination of the amount of Financial Provision.

a. Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation 22(2)(d) as described in 2.4 herein.

The main closure objectives of JRm's planned mining operation are:

- To restore the site to its pre-mining land capability in a sustainable matter.
- To prevent the sterilization of any ore reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained, when a closure certificate is issued.
- To establish a stable and self sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the mining activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the mining operation efficiently, cost effectively and in accordance with Government Policy.

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

A public meeting was held on 25 April 2017 during which the anticipated environmental impacts and mitigation measures were discussed.

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

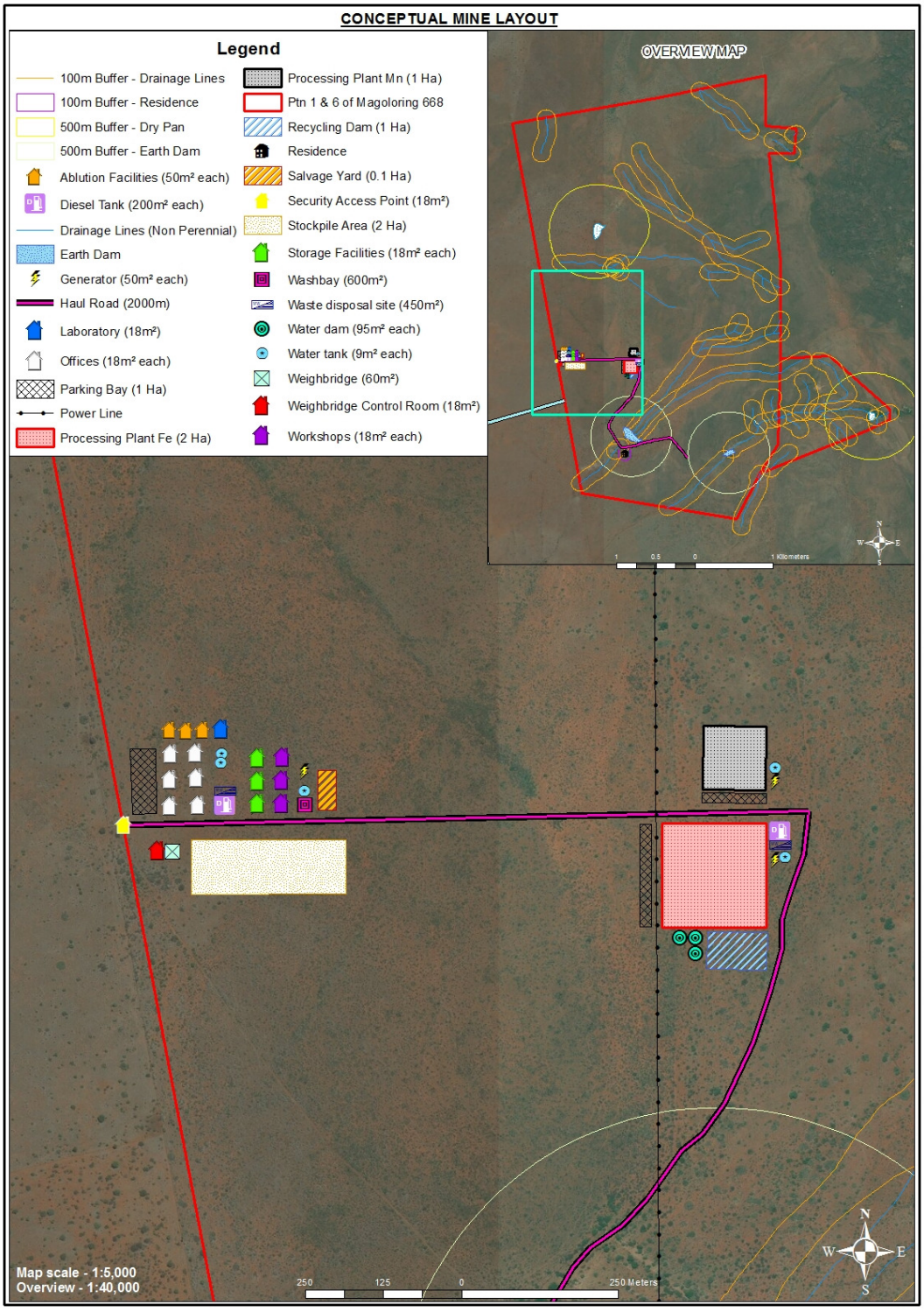


Figure 27 – Site layout map indicating mining activities

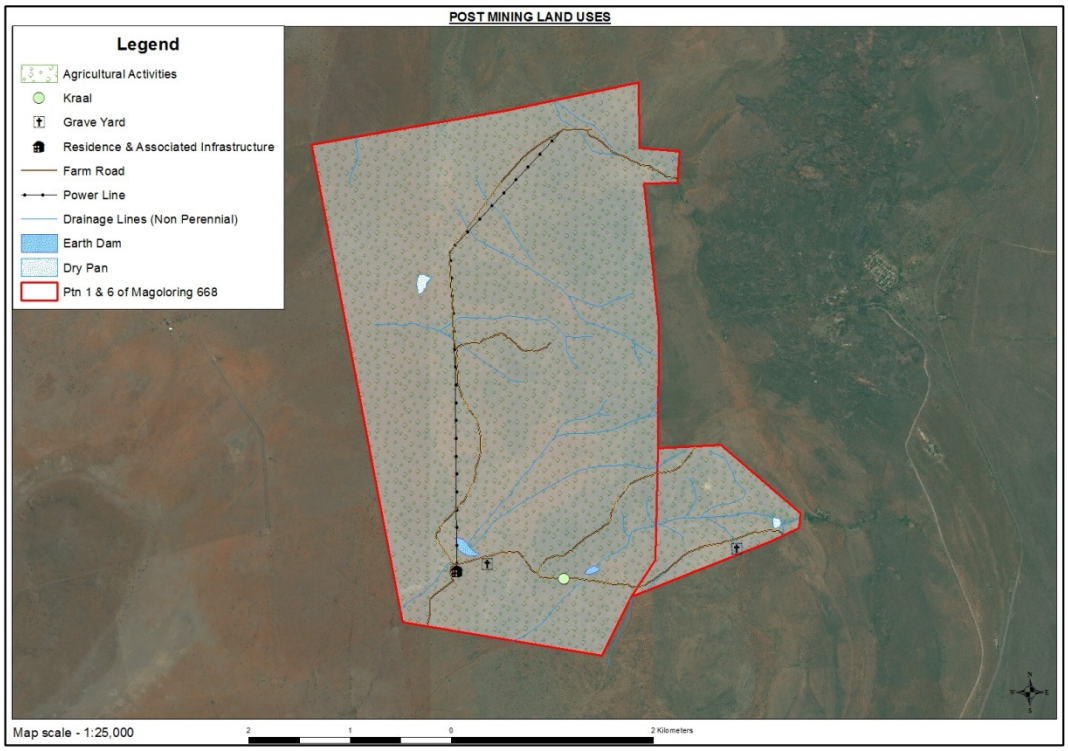


Figure 28 – Post mining land use map

Rehabilitation Plan:

- Infrastructure areas

  On completion of the mining operation, the various disturbed surfaces (e.g. access roads, office area, storage areas, plant site etc.) must be rehabilitated as follows:

  - All infrastructure, equipment, plant, and other items used during the operational period must be removed from the site.
  - All material (waste rock and stockpiles) on the surface must be removed to the original topsoil level. This material must then be backfilled into the open excavations.
  - Any compacted area must then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.

  On completion of operations, all buildings, structures or objects on the office site must be dealt with in accordance with Regulation 44 of the Minerals and Petroleum Resources Development Act, 2002, which states:

  "Regulation 44:
  1. When a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, the holder of such right or permit may not demolish or remove any building, structure or object-
  (a) which may not be demolished or removed in terms of any other law;
  (b) which has been identified in writing by the Minister for purposes of this section; or
  (c) which is to be retained in terms of an agreement between the holder and the owner or occupier of the land, which agreement has been approved by the Minister in writing.
  2. The provision of subsection (1) does not apply to bona fide mining equipment, which may be removed."

- Rehabilitation of the mobile office, workshop & storage areas
  On completion of the mining operation, the mobile containers must be removed from site where after the above areas will be cleared of any remaining contaminated soil which must be placed in acceptable containers and removed with the industrial waste to a recognized disposing facility or by a waste removal company.

  All buildings, structures or objects in the secured storage areas shall be dealt with in accordance with Regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

  The surface must be ripped or ploughed to a depth of at least 300mm, where possible, and the topsoil, previously stored adjacent the site, distributed evenly to its original depth over the whole area.

  The site must be seeded, should the need arise, with a vegetation seed mix adapted to reflect the local indigenous flora.

  Any other disturbed areas must be rehabilitated as described under the relevant activities.

- Residue deposits
  - Disposal facilities
    Waste material of all description inclusive of receptacles, scrap, rubble and tyres must be removed entirely from the mining area and disposed of at a recognized landfill facility. It must not be permitted to be buried or burned on the site.

  - Ongoing seepage, control of rain water.
    Monitoring of ground or surface water must take place.

  - Long term stability and safety
    It must be the objective of management to ensure the long term stability of all rehabilitated areas including the backfilled excavations. This must be done by the monitoring of all areas until a closure certificate has been issued.

  - Final rehabilitation in respect of erosion and dust control
    Self sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is planned.

- Rehabilitation of dangerous excavations
  Due to the removal of surface ore material, excavations will be created that can be classified as dangerous. All available material must be used during backfilling to avoid the existence of dangerous open excavations.

- Rehabilitation of boreholes
  - All shallow boreholes (i.e. <10m) must be backfilled and levelled.
  - All boreholes deeper than 10m must be covered with a concrete block and 1000mm of previously stored topsoil.

- Final rehabilitation of opencast haul ramps and roads and final voids
  After rehabilitation has been completed, all roads must be ripped or ploughed, providing the landowner does not want them to remain that way

and with written approval from the Director Mineral Development of the Department of Mineral Resources.

- Submission of information
  Reports on rehabilitation and monitoring must be submitted annually to the Department of Mineral Resources - Kimberley, as described in Regulation 55.

- Maintenance (Aftercare)
  Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme.

  The aim of this document is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.

  The aim with the closure of the mining operation must be to create an acceptable post-mining environment and land-use. Therefore all agreed commitments must be implemented by Management.

- After-effects following closure
  - Acid drainage
    No potential for bad quality leachate or acid drainage development exists.

  - Long term impact on ground water and / or surface water.
    No after effect on the groundwater yield or quality or surface water quality is expected.

  - Long-term stability of rehabilitated land
    One of the main aims of any rehabilitated ground must be to obtain a self-sustaining and stable end result. As the open excavations will be backfilled these areas will have long term stability.

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

The main closure objective of JRM's planned mining operation is to restore the site to its pre-mining capability in a sustainable matter. The rehabilitation activities proposed in the above rehabilitation plan will ensure that the land reverts back to grazing land upon closure of the mining right.

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

Calculation method:

No	Description	Quantity
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines) Provision is made for a plant footprint area of 1 500m² x 5m average height	7 500m³

2(A)	Demolition of steel buildings and structures - Control rooms (mobile containers) - Offices (mobile containers) - Security control room (mobile containers) - Storage (mobile containers) - Weighbridge - Weighbridge control room (mobile container) - Workshops (mobile containers)	 180m² 180m² 18m² 360m² 60m² 18m² 180m² 996m²
2(B)	Demolition of reinforced concrete buildings and structures Not applicable – There are no reinforced concrete buildings or structures planned for the Japiesrus project	 0
3	Rehabilitation of access roads	20 000m²
4(A)	Demolition and rehabilitation of electrified railway lines There are no electrified railway lines at Japiesrus.	 0
4(B)	Demolition and rehabilitation of non-electrified railway lines There are no non-electrified railway lines at Japiesrus.	 0
5	Demolition of housing and/or administration facilities - Ablution - Diesel tank (bund wall) - Explosive magazine (concrete floor) - Generator building - Washbay - Waste storage (bund wall)	 200m² 400m² 12m² 500m² 600m² 200m² 1 912m²
6	Opencast rehabilitation including final voids and ramps Provision is made for a maximum of 10 hectares opencast excavations at any time	 10Ha
7	Sealing of shafts adits and inclines There are no shafts, adits or inclines on the mine.	 0
8(A)	Rehabilitation of overburden and spoils - Brake test ramp - Safety berms - Topsoil dumps - Tyre bay	 0.10Ha 0.20Ha 0.50Ha 0.02Ha

	- Waste rock dumps	3.00Ha 3.82Ha
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential) - Recycling dam	 1Ha
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential) There are no processing waste deposits and evaporation ponds on site that have a polluting potential	 0
9	Rehabilitation of subsided areas There are no subsided areas at Japiesrus	 0
10	General surface rehabilitation • Parking • Processing plant (iron ore) • Processing plant (manganese ore) • Rapid reloading area • Salvage yard • Stockpile area	 1.0Ha 2.0Ha 1.0Ha 0.1Ha 0.1Ha 2.0Ha 6.2Ha
11	River diversions There are no rivers at Japiesrus	 0
12	Fencing Provision is made for 1 000m	 1 000m
13	Water management - Stormwater dam - Water dam (zinc) - Pipeline (1 000m x 100mm diameter=100m²) - Water point (borehole)	 0.100Ha 0.095Ha 0.010Ha 0.001Ha 0.206Ha
14	2 to 3 years maintenance and aftercare Provision is made for 2 hectares aftercare and maintenance	 2Ha
15 (A) & 15(B)	Specialist study Al specialist studies have been conducted and paid	 0

The calculations above were used to calculate the quantum of outstanding environmental rehabilitation. The annual inflation rates were obtained from Stats SA.

CALCULATION OF THE QUANTUM

Applicant: **JAPIES RUS MINERALE (PTY) LTD** **Ref No:** **NC 10112 MR**
Date: **APRIL 2017**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and pow erlines)	m3	7 500.00	14.12	1	1	105 879.76
2 (A)	Demolition of steel buildings and structures	m2	996.00	196.65	1	1	195 862.04
2(B)	Demolition of reinforced concrete buildings and structures	m2	0.00	289.80	1	1	0.00
3	Rehabilitation of access roads	m2	20 000.00	35.19	1	1	703 795.10
4 (A)	Demolition and rehabilitation of electrified railw ay lines	m	0.00	341.55	1	1	0.00
4 (A)	Demolition and rehabilitation of non-electrified railw ay lines	m	0.00	186.30	1	1	0.00
5	Demolition of housing and/or administration facilities	m2	1 912.00	393.30	1	1	751 984.36
6	Opencast rehabilitation including final voids and ramps	ha	10.000	200 167.61	1	1	2 001 676.06
7	Sealing of shafts adits and inclines	m3	0.00	105.57	1	1	0.00
8 (A)	Rehabilitation of overburden and spoils	ha	3.820	133 307.07	1	1	509 233.01
8 (B)	Rehabilitation of processing w aste deposits and evaporation ponds (non-polluting potential)	ha	1.00	171 187.81	1	1	171 187.81
8 (C)	Rehabilitation of processing w aste deposits and evaporation ponds (polluting potential)	ha	0.00	497 210.54	1	1	0.00
9	Rehabilitation of subsided areas	ha	0.00	115 091.20	1	1	0.00
10	General surface rehabilitation	ha	6.20	108 881.24	1	1	675 063.70
11	River diversions	ha	0.00	108 881.24	1	1	0.00
12	Fencing	m	1 000.00	124.20	1	1	124 199.14
13	Water management	ha	0.21	41 399.71	1	1	8 528.34
14	2 to 3 years of maintenance and aftercare	ha	2.00	14 489.90	1	1	28 979.80
15 (A)	Specialist study	Sum	0.00			1	0.00
15 (B)	Specialist study	Sum	0.00			1	0.00
					Total of 1 - 15 above		**5 276 389.12**

weighting factor 2
1

		Subtotal 1	**5 276 389.12**
1	Preliminary and General	316 583.35	316 583.35
2	Contingencies	527 638.91	527 638.91
		Subtotal 2	**6 120 611.38**
		VAT (14%)	856 885.59
		Grand Total	**6 977 496.97**

Please note that an escalation at inflation cost per annum of the master rate was calculated from 2004 to 2017 according to the Consumer Price Index as is published on Stats SA.

The calculations according to the DMR guidelines require Japies Rus Minerale (Pty) Ltd to provide an amount of R6 977 496.97 for rehabilitation and closure.

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

JRM undertakes to, upon request of DMR, provide an financial guarantee, as per the quantum calculations to the amount of R6 977 496.97 to cover the financial costs related to rehabilitation.

h) Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including:

a. Monitoring of Impact Management Actions
b. Monitoring and reporting frequency
c. Responsible persons
d. Time period for implementing impact management actions
e. Mechanism for monitoring compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
- Blasting - Brake test ramp - Excavations - Generator - Loading & hauling - Parking bay - Processing plant - Rapid reloading area - Roads - Safety berms - Salvage yard - Security access point - Stockpile areas - Topsoil storage - Waste rock dump - Weighbridge - Workshop	Air quality	A single bucket monitoring system must be placed on the site during the operational phase to measure the air quality levels and to ensure that JRM's operation adheres to the Management Standards as set out in the National Environmental Management: Air Quality Amendment Act, 2014 (20 of 2014), the Regulations of the MPRDA (28 of 2002) and the Mine, Health and Safety Act (29 of 1996).	Mine Management Environmental Officer / Contractor	Monthly fall-out dust sampling and annual reporting to DMR during operational phase.
- Blasting - Brake test ramp - Dams - Excavations	Flora	A registered mine surveyor must conduct measurements of open excavations, deposition sites, rehabilitated areas and any other	Mine Management Environmental Officer / Contractor	Quarterly surveys and submitted to the DMR annually.

- Infrastructure areas - Parking bay - Processing plant - Recycling dam - Rapid reloading area - Roads - Safety berms - Salvage yard - Stockpile area - Topsoil storage - Waste rock dump		infrastructure developments. The measurements must be plotted on plans and kept for life of operation.		
- Ablution facilities - Blasting - Chemical toilets - Clean & Dirty water system - Diesel tanks - Excavations - Explosives magazine - Generator - Office - Parking bay - Processing plant - Rapid reloading area - Recycling dam - Roads - Salvage yard - Security access point - Stockpile areas - Storage facilities - Stormwater dam - Topsoil storage site - Waste storage site - Waste rock dumps	Groundwater	Water samples must be taken and analysed to ensure that they comply with the SANS 241-1:2011 drinking water quality. Water levels must be measured. Water abstraction must be documented.	Mine Management Environmental Officer / Contractor	Monthly analysis and submitted to the DMR annually.

- Washbay - Water dams - Water distribution pipelines - Water tank - Weighbridge & control room - Workshop				
- Blasting - Excavations - Generator - Parking bay - Processing plant - Rapid reloading area - Roads - Security access point - Stockpile areas - Storage facilities - Topsoil storage - Waste rock dumps - Weighbridge - Workshop	Noise	Noise readings must be taken at pre-determined noise monitoring points with sufficient, calibrated sound level meter.	Mine Management Environmental Officer / Contractor	Monthly analysis and submitted to the DMR annually.

i) Indicate the frequency of the submission of the performance assessment / environmental audit report.

An Audit Report will be conducted annually in terms of Regulation 34 of the Environmental Impact Assessment Regulations, 2014 of the National Environmental Management Act, 1998 (Act no 107 of 1998).

j) Environmental Awareness Plan

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

JRM shall provide and discuss the Environmental Awareness Plan with each employee during pre-employment induction. Monthly Environmental Awareness training shall be provided during life of operation.

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

JRM shall ensure that there is an Emergency Response Plan on site, clearly indicating the different procedures to potential incidents.

k) Specific information required by the Competent Authority
(Amongst others, confirm that the financial provision will be reviewed annually.)

The financial quantum will be conducted annually as is prescribed by Regulation 54 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) and Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

JRM shall provide the DMR with an annual Environmental Audit Report in terms of Appendix 7 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

Application for additional Environmental Authorisation if scope of activities changes as well as a Section 102 application at DMR.

UNDERTAKING

The EAP herewith confirms:

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

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

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

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

Signature of the Environmental Assessment Practitioner:

Wadala Mining and Consulting (Pty) Ltd

Name of company:

05/06/2017

Date:

- END -