mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT 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: OIKONOMIA GRANITE (PTY) LTD
TEL NO:
FAX NO:
POSTAL ADDRESS:
PHYSICAL ADDRESS:
FILE REFERENCE NUMBER SAMRAD: NW 30/5/1/2/2/10171MR

1. IMPORTANT NOTICE

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

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

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

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

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

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

(a) determine the policy and legislative context within which the activity is located and document how the proposed 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 alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
(d) determine the—-

    (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

    (ii) degree to which these impacts—

        (aa) can be reversed;

        (bb) may cause irreplaceable loss of resources, and

        (cc) can be avoided, managed or mitigated;

(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 measures 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 ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 Contact Person and Correspondence Address

1.1 Details of the EAP

Environmental assessment practitioner	**MIELELANI CONSULTANCY (PTY) LTD**
Contact person(s)	**Mugagadeli Phathutshedzo**
Physical address	**Unit 21**, Sunrise View, **24 Iron Terrace**, **West Park**, **Pretoria**, **0183**
Postal address	**Unit 21**, **Sunrise** View, **24 Iron Terrace**, **West Park**, **Pretoria**, **0183**
Contact number(s)	**081 312 3915/ 073 796 6769**
Telephone number	**012 012 5580**
Fax	**086 560 5316**
Email(s)	phathu@mielelani.co.za/ info@mielelani.co.za

1.2 Expertise of the EAP

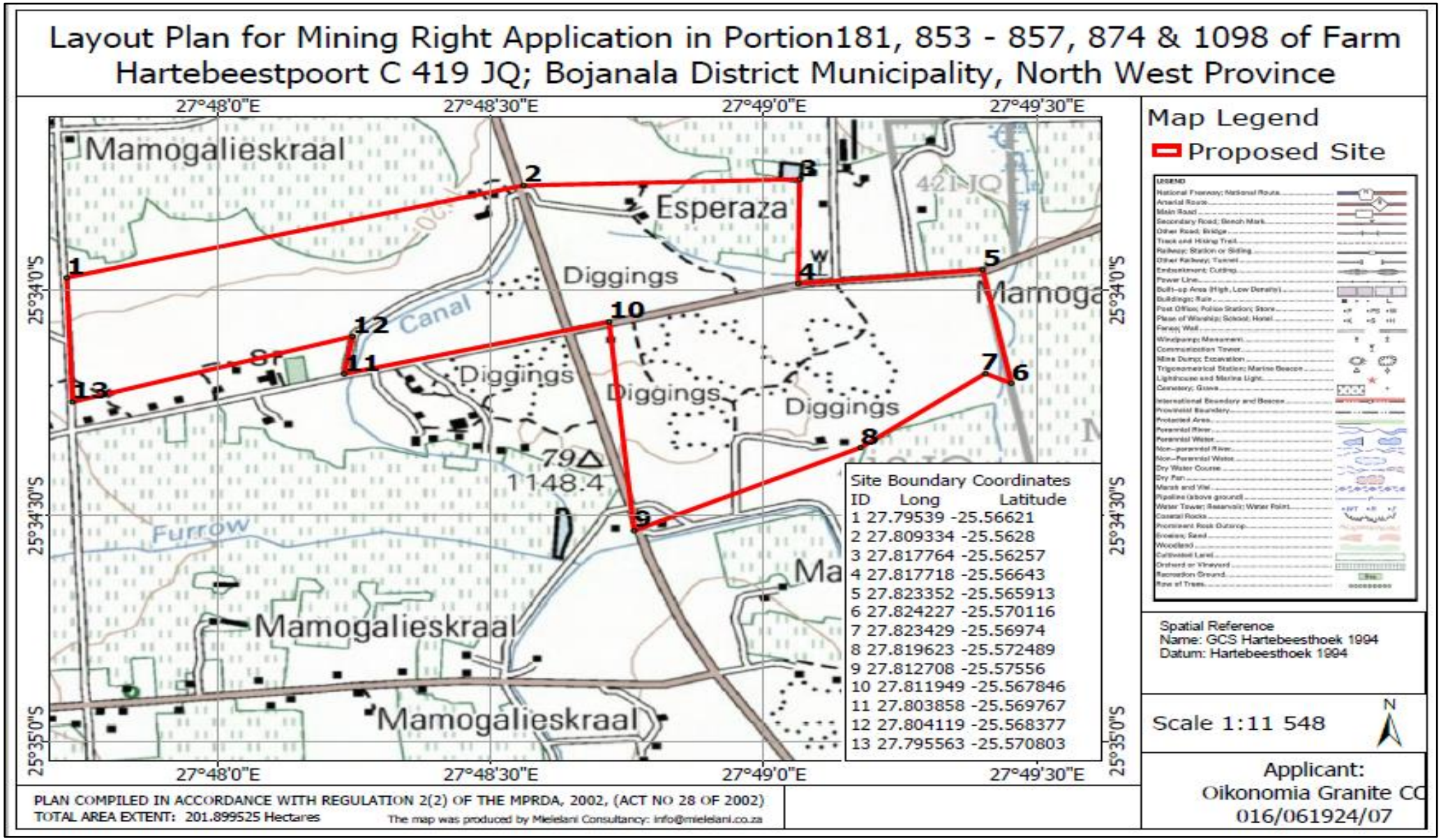
Mr. Ramulondi is a registered EAP with Environmental Assessment Practitioners Association of South Africa (EAPASA) and a registered Natural Professional Scientist with SACNASP. He has over five years of experience in conducting Environmental Impact Assessments (EIAs). Khuliso holds an Honors degree: Bachelor of Earth Sciences in Mining and Environmental Geology from the University of Venda. He has conducted EIAs for various projects including but not limited to Construction, Agriculture, Prospecting and Mining as well as Waste Management.

He currently serves as the ECO for the construction of Tshwane Automotive Special Economic Zone (TASEZ) in Silverton, Gauteng and has also served as an Environmental Control Officer (ECO) for Eskom 400 kV Powerline Construction in the Free State Province.

2 Description of the property.

Farm name	**Portion 181, 853, 854, 855, 856, 857 and 1098 of the farm Hartebeestpoort ''C'' 419 JQ**
Application area (ha)	**373.230119 Hectares**
Magisterial district:	**Bojanala Magisterial District**
Local government municipalities	**Madibeng Local Municipality**
Distance and direction from nearest town	**The proposed site is located 5 km north of Brits Town, North West Province**
21-digit Surveyor General code for farm portion	**T0JQ00000000041900181; T0JQ00000000041900853; T0JQ00000000041900854 T0JQ00000000041900855; T0JQ00000000041900856; T0JQ00000000041900857 T0JQ00000000041901098**
Locality map	**Locality map at a scale not smaller than 1:250000**

2.1 Locality map



3 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)

3.1 Listed and specified activities

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	Listed Activity (Mark with an X)	Applicable Listing Notice	Waste Management Authorisation (Mark with an X)
Any activity including the operation of that activity which requires a mining right in terms of section 22 of the mineral and petroleum Resource Development ACT ,2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to mining of mineral resources, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002) but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource. The activity will include: ❖ Topsoil & subsoil stripping stockpiling into berms; ❖ Overburden stockpiles; ❖ Drilling and blasting; ❖ Cutting of granite blocks; ❖ ROM Stockpiling	373.230 Hectares	X	GNR 325 Activity 17	X
The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	373.230 Hectares	X	GNR 327 Activity 11	
The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more.		X	GNR 327 13	
The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;		X	GNR 327	

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	Listed Activity (Mark with an X)	Applicable Listing Notice	Waste Management Authorisation (Mark with an X)
These will serve as primary mine access roads to the local routes and internal access roads.			24 (ii)	
The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic metres but less than 15000 cubic metres. ❖ Construction and operation of Ablution & change house with sewage treatment plant.		X	GNR 327 25	x
Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).		X	GNR 327 30	
The clearance of an area of 20 hectares or more of indigenous vegetation, for site establishment and infrastructure place.		X	GNR 325 15	
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. ❖ Construction and operation of Crusher Plant to be placed on site.		X	GNR 325 21	
The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. Outside urban areas, in: Critical biodiversity areas (Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; This will be to meet water requirement within the mine for both domestic and mine operations requirement		X	GNR 324 2 (e)(ii) (dd)	

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	Listed Activity (Mark with an X)	Applicable Listing Notice	Waste Management Authorisation (Mark with an X)
The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower- (a) is to be placed on a site not previously used for this purpose; and (b) will exceed 15 metres in Outside urban areas, in: Critical biodiversity areas (Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.		X	GNR 324 3(e)(ii) (ee)	
The development of a road wider than 4 metres with a reserve less than 13,5 metres outside urban areas, in: Critical biodiversity areas (Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans		X	GNR 324 4(e)(ii) (ee)	
The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 excluding conservancies; but not exceeding 80 cubic metres, Outside urban areas.		X	GNR 324 10.(f)(i)	
The clearance of an area of 300 square metres or more of indigenous vegetation (a) In Eastern Cape, Free State, Gauteng, Limpopo, North West and Western Cape provinces: Within critical biodiversity areas identified in bioregional management plan.		X	GNR 324 12 (a) (ii)	
Storm water management trenches: The mine will establish storm water management system which will be designed by a qualified engineer.				

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	Listed Activity (Mark with an X)	Applicable Listing Notice	Waste Management Authorisation (Mark with an X)
Establishment of the Run of Mine granite stockpiles within the proposed site				

3.2 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)

3.2.1 Minerals applied for

Oikonomia Granite Pty Ltd proposes to undertake a surface mining operations for Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite. The mining operations will be through an open cast

3.2.2 The proposed Mining Activities

Oikonomia Granite Pty Ltd proposes to undertake mining activities for Dimension Stone (general), Diorite/ syenite, Gabbro/norite and Granite/syenite through surface mining method also referred to as stone quarry. The applicant holds a Prospecting Right (NW 30/5/1/1/2/5/2 (11324) PR over the proposed site. The prospecting activities were successful undertaken and it was established the site resources are mineable through open pit mining method. The prospecting activities with bulk sampling are still ongoing and due to expire in 2022. The level of confidence on the site deposit is high based on the already conducted bulk sampling activities. The Life of mine (LoM) is expected to be approximately thirty (30) years. The life of the mine will precisely be determined by the Competent Person Report (CPR)

The mining will be done by open cast semi-mechanized method of mining. The excavation of mineral is proposed by excavators. The mineral is fractured and easily exploitable by rock and excavators. The hard strata are proposed to excavate after drilling and blasting. The bench height and width will be maintained 5 m. The Mining will be done with the help of tools such as drills, jack-hammer, compressors, hand shovel, picks, excavators etc.

The mining will be done open cast Semi mechanized. The working will be done by forming benches of 5 metres (average) height. The Stone production will be started from the first year the systematic working of open cast mines, the main development work will be the forming of systematic benching. The height of bench will not be kept more than 5 m at a time and the width of the benches will be always kept safe according to provisions. Loading of Stone will be done with the

help of shovel and excavators at face and at stock yard. The truck / tipper will be used for transportation of Stone from mine site to Destination.

First Stone bench will be opened by removal of Soil / Overburden than Stone will be mined out either by labour or with the help of an excavator. Considering the stability of rocks the final slope or say ultimate pit slope is proposed 45° from vertical. Haul road will be developed up to point of loading. Transportation of the mineral from pit-mouth to destination will be by tippers/trucks (20 Ton capacity).

3.2.2.1 Surface Stripping and Overburden

The site rock is low lying and in some areas covered by topsoil and overburden and areas where the rock is exposed. The covered rock will be exposed by removing the topsoil and the overburden.

3.2.2.2 Drilling and Blasting

The horizontally lying rock will be hard to excavate and will require drilling and blasting to obtain rock blocks. Drilling and Blasting will be used where the rock cannot be chipped to obtain larger sellable blocks.

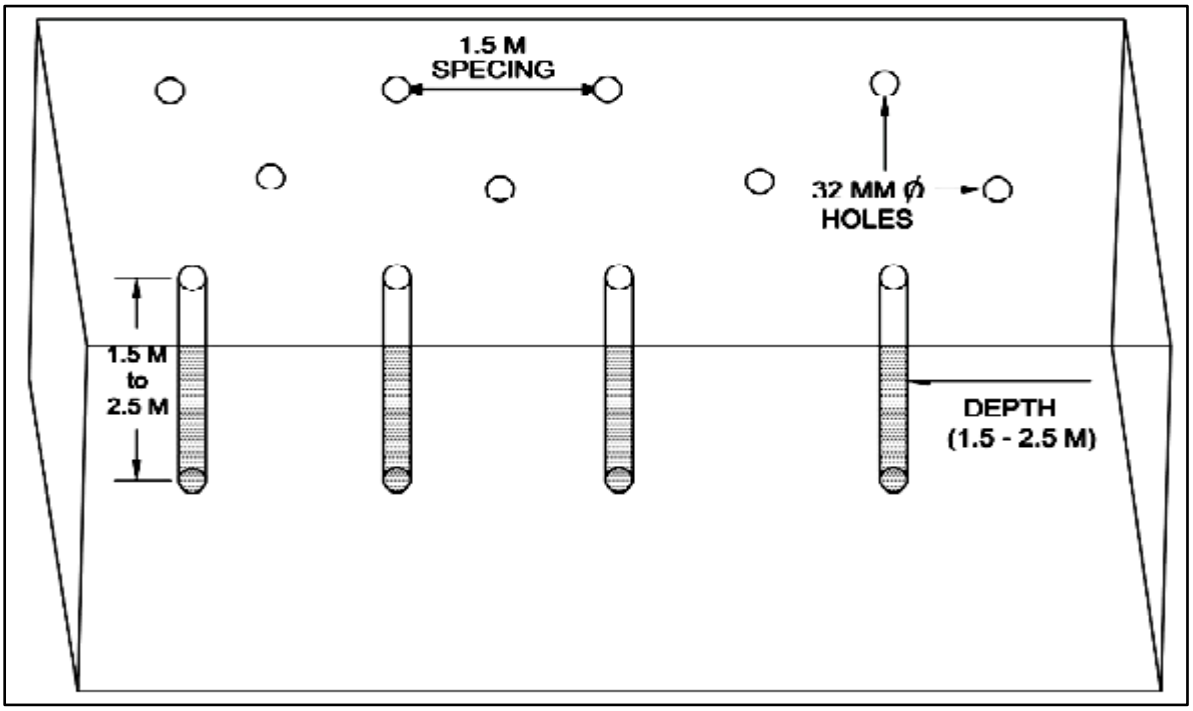


Figure 3-1: Drilling Cross-sectional View

The controlled blasting is proposed by adopting all the safety measures. Multiple blast holes of 1.5 to 2.5 m depth will be drilled with the help of 32 mm drill rod, Jack Hammer and Air Compressor of 100 cfm capacity. It is estimated about 250g of explosives per hole is required. About 30 – 50 holes per blast are proposed. Therefore, the requirement of explosives will be about 10 kg/ blast.

The blasting design system is properly planned with ideal spacing and burden patterns, ensuring appropriate stemming column and reduced optimized explosive charge, so that ground vibratory effects are less, fly rocks, etc. are properly regulated and controlled. The blasting pattern depends on the strata conditions of the rocks. Since the material in the site is Granite which is medium hard to full hard in nature, it requires drilling and blasting to exploit the same. Since conventional semi mechanized open cast method of quarrying/mining is done using drilling and blasting, the same is adopted in this mine/quarry. The drilling and blasting parameters are as given below:

Depth of each hole	1.5 to 2.0 m
Diameter of the hole	30 – 33 mm
App. Spacing between hole	1 – 1.5 m
App. Burden	0.6 – 1 m
Hole pattern :	Multi row staggered pattern
Explosives to be used	Cartridge Slurry / electric delay detonators

(a) *Blasting Safeguard*

- Blasting in the open cast pit will be done only during day time at designated hour;
- Maintaining safety distance all around the magazine as per statutory requirement;
- Only competent blasters will be appointed to handle explosives;
- Proper, safe and careful handling and use of explosives by competent blasters having Blaster's Certificate of Competency;
- Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area;

- Controlled blasting technique will be adopted by varying burden, spacing & charge per hole depending upon the field condition;
- Holes will be located beyond the weak zone after proper inspection of the site;
- No loose pieces will be kept on the bench slopes during blasting;
- Stemming materials and stemming length will be chosen suitably;
- Proper compaction of the stemming material will be undertaken before blasting;
- Carrying out blasting during designated time only that too day time only and displaying a board in the mine entrance specifying the blasting time;
- Posting guards at boundaries of the lease area and giving warning signal by way of whistle or siren blowing before blasting, to prevent unauthorized entry and to prevent mishaps;
- Avoiding blasting during lightening and high wind period; and
- The holes which have been charged with explosives will not be left unattended till blasting is completed.

(b) *Types of Explosive Used*

Only class 2 and class 6 explosive is proposed for use as given below:-

Booster (20%)	Slurry explosive
Explosive (Column charge) (80%)	Ammonium Nitrate Fuel oil (ANFO). The ANFO mixture can be readily produced at a site by mixing ammonium nitrate (94.5 %) with diesel oil (5.5 %).
Initiator	Electric detonators

(c) *Storage of Explosive*

Considering low consumption, a 250 kg magazine will be sufficient for storing the explosive. The magazines will be located within the complex. The controlled blasting is proposed by adopting all the safety measures.

3.2.2.3 Loading and Transportation:

Loading of the stone will be done with the help of shovel and excavators at face and at stock yard and will be sent to the temporary storage area where they will be sized according to the market needs. Trucks / Tippers of 15 Ton will be used for transportation of rock from mine site. It is expected that 10 - 15 trips will be required to transport on daily basis. For this, movement of truck per hour will be 1 - 3 only. Thus, the impact due to movement of trucks from the mine will be marginal and well within the capacity of the roads.

3.2.2.1 Equipment and/or Technology that may be used

The equipment required for this type of mining is readily available in South Africa. Local manufacturers and suppliers will supply the equipment.

Sr. No.	Machine Type	Required Quantity	Size/Capacity
1	Back Hoe	2	0.9 m^3
2	Rock Breaker	2	……..
3	Compressor	2	CFM/100
4	Tippers/Trucks	4	20 T
5	DG set	1	125 kVA
6	Water Bowser	1	1 000 litres

3.2.3 Mine Services

3.2.3.1 Water Supply

Oikonomia Granite will; bring water to site for storage in two 10 kilolitres water tank. The 20 kl tanks will be used for appropriately 2 weeks and therefore the water requirement for the mine on a monthly basis will be approximately 40 kl. The water will be used for washing the rock blocks, human consumption, sanitation and cleaning of equipment. The detailed breakup of the same is given below:-

Particulars	**Quantity KLD**
Domestic purpose	0.15
Dust Suppression / Water sprinkling	0.25
Green belt / Plantation	0.2
Washing of Blocks	0.73
Total	**1.33**

Water recycling will be practiced on site, rain water will be harvested by directing stormwater to the site pond. The harvested water will be used for dust suppression and cleaning/ washing of the granite blocks.

3.2.3.2 Power Supply

No electricity is needed for quarry operations as only diesel operated mining machineries are used. The mining operations is largely dependent on hydraulic equipment and as such the requirement of electrical power will be minimal. Electricity will be required to power the site mobile office.

Diesel generator and solar panels will be used for power generation. There will be no power connections to the local Eskom Grid.

3.2.3.3 Access Roads

The existing access roads on site will be used to access mining area. No new roads will be developed.

3.2.3.4 Waste

General and hazardous waste will be temporarily stored on-site in designated areas (waste/salvage yard), and disposed of at off-site permitted waste disposal facilities. The three R's principle will be applied to reduce the volume of waste to the disposal sites.

3.2.3.5 Sewage

Portable chemical toilets will be utilised and serviced regularly by external services providers during the construction and operational phases of the project.

3.2.3.6 Offices

The contractor will provide a mobile office.

3.2.3.7 Site Access

Access into the mining sites will be regulated and through the approved access gates. Security officers will be stationed at the access gates to control access into

the mining site. A routine perimeter inspection will be conducted by the security officers to identify any security breach.

3.2.3.8 Storage of Dangerous Goods

During the construction and operational phases, limited quantities of diesel fuel, oil and lubricants will be stored on-site. A maximum amount of 30 m^3 of diesel fuel may be stored in above ground diesel storage tanks with elevated bunded walls.

3.2.3.9 Staff and Housing

(a) *Employment*

Employment would constitute approximately 10 to 15 workers during the construction phase and approximately 15 to 20 full-time employees at peak production. Oikonomia Granite will ensure that equality is achieved during the sourcing of mine workers.

(b) *Operating times*

For mining activities, a 5.5-day work week with a one shift system. Operating hours would be from 06:00 to 18:00.

(c) *Housing*

Oikonomia Granite (Pty) Ltd will facilitate suitable employee accommodation that will allow employees to reside in a stable, healthy and secure environment within commuting distance from their place of work. The most immediate communities from which the workers will be sourced from, are the

3.2.3.10 Mine Scheduling

The mine lifespan is expected to be 15 – 20 years. A competent person report is being compiled to establish Prospecting activities were conducted with bulk sampling and the required mining support services have been established. On granting of mining right granite extraction will commence at steady pace throughout the mine life span.

3.2.4 Summary of the Proposed Mining Activities

Main activity/action/process	Ancillary activity
Planning and Design	
General mine management	Employment Human resource management Interaction with local community
Drilling for monitoring boreholes	Drilling
Construction	
General management	Employment Human resource management
Site preparation and site establishment	Clearance and preparation of soil stockpile areas Dust suppression Construction of temporary access roads Employment Fencing Hazardous substances management Truck and heavy machinery operation Site security Soil management Utilisation of portable toilets and generation of sewage Vegetation clearance Waste management
Construction of mineral processing Facilities	Dust suppression Earthworks Fencing Fuel storage and refuelling Hazardous substances management Power supply connections Soil management Vegetation clearance Waste management
Mine area site preparation	Clearance and preparation of soil stockpile areas Dust suppression Establishment of storm water management infrastructure for road network Fuel storage and refuelling Road construction Truck and heavy machinery operation
Site establishment – Temporary site office infrastructure	Dust suppression Fencing Fuel storage and refuelling Hazardous substances management Power supply connections Site security Soil management

Main activity/action/process	Ancillary activity
	Truck and heavy machinery operation Utilisation of portable toilets and generation of sewage Vegetation clearance Waste management
Water management infrastructure Construction	Construct the dirty and clean water management features Dust suppression Installation of pipelines for water management Installation of pumps, flow meters Truck and heavy machinery operation Vegetation clearance Rehabilitation of vegetation where necessary
Operation	
General management	Employment Human resource management Interaction with local community
Maintenance and operation of site infrastructure and facilities	Site security Employment Soil management Noise management Dust management Vegetation clearance Waste management Water management Maintenance and management of portable toilets by contractor Vehicle and foot traffic on-site Hazardous substances management Interaction with local community
Open pit mining	Dust suppression Establishment of in pit infrastructure Fuel storage and refuelling Hauling for mineral processing Pumping of in-pit water/dewatering Product stockpiling Soil stockpile management Removal of granite rock - truck and shovel Truck and heavy machinery operation Use and maintenance of portable toilets Vegetation clearance
Granite processing	Rock Sizing Product stockpile management Dust suppression Fuel storage and refuelling Hauling processed products Water management Waste management

Main activity/action/process	Ancillary activity
Decommissioning	
General mine management	Employment Interaction with local community
General decommissioning activities	Dust suppression Removal of waste
Infrastructure removal	Dismantling, removal and rehabilitation of unnecessary Infrastructure
Filling open pit voids	Filling the final open pit voids
Rehabilitation and Closure	
General mine management	Employment Human resource management
General surface rehabilitation	Profiling of area Replacement of subsoil and topsoil Ripping of roads and other compacted areas Managing the site for all post mining impacts to prevent any further pollution
Storm water management	Construction of contour berms or other erosion control measures
Re-vegetation	Dust suppression Fertilisation Seeding with local indigenous species
Post closure monitoring and Maintenance	Alien vegetation management Environmental monitoring of rehabilitated areas Erosion control measures
Application for closure certificate	Alien vegetation management Environmental monitoring of rehabilitated areas Erosion control measures

4 Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
Constitution of South Africa, specifically section 24(a), (b)(i) – (iii). The constitution of any country is the supreme law of that country. The Bill of Rights in Chapter 2 Section 24 of the Constitution of South Africa Act, 1996 (Act 108 of 1996) makes provisions for environmental issues and declares that: "Everyone has the right - (a) To an environment that is not harmful to their health or well-being. (b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: i. Prevent pollution and ecological degradation. ii. Promote conservation. iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development	Identification of possible impacts on the environment and the public participation process which protects the Rights of the Citizens	The mining activities will only proceed after effective consultation and probable impacts identified and assessed
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) section 16(1)(a)-(c)	The mining right application was lodged in terms of the MPRDA and requirements were satisfied.	The application for prospecting right was lodged and all required documents submitted.

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
National Environmental Management Act (107; 1998) section 23(1) & (2), 24(1); & 24(4)(b)(i) – (vii). The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA	Impact Assessment, Financial Provision, Mitigation Measures and Public Participation.	✓ The receiving environment will be thoroughly assessed during the EIR Phase; ✓ Probable impacts will have identified, assessed and their mitigation measures and monitoring mechanisms developed; ✓ Financial Provision for rehabilitation will be determined and the applicant will pay the amount before the right is issued; ✓ Affected and Interested Parties will be engaged and given opportunities to get involved in the proposed project.
NEMA Environmental Impact Assessment (EIA) Regulations, 2014; R 982 & R 983. In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity.	Entire document	✓ All triggered listed activities have been identified and applied for; ✓ Specialists report will be conducted in terms of the EIA Regulations and ✓ The public participation was done as per the said Regulations.
National Environmental Management: Waste Act The applicable waste act is no. 59 of 2008: National Environmental Management: Waste Act, 2008 (NEM:WA). On 2 June 2014 the National Environmental Management: Waste Amendment Act came into force. Waste is accordingly no longer	The conditions as set out in the Act will be used to design the mine layout and waste management strategies.	The Waste Management license has been applied for with the DMR as waste management listed activities are triggered by the proposed mining activities.

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
governed by the MPRDA, but is subject to all the provisions of the National Environmental Management: Waste Act, 2008 (NEMWA). Waste can be defined as either hazardous or general in accordance to Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste.		
National Heritage Resources Act (Act No. 25 of 1999) The National Heritage Resources Act aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations. Due to the nature and extent of the project, it is likely that some heritage resources and palaeontological features are likely to occur within the project boundary area.	Heritage Impact Study will be instituted during the EIR Phase	Heritage study was conducted and no sensitive sites were identified.
The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: Management of alien invasive species, threatened and protected species, biodiversity management plans and frameworks, and bioregional plans. The Act provides for sustainable usage of biodiversity resources.	Description of the receiving environment and Assessment of Probable impacts.	Biodiversity/ Ecology Study will be conducted by a qualified and experienced professional

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
National Water Act, NWA (Act No. 36 of 1998) The NWA recognizes that water is a scarce and unevenly distributed national resource which must managed encompassing all aspects of water resources. In terms of Chapter 4 of the NWA, activities and processes associated with the proposed mine and associated infrastructure, are required to be licensed by the Department of Water and Sanitation (DWS). An Integrated Use Licence Application (IWULA) will be lodged with the DWS in terms of Section 21 of the NWA, which lists several water uses requiring authorisation. Furthermore, an Integrated Water and Waste Management Plan (IWWMP) will be compiled and submitted in support of the IWULA.	Impact Assessment	✓ No water use license is required for this application; ✓ The water resource will be protected and no activities will take place within 100 metres of any water resource; and ✓ Any water required for drilling activities will be obtained from a legal source within the area and brought to site by a tanker.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004); GNR893, November 2013 regarding Scheduled Listed Activities. Mines are listed as Group C emitters (GNR283, April 2015). The dust monitoring will be conducted and measured against the dust fallout rates published in GNR827, November 2013. As a Group C controlled emitter, the mine will be required to register and report to the National Atmospheric Emissions Inventory System (NAEIS) as per GNR283 and GNR284, April 2015. Regulations (GN541, July 2015) pertaining to greenhouse gas emissions reporting will be applied on site, if relevant, once the regulations are promulgated.	Impact assessment & Management	NEM:AQA will be considered to determine whether an AEL is required for the project based on the final project description and layout. Dust monitoring will be incorporated into the monitoring plan of the EMPr report. EGM will register and report on NAEIS. This will be incorporated into the EMPr. Draft regulation will be applied once promulgated if relevant.

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
National Environmental Management: Protected Areas Act (NEMPAA), Act 57 of 2003 as amended and its associated regulations.	Receiving environment description	SANBI website and GIS tools were utilised to determine occurrence of protected areas around site.
Conservation Of Agricultural Resources Act (CARA), Act 43 of 1983 and Regulation GNR 1048 relating to alien and invasive species.	Impacts management and Receiving environment description	Alien invasive species management and monitoring programme will be developed.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996);	Impact assessment and management	Risk Impact Assessment to be conducted
THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA): The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promotes optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes (LUS); and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be re-zoned for mining purposes.	The current land zoning of the site is agriculture, rezoning will be applied towards the end of the EIA process.	The current land zoning of the site is agriculture, rezoning will be applied towards the end of the EIA process.

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
North West Terrestrial Conservation Plan: The conservation plan classify the environment in terms of their ecological sensitivity and importance. The categories are Critical Biodiversity Areas, Protected Areas, Ecological Support Areas and No natural remaining.	Impact Assessment & Description of receiving environment	The ecological categories will be fully explained in the EIR.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996);	Impact assessment and management	Risk Impact Assessment to be conducted
Policies, Regulations and Frameworks		
National Freshwater Ecosystems Priority Areas (NFEPA, Nel et al., 2011);	Impact Assessment & Description of receiving environment	The NFEPA Wetlands were identified and 100 metres buffers were created for each HGM.
The regulations regarding the planning and management of residue stockpiles and residue deposits and associated amendment: These Regulations pertain to the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation were published in 2015 and were amended in 2018. The Regulations and associated amendment relate to the assessment of impacts and the analyses of risks relating to the management of residue stockpiles and residue deposits, and involve the following: • The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact	Impact Assessment, Mine Design and Waste Management	A qualified personnel will compile residue waste management plan which will be incorporated into the EIR.

Applicable Legislation and Guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the Legislation and Policy context.
assessment conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998); • A risk analysis based on the characteristics and the classification set out in regulation 4 (characterisation of residue stockpiles and residue deposits) and 5 (classification of residue stockpiles and residue deposits) of these regulations must be used to determine the appropriate mitigation and management measures; and • A competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of these Regulations.		
DEA Guidelines on Public Participation	Used as a guide to inform of the public participation process.	Public Participation will be conducted in terms of the EIA Regulations of 2014 as amended
DEA Guidelines on Alternatives	Alternatives assessment	
DEA Guidelines on Need and Desirability	Need and desirability assessment	

5 Need and desirability of the proposed activities.

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

The need and desirability of the proposed mining activities were investigated and assessed based on the DEA (2017), Guideline on Need and Desirability. According to this guideline the concept of "need and desirability" can be explained in terms of the general meaning of its two components in which need primarily refers to time and desirability to place (i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed?), "need and desirability" are interrelated and the two components collectively can be considered in an integrated and holistic manner. The "need" relates to the interests and needs of the broader public.

Addressing the need and desirability of a development is a way of ensuring sustainable development – in other words, that a development is ecologically sustainable and socially and economically justifiable – and ensuring the simultaneous achievement of the triple bottom-line. The 2017 Need and Desirability Guideline sets out a list of questions which should be addressed when considering need and desirability of a proposed development. These are divided into questions that relate to ecological sustainability and justifiable economic and social development.

The questions that relate to ecological sustainability include how the development may impact ecosystems and biological diversity; pollution; and renewable and non-renewable resources. When considering how the development may affect or promote justifiable economic and social development, the relevant spatial plans must be considered, including Municipal Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) and Environmental Management Frameworks (EMF). The assessment reports will need to provide information as to how the development will address the socio-economic impacts of the development, and whether any socio-economic impact resulting from the development impact on people's environmental rights. Considering the need and desirability of a development entails the balancing of these factors.

In the National Spatial Development Perspective (NSDP) (2003 and updated in 2006) it is highlighted that, to achieve the goal of stimulating sustainable economic activities and to create long-term employment opportunities, it is required that spending on economic infrastructure is focused in priority areas ("spatial targeting") with potential for economic development, with development to serve the broader societies' needs equitably.

The New Growth Path (NGP) (2010) in turn highlights the need to focus on facilitating growth in sectors ("sectorial targeting") able to create employment on a large scale, while not neglecting more advanced industries that are crucial for sustained long-run growth, and encouraging stronger investment by the private and public sectors to grow employment-creating activities rapidly while maintaining and incrementally improving South Africa's core strengths in sectors such as capital equipment for construction and mining, metallurgy, heavy chemicals, pharmaceuticals, software, green technologies and biotechnology.

The National Development Plan 2030 (NDP) (2012) stresses that the threat to the "environment and the challenge of poverty alleviation are closely intertwined" and as such environmental policies should not be framed as a choice between the environment and economic growth. The NDP states that: South Africa faces urgent developmental challenges in terms of poverty, unemployment and inequality, and will need to find ways to "decouple" the economy from the environment, to break the links between economic activity, environmental degradation and carbon-intensive energy consumption.

The aspects of need and desirability of the proposed mining projects are discussed below in subsection 5.1 and 5.2.

5.1 Securing ecological sustainable development and use of natural resources

5.1.1 How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

Mining activities are very destructive in nature especially where ecology is concerned. The proposed mining activities will be undertaken through surface mining methods which requires clearing of extensive surface areas. Vegetation and Habitats will be lost at the direct mining surface. The summative site ecological background is a per the below:

The site assessment conducted to date has established that there are no protected or threatened ecosystems within the proposed site or 10 km radius from the proposed site, however a number of the (National Forest Act (NFA), 84 of 1998, protected *Sclerocarya Birrea* (Marula Tree). The Marula Tree cannot be cut and/or removed without tree removal permit issued by the Provincial (North West) Department of Agriculture and Rural Development (NWDARD).

According to the North West Terrestrial CBA of 2015, the site is located on a Critical Biodiversity Area 2 and an Ecological Support Area 2. Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses. Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs. The conducted site assessment to date has established that the site is partially transformed by agricultural activities and mining.

According to mining and Biodiversity guideline of 2013 the proposed site is located on sections with moderate to high biodiversity important areas. The proposed granite mining will negatively impact these important biodiversity area, an ecological specialist will assess potential impacts and degree of acceptable changes.

According to the South African National Vegetation Map, the proposed site is located within the Endangered SVcb 6 Marikana Thornveld.

5.1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity?

The proposed mining project will have negative impact on the ecosystem as the natural environment will be disturbed to make way for the developed of mining facilities. Mining activities are chiefly dictated to by the location of mineralised zones and can only be undertaken where a mineable resource exists. The prospecting activities established that the Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite deposits are at shallow depth of less than 50m mineable through surface mining. Surface mining have more direct negative impacts on the ecosystems as compared to underground mining. With the resource burial depth of less than 50 metres surface mining is the automatic choice.

5.1.3 How will this development pollute and/or degrade the biophysical environment?

Mining activities, especially surface mining activities, have the greatest potential to degrade the biophysical environment. The proposed mining activities will remove the granite rock resulting in an altered landscape.

Vegetation will be cleared to make way for surface mining and along with it the local habitats will be lost.

The proposed site is fairly dry with no surface water resource running through the proposed site. The proposed mining activities will have minimal impacts on local water resource.

Blasting activities will also be undertaken, which will generate tremors and noise affecting adjacent habitats.

5.1.4 What waste will be generated by this development?

The mine operations will generate both the general and hazardous wastes. The waste management license application has been lodged for together the Mining Right application.

Granite quarry operations generate the very small volumes of hazardous wastes, this is mainly because of the absence of sophisticated and chemical treatments of minerals. The secondary processing the granite undergoes is the shaping and sizing which generate dust.

Other waste source will be the hydrocarbons from the operating equipment. Hazardous hydrocarbon waste are manageable by defining maintenance area and placement of drip trays under stationary and leaking trucks and equipment. The storage of the hydrocarbons is also critical in preventing contaminations.

General waste will mainly be the domestic waste from the site mobile office comprised of food containers and left overs, and office stationery.

5.1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?

There are no know heritage significance site and /or artefacts within the proposed site. A heritage and archaeological study conducted did not identify any heritage significance sites and objects. The mining activities will be undertaken in a cautious approach, should any heritage significance resources be unearthed the operations will be stopped until an assessment is undertaken.

5.1.6 How will this development use and/or impact on non-renewable natural resources?

The project is aimed at extracting non-renewable Rock Deposit. On mine closure the non-renewable rock deposit will be depleted. The proposed mining activities are not expected to increase regional dependency on non-renewable resources. The proposed mining activities will not compete with local population for non-renewable resources.

The site power will be supplemented by the Solar Panel, which is a form a renewable energy.

5.1.7 How will the ecological impacts be resulting from this development impact on people's environmental right?

The proposed properties are unoccupied, with some areas used for agricultural activities. The applicant is not the land owner, therefore the farm owners will be the directly affected parties.

The proposed mining will make use of drilling and blasting agents, generating noise nuisance and ground tremors. The adjacent land users will be affected by these mine generated impacts.

5.2 Promoting justifiable economic and social development

The proposed mining project is expected to have a life span of at least 15 years. During that period the mine will provide sustainable job opportunities and contribute significantly to improving the social living standards of the surrounding community (Brits, North West). The most immediate communities form which the workers will be sourced are the Oukasie and the Elandsrand which are part of the Brits Town.

Mining operations are legally obligated to improve the living standards of the most immediate surrounding communities. Oikonomia will through, the Social Labour Plan (SLP) identify projects through which they can improve the living conditions of the surrounding communities. The SLP is prepared in consultation with the local Municipality's (Madibeng) Local Economic Development (LED) Department.

The proposed project will benefit society and the surrounding communities both directly and indirectly by generating additional employment at the proposed operation. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. Through employment, persons at the mine will also gain skills involved in the construction and operation of a mine.

The proposed site is unoccupied, used as a mine area. On completion of the mining operation the Applicant will rehabilitated the site and the Department of Mineral Resource will ensure that the site is rehabilitated to acceptable standards. The cost of rehabilitation will be calculated using the DMRE's guide and the applicant will ensure that the rehabilitation funds are made available before the

mining activities are undertaken. The rehabilitation funds will be kept under the custodianship of the DMRE for the entire duration of the mining process.

Regular inspections will be conducted by the Department of water Affairs, Department of Mineral Resources and the Department of Environmental Affairs to ensure continuous compliance to operating licences and permits. The applicant will conduct monitoring programmes which will be developed during the EIR phase of this application. An external independent environmental compliance monitor will be appointed by the applicant to audit and monitor compliance to the operating licenses and permits reporting to the competent authority.

6 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 site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

6.1 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

The identification of alternatives is a key aspect of the success of the environmental scoping phase. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess in the EIA phase. There are, however, some significant constraints that have to be taken into account when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which will be discussed as part of the evaluation of the alternatives for this project. Alternatives can typically be identified according to:

- Property or locality;
- Type of activity;
- Design or layout;
- Technology;
- Operational aspects; and
- The "no-go" alternative.

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts.

In this section the various alternatives considered are described and their advantages and disadvantages are presented where applicable. Furthermore, the feasibility of the considered alternatives, from both a technical as well as environmental perspective, is determined and the result thereof are the alternatives, towards the selection of preferred alternatives. Essentially,

alternatives represent different means of meeting the general purpose and need of the proposed project through the identification of the most appropriate and feasible method of development.

Alternatives can further be distinguished into discrete or incremental alternatives. Discrete alternatives are overall development options, which are typically identified during the pre-feasibility, feasibility and or scoping phases of the EIA process (DEAT, 2004). Incremental alternatives typically arise during the EIA process and are usually suggested as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation and management measures and are not specifically identified as distinct alternatives.

Alternatives were chosen based on the consideration of both geological attributes, site sensitivity and current land uses on the site. Geological attributes were determined with the use of geological maps. Also, the local geology determines the type of technology to be used, such as geological core drilling and pitting or trenching with back tractors. A comparison of cost-benefit of alternatives chosen was done to choose the most cost-effective methods that are environmentally sound. Existing infrastructure was also considered. Areas that need protection would be excluded from the targeted sites in the demarcation process. Existing infrastructure that could be of use was also considered such as farm roads to ensure minimal impact on the environment.

6.1.1 The property on which or location where it is proposed to undertake the activity

Mineral resources are by nature very difficult to locate, as it requires extensive prospecting and calculated stock determination; minerals can only be mined where they exist. The proposed property is in an area with mining activities and extensive prospecting has indicated the presence of Dimension Stone (General), Diorite/Syenite, Gabbro/Norite And Granite/Syenite on this property. Mineral can only be mined where identified and verified, therefore it was not practical to select other sites. No location alternative was considered.

6.1.2 The type of activity to be undertaken;

The proposed site has abundant Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite deposits as determined through prospecting activities. In order to extract the rock deposit deposits a mine must be established. In this regard a mine is the only feasible option Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite extraction method available to the applicant.

The current land use is predominantly agriculture, mainly grazing (unimproved grasslands) with limited cultivation. Livestock Farming: Sheep and Cattles; and Crop Farming: Maize

6.1.3 The design or layout of the activity;

The complexity of the mineral deposits determines how the mine must be designed. The prospecting activities has established that the Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite deposit is at a shallow depth between 1 – 8 metres mineable through surface mining. Other mining options available is the underground mining method which is the preferred choice for deeply buried deposits and where the hard rock can support the hanging walls.

It has been established that the rock deposits are at a shallow depth and mineable through open pit mining method. The Open Pit mining method have low health and safety risks as compared to the underground mining. However, the surface mining pose high environmental impacts risks as compared to the underground mine.

The opencast mining method has several factors that make it more favourable when compared to other mining methods such as underground mining and these include the following:

- Economic and financial – higher productivity during the ROM and lower capital and operating costs to mine (i.e. more cost effecting as more ore can be extracted and more quickly);

- Technical – allows for improved geological certainty of reserves, and possible exposure of lower grade reserves because of the lower operational costs. Furthermore, there is increased recovery of ore and fewer restrictions or limitations on mining equipment / machinery in terms of size and weight; and
- Safety – working conditions are safer for the mine workers with regards to toxic gas and the risk of cave in or loose material which can be easily seen, removed or avoided.

Despite the factors mentioned above, there are environmental concerns regarding opencast mining due to the method's anticipated disturbance footprint on the receiving environment. However, the environmental impacts from the proposed mining project are assessed and addressed below and will also be addressed by other related legal requirements that must be undertaken and authorisations obtained prior to approval. Further, the opencast mining method allows for progressive and concurrent backfilling and rehabilitation of affected land throughout the ROM, thereby limiting the affected receiving environment throughout operations. Additional mitigation measures to address all identified potential environmental impacts are included in the EMPr towards ensuring that any environmental sensitivities and impacts are managed in accordance with the relevant legislation.

6.1.4 The technology to be used in the activity

6.1.5 The operational aspects of the activity

Water requirement: The water requirement can be met through sourcing water from the local municipality connection or from the local registered boreholes. No new boreholes will be drilled on site for water sourcing. A consent will be obtained from the municipality for water usage. The water usage onsite is not expected to trigger the NWA Listed activities which would require water use application.

Waste Management: The principle of Reduce, Re-use and Recycle will be implemented at all times. The waste must be separated at source and disposed at an appropriate waste management facility.

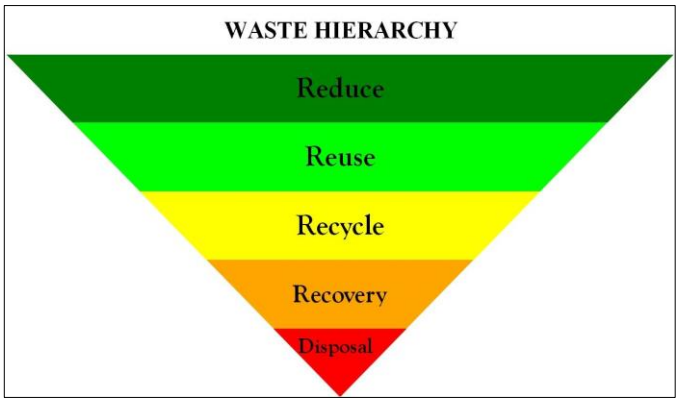


Figure 6-1: Waste Management Hierarchy

Access Roads: The existing access tracks on site will be used to access drilling points. No new roads will be developed without prior communication with the landowner.

6.1.6 The option of not implementing the activity

The option of not implementing the activity also referred to as a "No-Go" option ensures that the current status quo remains. The scoping has established that some sections of the proposed site are largely in their natural state, whilst other areas within the proposed site have been transformed by agricultural activities. The no-go option will ensure that the site current natural state will remain as it is.

It has been established that the proposed site is located within the threatened Marikana Thornveld and there are the protected Marula Trees on site which will be affected by the proposed mine. The site according to the North-West Biodiversity Plan is located with Critical Biodiversity Area 02 and Ecological Support Area 1. The ecological management objective for the area is threatened by the proposed mine also taking into consideration the cumulative impact from the surrounding agricultural and mining areas. The option of not implementing the proposed mining activities will ensure that the management objective of the area is achieved. It becomes very critical to identify other suitable areas that will meet the same ecological management areas that will meet the same objectives should the mining activities be implemented.

The applicant (Oikonomia Granite) holds the prospecting right over the proposed mining site. The prospecting activities have been conducted with bulk sampling

largely impacting the local ecology. The proposed mining activities will be undertaken on target areas within the proposed site, not the entire approved area. The areas not targeted for mining activities must therefore be used to improve the ecological state of the site.

The prospecting activities has established that the site has abundant rock deposit mineable through surface mining method with a life span of at least 15 years. The mine has the potential to create sustainable jobs for the entire duration of the mining operation whilst also transferring skills to the local community. The social labour plan will also identify means through which the proposed mine can help upgrade the standard of living for nearby communities. The site has been established as mineralised and other activities besides mining have great potential for sterilizing the ore deposits and huge potential economic returns would be lost. The no-go alternative would mean that the benefits of local and regional employment at the mine would not be realised in the long term. The potential employment and economic benefits will therefore be fore-gone. The no-go alternative would maintain the current environmental status quo at the site

6.2 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.

6.2.1 Summary of the Public Participation Process undertaken for the Scoping Phase

The PPP undertaken was in accordance with the requirements of Section 6 of the EIA Regulations (GNR 326; 2017). Land owners where identified through online search engines accessing the Title Deed office database. In addition to land owners, other relevant organisations where identified and notified of the application. This included municipal and State departments with jurisdiction in the area and Non-governmental Organisations (NGOs) with an interest.

A meeting with land owner's representative was held to engage them regarding the proposed mining project.

The PPP tasks conducted included:

1. Identification of key Interested and Affected Parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties);
2. Formal notification of the application to key Interested and Affected Parties (IAPs) (all adjacent landowners) and other stakeholders;
3. Consultation and correspondence with IAPs and Stakeholders and the addressing of their comments; and
4. Newspaper adverts.

6.2.1.1 IAPs and Stakeholder identification, registration and the creation of an electronic database

Interested and Affected parties (IAPs) representing the following sectors of society has been identified:

- ❖ National, provincial and local government;
- ❖ Agriculture, including local landowners;
- ❖ Community Based Organisations;

- ❖ Non-Governmental Organisations;
- ❖ Water bodies;
- ❖ Tourism;
- ❖ Industry and mining;
- ❖ Commerce; and
- ❖ Other stakeholders.

6.2.1.2 Formal notification of the application to key Interested and Affected Parties (adjacent landowners) and other stakeholders

The project was announced as follows:

1. Newspaper advertisement

An advertisement is placed in a Platinum Weekly newspaper announcing the release of the scoping report.

2. Site notice placement

In order to inform surrounding communities and adjacent landowners of the proposed development, site notices were erected on site and at visible locations in the vicinity of the project, around Brits town and around the mining areas.

3. Written notification

I&AP's and other key stakeholders will be notified of the project. A background information document and landowner notification letter were also sent out to the identified I&AP's. The draft scoping report were available for comment for at least 30 days

4. Background Information Document

A Background Information Document (BID) was distributed (by emailed) to land owners. The BID provides information concerning the proposed project and invites IAPs to register. IAPs should distribute the documents to other parties who may be interested or affected by the project.

6.2.1.3 Consultation and correspondence with IAPs and Stakeholders and the addressing of their comments (continuous).

Meeting was held with the land owner's representative to discuss project EIA related matters.

6.2.1.4 Public Review of the Scoping Report

This scoping report was released to the public for review and comment from the 20th of October 2020 to 19th of November 2020. All registered stakeholders and I&AP's were notified of the report's availability for comment for 30 days.

Additional electronic and or hard copies were made available to interested and affected parties and stakeholders who request for them. Hardcopies of the report were also submitted to all commenting organs of state and relevant authorities.

6.2.1.5 Received correspondences

The received corresponds for the Scoping Phase will be recorded together with the comments and response report for this EIA Report.

6.2.2 The PPP for the Environmental Impact Assessment Report Phase

All PPP undertaken is in accordance with the requirements of Section 06 of the EIA Regulations (GNR 326; 2017). The project Interested and Affected Parties were identified during the Scoping Phase. Registration of IAPs has remained open, and will remain open until the PPP closing date for finalisation of the EIA Report.

6.2.2.1 Registered Formal notification of the application to key Interested and Affected Parties (adjacent landowners) and other stakeholders

The project was announced as follows:

1. Newspaper advertisement

An advertisement is placed in a Platinum Weekly newspaper announcing the availability of the scoping report.

2. Site notice placement

In order to inform surrounding communities and adjacent landowners of the proposed development, site notices were erected on site and at visible locations in the vicinity of the project, around Brits town and around the mining areas.

3. Written notification

The registered IAPs from the scoping phase were all sent a copy of this EIA report.

6.2.2.2 Consultation and correspondence with IAPs and Stakeholders and the addressing of their comments (continuous).

The consultation process is continued from the Scoping Phase. The main consultation activities to date are the following:

- A meeting with legal representative of the land owners who were raising their concerns in connection with the current prospecting activities, the roads conditions and the rehabilitation process undertaken to date for the bulk sampling prospecting activities; and
- An inspection undertaken by the Department of Forest, Fisheries and Environment (DFFE). The inspection was mainly to assess the NFA protected species.

6.2.2.3 Public Review of the Draft EIA Report.

The draft report will be made available to all registered IAPs and public places as from 25 May – 25 June 2021.

6.3 Summary of issues raised by I&APs

(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 issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s					
Lawful occupier/s of the land					

Landowners or lawful occupiers on adjacent properties					
Municipal councillor					
Municipality					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e					
Communities					
Dept. Land Affairs					

Traditional Leaders					
Dept. Environmental Affairs					
Other Competent Authorities affected					
<u>OTHER AFFECTED PARTIES</u>					
<u>INTERESTED PARTIES</u>					

7 The Environmental attributes associated with the development footprint alternatives.

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

7.1 Type of environment affected by the proposed activity.

7.1.1 Topography

The entire site gently slopes towards north east. The highest point which is on southern side of the site is 1402 m and the lowest point which is on the north east of the site is at 1116 m.

7.1.2 Climate

The proposed mining site is located approximately 5 km to the north west of Brits Town. The climate for Brits Town can be best described in terms of two seasons which is the wet and warm September – April of the following year period and the cold and dry May to August Period.

The proposed site is located within rain zone A2D, with Mean Annual Precipitation (MAP) of 635 mm. The proposed mining site is located within Evaporation Zone 3B, with evaporation range of 1700 – 1800 mm annually, and mean apan evaporation ranging between 2200 – 2600 mm. According to Köppen and Geiger, this climate is classified as BSh. The average annual temperature in Brits is 19.4 °C | 66.9 °F.

Table 7-1: Site Climatic Data

Months	Average Daily Temperature (°C)	Night Average Temperature (°C)	MAP (mm)	Humidity (%)	Number of Rainy Days
January	28.9	18.3	102	60%	11
February	28.9	18.3	95	57%	9
March	27.5	16.8	82	58%	8
April	24.7	13.4	38	58%	5
May	22.6	9.3	17	51%	2
June	20	6.2	6	49%	1
July	20.1	5.6	3	43%	0
August	23.7	8.4	7	36%	1
September	27.6	12.3	17	33%	2
October	29.1	15	57	41%	6
November	28.8	16.4	87	51%	9
December	28.8	17.8	118	59%	11

The December and January are the wettest and hottest period in Brits with MAP of 118 and 102 mm respectively and equal number of rain days of 11. July is the driest month with no rain days. The period June and July are the coldest, with temperatures reaching as low as 6.2 °C and 5.6 °C respectively. The graphical representation of the site climate is shown in Figure 7-1 below.

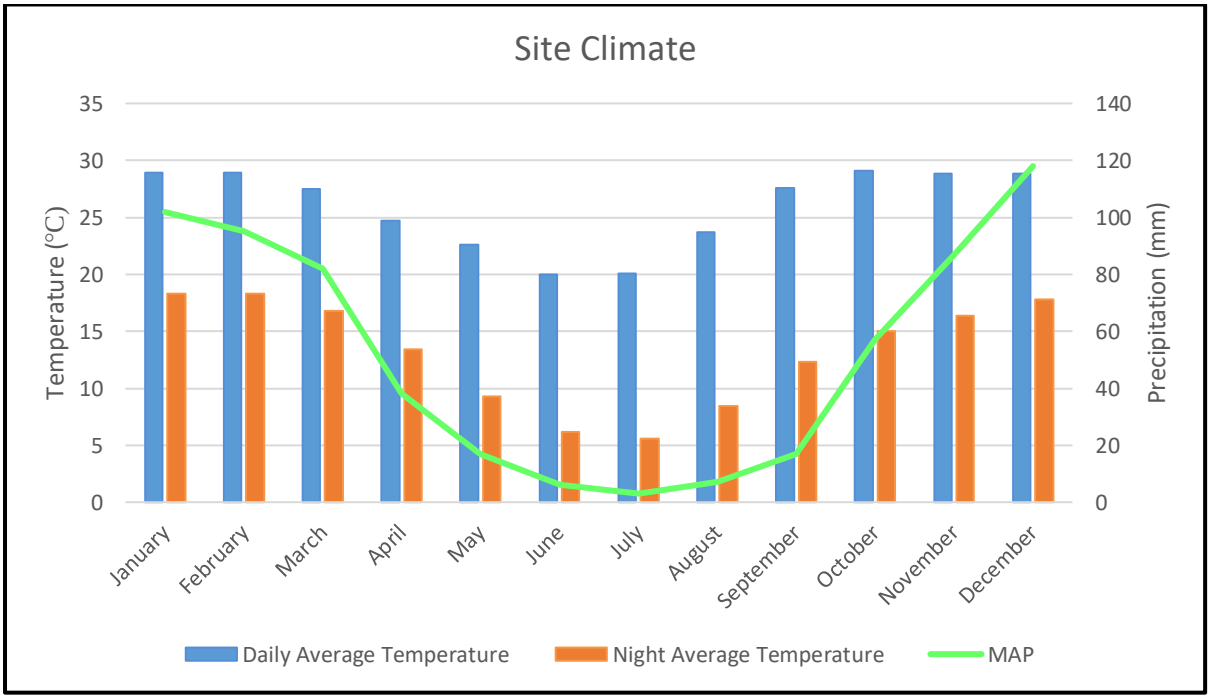


Figure 7-1: Site Climate background

Wind

The proposed site mainly experience wind blowing from the North East, rarely do the wind blow from the South-West.

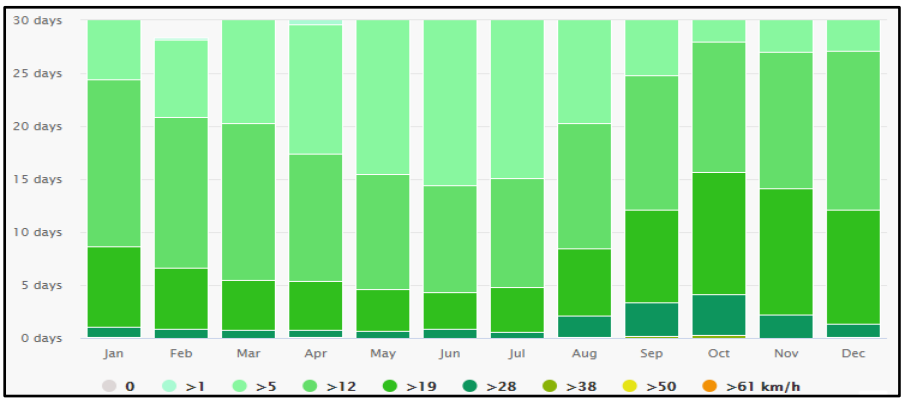


Figure 7-2: Site Windy Days and Speed

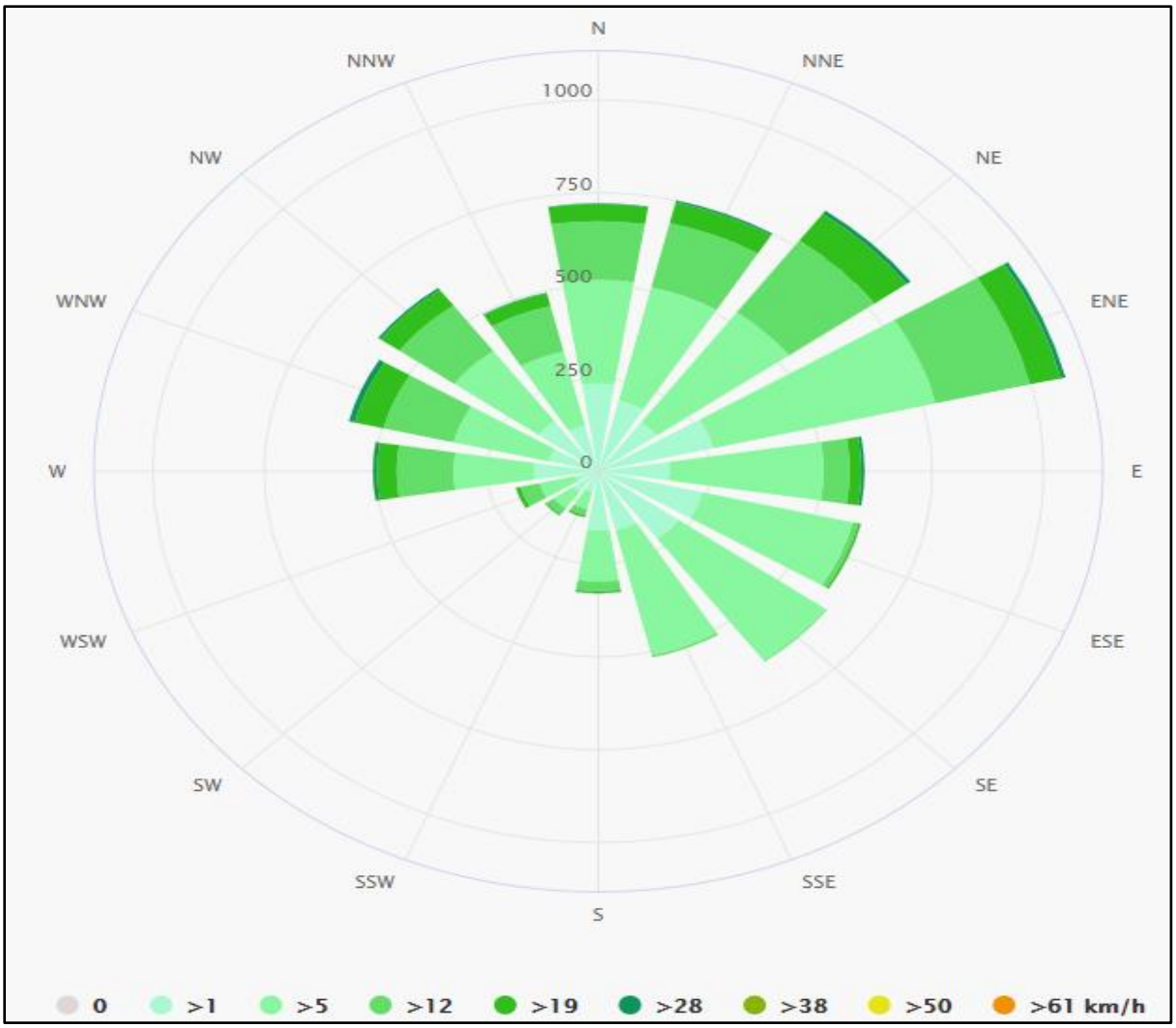


Figure 7-3: Site Wind Rose

7.1.3 Site Water Resources

The study area is located within the catchment A21J which falls within the Crocodile (West) and Marico water management area number 3. Quaternary catchment A21J has a catchment area of 1151 km^2 and a MAR of 22.65 million m^3.

Hartbeespoort Dam is the most significant surface water resource within the catchment. The dam is located at 18 km south of the proposed mining site. The A21J catchment which is located in the southern regions of the Crocodile West and Marico catchment management area.

7.1.3.1 Surface Water

There are no surface water resources (wetlands and streams) within the proposed site. A canal from the Hartbeespoort Dam is located on the south at approximately 150 metres.

Other man-made water resources are the dams/ ponds within the proposed site created by local farmers for irrigation and drinking water supplies for the livestock. The site ponds are interconnected by canals.

The Rosespruit River is located on the north of the proposed site, flowing in westerly direction into the Crocodile River. The Crocodile River is located on the west of the proposed site at approximately 4 km. The two rivers are National Freshwater Ecosystem Priority Areas (NFEPA) according to the 2011 NFEPA project conducted by Nel *et al.* The river conditions are represented in Table 7-2.

Table 7-2: River Conditions

	Crocodile	Rosespruit
NFEPA	X	X
PES	Class C: Moderately Modified	Class C: Moderately Modified
River Condition	C	D
Ecoregion	E	E
River Order	3	2
Flowing Season	Perennial	Non-Perennial

7.1.3.2 Ground water

According to Vegter's ground water regions the proposed site is located in region 14. The proposed site is underlain by Acid and intermediate extrusives of the Western Bushveld Complex with borehole yield ranging between 0.5 – 2.0 l/s. The average depth to the ground water resource is 13.98 m. According to the Aquifer Classification Map of South Africa (2013), the proposed site is within the minor aquifer region described as moderately-yielding aquifer system of variable water quality. The site aquifers are considered least vulnerable according to the Aquifer Vulnerability Map of South Africa which indicates the likelihood for contamination to reach a specified position in the groundwater system after introduction at some

location above the uppermost aquifer. According to the aquifer classification map (2013).

The site aquifer susceptibility is considered low according to the SA Aquifer Susceptibility Map of South Africa which indicates the qualitative measure of the relative ease with which a groundwater body can be potentially contaminated by anthropogenic activities and includes both aquifer vulnerability and the relative importance of the aquifer in terms of its classification. The table below provides the site geohydrological background.

Table 7-3: Site Geohydrological Background

Vegeter's Groundwateer Region	14
Electrical Conductivity	70 - 300 mS/m
Average Depth to Groundwater	12.83 m
Exploitation Factor	0.375000
Mean Recharge	24 mm/a
Transmissivity	100 m^2/day
Relative Transmissivity	Moderate
Thickness of Fractured zone	122.65 m
Storage Volume in the Fractured Zone	5146.85 $m^{3/}km^2$
Thickness of Weathered Zone	24.84 m
Storage Volume in the Weathered Zone	27217.24 m^3/km^2
Storage Volume in the Aquifer	32364.1m^3/km^2
Average Groundwater Resource Potential (AGRP)	22060.41 $m^3/km^2/a$
Average Groundwater Exploitation Potential (AGEP)	8801.64 – 11002.05 $m^3/km^2/a$
Potable Groundwater Exploitation Potential (PGEP)	5790.86 $m^3/km^2/a$
Utilisable Groundwater Exploitation Potential (UGEP)	8278.77 $m^3/km^2/a$
Yield	0.5 - 0.2 l/s

7.1.4 Air quality

The air impact is mainly from agricultural activities and mining: methane; fungal spores and pollen, and odours. From transport: particulate matter; volatile organic compounds; lead; nitrogen oxides, and carbon oxides.

Sensitive receptors have been identified in the immediate vicinity of the study area and proposed project area. The following may be affected by dust if not properly mitigated:

- farm homesteads
- Agricultural cultivated around the area
- Surface water bodies

The following sources were identified as potential pollutants:

7.1.4.1 Vehicle exhaust gases

Vehicle exhaust gasses contain pollutants like carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NOx), sulphur and PM10. Tiny amounts of poisonous trace elements like lead, cadmium and nickel were also present. The quantity of each pollutant emitted depends on the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air. Pollutant concentrations in the air can be measured or modelled and then compared with ambient air quality criteria.

7.1.4.2 Veld fires

Veld fires are widespread across the world, occurring in autumn, winter and early spring. In addition to controlled burning for fire breaks and veld management, many fires are set deliberately for mischievous reasons. Some are accidental, like those started by motorists throwing cigarettes out of car windows. Emissions from veld fires are similar to those generated by wood combustion. Whilst veld fire smoke primarily impacts visibility and landscape aesthetics, it also contributes to the degradation of regional scale air quality. Dry combustible material is consumed first when a fire starts. Surrounding live, green material is dried by the large amount of heat that is released when there are veld fires, and sometimes this material also burns. The major pollutants from veld fires are particulate matter,

carbon monoxide, and volatile organics. Nitrogen oxides are emitted at rates from 1 to 4 g/kg burned, depending on combustion temperatures. Emissions of sulphur oxides are negligible (USEPA, 1996).

7.1.4.3 Agricultural activities

The activities responsible for the release of particulates and gasses into atmosphere do, however, include:

- Particulate emissions generated due to wind erosion from exposed areas
- Particulate emissions generated due to the mechanical action of equipment used for tilling and harvesting operations

7.1.4.4 Trucks passing on the gravel road, loading and offloading raw materials

Dust emissions occur when soil is crushed by a vehicle, due to its low moisture level. Vehicles used on the roads will generate PM-10 emissions throughout the area and carry soils onto the paved roads, thereby increasing entrainment PM-10 emissions. The quantity of dust emissions from unpaved roads varies linearly with the volume of traffic.

7.1.4.5 The Plume Air Quality Index (AQI)

The Plume Air Quality Index (AQI) is the overview of the breathing air. The **Pollution Thresholds are** based on the WHO recommendations for annual, daily, and hourly exposure guidelines, along with other global institutions, including the European Commission, the Chinese Air Quality Standards, and the United States EPA. The table below defines the Air Quality Index scale as defined by the US-EPA 2016 standard:

Table 7-4: AQI Categories Description

AQI	Air Pollution Level	Health Implications
0 – 50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk
51 – 100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health

		concern for a very small number of people who are unusually sensitive to air pollution.
101 – 150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151 – 200	Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects
201 – 300	Very Unhealthy	Health warnings of emergency conditions. The entire population is more likely to be affected.
300+	Hazardous	Health alert: everyone may experience more serious health effects

(a) *Site Plume Air Quality Index*

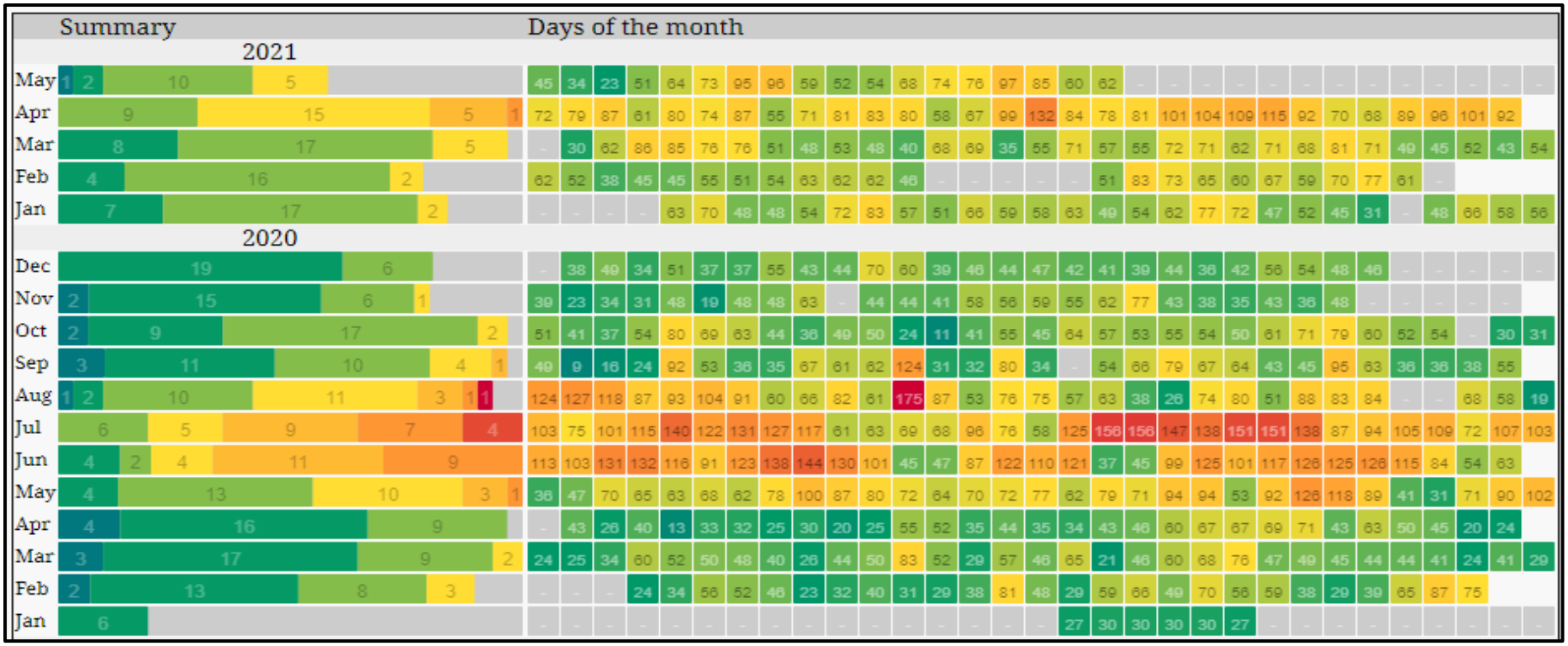


Figure 7-4: Site AQI Background (PM 2.5) (1)

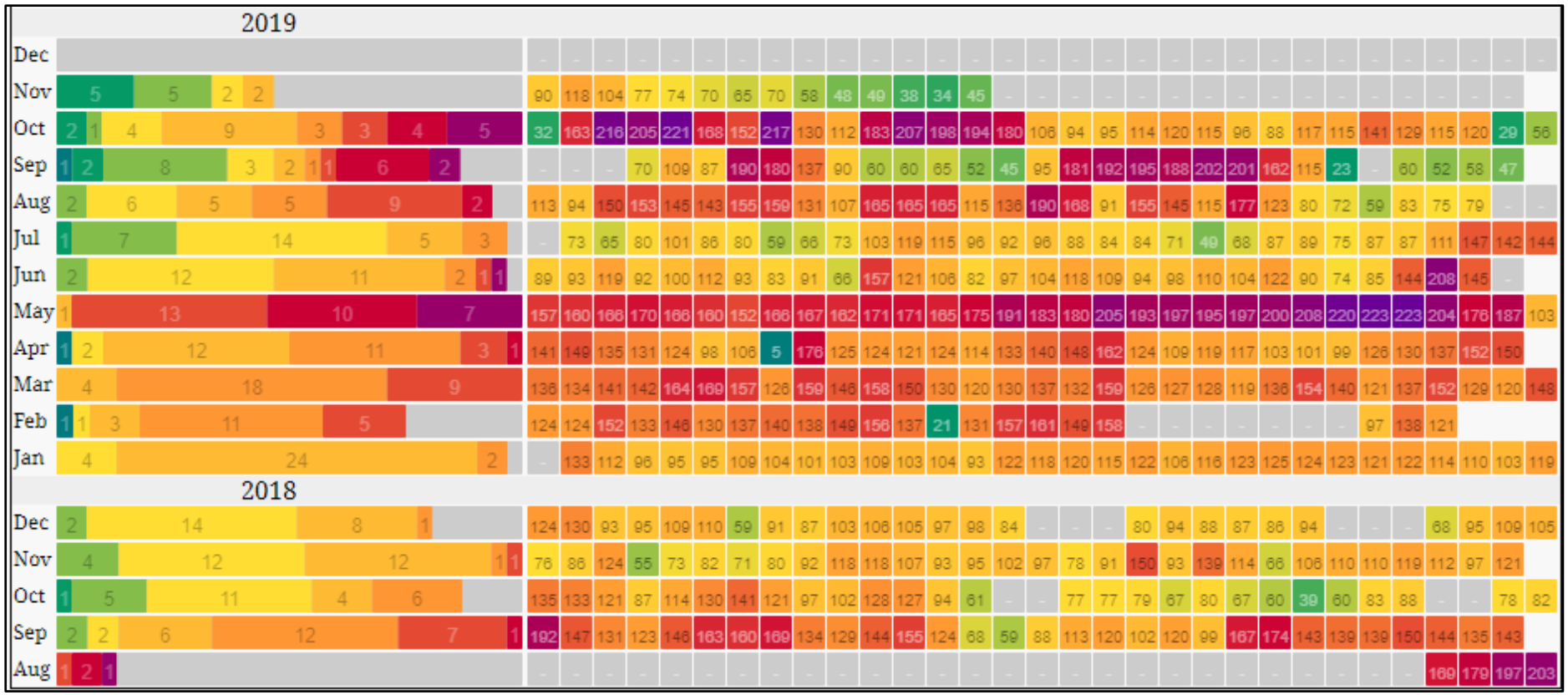


Figure 7-5: Site AQI Background (PM 2.5) (2)

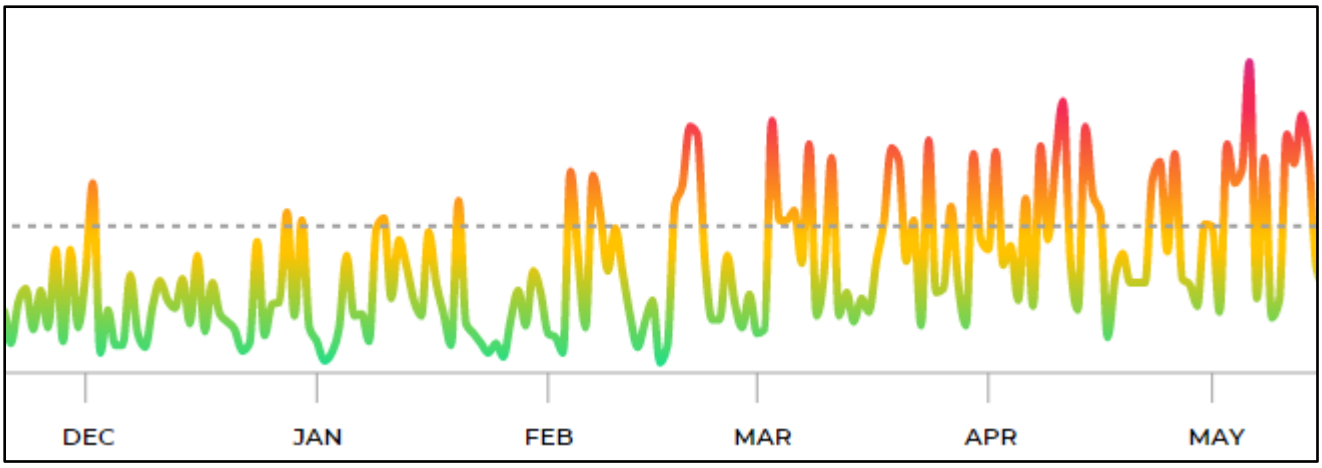


Figure 7-6: Graphical Presentation of Site AQI.

7.1.5 Geology

7.1.5.1 Regional Geology

The proposed site is located within the Bushveld Igneous Complex. The Bushveld Complex is seated in the central northeast portion of the Kaapvaal craton and is regarded as having been emplaced in an intra-cratonic, anorogenic setting possibly related to mantle pluming. The BIC was intruded about 2,060 million years ago into rocks of the Transvaal Supergroup along an unconformity between the Magaliesberg quartzites (Pretoria Group) and the overlying Rooiberg felsites (a dominantly felsic volcanic precursor).

The BIC is by far the most economically important of these deposits as well as the largest in terms of preserved lateral extent, covering an area of over 66,000 km^2. It has a maximum thickness of 8km, and is matched in size only by the Windimurra intrusion in Western Australia and the Stillwater intrusion in the USA (Cawthorn, 1996). The mafic component of the Complex hosts layers rich in PGEs, nickel, copper, chromium and vanadium. The BIC is reported to contain about 75% and 50% of the world's platinum and palladium resources respectively (Vermaak, 1995). The mafic component of the BIC is subdivided into several generally arcuate segments/limbs, each associated with a pronounced gravity anomaly. The Kaapvaal Craton covers an area of approximately 1.2 x 106 km^2 and comprises predominantly granitoids interspersed with greenstone belts, covered by a variety of Neo-Archean to Mesoproterozoic sedimentary and volcano sedimentary basins (Good & De Wit, 1997). The Complex is composed of four lobes in the north, east, south and west about an east-northeast and northnorthwest set of axes, and it has a long axis of approximately 470 km and a short axis of approximately 380 km.

Field relationships indicate that the Rashoop Granophyre Suite (2061.8 + 5.5 Ma; Harmer & Armstrong, 2000) predates the intrusion of the Rustenburg Layered Suite (2054.4 + 2.8 Ma UPb SHRIMP; Harmer & Armstrong, 2000) and occurs as an intrusive sheet into the Rooiberg rhyolites and the Transvaal Supergroup rocks (Kleeman, 1985). The granophyres are thought to be a cogenetic, shallow intrusive equivalent of the Rooiberg Group volcanic event. The granophyrerhyolite magma is largely thought to be derived from partial melting of the lower crust, presumably with a granitic composition (Walraven, 1982). Some varieties of

granophyre, however, possibly formed as a result of metamorphic/metasomatic effects related to the intrusion of the Rustenburg Layered Suite acting on the Pretoria Group sedimentary roof rocks; or by the partial melting of Rooiberg Group rhyolites also a consequence of the hot intrusive magmas of the Rustenburg Layered Suite (Walraven, 1982).

The Rashoop Granophyre Suite comprises three units based on textural variations; the Stavoren Granophyre, the Zwartbank Pseudogranophyre and the Rooikop Granite Porphyry (SACS, 1980). Many more varieties have been proposed by extensive work by Walraven (1977, 1979 and 1982).

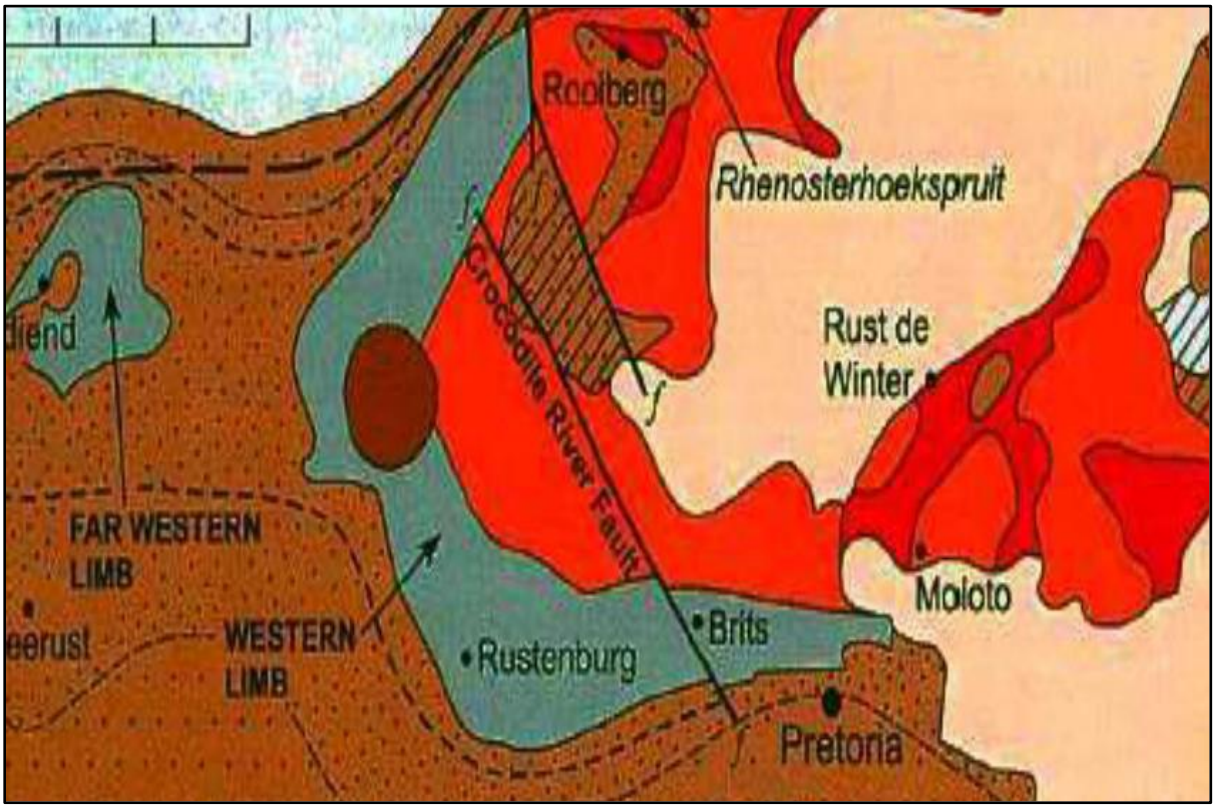


Figure 7-7: West Limb of the BIC

7.1.5.2 Local Geology

The proposed site is specifically located within the **Rustenburg Layered Suite (RLS)**.

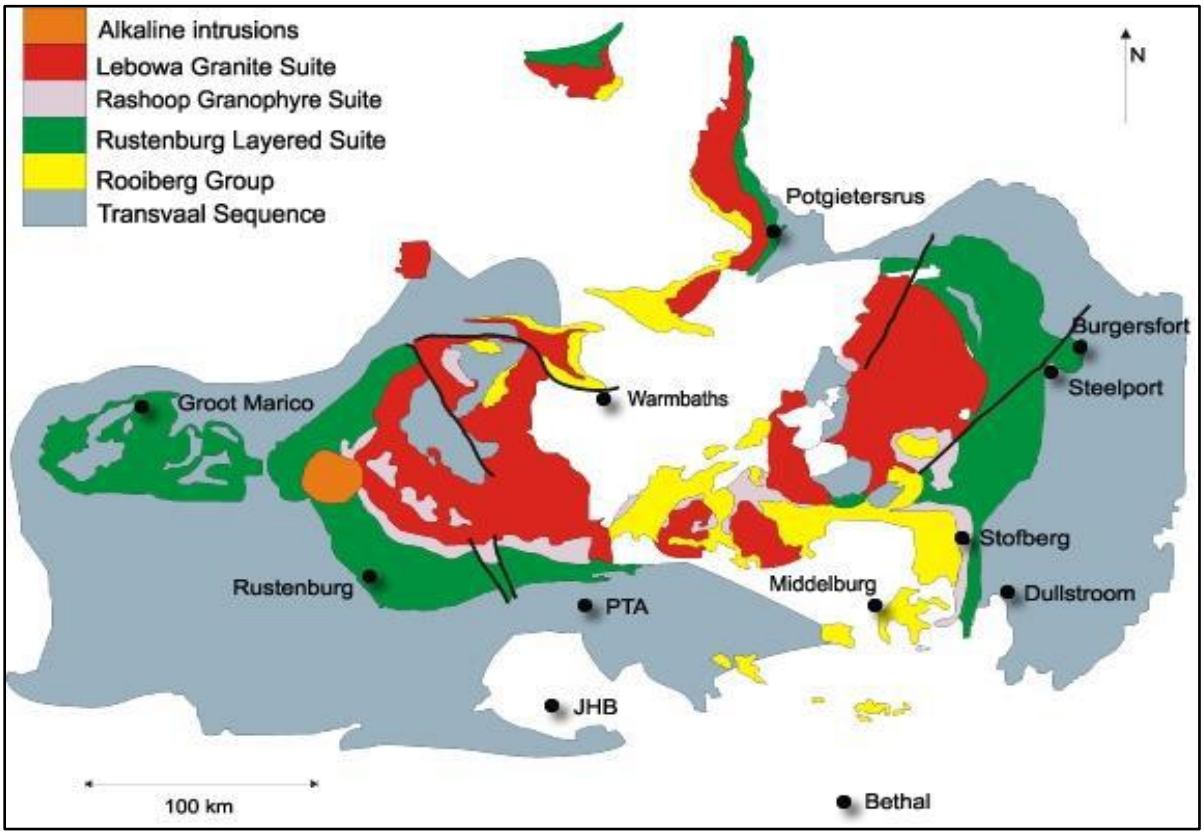


Figure 7-8: The Bushveld Complex

The Rustenburg Layered Suite (RLS) was emplaced at shallow crustal levels beneath the volcanic pile of Rooiberg felsites and Rashoop granophyres as sills in the Transvaal Supergroup. North of Burgersfort, emplacement occurred at the level of the Magelliesberg quartzite, but to the south it transgressed upwards through more than 2 km of sediments so that near Stoffberg basaltic rocks of the Dullstroom Formation (at the base of Rooiberg Group) are preserved in the floor. The crescentic outcrop pattern of the RLS is comprised of four exposed sectors, the eastern limb, the western limb, the far western limb and the northern limb, with a fifth limb, the south-eastern Bethal limb, obscured by younger sediments.

The main western and eastern lobes are disrupted by domes and diapirs of floor rocks, the largest of which are the Crocodile River, the Moos River and the Marble Hall fragments. Exposure is poor in the northern and western limbs, but the 200

km long eastern limb extending from Chuniespoort to Stoffberg underlies rugged terrain where surface exposures are far better.

The RLS has been subdivided into a number of zones, the Marginal, Lower Zone (LZ), Critical (CZ) Main MZ) and Upper Zones (UZ), although their exact boundaries have been the subject of much debate (e.g. Kruger 1990). Lateral facies variations within the sequence are common.

(a) *The Marginal Zone*

The Marginal Zone is not always present. Where it occurs it ranges in thickness from zero to hundreds of metres along the basal contact of the Complex. The rocks are most commonly norites with variable proportions of accessory clinopyroxene, quartz, biotite and hornblende, which reflect varying degrees of contamination from the underlying sediments. Generally, it is related to the immediately adjacent cumulate rocks but in places it has been disrupted and has been partly digested by later magma injections (see Eales, 2003 for an overview). However, where Marginal Zone occurs beneath the Lower Zone, it may represent an early magma which in the east occurs as the Shelter norite (SACS, 1980), a succession up to 400m thick around Burgersfort. For a discussion on magma lineages see Kruger, (2004).

(b) *The Lower Zone*

The Lower Zone has the most limited lateral extent, and is best developed in the northern parts of both eastern and western limbs and in the southernmost part of the northern limb. The thickness of the Lower Zone has been influenced by floor topography and structure and is 1300 m at maximum (Cawthorn et al 2002). In the Oliphants River Trough, in the eastern limb Cameron, 1978, subdivided the Lower Zone into 3 zones, a central harzburgite between an upper and lower pyroxenite:-

The lower pyroxenite is extremely uniform in composition, containing on average 98% and never less than 95% orthopyroxene with minor interstitial plagioclase and clinopyroxene. Chromitite is absent. The harzburgite unit consists of cyclic units of dunite, harzburgite and pyroxenite varying in thickness from a few to tens of metres. Dunite layers are distinctive, they weather more easily than pyroxenite

to a dull greasy brown, they usually contain magnesite veins, and are covered in magnesite float. Little serpentinisation is apparent. Up sequence the orthopyroxene occurs as small oikocrysts, increasing in size up to 1-2 cm. As the modal proportion of orthopyroxene increases the texture changes, with harzburgites containing sub-equant grains of both minerals. In the olivine pyroxenites the olivine appears anhedral against pyroxene. However, in view of the extreme textural recrystallisation in these rocks the inference that the olivine is post-cumulus should be viewed with caution. Scattered chromite grains are present, green clinopyroxene and plagioclase are rare. The orthopyroxene changes in habit from granular to elongate with a range of grain sizes.

The upper pyroxenite of Cameron's Lower Zone is similar to the lower one except that variations in grain size produce recognisable layering. The orthopyroxene varies little in composition (En_{84-87}) throughout the entire Lower Zone with more magnesian compositions occurring in the harzburgite together with olivine (Fo_{85-87}).

(c) *The Critical Zone*

The Critical Zone, which is characterised by spectacular layering, hosts world-class chromite and platinum deposits in several different layers (termed reefs). The Critical Zone, which is up to 1500 m thick, is divided into a lower sub-zone (C_LZ) which is entirely ultramafic and is characterised by a thick succession of orthopyroxenitic cumulates and an upper sub zone (C_UZ) that comprises packages of chromitite, harzburgite, pyroxenite, through norite to anorthosite. Subdivision into magmatic cycles is somewhat subjective but nine cycles have been recognised in the C_LZ and eight cycles in the C_UZ consisting of partial or complete sequences from a base of ultramafic cumulates through norite to anorthosite.

The base of the upper Critical Zone is defined as the first appearance of cumulus plagioclase and is drawn at the base of the lowermost anorthositic layer of the RLS between two chromitite layers.

Two distinctive cyclic units, the Merensky and Bastard units were included within the CZ of the original classification, however a significant break in the initial Sr isotope ratio, and a major unconformity at the base of the Merensky Unit, led

Kruger (1992), to draw the boundary between the CZ and MZ at the base of the Merensky Unit, where the major magma influx occurs, rather than at the top of the Giant Mottled Anorthosite, a distinctive layer characterised by large oikocrysts of pyroxene at the top of the Bastard Unit.

(d) *The Main Zone*

The Main Zone, which is >3000 m in thickness, forms almost half the thickness of the entire RLS. It comprises a succession of gabbronorites with infrequent anorthosite and pyroxenite bands while olivine and chromite are absent. In addition to the Merensky Reef at its base it is economically important for numerous dimension stone quarries which exploit the Pyramid Gabbronorite; a dark-coloured inverted-pigeonite-bearing gabbronorite.

Although not as spectacularly layered as the Critical Zone discrete packages of modally layered rocks can be identified (Molyneaux, 1974; Mitchell, 1990; Nex et al., 1998, 2002), possibly associated with the influx of new magma. In the eastern Bushveld a modally layered succession of gabbronorites 10-20 m thick occurs some 60-70 m below the Pyroxenite Marker (Quadling and Cawthorn, 1994). This layered package is continuous for 80 km along strike. It has also been identified in the western Bushveld with a 20 km strike extent (Nex et al, 1998). All the layers have sharp bases and planar tops and are composed of orthopyroxene (inverted pigeonite) + clinopyroxene + plagioclase but the proportions vary so that the lighter layers are typically 70% plagioclase, whereas the darker layers are 30-40% plagioclase. Darker layers vary from 2-10 cm in thickness. The layering is considered to be due to mechanical re-distribution of crystals since none of the layers has typical cotectic proportions. In the eastern Bushveld geochemical studies suggest that compositional reversals in orthopyroxene and plagioclase occur slightly above this layered package reflecting the influx of new magma to form the Upper Zone (Nex et al., 2002).

(e) *Upper Zone*

The Upper Zone is characterized by sequences which are intensely banded with gabbros as the dominant rock type, There is no chill at the top contact with the metamorphosed felsite or granophyre, and the most differentiated rocks occur towards the top. The most striking feature of the Upper Zone is the presence of

some 25 magnetitite layers in the eastern limb (Molyneaux, 1974) that cluster into four groups, each with up to seven layers. Magnetite layers typically have sharp bases, but gradational tops. The thickest is 6 m, while the Main Magnetite layer, near the base of the Upper Zone is 2 m thick and is mined for its vanadium content. The titaniferous magnetitite layers comprise a vast source of vanadium ore and hosts almost half of the world's vanadium reserves.

7.1.5.3 Site Specific Geology

The proposed site located within the rocks of the Rustenburg Layered Suite as described above. The proposed site is underlain by the pyramid Gabbro-Norite and the Bierkraal Magnetite Gabbro. The site is underlain the mafic igneous rock: the Gabbro and Norite.

7.1.6 Site Ecology

The proposed site is within the Savanna Biome. The savanna vegetation of South Africa and Swaziland constitutes the southernmost extension of the most widespread biome in Africa. It represents 32.8% of South Africa (399 600 km2) and 74.2% of Swaziland (12 900 km2). It extends beyond the tropics to meet the Nama-Karoo Biome on the central plateau, the Grassland Biome at higher altitudes towards the east and extends down the eastern seaboard interior and valleys where it grades into Albany Thicket in the Eastern Cape. More specifically, savanna occupies most of the far-northern part of the Northern Cape, the western and north-eastern parts of North-West Province, extreme western parts of the Free State Province, northern Gauteng with more isolated occurrences in the south of this province, almost the entire Limpopo Province, north western and north-eastern Mpumalanga, most of central and eastern Swaziland, low-altitude parts of the eastern seaboard, inland of the Indian Ocean Coastal Belt in KwaZulu-Natal and the Eastern Cape Provinces, and with the southernmost extension abutting Albany Thicket of the Komga to Albany Districts. The mining area located within the Marikana Thornveld of the Central Bushveld Bioregion.

7.1.6.1 Marikana Thornveld

Distribution: The Marikana Thornveld is distributed in North-West and Gauteng Provinces, it occurs on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. The Marikana Thornveld is at altitude ranging between 1 050 – 1 450 mamsl.

Vegetation & Landscape Features: The Marikana Thornveld is characterised by Open *Vachellia Karoo* formerly known *as Acacia Karroo* woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are more dense along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire.

Important Taxa *Tall Tree: Acacia burkei. Small Trees: Acacia caffra (d), A. gerrardii (d), A. karroo (d), Combretum molle (d), Rhus lancea (d), Ziziphus mucronata (d), Acacia nilotica, A. tortilis subsp. heteracantha, Celtis africana, Dombeya rotundifolia, Pappea capensis, Peltophorum africanum, Terminalia sericea. Tall Shrubs: Euclea crispa subsp. crispa (d), Olea europaea subsp. africana (d), Rhus pyroides var. pyroides (d), Diospyros lycioides subsp. guerkei,*

Ehretia rigida subsp. rigida, Euclea undulata, Grewia flava, Pavetta gardeniifolia. Low Shrubs: Asparagus cooperi (d), Rhynchosia nitens (d), Indigofera zeyheri, Justicia flava. Woody Climbers: Clematis brachiata (d), Helinus integrifolius. Herbaceous Climbers: Pentarrhinum insipidum (d), Cyphostemma cirrhosum. Graminoids: Elionurus muticus (d), Eragrostis lehmanniana (d), Setaria sphacelata (d), Themeda triandra (d), Aristida scabrivalvis subsp. scabrivalvis, Fingerhuthia africana, Heteropogon contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa. Herbs: Hermannia depressa (d), Ipomoea obscura (d), Barleria macrostegia, Dianthus mooiensis subsp. mooiensis, Ipomoea oblongata, Vernonia oligocephala. Geophytic Herbs: Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica.

Conservation Endangered. Target 19%. Less than 1% statutorily conserved in, for example, Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land transformation. Erosion is very low to moderate. Alien invasive plants occur localised in high densities, especially along the drainage lines.

7.1.6.2 Site Sensitivity

The site sensitivity is determined using pre-existing data obtained from institutions such as the South African Biodiversity Institute (SANBI), Regional Environmental Management Framework, Mining and Biodiversity Guideline, *etc*. The existing Data includes the North West Terrestrial CBA, National Freshwater Priority Areas and South African National Vegetation Map.

(a) *The North West Terrestrial Critical Biodiversity Area v1: 2015*

According to the NW Terrestrial CBA map, the proposed site is located within Critical Biodiversity Area 2 ($CBA_{2)}$ and Ecological Support Area ($ESA_{2)}$ within the proposed site.

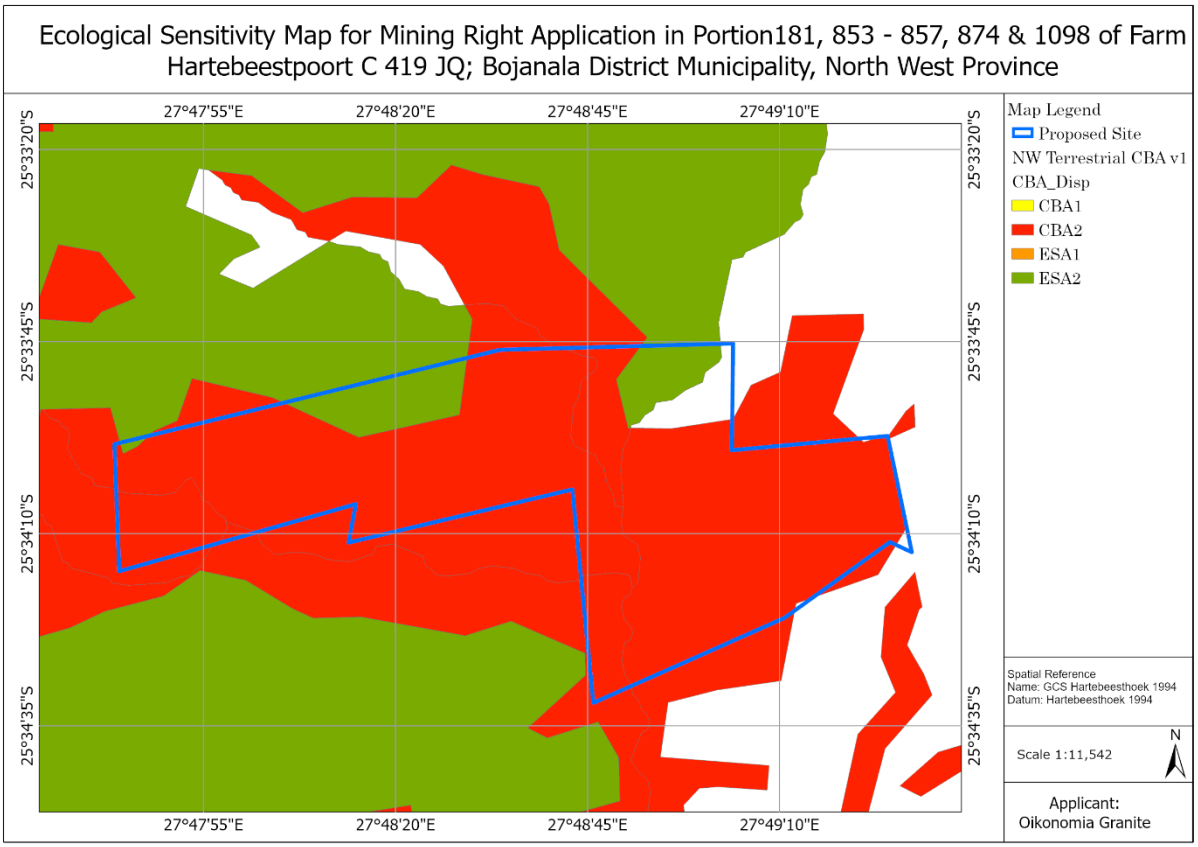


Figure 7-9: Site CBA Map

Critical Biodiversity Areas (CBAs): are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

Ecological Support Areas (ESAs): are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

From a land use planning perspective, it is useful to think of the difference between CBAs and ESAs in terms of where in the landscape the biodiversity impact of any land use activity action is most significant:

- In CBAs where a change in land use results in a change from the desired ecological state, the impact on biodiversity as a result of this change is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat).
- In ESAs, however, a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway. For example, removing a corridor results in a population going extinct elsewhere in the landscape due to loss of connectivity, or a new plantation locally results in a reduction in stream flow at the exit to the catchment, which affects downstream biodiversity.

(b) *Mining and Biodiversity Guideline of 2013*

According to mining and Biodiversity guideline of 2013 the proposed site is located on sections (area) with moderate to high biodiversity important areas. The proposed granite mining will negatively impact these important biodiversity area, an ecological specialist will assess potential impacts and degree of acceptable changes.

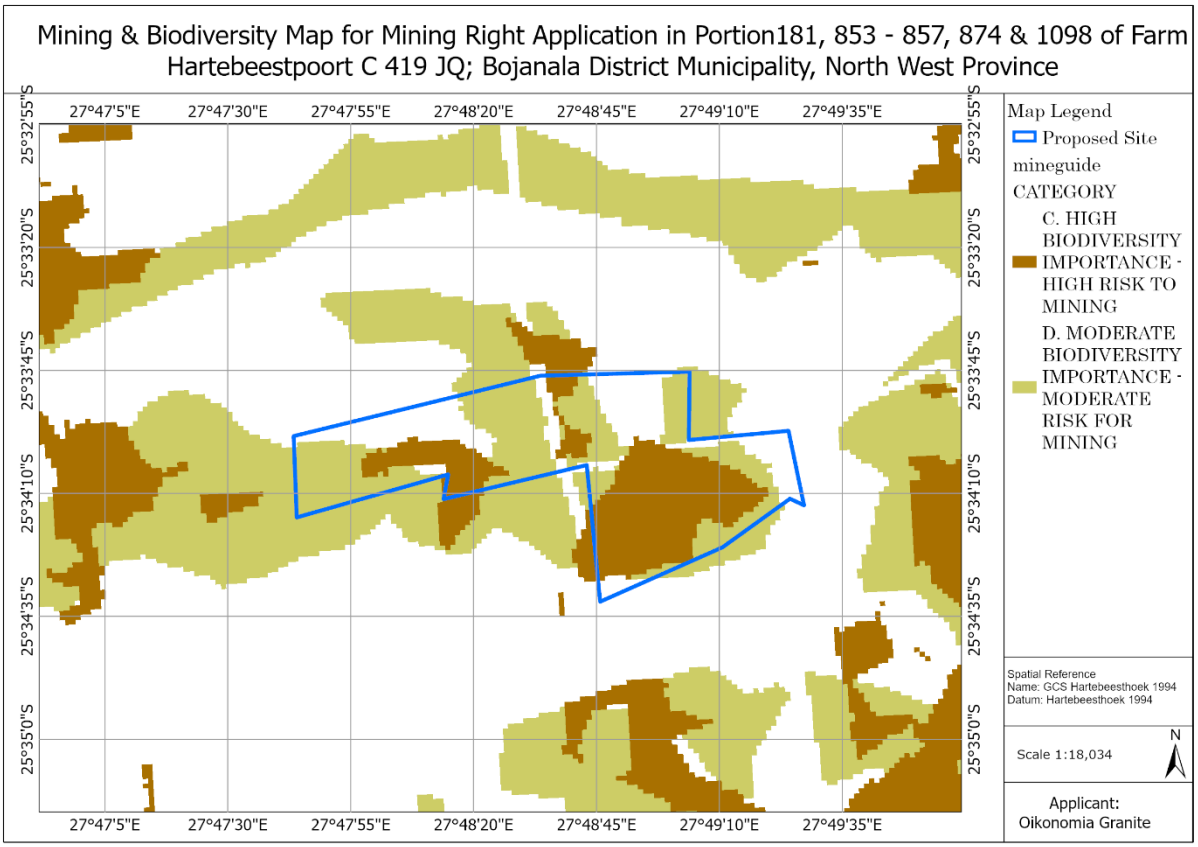


Figure 7-10: Site MBG Map

(c) *National Vegetation Map*

According to the South African National Vegetation Map, the proposed site is located within the Endangered SVcb 6 Marikana Thornveld.

(d) *National Freshwater Priority Area*

There are no NFEPA water resources on site.

(e) *Species of Conservation Concern (SCC)*

The search on the Plant of South Africa did not return any species of conservation concern.

The site assessment has established that there is a large population of the Nationally Protected *Sclerocarya birrea* (Marula Tree). The Marula population was investigated by a commissioned terrestrial ecology study.

7.1.7 Social Characteristics of the Study Area and Surrounds

(North West) Bokone Bophirima Province is bordered by Botswana in the north and is fringed by the Kalahari Desert in the west, Gauteng to the east, and the Free State to the south. It is known as the "Platinum Province", owing to its wealth of this precious metal. The province has a population of 3, 2 million people who mainly speak Setswana.

The mainstay of the economy of Bokone Bophirima Province is mining, which generates more than half of the province's gross domestic product and provides jobs for a quarter of its workforce. The chief minerals are gold, mined at Orkney and Klerksdorp; uranium, mined at Klerksdorp; platinum, mined at Rustenburg and Brits; and diamonds, mined at Lichtenburg, Christiana, and Bloemhof. The northern and western parts of the province have many sheep farms and cattle and game ranches. The eastern and southern parts are crop-growing regions that produce maize (corn), sunflowers, tobacco, cotton, and citrus fruits. The entertainment and casino complex at Sun City and Lost City also contributes to the provincial economy.

7.1.7.1 Regional Setting: North West Province

The proposed Oikonomia Granite Project area is located in the Northwest Province, the Bojanala Platinum District in Madibeng Local Municipalities.

The Northwest Province covers a geographical area of 105,238 km2 and with a 2018 population estimate of almost 4 million people, is the 7th largest province in South Africa (based on population size). A population density of 37.8 people per km2 is indicative of the largely rural nature of the province. Urban centres can be found around Mafikeng (the provincial capital), Klerksdorp, Potchefstroom and Rustenburg where the population density is expected to be much higher. The majority of the population is Black African (91.6%), followed by White (6.4%). There is an almost equal split between males and females, with males in the slight majority at 50.9%. According to Community Survey 2016, the majority of the province’s residents are native to the Northwest Province (81.2%).

More than half of the province’s gross domestic product is generated by the mining industry. It produces 5.7% of South Africa’s GDP through its mining, agriculture and manufacturing sectors. Tourism is regarded as the fourth most important sector, after those mentioned above. Domestic tourism is an important source of

the province's revenue and employment, contributing approximately 52% of total tourism consumption. According to the South African Annual Tourism Report (2014), the Northwest is one of three least visited destinations in South Africa, both in terms of domestic and international visitors with a 5.3% market share in tourist arrival. Even so, this is an indication of quantitative growth in the province's tourism profile as it represents an increase of 15,340 tourists over a year period (Northwest Department of Tourism, Annual Performance Plan, 2018/19).

Growth and development in the province are guided by the North West Development Plan (NWDP). The NWDP adopted 8 development priorities which constitute the first 5-year cycle of economic transformation. These are:

- Economy and employment;
- Economic infrastructure;
- An integrated and inclusive rural economy;
- Human settlement and spatial transformation;
- Improving education, training and innovation;
- Building a capable and development state;
- Fighting corruption; and
- Transforming society and uniting the province

7.1.7.2 Bojanala District

The Bojanala Platinum District Municipality (BPDM) is one of four districts in the Northwest province. It covers an area of 18,333 km2 (17.4% of the province) and in 2016, was home to just over 1.5 million people (44.2% of the province's total population). At 89.6 persons per km2, the population density of the district is more than double that of the province as a whole, but still indicative of a largely rural area. Similar to the province, the largest population group in 2016 was Black African (93.8%), followed by White (5.3%). More than half of the population are male (52.9%). Although a higher percentage of the population migrated from neighbouring Gauteng (8.7%), the majority of the district's population (71.8%) are native to the Northwest. Low out-migration rates are indicative of strong place attachment to an area.

The district's main economic drivers are agriculture, tourism, manufacturing, mining and the service industry. In 2015 the mining sector was the largest within the district, accounting for 51.8% (R61.1bn) of the local GVA. Agriculture is the smallest economic sector, contributing an estimated R1.37bn (or 1.2%) of the total GVA. Overall the BPDM contributed 54.29% to the province's GDP of R226bn in 2014 (BDPM IDP, 2018/19). Tourism and marketing development is one of the core objectives of the district's local economic development KPA.

7.1.7.3 Madibeng Local Municipality

The Madibeng Local Municipality is a Category B municipality located in the North West Province within the Bojanala Platinum District. It is situated between the Magaliesberg and Witwatersrand, 60km from Rustenburg and 50km north of Pretoria. It is one of five municipalities in the district. It is strategically located in relation to Gauteng, Limpopo, Harare and the Maputo Harbour, and is positioned along the Heritage Route, linking the World Heritage Site with the Pilanesberg and Madikwe Game Reserves.

It is known for its diversified economy. Currently, mining is the predominant economic activity, and the Hartebeespoort Dam is the second most visited place after the Waterfront in Cape Town.
Area: 3 720km²
Cities/Towns: Brits, Hartbeespoort, Mooinooi
Main Economic Sectors: Mining, manufacturing, agriculture, tourism

(a) *Demographic Profile*

Madibeng Local Municipality population was estimated at 242 553 by 2011 Census compared to 237 175 by Census 2001. The Municipality has a predominantly African population with fewer Indian, Coloured and White groups who are mostly residing in Sun City residence and Mogwase Unit 2. It should be noted that the recognized legal statistics to be used in developing IDP's is from Census 2011.

Geographic information of households by 2011 was estimated at 75 195 compared to 61 759 by Census 2001 with the same total number of demarcated wards. The Municipality is comprised of 31 Wards and is led by Council, the Speaker, Mayor and the Executive Committee. The Mayor is the Head of Executive Committee (EXCO) which comprises of 10 Councillors who are head of various departments

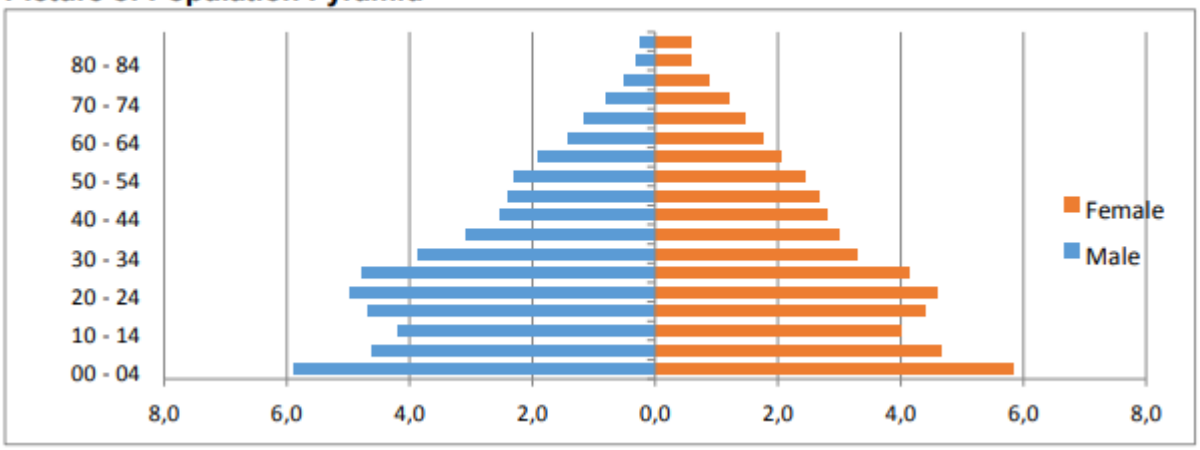
and serve in portfolios. Total number of Proportional Representatives and Ward Councillors amount to 62.

The word demography?> means "Demo" – people and "Graphy" – measurement. It is a statistical study of human population dynamics which focuses on population and spatial / temporary changes. Is regarded as a scientific study of human population primarily with respect to the following: Size, Structure and Development / distribution ("Van de Walle, Multilingual Demographic Dictionary 1982"), For some is data comprises as a "set of techniques by which data collected in census, surveys and vital registration system about: Age, and Sex, Births, and Deaths, Migration, and Marriages and many others are described, summarized and manipulated (Newel p3) Population encompasses study of: Fertility, Mortality and Migration. This is reflected from a variety of different viewpoints including sociology, economics, anthropology, etc. As such it is inherently multi-disciplinary and it is often referred to as "Population Studies". Below table indicates ward level statistics released 2011.

Demographic Indicators				
Census 1996	Male	108313	Female	121308
Census 2001	Male	115715	Female	121460
Census 2011	Male	120515	Female	122038
Population Growth(2001-2011)	**0.22**			

Racial Composition / Population Group	**Population group**	**Male**	**Female**	**Total**
	Black African	118092	120424	238516
	Coloured	325	294	620
	Indian or Asian	837	363	1200
	White	989	840	1829

Picture of Population Pyramid



(b) *Education Levels*

Level of education attained is used as an indicator of human capital and is measured by the percentage distribution of the adult population and the highest level of schooling they completed. South Africa's National Qualification Framework (NQF) recognises three bands of education namely; general education and training, further education and training and higher education and training.

In Madibeng, 63.3% of the population completed Grade 9 or higher and only 35% completed Matric or higher. This rate is similar to the rate for Bojanala which is 38.7%. School attendance however is high with 94.8% of children between ages 5 to 17 years attending school which is an increase of 24.8% since 2011. This rate is comparable to both Bojanala (94.9%) and Northwest (94.8%). A survey of 17 years olds during the Community Survey in 2016 indicated that 88% had some form of secondary school education.

6.8 **Level of Education**	**2001**	**2011**
Literacy Rate	79	94.4
Attending Educational Institutional (%)	75	70
No Schooling (%) (20yrs +)	18	10.4
Primary Enrolment (%) (6-13yrs)	97.8	98
Matric Completion (%) (20yrs +)	36.5	33
Matric Pass Rate	See DoE report	
Completion of Higher Education (%)	6.2	5.9

(c) *Infrastructure*

The majority (79.8%) of the population with the local municipality get water from a regional or local service provider, 40% have access to piped water in their yard (Community Survey, 2016) a substantial increase from 18.7% in 2011. A very small portion of the population (3.2%) have no access to the electricity and the majority of the households (90%) have a pre-paid meter in the house.

Approximately 79% of the population make use of pit toilets and according the Community Survey of 2016 of 15.2% of the population have access to flush or chemical toilets. This is significantly lower the rate in Bojanala which is 39.3%. Access to basic sanitation remains problematic as indicated in the IDP 2016/2017.

In terms of refuse disposal, 82.4% of the population are getting refuse disposal from either the local authority, private company or community members on a regular basis. This rate is 1.3 times higher than the rate in Bojanala (64.2%).

A concern noted in the in IDP 2016/2017 was the waste management as the medical waste from most clinics is reportedly dumped into open areas due to the lack of suitable incinerators. An additional need for waste management is limited to the disposal of general waste in the towns of Madikwe and Mogwase where large amounts of waste are produced and contributing to littering.

Roads

In terms of road provision, the IDP 2016/2017 states that some areas the roads infrastructure and maintenance are poor, roads are in a dilapidated condition, have potholes and some tar roads need patching (SDF, 2014- 2034). The IDP from 2016/2017 identified 19.6% of its road where in need of immediate repairs as the current condition restricted movement in terms of safe driving speeds. A further 51.4% of the roads are in fair condition but would requirement re-sealing in the near future.

The immobility of communities within the local municipality area was noted to be a concern. Car ownership within the municipal area is low and commuters depend on public transportation. The majority of the population mostly uses public transport services (bus and taxi operations). In addition to formal vehicle use, donkeys with trailers are also commonly seen traversing between vehicles and on the side of roads. Donkeys and trailers have been a traditional mode of transport and while the 'horse and carriage' is privately owned, it is very often leased out for business purposes (Sanral, 2012).

7.2 Heritage

The proposed site is in agricultural land with no evidence of human dwellings.

A Heritage and Cultural Impact Assessment study was commissioned and did not identify any sensitive heritage and cultural features that will be affected by the proposed mining activities. A study was conducted for the application of prospecting activities with Bulk Sampling and was relevant for the proposed mining activity.

7.3 Description of the current land uses.

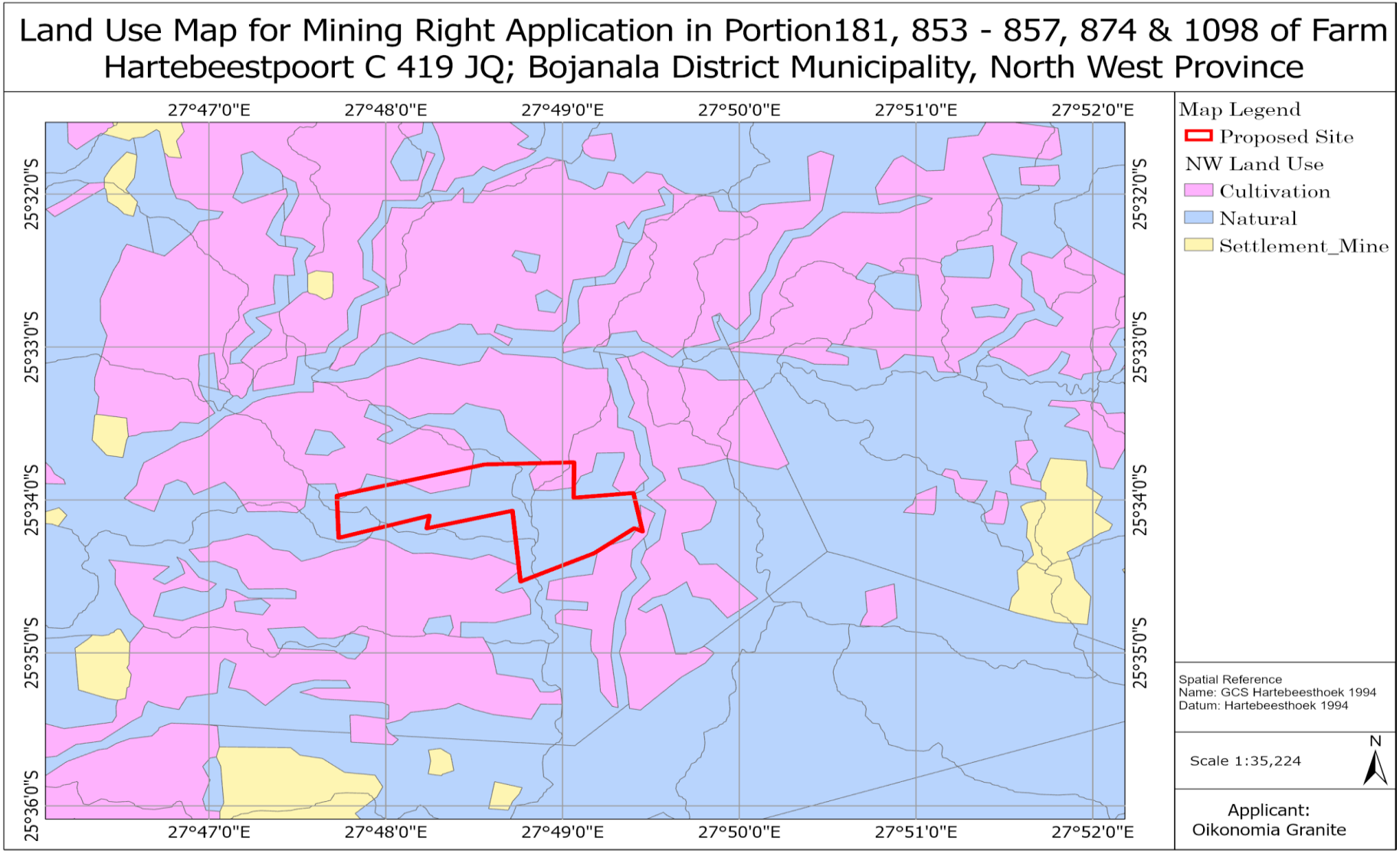
- The proposed site is mainly used for agriculture;
- There are few scattered houses within and adjacent to the proposed site; and

- Tared road to Lethlabile from Brits.

7.4 Description of specific environmental features and infrastructure on the site

- Water Ponds: for retaining water for site agricultural activities;
- Water Canals: the water canals interconnect the site dams supplying water for agricultural activities;
- Family houses: two family houses located within the proposed site; and
- Bulk sampling area from prospecting activities conducted.

7.5 Environmental and current land use map



8 The Impacts associated with the proposed Mining Activities

8.1 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(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).

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Destruction of drainage wetland and associated aquatic ecosystems	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Surface water & associated wetlands & aquatic ecosystems	X	X	X	x		(-)
Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Surface water & associated wetlands & aquatic ecosystems	X	X	X	x	x	(-)
Flow reduction to downstream water catchment due to containment of dirty water runoff	Rock extraction and processing	Surface water & associated wetlands & aquatic ecosystems		X	X	X	X	(-)
Increased risk of contamination through runoff and seepage from stockpiling area and active mining area	Rock extraction and processing	Surface water & associated wetlands & aquatic ecosystems	x	X	X	X	X	(-)
Increased risk of contamination through seepage or spills to the environment	Rock extraction and processing	Surface water & associated wetlands & aquatic ecosystems		X	X	X		(-)

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Irresponsible use of water and water wastage through leaks which will alter downstream water dynamics	Mine operations	Surface water & associated wetlands & aquatic ecosystems	X	X	X	X	X	(-)
Pit de-watering, PCD over flows and seepages to affect both the local surface and sub-surface water bodies	Mine Operations & Rock Processing	Surface water & associated wetlands & aquatic ecosystems	X	X	X	X	X	(-)
Increased risk of contamination and siltation to downstream areas though leaks in slurry pipelines	Rock extraction and processing	Surface water & associated wetlands & aquatic ecosystems			X	X	X	(-)
Flooding of active mine working areas	Mine operations	Underground and Surface water & associated wetlands & aquatic ecosystems			X	x		(-)
Decanting of poor-quality water from rehabilitated pit	Open Pit Mining	Underground water				X	X	(-)
Overflow of pollution control system such as PCD.	Mine operations	Surface water & associated wetlands & aquatic ecosystems			X	X	x	(-)
Potential contamination on surface through improper storage of chemicals, which could impact the environment through runoff and seepage	Chemical / Reagent Storage	Surface water & associated wetlands & aquatic ecosystems. Groundwater; Soil & land capability; Flora.	x	x	x	x		(-)
Potential hydrocarbon contamination on surface which could impact the environment through runoff and seepage	hydrocarbon Storage	Surface water & associated wetlands & aquatic ecosystems	x	x	x	x		(-)

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Increased risk of contamination through seepage or spills to the environment	Dirty water containment facilities/dams	Groundwater& Surface water & associated wetlands & aquatic ecosystems	x	x	x	x		(-)
Irresponsible use of water and water wastage	Potable Water supply & reticulation	Surface water & associated wetlands & aquatic ecosystems	x	x	x	x		(-)
Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments	Ablutions & change house with sewage treatment plant	Surface water & associated wetlands & aquatic ecosystems	x	x	x	x		(-)
Loss of soil characteristics, erosion and compaction	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Land capability	X	X	X	x		(-)
Loss in land capability	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Land capability	X	X	X			(-)
Erosion of stockpiled topsoil affecting rehabilitation success	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Land capability	X	X	X	X		(-)
Alien invasive establishment and bush encroachment	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Flora & Fauna	X	X	X	x	x	(-)

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Destruction of ecological species of conservation concern	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Flora & Fauna	X	X	X			(-)
Loss of biodiversity through vegetation clearance and habitat destruction	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Flora & Fauna	X	X	X			(-)
Alienation of, and disturbance to, animals and loss of roost and foraging sites for birds and bats	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Flora & Fauna	X	X	X			(-)
Dust generation and particulate matter	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Air quality	X	X	X	X	X	(-)
Increased noise levels	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Noise	X	X	X	X	X	(-)
Loss of and disturbance to archaeological / heritage sites	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	Heritage sites	X	X	X			(-)

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles	Operations of machinery and equipment	Air quality	X	X	X	X	X	(-)
Permanent alteration the topographical nature of the area	Site Activities	Topography & Visual aesthetics	x	x	x	x	x	(-)
Alteration in visual aesthetics and sense of place.	Site Activities	Topography & Visual aesthetics	x	x	x	x	x	(-)
Increased traffic in the local roads resulting in delays, accidents and loss of lives (human & animals)	Transportation of rock, Human Resource, materials and equipment	Fauna, Health and Safety, Land Capability, Socio-economy		x	x	x		(-)
Blasting operation has the potential to yield secondary effects such as ground vibration, air blast, fly rock and fumes.	Blasting Operations	Fauna, Health and Safety, Land Capability, Socio-economy, Air Quality		x	x			(-)
Emission of dust and particulate matter	Plant and associated infrastructure & processing	Air quality	x	x	x	x		(-)
Increased noise levels	Blasting, Plant and associated infrastructure & processing	Visual Aesthetic & Socio-economic	x	x	x	x		(-)
Deterioration in visual aesthetics and sense of place	Plant and associated infrastructure	Visual Aesthetic & Socio-economic		X	X	X	X	(-)

POTENTIAL IMPACT	SOURCE ACTIVITY	ASPECT	Project Phases					Nature
			Planning	Construction	Operation	Closure	Post Closure	
Employment opportunities	All activities	Socio-economic	x	x	x	x		(+)
Support of Local / Regional business	All activities	Socio-economic	x	x	x	x		(+)
Skills development programmes	All activities	Socio-economic		x	x			(+)
Project-induced in-migration	All activities	Socio-economic	x	x	x			(-)
Contribution to the national fiscus. Payments towards direct taxes, royalties and regulatory fees	All activities	Socio-economic		x	x			(+)
Improved Local Tourism	All activities	Socio-economic	x	x	x	x		(+)

8.2 Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

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

The EIA was undertaken in accordance with the impact assessment methodology as presented in the following section. Comments from stakeholders and responses are listed in a consultation report and are crossly referenced with the mitigation measures in the impact assessment tables.

The impact identification process commenced by identifying all environmental aspects on site, whether sensitive or not. General environmental aspects that were considered includes:

- Topography
- Geology
- Soils, land use and capability
- Surface water, associated wetlands and aquatic ecosystems
- Groundwater
- Floral and faunal ecosystems
- Ambient environmental noise
- Archaeological and cultural sites
- Local traffic and safety
- Socio-economics, health and safety
- Mine work Programme
- Social and Labour Plan
- Blasting
- Agricultural studies
- Rehabilitation
- Palaeontology study
- IWWMP
- Geotechnical Report
- CPR

As the specialist studies were completed, additional impacts identified through the specialist investigations were added, including impacts identified from the modelling exercises reported in the preceding section. The impact rating completed by the specialists were as far as possible translated into the impact assessment process detailed below. As far as practically possible, considering variations in impact assessment methodology by different specialists, the specialist impact assessment is therefore duplicated within a single unified impact assessment process, to allow for all impacts to be assessed in the same way, reducing subjectivity and allowing direct comparative ranking of all the impacts identified during the environmental processes.

Through the Public Participation Process (PPP), any issues or potential impacts identified by the I&APs were added to the list of potential impacts. All these impacts were then assessed and their significance determined. Impact identification will be a consolidated approach based on Mielelani Consultancy professional experience, specialist expertise and I&AP (including organs of state which are involved in the PPP) input.

The full impact assessment methodology utilised is described below. Impact assessment methods were developed to: (1) identify potential impacts of a proposed development on the social and natural environment; (2) predict probability of these impacts and (3) evaluate significance of the potential impacts. The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

Extent: The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;

Duration (D): Indicates what the lifetime of the impact will be;

Intensity (I): Describes whether an impact is destructive or benign;

Impact Reversal (R): The probability and the degree of reversing the activity impact**;**

Irreplaceable Loss (L): Loss of resources that cannot be replaced; and

Probability (P): Describes the likelihood of an impact actually occurring;

Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The significance of each risk/impact will be identified as follows:

Impact Significance = Probability (P) X Consequence (C), where

$$C = E + I + D + R + L$$

Table 8-1: Criteria Used for Rating of Impacts

CRITERIA	DESCRIPTION			
Extent	National (4) The whole of South Africa	Regional (3) Provincial and parts of neighbouring provinces	Local (2) Within a radius of 2 km of the construction site	Site (1) Within the construction site
Duration	Permanent (4) 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	Long-term (3) The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	Medium-term (2) The impact will last for the period of the mining phase, where after it will be entirely negated	Short-term (1) The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the mining phase
Intensity	Very High (4) Natural, cultural and social functions and processes are altered to extent that they permanently cease	High (3) Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Moderate (2) Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Low (1) Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected

CRITERIA	DESCRIPTION			
Impact Reversal	Highly Impossible (4) Impact reversal will certainly be impossible	Moderate (3) Impact can be reversed to some extent with loss of natural resources	Possible (2) High possibility of impact reversal	Definite (1) Impact can be totally reversed
Loss of irreplaceable resources	Definite (4) Resources definitely be lost	Highly Probable (3) Most likely that resources will be lost	Possible (2) Resources may be lost	Improbable (1) Loss of resources is highly unlikely
Probability Of Occurrence	Definite (4) Impact will certainly occur	Highly Probable (3) Most likely that the impact will occur	Possible (2) The impact may occur	Improbable (1) Likelihood of the impact materialising is very low

Significance is determined through a synthesis of impact characteristics. Significance is also 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 total number of points scored for each impact indicates the level of significance of the impact.

Table 8-2: Criteria for Rating of Classified Impacts

		Impact Significance (Consequence * Probability)															
Probability ↑	4	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
	3	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	2	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	1	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Consequence (Extent + Intensity + Duration + Reversibility +Irreplaceable Loss) →															

Table 8-3: Impact consequence class description

Score	Description	Colour Code
Negligible (0 -10 points)	A negligible impact that can be easily managed and avoided.	
Low impact/ Minor (11 -20 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.	
Medium impact/ Moderate (21 - 30 points)	Mitigation is possible with additional design and construction inputs.	
Critical (31 – 50 Points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.	
Catastrophic (51 - 80 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.	
Status	Denotes the perceived effect of the impact on the affected area.	
Positive (+)	Beneficial impact.	
Negative (-)	Deleterious or adverse impact.	

The suitability and feasibility of all proposed mitigation measures is included in the assessment of significant impacts. This was achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

8.3 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)

Oikonomia Granite has applied for Mining Right covering the entire application area. There are no areas excluded within the proposed site. The impact identification and assessment was therefore focused on the entire application area.

No alternative sites were assessed for the project mainly because the proposed site is the only accepted area by the Department of Mineral Resources and Energy (DMRE).

8.3.1 Construction Phase

8.3.1.1 Ecology (Fauna, Avifauna and Flora)

- Site clearance for infrastructure and associated access roads during the construction phase has the potential to directly disturb vegetation, regardless of the alternatives that are selected. The identified impact would result in high severity impacts in the absence of mitigation measures. There is a large population of Nationally protected Marula Tree.
- The placement of infrastructure has the potential to destroy habitats for faunal species. In addition, the construction activities may result in disturbances such as noise, vibrations, dust and increased human presence (and possible poaching).
- The significance of this impact would be high in the unmitigated scenario. In the mitigated scenario, which focuses on avoiding ecologically sensitive areas, adhering to buffer zones and implementing training to ensure that the staff is aware of faunal sensitivity, the significance remains high.

8.3.1.2 Aquatic and Wetland Biodiversity

- The removal of vegetation, ground compaction and infrastructure placement during the construction phase may result in the destruction of wetland systems.
- The placement of infrastructure within the catchment area may result in a loss/reduction in catchment yield.
- Vegetation removal and altered surface flow dynamics may result in an increase in the concentration of suspended solids.
- On site mixing, fuelling and use of machines and vehicles as well as erosion of the cleared footprint areas may result in the contamination of surface water resources. It is important to note that the use or potential contamination of water resourced is regulated through water use licensing requirements of the DWS as the custodian of water resources in South Africa.
- Construction activities may result in noise and traffic which will result in the loss of species diversity.
- Introduction of "pests" and weeds into the area during the construction phase may result in a change in species abundance.
- Preparation of the mining area may result in a loss of wetland systems.
- Construction of associated infrastructure may result in the loss of sub-surface flows.

8.3.1.3 Pedology

- Potential disturbances include compaction, physical removal and potential pollution. The exposed soil surfaces have the potential to erode easily if left uncovered which could lead to the loss of the soil resources. Soils that are excavated for the installation of foundations will have their physical and chemical states altered negatively.
- There may also be potential loss of stockpiled topsoil and other materials through erosion if not protected properly. Insufficient storm water control measures may result in localised high levels of soil erosion, possibly creating

dongas or gullies, which may lead to decreased water quality in surrounding watercourses. Increased erosion could result in increased sedimentation which could impact on ecological processes.

- The additional hardened surfaces created during construction could increase the amount of storm water runoff, which has the potential to cause erosion.
- Physical disturbance of the soil and plant removal may result in soil erosion/loss.

8.3.1.4 Riverine Ecology

- Vegetation clearance during the construction phase may result in the alteration of catchment drainage, resulting in an increased runoff velocity and erosion.
- Construction of infrastructure and minor earthworks may result in the alteration of the catchment drainage and exposure of un-weathered materials, resulting in increased dissolved solid concentrations in local water bodies.
- Placement of infrastructure within the catchment area may result in the alteration of the catchment drainage thus causing erosion and sedimentation.

8.3.1.5 Visual

- The removal of vegetation during the construction phase will expose the area to sensitive visual receptors, particularly those located on elevated areas surrounding the project area. Dust generated during the construction phase is further likely to create a visual disturbance
- The movement of vehicles and heavy machinery as well as dust generated by vehicular movement is likely to create a visual disturbance to surrounding visual receptors. In addition, the erection of mine infrastructure (plant, workshop etc.) is likely to visually intrude on the landscape.

8.3.1.6 Heritage/Cultural Resources

The placement of infrastructure and mining activities, in all phases prior to closure, may result in the potential removal, damage and destruction of heritage/cultural resources. This will result in the loss of the resource for future generations. A heritage

study conducted for the site did not identify any heritage and cultural resources within the mining site.

8.3.1.7 Socio-Economic

- The potential positive impacts which could arise as a result of the construction activities include increase in job opportunities both for skilled and unskilled labourers. Jobs for the unskilled labourers are likely to be filled by the local community and the skilled personnel likely to be drawn around South Africa. The project also brings with it an opportunity for training and capacity building of personnel that will be recruited. Furthermore, during construction, the informal business sector, particularly women in the area, could benefit from selling food to construction workers. The unmitigated impacts are considered positive.
- An influx of workers and jobseekers to an area (whether locals are employed, or outsiders are employed) could increase the safety risks in the local area and have an impact on the local social dynamics. Should locals be employed, it could minimise the perceived and actual risk in this regard.
- During the construction phase, adjacent landowners could be negatively affected by the dust, noise and negative aesthetics created as a result of the construction activities.
- Heavy vehicles and construction activities could result in damage to roads and present safety risks in the local area.

8.3.1.8 Surface Water

The removal of vegetation and subsequent exposure of soils, laydown of impermeable surfaces such as concrete, alteration to the natural topography due to pit excavations, dumps and infrastructure may result in erosion and consequent increase in TSS in surrounding water courses.

8.3.1.9 Groundwater

- During the construction phase little impacts are expected on groundwater quality. Minor impacts on the groundwater can be expected from accidental

hydrocarbon spillage from construction vehicles at the service station or diesel bays.

- The use of groundwater as a potential source of water during construction could potentially have an impact on local water users due to the cone of depression around the production boreholes. The study area is not known for high yielding boreholes.

8.3.1.10 Air Quality

Mining activities usually present a number of emission sources that can have a negative impact on ambient air quality and surrounding land uses in all phases, regardless of the alternatives that are selected. Emission sources would include land clearing activities for construction and ahead of mining, materials handling, wind erosion from stockpiles, wind erosion of disturbed areas, vehicle movement along unpaved roads, crushing, drying and exhaust emissions. The main contaminants would include inhalable particulate matter, Total Suspended Particulates (TSP) that relate to dust fallout and Diesel Particulate Matter (DPM).

8.3.1.11 Noise

Mining activities have the potential to contribute to an increase in ambient noise levels during the construction and operational phases. For this proposed project, pre-mining ambient noise environment can be described as suburban in nature. Project-related noise sources would include construction related activities, emergency power supply, operation and movement of machinery and equipment (including reverse beepers), crushing, transport of product off site and demolition activities.

8.3.2 Potential Impacts Associated with the Operation Phase

8.3.2.1 Ecology (Fauna, Avifauna and Flora)

- Mining related activities have the potential to result in encroachment of alien invasive plant species and possible decrease in available ground-water for floral species.

- Mining activities could result in loss of species of conservation concern and their habitat as well as continued displacement, direct mortalities and disturbance of faunal community (including possible threatened species) due to habitat loss and disturbances (such as dust, poaching and noise).

8.3.2.2 Aquatic and Wetland Biodiversity

- Mining operations have the potential to negatively impact on wetland systems.
- Operation of the supporting infrastructure to be established within the mining area may result in a reduction in catchment water yield.
- Operation of the supporting infrastructure to be established within the mining area may result in the loss of sub-surface flows.
- Operation of the supporting infrastructure to be established within the mining area may result in an increase in the concentrations of suspended solids.
- Mining operations have the potential to negatively impact on water resources through dewatering activities.

8.3.2.3 Pedology

- Potential disturbances include compaction, physical removal and potential pollution.
- Soils that are excavated for the installation of foundations will have their physical and chemical states altered negatively.
- Soils that are excavated for the installation of foundations will have their physical and chemical states altered negatively.
- There may also be potential loss of stockpiled topsoil and other materials through erosion if not protected properly. Insufficient storm water control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding watercourses. Increased erosion could result in increased sedimentation which could impact on ecological processes.

- The additional hardened surfaces created during construction could increase the amount of storm water runoff, which has the potential to cause erosion.
- Physical disturbance of the soil and plant removal may result in soil erosion/loss.
- The unmitigated impact is considered to be of medium significance and can be reduced to low significance should the necessary mitigation measures be applied.

8.3.2.4 Riverine Ecology

- Operation of the open pit mine may cause alteration of the catchment drainage and exposure of un- weathered materials, resulting in an increase in the concentrations of dissolved solids in local water bodies.
- During operation of the processing plant, the use and storage of dirty water may result in diffuse or point source contamination via seepage and direct runoff. This may result in an increase in the suspended and dissolved solids within the local water sources and subsequent ecological impact.
- The operation of active Run of Mine stockpiles may result in runoff of materials from stockpiles thus resulting in an increase in the suspended and dissolved solids within the local water sources and subsequent ecological impact.
- Operation of the supporting infrastructure may result in an increase in the suspended/dissolved solid concentrations and erosion from drainage alteration.
- The dewatering of the open pit may result in the discharge of dirty water, resulting in increased suspended and dissolved solids and local water bodies.

8.3.2.5 Visual

- Open pit mining will result in depressions which will be approximately 50m in depth, and will visually intrude on the surrounding landscape. In addition, dust will be generated during the mining activities. In the absence of mitigation measures, the severity of the impact is expected to be high.
- The development of dumps, as mining progresses will visually intrude on the surrounding landscape.

8.3.2.6 Heritage/Cultural Resources

- The placement of infrastructure and mining activities, in all phases prior to closure, may result in the potential removal, damage and destruction of heritage/cultural resources. This will result in the loss of the resource for future generations.
- Where the project planning takes into account the findings of the specialist studies and either avoids resources of high significance or alternatively document and/or relocate resources in line with a permit or the necessary approvals, the significance can be reduced to low.

8.3.2.7 Traffic

- Mining projects contribute to increased traffic and introduce mine-related trucks on public road networks which can result in an inconvenience to current road users, higher accidents (for people and animals) decreased road service levels and/or increased road damage. This in turn can put pressure on the relevant roads authority to increase the maintenance programmes and/or upgrade the roads.
- In the absence of mitigation measures that take into account other road uses and users, project-related use of public roads could result in a high severity impact. Any serious injury or death is a long term impact that would extend to the communities to which injured people/animals belong. The related unmitigated significance is high. With mitigation that focuses on ensuring adequate capacity on the road network and safety measures for other road users, the significance could reduce to medium as the severity, duration and frequency of potential accidents is expected to reduce.

8.3.2.8 Socio-Economic

- Employment opportunities would be created which could result in benefits to unemployed individuals within the local communities. Furthermore, capacity building and skills development throughout the life of the mine (20 years) could

be to the benefit of the employees and could assist them in obtaining transferable skills.

- Local procurement for general materials, goods and services (e.g. transport, catering (local women may get the opportunity to sell food to mine workers) and security) and other spin-off benefits could materialise.
- The proposed development will assist in the generation of resources such as aggregate and Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite which would boost South Africa's economy.
- The permanent visual impact associated with the mine and its associated infrastructure would alter the landscape. The proposed development is located in "largely natural" area. Therefore, the visual implications could have a further negative impact on the area's sense of place.
- The development of the mine is likely to affect tourism in the area.

8.3.2.9 Surface Water

- Open pit mining will result in a loss of contributing catchment area to the Rosespruit River. Runoff will be captured in the pits that would have otherwise reported to the Rosespruit River.
- Runoff from the plant area and stockpiles is likely to contain high levels of TSS and potentially high dissolved solids that could runoff into the environment.
- Some of the proposed mining deposits occur within drainage lines. The function of these drainage lines is to drain the area during and post rainfall. Mining through drainage lines may result in flooding of pits and other infrastructure, as well as a loss of runoff reporting to the Rosespruit River.
- It is highly likely that groundwater will seep into the open pits, resulting in dirty water. The pits may also become flooded due to high seepage rates.
- It is important to note that the use or potential contamination of water resources is regulated through water use licensing requirements of the DWS as the custodian of water resources in South Africa.

8.3.2.10 Groundwater

- Groundwater quality could potentially be negatively affected by the excavation of the sand and around the washing facility. Hydrocarbon spillage, as well as the incorrect handling and storage of hazardous waste and sewage can potentially contaminate the aquifers.
- Pit dewatering and groundwater abstraction could potentially influence the local groundwater system and may have a negative impact on the local groundwater users.

8.3.2.11 Air Quality

Mining activities usually present a number of emission sources that can have a negative impact on ambient air quality and surrounding land uses in all phases, regardless of the alternatives that are selected. Emission sources would include land clearing activities for construction and ahead of mining, materials handling, wind erosion from stockpiles, wind erosion of disturbed areas, vehicle movement along unpaved roads, crushing, drying and exhaust emissions. The main contaminants would include inhalable particulate matter, Total Suspended Particulates (TSP) that relate to dust fallout and Diesel Particulate Matter (DPM). Similar emission sources are likely to be produced by adjacent mining activities which collectively could result in cumulative air quality impacts on potential receptors.

8.3.2.12 Ground Vibrations

- Blasting operations primary objective is producing rock for crushing to be used in construction. The blasting operation has the potential to yield secondary effects such as ground vibration, air blast, fly rock and fumes. These aspects may have a negative impact on the surrounding areas depending on the levels generated.
- Levels greater than recommended limits may be damaging to structures. Different structures will also have different permitted levels. Ground vibration may cause damage if levels exceed the structures safe limit. People may also

experience ground vibration as perceptible at very low levels and normally react negatively to the experience of ground vibration.

- In most cases the effect of air blast is underestimated. High levels of air blast could cause damage and normally windows are first to be damaged. Levels lower than required to induce damage may rattle windows and large roof surfaces. These effects are generally mistaken as ground vibration effect and leads to complaints. Rattling of doors and roofs causes concern and lead to upsetting people.

8.3.2.13 Noise

- Mining activities have the potential to contribute to an increase in ambient noise levels during the construction and operational phases. For this proposed project, pre-mining ambient noise environment can be described as suburban in nature. Project-related noise sources would include construction related activities, emergency power supply, operation and movement of machinery and equipment (including reverse beepers), transport of product off site and demolition activities.
- Noise pollution impacts would extend beyond the site boundary and would occur until full closure is reached. The related unmitigated significance would be high.

8.3.2.14 Economic

- The project would result in spending injections that would lead to increased economic activity best measured in terms of impacts on employment and associated incomes focusing on the local area and region. In addition to the direct employment and associated income opportunities indirect opportunities would be associated with the operational phase of the project. These would stem primarily from increased expenditure by the applicants and their employees in the local area and region.
- The nature of the project should ensure that it makes a relatively significant contribution to the national fiscus. Payments towards direct taxes, royalties and regulatory fees (including payments towards mine health and safety regulations,

national skills fund contributions as well as environmental monitoring and auditing) are key variables for the measurement of these benefits.

- ❖ It is envisaged that about 15– 20 people will be employed (SLP will determine exacts numbers during the EIR Phase) This means people will migrate to the area on a permanent or semi-permanent basis resulting in rapid population increase. On the other hand, a process of out-migration could also occur with the transformation of land.
- ❖ Depending on how stable the local social networks are, this could create any of the following:
    - ✓ In-migration: rapid population growth can place strain on the local area and lead to economic, social and environmental impacts;
    - ✓ Out-migration: the area affected by the Project becomes less desirable. A decline in the local population can have an effect on the viability and vitality of the area;
    - ✓ Presence of newcomers: impacts of in-migration can be exacerbated if newcomers are different from (or perceived to be such) from local communities;
    - ✓ Presence of construction workers: the type and severity of impacts will depend on the number, composition and (dis)similarity of this group to local residents. Due to the temporary nature of their presence, they are unlikely to form place attachment and follow a 'work hard, play hard' mentality, impacting on social cohesion locally; and
    - ✓ Displacement: local people can lose land or other assets, resulting in physical relocation or loss of income which could cause impoverishment or social disintegration.

8.3.2.15 Tourism

The proposed project has some potential to result in increased tourism to the area as a result of increased business.

Negative impacts on air quality have the potential to impact on the experience of tourists particularly if significant direct nuisance is caused by dust.

Noise impacts have the potential to impact on tourism if they are significant and impact negatively on tourism receptors and tourist experiences.

The project's impacts on terrestrial biodiversity have the potential to impact negatively on tourism in the area.

The proposed project has some potential to result in increased tourism to the area as a result of increased business tourism. Experience indicates that a number of technical, management and sales staff generally associated with the companies involved in a project of this nature are required to periodically visit the project site to conduct business. These staff generally fall into middle to higher income brackets and in the event that they have travelled significant distances there is some chance that they could require accommodation and potentially make use of other tourist facilities and services such as restaurants and retail outlets.

8.3.3 Potential Impacts Associated with the Decommissioning, Rehabilitation and Closure Phase

8.3.3.1 Ecology (Fauna, Avifauna and Flora)

Impacts on flora species due to spread and/or establishment of alien and/or invasive species may occur during the decommissioning and rehabilitation phases.

During rehabilitation the removed protected species will be re-introduced and a new plant species be established.

8.3.3.2 Aquatic and Wetland Biodiversity

- Backfilling of voids and removal of infrastructure will result in restoration of the catchment water yield.
- Backfilling of voids and shaping of the catchment area may result in an increase in concentrations of suspended solids.
- Backfilling of voids during rehabilitation will result in the restoration of shallow recharge.
- Degradation of soil resources by means of vehicle transportation may result leaks and compaction as well as contamination of surface water resources.

Contaminants from the project are expected to include fuels, hydrocarbons, hazardous wastes etc.

- ❖ Ripping of compacted areas will result in an improvement in soil quality.

8.3.3.3 Socio-Economic

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income.

8.3.4 Potential Impacts Associated with the Post Closure Phase

8.3.4.1 Groundwater

The water quality impacts associated with the excavations and washing of sand will reduce and possibly disappear post closure.

No impact is expected on the water quantity during the post mine phase. The groundwater table will recover during this phase and boreholes in the area previously affected by mine dewatering could start to improve. This will be a function of the recharge to the area.

8.3.4.2 Acid Mine Drainage

Mine closure are largely associated with generation of Acid Mine Drainage, due to decanting and outflows from impacted areas.

8.4 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).

The environmental management programme (EMPr) (Part B) of this report details the risk management on site through all phases of mining.

Table 8-4: Impact Management

Potential Impact	Source Activity	Mitigation Measures
Destruction of drainage wetland and associated aquatic ecosystems	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Limit site clearance to what is absolutely necessary. ✓ Avoid sensitive areas as far as practically possible. ✓ Ensure necessary setback distances from watercourses and wetlands. ✓ Implementation of an alien invasive species programme. ✓ Limit emissions (dust, light, noise). ✓ Training of employees on the value of biodiversity. ✓ Zero tolerance for harming and harvesting fauna and flora. ✓ Effective waste management and pollution prevention. ✓ Implementation of a biodiversity action plan to ensure that the undeveloped/ disturbed areas within the property are properly conserved and maintained. ✓ Effective rehabilitation to achieve post closure land use.
Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Design and implement contamination containment measures. ✓ Develop and implement a stormwater management plan to minimise containment areas and divert clean water away from the site. ✓ Mine infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999): ❖ Clean and dirty water system will be separate. ❖ Clean run-off will be diverted away from the site. ❖ Dirty water will be contained. ❖ Conduct surface water monitoring and implement remedial actions as required. ✓ Effective equipment and vehicle maintenance. ✓ Fast and effective clean-up of spills. ✓ Effective waste management. ✓ Education and training of workers. ✓ Apply and operate in line with a water use license.
Increased risk of contamination and siltation to downstream areas though residue mobilisation	Rock processing	✓ Design and implement contamination containment measures. ✓ Mine infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999): ❖ Clean and dirty water system will be separate. ❖ Clean run-off will be diverted away from the site. ❖ Dirty water will be contained. ❖ Conduct surface water monitoring and implement remedial actions as required. ✓ Effective equipment and vehicle maintenance. ✓ Fast and effective clean-up of spills.

Potential Impact	Source Activity	Mitigation Measures
		✓ Effective waste management. ✓ Education and training of workers. ✓ Apply and operate in line with a water use license.
Flow reduction to downstream water catchment due to containment of dirty water runoff	Rock extraction and processing	✓ Develop and implement a stormwater management plan to minimise containment areas and divert clean water away from the site. ✓ Effective rehabilitation to achieve post closure land use. Conduct groundwater monitoring and implement remedial actions where required. This includes compensation for mine related loss of third party water supply. ✓ This monitoring programme should include third party boreholes. ✓ Apply and operate in line with a water use license. ✓ Minimise water usage and optimise water recycling and treatment of dewatering water.
Increased risk of contamination through seepage or spills to the environment	Rock extraction and processing	✓ Inspect, maintain and repair all water management features including dams, trenches, pipelines and pumps. ✓ Follow emergency response plan for spills and keep back-up pumps and pipes on site. CONTROL Ensure all dirty water facilities are adequately sized, designed and constructed (GN704). ✓ All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. ✓ All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs. ✓ Install monitoring boreholes downstream of the dirty water dams to monitor for seepage. ✓ Dams will remain outside 100m buffer zones / 1:100 year flood lines unless authorisation is obtained to do so.
Irresponsible use of water and water wastage through leaks which will alter downstream water dynamics	Mine operations	✓ Apply and operate in line with a water use license. ✓ Minimise water usage and optimise water recycling and treatment of dewatering water
Pit de-watering, PCD over flows and seepages to affect both the local surface and sub-surface water bodies	Mine Operations & Rock Processing	✓ Design and Construction of pollution control infrastructures must be done under supervision of a qualified engineer following standard international and national mines technical designs. ✓ Conduct water monitoring and implement remedial actions where required.

Potential Impact	Source Activity	Mitigation Measures
		✓ Apply and operate in line with a water use license
Increased risk of contamination and siltation to downstream areas though leaks in slurry pipelines	Rock extraction and processing	✓ Design and Construction of pollution control infrastructures must be done under supervision of a qualified engineer following standard international and national mines technical designs. ✓ Conduct water monitoring and implement remedial actions where required. ✓ Apply and operate in line with a water use license
Flooding of active mine working areas	Mine operations	✓ A stormwater Management Plan complying with the requirements of GN704 must be developed and implemented for the mine areas ✓ Develop and implement a stormwater management plan to minimise containment areas and divert clean water away from the site. ✓ Mine operations must strictly adhere to engineering designs ✓ Contaminated pit water must be pumped into the dirty water channels o be contained on site.
Potential contamination on surface through improper storage of chemicals, which could impact the environment through runoff and seepage	Chemical / Reagent Storage	✓ Ensure appropriate spill kits are available on site to clear chemical spills and ensure staff is trained to utilise these or have access to appropriate specialists. ✓ Materials will be stored within designated areas at all times within concrete bunded areas. ✓ Designated areas should be enclosed with appropriate signs and not be exposed to the elements. ✓ Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. ✓ Chemicals and Hydrocarbons must be stored separately on bunded walls. ✓ Spills and leakages must be removed as soon as they are noticed. ✓ The dirty water from the storage area must be directed to the dirty water channel to be contained on site.
Potential hydrocarbon contamination on surface which could impact the environment through runoff and seepage	hydrocarbon Storage	✓ All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed and in accordance with SANS standards. ✓ Refuelling and transfer areas are to be concreted. Bunds in workshop, wash bay and fuel storage facility will be fitted with an outlet valve and drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water.

Potential Impact	Source Activity	Mitigation Measures
		✓ Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. ✓ Spills and leakages must be removed as soon as they are noticed. ✓ The dirty water from the storage area must be directed to the dirty water channel to be contained on site
Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments	Ablutions & change house with sewage treatment plant	✓ Use of pit latrine is prohibited ✓ The mine will make use of chemical toilets and flush system ablution facilities will be installed during the operation phase of the mine, a sceptic tank will bused which will be emptied by a registered service provider who will also collects waste from the chemical wastes. ✓ Inspection of ALL plumbing, pipelines and bathrooms to ensure no leaks, which will be repaired immediately ✓ Keep all bathrooms in clean and hygienic state. ✓ Mine infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999).
Decanting of poor-quality water from rehabilitated pit	Open Pit Mining	✓ A monitoring borehole should be drilled into the rehabilitated opencast pit to monitor the rate at which it fills with water; ✓ This same monitoring borehole can also be used to manage the water levels and prevent the pit from decanting; ✓ The pit should be flooded as quickly as possible to minimise the oxidation of metal sulphides (Acid Mine Drainage – AMD. Once the pit is flooded, surface water should be diverted away from it; and ✓ A final void is, however, the preferred method of managing the post-closure decant.
Loss of soil characteristics, erosion and compaction	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Limit site clearance to what is absolutely necessary for the immediate future mining area. ✓ Only the designated access routes are to be used in order to reduce any unnecessary compaction; ✓ Compacted areas are to be ripped to loosen the soil structure; ✓ The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks; ✓ Topsoil stockpiles are to be kept to a maximum height of 4m; ✓ Topsoil is to be stripped when the soil is dry, so as to reduce compaction; ✓ Any topsoil that is removed during construction must be appropriately removed and stored according to the national

Potential Impact	Source Activity	Mitigation Measures
		and provincial guidelines, specifically the Department of Environmental Affairs and Forestry, 2005 (DWAF, 2005) This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation; ✓ Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and silt traps downstream of areas of activity to trap sediment before water drains to the natural area. ✓ Establish approved erosion control measures to reduce the risk of transported soils. Road surfaces must be compacted in order to increase stability. Sheet runoff from hard surfaces and roads curtailed through proper drainage control. ✓ Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs. ✓ Strip, handle, stockpile and re-use soil resources in line with site specific soil conservation and management plan ✓ Basic infrastructure design that is adequate to contain polluting substances. ✓ Training of workers to prevent pollution. ✓ Equipment and vehicle maintenance. ✓ Fast and effective clean-up of spills. ✓ Effective waste management. ✓ In case of major spillage incidents an emergency response procedure must be implemented
Erosion of stockpiled topsoil affecting rehabilitation success	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Stockpiles must be protected from erosion through diversion channels and berms; ✓ Stockpiles must be located away from drainage lines including the 1:100 year floodline
Alien invasive establishment and bush encroachment	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. ✓ Compile and implement an alien invasive species management plan. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. ✓ Rehabilitate all disturbed areas and seed with local indigenous species.

Potential Impact	Source Activity	Mitigation Measures
Destruction of ecological species of conservation concern	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ As far as possible species should be transplanted to suitable nearby habitat. ✓ Specialist will have to walk area and plot all protected species. Preserve all other species in situ. ✓ Prohibit the harvesting of indigenous trees for firewood and general flora in the area. ✓ Species of conservation concern cannot be removed until the necessary permits are obtained under NEM:BA.
Loss of biodiversity through vegetation clearance and habitat destruction	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Undertake pre-construction surveys of the development footprints for species suitable for search and rescue operations. ✓ Avoid sensitive areas as far as practically possible. ✓ Obtain relevant permits prior to removal of protected species. ✓ Implementation of an alien invasive species programme. ✓ Limit emissions (dust, light, noise). ✓ Training of employees on the value of biodiversity. ✓ Zero tolerance for harming and harvesting fauna and flora. ✓ Effective waste management and pollution prevention. ✓ Implementation of a biodiversity action plan to ensure that the undeveloped/disturbed areas within the property are properly conserved and maintained. ✓ Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. ✓ No open fires must be allowed on site such as for cooking. Prohibit the harvesting of indigenous trees for firewood and indigenous flora in general. ✓ Do not hinder, harm, or trap animals. Maintain ecological corridors associated with wetlands and their buffer zones. ✓ Effective rehabilitation to achieve post closure land use.
Alienation of, and disturbance to, animals and loss of roost and foraging sites for birds and bats	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Keep areas of vegetation clearance to a minimal. ✓ Do not hinder, harm, or trap animals. Maintenance of wetlands and associated natural vegetation will provide ecological corridors and refuges for animals. ✓ Animals or protected flora under threat from the development will be relocated from site by specialists
Dust generation and particulate matter	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Speed limits must be established on dirt roads. ✓ Stockpile heights must not exceed 2m for topsoil, 6m for subsoil. Vegetate soil stockpiles and berms and all exposed areas. ✓ Manage dust through water carts or sprinklers.

Potential Impact	Source Activity	Mitigation Measures
		✓ Consider windbreaks, enclosures, shelters or misting in very dusty areas.
Increased noise levels	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Maintain vehicles and equipment in good working order. ✓ Provide noise berms where possible between activities and receptors. ✓ Conduct noise monitoring in response to noise complaints.
Loss of and disturbance to archaeological / heritage sites	Clearing of vegetation; Topsoil & subsoil stripping; & stockpiling	✓ Plan project to avoid any resources of significant importance. ✓ Training of workers regarding the heritage and cultural sites that may be encountered and about the need to conserve these. ✓ Fence off and limit access to the heritage and cultural sites that could be indirectly disturbed by mining activities. ✓ In the event that resources are identified, a chance find emergency procedure should be implemented.
Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles	Operations of machinery and equipment	✓ Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.
Permanent alteration the topographical nature of the area	Site Activities	✓ Effectively manage biophysical, cultural and socio-economic impacts. ✓ Effectively rehabilitate opencast mining areas in line with an approved rehabilitation plan that meets the post closure land use objectives and ensure successful rehabilitation as soon as mining is complete. ✓ Schedule the opencast mining operations in a manner that minimises cumulative impacts on receptors. ✓ Establish a stakeholder communication and grievance mechanisms for the duration of the mining operation.
Alteration in visual aesthetics and sense of place.	Site Activities	✓ Effectively manage biophysical, cultural and socio-economic impacts. ✓ Effectively rehabilitate opencast mining areas in line with an approved rehabilitation plan that meets the post closure land use objectives and ensure successful rehabilitation as soon as mining is complete. ✓ Schedule the opencast mining operations in a manner that minimises cumulative impacts on receptors. ✓ Establish a stakeholder communication and grievance mechanisms for the duration of the mining operation.

Potential Impact	Source Activity	Mitigation Measures
Increased traffic in the local roads resulting in delays, accidents and loss of lives (human & animals)	Transportation of Rock, Human Resource, materials and equipment	✓ Construct safe access points/intersections. ✓ Educate employees (temporary and permanent) about road safety. ✓ Enforce strict vehicle speeds. ✓ If a person or animal is injured by transport activities an emergency response procedure must be implemented.
Blasting operation has the potential to yield secondary effects such as ground vibration, air blast, fly rock and fumes.	Blasting Operations	✓ Blast design – Changes in the blast design involve a change in drill diameter or depth of the holes to be drilled whereby a smaller diameter blast hole will use less explosives. A shallower blast hole will also use less explosives. Both reductions will facilitate less explosives. However, this must be read with changes in the initiation system. If the initiation system for the two blast designs (smaller or shallower hoe) are kept the same then it will reduce the explosive charge mass per delay; ✓ Reduce charge mass per delay – This is linked to the above, whereby specific design decking can be used with alternative charging to reduce the charge in the blast hole. This is achieved by charging the explosives in two separate columns in the blast hole. The two columns of explosives are initiated separately. This results in the reduction of the charge mass per delay. Reduce charge mass per delay is also achieved through the consideration of changes to the blast design as described above; ✓ Change drilling configuration – This refers to changes in drilling diameter, pattern layout and direction of the blast; ✓ Alternative blasting – Alternative blasting pertains to the consideration of mechanical means for excavation, not necessarily blasting; and ✓ Change initiation systems – Changes in the initiation systems refers to using different initiating systems for initiating the blast. It involves the detonating cord, shock tube systems and electronic initiating systems. Generally, the mine would use shock tube systems as the normal product as it is relatively cheap. The use of shock tube systems on the other hand, can have (depending on the timing layout on the blast and delays used) at least 1 to 6 holes detonating simultaneously. This contributes to the ground vibration effects. If electronic initiation is used and the blast is timed to give only one hole firing at a time, then there is more certainty that only one blast hole's explosive is contributing to the ground vibration. However, electronic initiation can also be setup to use the

Potential Impact	Source Activity	Mitigation Measures
		same timing as a shock tube system whereby there can be multiple blast holes firing. The advantage of electronic initiation is that it can be programmed accordingly whereas shock tube systems have fixed delay time periods. ✓ Develop and implement a vibration and blast management plan which addresses vibration and blast design criteria to limit air blast, ground vibration and fly rock; pre-blast warning and evacuation and auditing of the blasts to check compliance to applicable requirements. ✓ Communication of scheduled blasts with IAPs. ✓ Remediation of all impacts caused by vibration and blasting. ✓ In case of a person or animal being injured by blasting activities an emergency response procedure will be followed. ✓ Limit blasting frequency and conduct blasting during daylight hours
Emission of dust and particulate matter	Plant and associated infrastructure & processing	✓ Apply dust control measures such as water spray or misting during times of high dust generation. ✓ Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.
Deterioration in visual aesthetics and sense of place	Plant and associated infrastructure	✓ Limit the extent of disturbed areas. ✓ Supress dust to prevent a visual dust cloud. ✓ Effective waste management. ✓ Implement effective use of lighting which reduces light spill. ✓ Effective rehabilitation to achieve post closure land use. ✓ The use of berms where appropriate
Employment opportunities	All activities	✓ Develop and implement procedures for recruiting, training and procurement that align with good industry practise. ✓ Employ local people and procure goods and services locally as far as practically possible. ✓ Effective communication to manage expectations with regard to employment and other opportunities. ✓ Ensure that closure planning considerations address the re-skilling of employees for the downscaling, early closure and long-term closure scenarios. ✓ Work together with residents to manage issues such as security.
Potential surface contamination which will impact surrounding areas	Waste Management	✓ Inspect and clear all litter and waste. ✓ Waste storage area will be treated as a dirty area and any runoff from site must be contained.

Potential Impact	Source Activity	Mitigation Measures
through runoff and seepage		✓ Waste should be recycled as far as possible and sold/given to interested contractors. Waste will be stored according to the Norms and Standards for Storage of Waste. ✓ Recyclable waste should not be stored for excessive periods. ✓ Chemical waste must be stored as per MSDSs and not stored on site for excessive periods. ✓ General waste must be collected and disposed of at a registered waste disposal site.
Employment opportunities	All activities	Implementing a "local first" recruitment policy. Ensure that the local jobs created are linked to a skills development programme for permanent employment
Support of Local / Regional business	All activities	Adopt preferential procurement policies towards local suppliers and distributors. Ensuring that principle of "local first" when procuring consumables, construction materials etc.
Skills development programmes	All activities	
Project-induced in-migration	All activities	Implementing a "local first" recruitment policy. Ensure that the local jobs created are linked to a skills development programme for permanent employment
Contribution to the national fiscus. Payments towards direct taxes, royalties and regulatory fees	All activities	
Improved Local Tourism	All activities	

8.5 Statement motivating the alternative development location within the overall site.

(Provide a statement motivating the final site layout that is proposed)

The mine layouts are primarily dictated to by the distribution of the rock deposits of interest. The igneous rock is abundantly distributed within the application area.

The site granite deposit are shallowly buried at depth between 0.5 – 5 metres deep. The rock deposit is accessible through a surface mining method.

The site is relatively dry with no streams and located on a hard rock with low borehole yield. The proposed mine will have minimal impacts on water resources.

9 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.

In order to identify the potential impacts associated with the proposed prospecting activities the following methods were adopted:

9.1 Project Screening

Screening was the initial identification of potential interactions between the Project and physical, ecological and human receptors. The project applicant briefed the EAP (Mielelani Consultancy) about the proposed mining activities. All the project activities were identified, described and project layout plans acquired from the applicant. During screening process all relevant policies and regulations were identified and their applicability to the project was identified. Screening also included identification of likely physical, ecological and human receptors based on existing knowledge of the environmental and social baseline conditions and professional expertise.

9.2 Project Scoping

Following the Screening Stage, scoping was undertaken to provide further detail of potential environmental and social effects of the Project. The Scoping Stage intended to facilitate impact identification in a consistent and robust manner. The scoping process identified intended to identify environmental impacts, receptors and alternatives assessments. The following are the process undertaken during project scoping:

9.2.1 Desktop Study

Desktop study was undertaken for systematic identification of potential interactions between project activities or events and known receptors, i.e. identification of potential physical, ecological, and human receptors that may be affected by the Project. This was done through review of existing environmental and social information, and gap analysis to identify additional baseline information required for the impact assessment.

9.2.1.1 GIS Review

The project made use of ArcMap, ArcGIS Pro, Google Earth and Bing Maps to identify and assess probable impacts, various data sources were consulted to define the receiving environment and identification of probable impacts. Overlay of proposed activities on site GIS data from various sources enables for detailed identification of probable impacts and impact receptors. The GIS data used to identify probable impacts are the following:

Earth Image (ESRI, Google & Bing Map) – The imagery provides review of site setting and also provide review of changes over time as the images can be back dated. The Images provide vegetation cover, site land uses, identification of environmental features such as streams and natural habitats;

Bojanala District RSDF Plan – Provides data such as floodlines and zone, land use planning, watercourses and sensitivities;

North West Conservation Plan – Provides data on site ecological sensitivities with categories Critical Biodiversity Area (1 & 2), Ecological Support Area (ESA) 1 & 2, Other Natural, and No Natural Remaining;

National Vegetation Map – The layer/ shapefiles provides data on vegetation cover of South Africa as mapped by Mucina and Rutherford in 2006. The vegetation map provides data on expected site vegetation types to be affected by the proposed prospecting activities;

SANBI Plants of South Africa Quarter Degree Search – The website provides probably plant species on site.

National Freshwater Ecosystem Priority Areas (NFEPA) – The data provides mapped wetlands and streams of South Africa with their respective Present Ecological Status, Wetland/ river condition and their flow season;

South Africa 1:50 000 Vector Data – The data maps out most of the site features which include open spaces, roads, rivers, vegetated areas, protected areas, agricultural and residential areas;

Important Birds Areas – Provides bird areas of South Africa and their respective birds' species;

DWS Aquifer Classification, Vulnerability and Susceptibility – Provide site aquifer information.

Vegter's Underground Water Resource – The water reports shapefiles provide data such as depth to underground water, available water in aquifers and flow potentials.

9.2.1.2 Literature Review

Literature review is the review of existing literatures pertaining to the proposed activities and the receiving environments. The review included review of metadata and explanatory documents for GIS data. The following are some existing literatures reviewed:

- ✓ Bojanala and Madibeng Municipalities Integrated Development Plans;
- ✓ Review of Books, Journals and Unpublished Papers; and
- ✓ DEA Guidelines such as Need and Desirability and Alternative Assessments

9.2.2 Field Investigation

A site visit was conducted to ensure that the information gathered as part of the Desktop investigation reflects the current status of the site. The site visit was conducted on 08 – 10 March 2021. Target areas for further investigation were determined through GIS review. The field investigation was aimed at assessing site land uses, vegetation cover, habitats, flora and fauna, water resources, heritage resources and any other sensitive environmental receptor as determined by the desktop review.

The field investigation was also aimed at identifying issues as identified from the Scoping Phase.

9.2.3 Stakeholder consultation

Project stakeholders included the applicant, specialists, land owners and users, municipalities, provincial and national departments such as Department of Water Affairs and Sanitation and Department of Environmental Affairs, and NGOs such as BirdLife South Africa.

All the stakeholders were notified of the proposed project and encouraged to participate. The stakeholders were registered from the Scoping Phase. The project stakeholders engaged the EAP on site background and probable impacts.

9.3 Impacts Identification and rating

The process for assessing potential Project impacts involved:

- ✓ Prediction: What will happen to the environment as a consequence of this Project (i.e. defining Project activities and impacts)?
- ✓ Evaluation: Will it have a beneficial or adverse effect? How big is the change expected to be? How important will it be to the affected receptors?
- ✓ Mitigation: If the impact is of concern, can anything be done to avoid, minimise, or offset the impact? Or to enhance potential benefits?
- ✓ Residual Impact: After mitigation, is the impact still of concern?

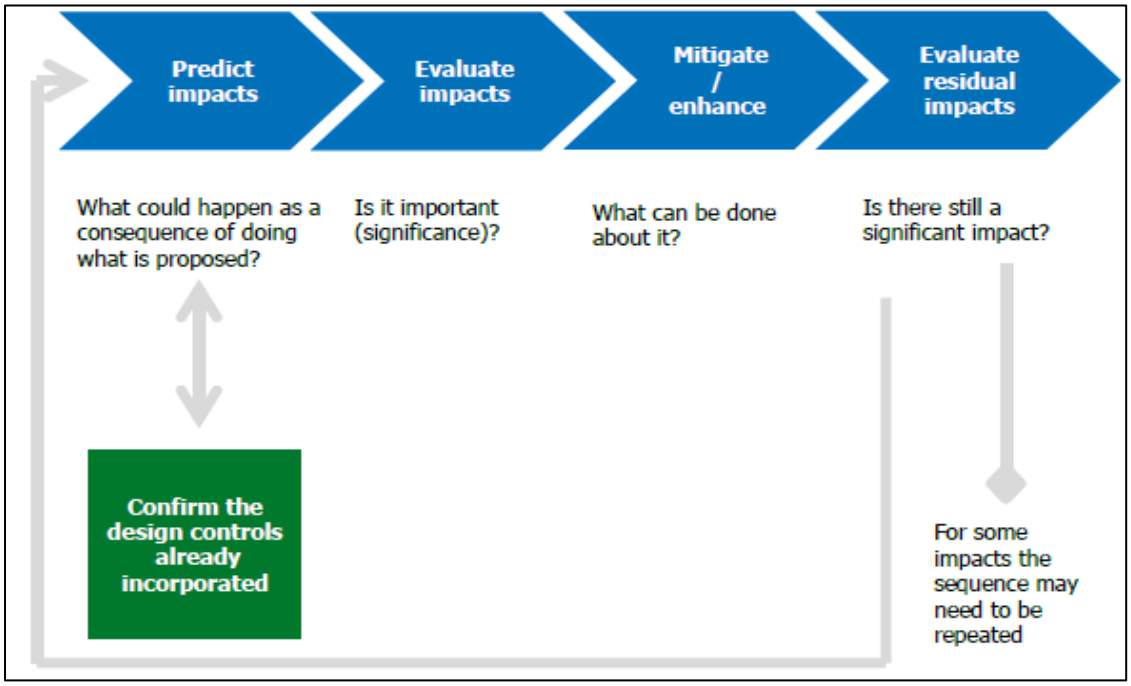


Figure 9—1: Impact Identification and Assessment Process

The residual impact is what remains following the application of mitigation and management measures, and is thus the final level of impact associated with the development of the Project. Residual impacts also serve as the focus of management and monitoring activities during project implementation to verify that actual impacts are the same as those predicted in this Scoping Phase.

For some types of impact there are empirical, objective and established criteria for determining the potential impact significance (e.g. if a standard is breached or a protected area is damaged). However, in other cases assessment criteria are more subjective and require professional judgement to a greater degree.

10 Assessment of each identified potentially significant impact and risk

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

10.1 Impact Assessment for Establishment and Construction Phase

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
Construction of access and haul roads	Top Soils	Soils will be stripped and stockpiles with some of the soils used for construction of haulage roads and other access roads that may be required. There is a potential of mixing of topsoil's. Soil negative impact will occur due to the presence of vehicles and equipment's leading to hydrocarbon spills which may cause soil contamination.	M	• Access and Haulage roads will be constructed with uncontaminated materials and/or not containing any carbonaceous rocks that are known to host pyrite mineral. • Enough spill kits will be stored on site, and the stuff will be trained to act when spills occur. • Spill specialist contactor or consultancy will be appointed and be used when needed. • Contaminated soil to be removed and transported by appointed specialist for treatment. • Drip trays to be used for vehicles and equipment's (Drill rigs) that stand overnight.	L
	Vegetation	Vegetation will be removed during the construction of the roads.	M	• Removal and stockpiling of all topsoil's to be used in final rehabilitation. • Access roads and haul roads to avoid sensitive areas such as protected land and water bodies.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Surface water and Ground water	Carbonaceous material and contaminated soils can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads and access haulage roads. Runoff from untreated/ unattended hydro-carbon spills areas my cause contamination and deterioration in the surface and ground water quality.	M	• All identified hydrocarbon spills to be contained and soils removed by trained stuff or appointed consultancy. • Recommendation from the storm water management plan to be implemented to prevent contamination on surface and ground water. This will include the construction of berms, dirty water trenches, clean water trenches and stockpiles to shield any surface and ground water from mining activities.	L
	Air quality	Roads construction activities may cause dust that may influence the quality of air. Construction vehicles and machines can lead to the deterioration in air quality.	M	• Dust depressing methods to be implemented while construction of the access roads and haul roads take place. Water bowsers to be used to make sure dust impact is minimized.	L
	Noise levels	Construction activities may cause an increase in noise levels.	M	• Proper maintenance of all vehicles and equipment's to be undertaken on a regular basis to prevent excessive noise.	L
Stripping and stockpiling of topsoil	Topsoil's	Topsoil will be stripped and stockpiled; this action may cause contamination and deterioration in soil quality. There is a potential of mixing of topsoil's. Soil negative impact will occur due to the presence of vehicles and equipment's leading to hydrocarbon spills which may cause soil contamination.	M	• Topsoil and subsoil to be stockpiled separately and recorded accordingly. • A limited height of 2.5 m is advised for all stockpiles to prevent any potential seeds and regrowth potential. • Contaminated topsoil's to be removed and transported for treatment.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				• Drip trays to be used for vehicles and equipment's (Drill rigs) that stand overnight.	
	Vegetation	Vegetation will be removed during the stripping of the topsoil and will also be affected during the stockpiling process.	L	• Only vegetation directly in the path of the proposed access roads and haul roads to be removed with exception of any protected area. • Removal and stockpiling of all topsoil's to be used in final rehabilitation.	L
	Land capability	Stripping and stockpiling of topsoil will put the original land capability on hold until rehabilitation takes place.	L	• During the final rehabilitation stage, land capability to be restored completely to arable land.	L
	Land use	Topsoil stripping will result in the current possible land use to cease completely.	M	• Land use currently is agricultural orientated. Rehabilitation plan has post mining land use.	L
	Surface and ground water	Carbonaceous material and contaminated soils can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads and access haulage roads. Runoff from untreated/ unattended hydro-carbon spills areas my cause contamination and deterioration in the surface and ground water quality.	M	• All identified hydrocarbon spills to be contained and soils removed by trained stuff or appointed consultancy. • Recommendation from the storm water management plan to be implemented to prevent contamination on surface and ground water. This will include the construction of berms, dirty water trenches, clean water trenches and stockpiles to shield any surface and ground water from mining activities.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Air quality	Stripping and stockpiling of topsoil may cause dust due to vehicle movement that will influence the quality of air. Material handling (topsoil) will generate dust and this and vehicle emissions can potentially cause deterioration in air quality.	M	• Dust depressing methods to be implemented while construction of the access roads and haul roads take place. • Water cars to be used to make sure dust impact are minimized. • Material handling has to be limited to as little as possible to prevent the generation of dust.	L
	Noise levels	Stripping and stockpiling activities may cause an increase in noise levels.	M	• The construction of the stockpiles will limit noise beyond the mine. • Proper maintenance of all vehicles and equipment's to be undertaken on a regular basis to prevent excessive noise.	
Construction of the pollution control dam (PCD)	Soils	Topsoil will be stripped as part of clearing the PCD AND STP positions and this may sewage treatment plant. This may cause contamination and deterioration in soil quality.	M	• Soils to be carefully stripped in layers and each layer stockpiled separately. • All notices or identifies spills to be attended or cleared • Application of drip trays for overnight storage of vehicles and equipment's.	L
	Vegetation	Vegetation will be removed from the dam footprint area as well as where the cut off drains will be located.	M	• Peg position of pollution control dam and water management infrastructure. • Infrastructure area to be located on cultivated land.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Land capability	During the construction and operation of the pollution control dam and water management infrastructure the original land capability classified as agricultural to cease completely. Note that these measures will remain post closure and will be of a permanent nature.	M	• Limit the area of the PCD and STP vegetation clearance to a minimum	L
	Land use	Construction of the water management measures and pollution control dam will result in the current possible land use to cease completely.	M	• Rehabilitate area back to arable land	L
	Surface water	Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of these facilities. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality. Blasting of surfaces, footprint clearance on the sites of the proposed processing plant and other infrastructure, and other excavations in the mining area are likely to lead to increased sediments in runoff water.	H	• Construction of cut off drains • Encourage vegetation of topsoil and subsoil stockpiles • Design all blasts by a professional and use electronic blasting techniques to limit the impact as far as possible.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Surface quality water	The transport, handling and storage of fuels, chemicals, construction materials and waste could lead to spills that contaminate soil surfaces and water resources.	M	• Waste must be discarded in an approved manner • Fuel and oil storage areas should be bunded • Spills should be cleaned up immediately.	L
	Air quality	Material handling during the construction of the pollution control dam, sewage treatment facilities and surface water management structures will generate dust and this and vehicle emissions can potentially cause deterioration in air quality.	M	• Ensure that vehicles are maintained • Implement dust depression • Monitoring of fallout dust on a monthly basis	L
	Noise levels	Stripping and stockpiling activities may cause an increase in noise levels.	M	• The construction of the stockpiles will limit noise beyond the mine • Proper maintenance of all vehicles and equipment's to be undertaken on a regular basis to prevent excessive noise.	L
Construction of Infrastructure area.	Air quality	**Site clearing, removal of topsoil and vegetation** • During land clearing; topsoil removal, loading of material, hauling, grading, stockpiling, bulldozing and compaction are very common. Normally, topsoil and subsoil will be removed first with large scrapers. The topsoil will be stockpiled for final	L	• Topsoil should not be removed during windy seasons due to associated wind erosion heightening dust levels in the atmosphere. • Clearing of vegetation must be restricted to constructing only. • During the loading of topsoil onto trucks or stockpiles, the dropping heights should be minimised.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		rehabilitation around the infrastructure area. It is anticipated that each of the above mentioned operations will have its own duration and potential for dust generation. • Fugitive dust will give rise to nuisance impacts as fallout dust and give rise to health impacts. It is anticipated that the extent of dust emissions would from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. • This activity will be short-term and localised, seizing after construction activities. Material will be removed by using a bulldozer and then storing this material separately for use during final rehabilitation at end of LoM when the operation cease. These construction sites are ideal for dust suppression measures as land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles and deposit it elsewhere (wind erosion).		• Water or other binding agents such as (water bowsers) with extended sprays can be used for dust suppression on earth roads. • Minimum travel speed of 30km/h distance and volume of traffic on the roads to be used for bulldozers and graders. • Stockpiles should not be left for prolonged periods as wind energy generates erosion and causes more dust to form. • Constricting the areas and time of exposure of pre-strip clearing in advance of mining development	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Issues with dust can also arise during the transportation of the extracted material, usually by truck and shovel methods, to the stock piles. The dust can further be created by the entrainment from the vehicle itself or due to dust blown from the back of the bin of the trucks during transportation of material to and from stockpiles.			
Construction of Infrastructure area.	Biodiversity	• Loss of Nationally Protected Marula Tree. • Influx of personnel, especially during the construction phase, faunal species will be more likely to collide with vehicles. • The possibility of fire within the study area will also increase ore especially in dry seasons which will have negative impact on final biodiversity and habitants.	M	• Clearance of vegetation will be limited to the surface mining part which is the small portion of the mining right application. • Removal of protected species must only be undertaken once the Tree Removal Permit has been issued by relevant authority. • Mining activities should be restricted to the proposed mining activity layout. • Occurrence of alien species should be monitored on site and once identified should be cleared, as disturbance in natural habitat and compaction of soil usually leads to the establishment of alien plant species. • Sensitive areas such as wetlands (Pans) and drainage lines should avoided and any plan to	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				operate within wetlands must be authorised by DWS. • Minimising the destruction of or disturbance to vegetation within the proposed area of activity, as well as in the surrounding areas; • Preventing the unnecessary destruction of any natural habitat and animal life within the boundaries of the proposed area of development and adjacent area such as hunting, killing of snakes' etc.	
General construction of mining project to operational phase at Mine.	Socio-Economic Local Economic Impacts	As a result of general construction of the mine, buildings and other mine related infrastructure, procurement opportunities will be created that could benefit local suppliers.	PL	• Procurement of suppliers must be as per the approved SLP. • Conduct a local skills assessment and update quarterly or annually to ascertain what skills are available that may meet supply chain requirements. • Proper or improved Communication with local suppliers to register on the suppliers list to manage expectations.	MP
		Impacts on local employment Approximately 25 of temporary and permanent employment opportunities will manifest over mine period. Employment will relate to site clearing, fencing, etc.	H	• Communicate available opportunities though mine notice bard and liaising with the community representatives and including recognised community forums. • Enforce employment/procurement policies and procedures (e.g. do not employ at the mine gate) to prevent unnecessary influx by jobseekers.	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				• On-going consultation with the stakeholders must be made with regards to the start date of the mine Project to prevent early or long-term influx. • Address concerns with and ensure local job and procurement opportunities. • Ensure compliance with socio-economic tools and legal requirements (BBBEE and Mining Charter).	
		Impacts on local economy • Granite rock is mostly processed locally ensuring that all the economic benefits remain within the most immediate site; • Support services will be required for the mining operations such as supply of trucks and machinery and waste handling service providers.	H	• Reduction of unemployment rate. • Issue Contracts SMMEs and local service providers. • Source Local procurement of material and goods, where possible. • Positive impacts for the retail market (groceries, goods and services, food suppliers, etc.) for local merchants, shops and informal traders; • Boost accommodation facilities for temporary skilled employees in local establishments and its associated spin-offs. • It is recommended that the mine directly engage with Madibeng LED to ensure compliance to the SLP commitments; • Contractor Social Management Plan (CSMP) to be in place and implementation of its requirements for the duration of the construction period to: • Ensure proper and constant communication between the various sectors that deal with 'social' issues, such as Human Resources (employment),	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				Supply Chain (contractors), Corporate Affairs (communities). • Address concerns timeously, ensure local job and procurement opportunities; and • Ensure compliance with national legal requirements (BBBEE and Mining Charter). • As part of the tender documents the contractor has to provide subcontracting values per package and the plan on how he will meet BEE procurement and SMMEs targets assigned. • Implement relevant measures should the contractors not comply with the social management plan they submitted (impose penalties, termination where necessary, review of future prospective work and so forth). • Erect signboards along the affected routes that display the contactors name, contract description and construction period.	
	Socio-Economic Impact Population impacts	**Ingress of jobseekers** Unemployment levels in the study area are a concern. Although limited (approximately 25 permanent employment opportunities) the prospect of employment during the construction phase is likely to attract jobseekers from the broader local	L	• Approved SLP must not create unrealistic expectations and communicate accurate details of the construction period to the local communities. Establish a labour desk and ensure that the local Councillor(s) are involved. • Set guidelines in the CSMP for local employment and ensure implementation thereof for the duration of the construction period.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		municipal area and even the district and can affect locals and the Municipality in the following ways: • An increase in local unemployment levels should the jobseekers outnumber demand for employment. It is possible that many of the jobseekers will remain in the area after the construction period; • South Africa is well known for xenophobic attacks which will lead to potential conflict between locals and "outsiders" that creates employment opportunities and other resources. • Rise in the number and size of informal settlements which is currently not the case in the proposed study area. • A potential increase in crime in the direct vicinity of the study. • Additional pressure on local government to provide housing, employment and so forth should job seekers remain post-construction. • The establishment of informal areas are often also a consequence of non-local contractors and sub-contractors		• The provision of accommodation for contractors and the erection of a construction camp are not allowed on site. • Employees and contractors to be housed in the nearest towns	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		that want to live near their places of employment. The prevention of an influx of jobseekers/contractors and the subsequent establishment of informal settlements near employment opportunities are always a concern and challenge.			
	Socio-Economic Impact Population impacts	**Impacts on the size and structure of the population** Although employment opportunities for this project will be limited, unrealistic employment expectations could result in the uncontrolled influx of jobseekers and migrants, specifically males (followed by family members), with negative consequences for locals and local government. As large-scale influx of construction workers are not anticipated, it is unlikely that the age, gender or racial structure of the local or wider municipal area will be impacted significantly during the construction phase.	L	• Involve the Local Councillor(s), community forum and other recognized stakeholders in the process to ensure that they convey the information to the local communities through their established means of communication (community meetings, etc.). • Set guidelines in the CSMP for local employment and ensure implementation thereof for the duration of the construction period. • The provision of accommodation for contractors and the erection of a construction camp are not allowed on site. Employees and contractors to be housed in the nearest towns	L
	Socio-Economic Impact Individual and	**Disruptions in daily living and movement patterns** Disruptions in daily living and movement patterns for surrounding communities, land owners and road users could	M	• Announce disruptions, road closures (if any) and so forth by using the local media, road sign boards and other Municipal structures and collaborate with the Local Municipality in this regard.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	family level impacts	manifest in the form of traffic and intrusion impacts resulting in short-term disruptions and safety hazards. Road R38 closer to mining area and gravel route traverses the mining area. Additional factors that could impact negatively on daily living and movement patterns include; The available gravel route will be applied for relocation with Sanral. The process of relocation will increase in accidents, frustrated motorists and financial implications for local and provincial government (road repairs), temporary road closures (if any), construction vehicles that offload materials on site (dust, noise, etc.), and dust generated on access and haul roads resulting in impacts for residents, farm houses, crops and livestock.		• Erect signboards indicating accesses to the construction site and detour. • Fence off the development footprint of the proposed construction site prior to the commencement of site clearing and construction activities. • Make golden rules or Impose penalties for reckless drivers to enforce compliance to traffic rules. • Inspect trucks and other heavy vehicles on a regular basis and ensure proper maintenance to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • Fence off the development footprint of the proposed construction site prior to the commencement of site clearing and construction activities. • Display a contact number on the construction vehicles where motorists can report reckless driving. • The mine to consult with adjacent landowners whose private residences, crops, livestock and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement. Provide a schedule of the construction activities to landowners and relevant I&APs. • Keep the local SAPS in Davel and Ward Councillors informed about the construction progress and timelines to ensure that they would be able to	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				adequately deal with any type of disruptive behaviour or theft.	
	Socio-Economic Impact Individual and family level impacts	**Security impacts** Criminal activities increase in areas where construction projects take place. An influx of "outsiders" (jobseekers and contractors) and the potential increase in the unemployed and the establishment/growth in informal settlements could exacerbate security issues. Employment of locals and strict implementation of the guidelines set in the CSMP during the entire construction phase will minimise potential security impacts.	L	• Provide workers with identity tags and prohibit the access of unauthorized people to the construction site. • Visitors to report to security guards or security officer's prior entrance. • Workers should not be allowed to remain in the construction area when they are off duty and have any social visits during working hours. • Implement safety and security measures, such as fencing, 24-hour security guards, CCTV cameras, random security checks and access control.	L
		Impacts on road infrastructure An increase in the size and frequency of large construction vehicles and trucks could potentially damage already deteriorating local road surface.	L	• Communicate with the local Municipality with regards to potholes and possible repairs to the road surfaces that might be required and also engage with the counsellor to see where in terms of the planned SLP, the mine can assist.	L
		Disruptions of services (water/electricity/sewerage) No impacts and disruptions on services such as water, electricity provision and	L	• Inform surrounding landowners and other affected parties in advance and have an agreement in terms of the use of water from windmills and located boreholes.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		sewerage are anticipated as a result of the construction phase.		• Adhere to all approved water uses requirements. • Ensure that surrounding landowners and residents are aware of procedures to raise complaints and make the contact numbers of the Main Contractor available to them, should issues arise.	
	Socio-Economic Impact Health and safety impacts	**Health and safety risks for workers** • Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: • Construction-related accidents due to structural safety of project infrastructure. • Dust generation and air pollution resulting in respiratory diseases. • High noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient funds, facilities, littering and refuse) flies,	H	• Enforce the use of PPE where relevant. • Store dangerous plant, equipment and material away from reach when not supervised or in use. • Dispose of the various types of waste generated in the appropriate manner at licensed waste fill sites at regular intervals. • Provide safe and clean drinking water and instil regular fatigue breaks to keep workers hydrated. • Provide enough ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Keep the local police and ambulance services informed of construction times and progress. • Ensure that the mine has an ambulance that remains on stand-by for the duration of the project. • Store any materials away from sensitive locations in fenced-off areas • Accommodation and facilities of security guards and any other personnel that may stay on site should comply with health and safety regulations.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		rodents and pests and possible contamination of drinking water. • Unsafe and insufficient drinking water • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on basic healthcare services. • An increase in several abortions • Dehydration and sunburn which will results to heatstroke, as high temperatures can be experienced during summer months.		• Train employees and contractor on how to handle dangerous substance on site and to understand the material safety datasheet. • Inform the Municipality and emergency services if harmful substances are spilled. • Erect or put barricaders to restrict access in construction area. • Utilise and increase existing mine security and procedures and 24-hour security in and around the mining area. • Fence off the construction site where possible to avoid illegal trespassing. Close off any excavation areas to prevent access. • Implement measures to suppress dust - spraying of gravel roads, surfaces and stockpiles with water on a regular basis. • Construction workers to wear protective clothing (e.g. Full PPE) that minimise dust inhalation and clothing that protect against sunburn.	
	Socio-Economic Impact Health and safety impacts	**Community health and safety** • Farm Residents, surrounding landowners and road users could be subject to community health and safety impacts if the construction process is not managed adequately. This could include:	H	• Identifiable tags and clothing for construction workers (PPE) and the implementation of security measures at the entrance to the construction site. • Display "danger" warning signs and "no public access" signs at all potential accesses and paths.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		• Road accidents, subsequently placing pressure on local disaster management and health services (fire, ambulance, police services, etc.). • Unauthorised access/trespassing at the construction site resulting in theft, public safety issues and even death. • Fire hazards at the construction site and the possibility of spreading and damaging surrounding farmland and infrastructure. • Machinery resulting in respiratory diseases.		• Adhere to the Emergency and Safety plan procedures for the duration of the construction phase. • Make the procedure to lodge complaints available to the surrounding property owners and Ward Councillors to enable them to lodge complaints when problems with regards to community and/or environmental health arise. • Heavy vehicles to keep headlights and strobe lights/protection lights always switched on to improve visibility. • Inspect vehicles on a regular basis and impose penalties for reckless driving. • Ensure good visibility at the accesses to the site by watering making use of bowsers.	

10.2 Impacts and proposed mitigation measures of activities in the operational phase of the project

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
Operation and Infrastructure area containing stockpile areas.	Soils	During operation of the mine, it is anticipated that carbonaceous material (e.g pyrite host materials or acid generating minerals) may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery.	M	• All spills to be cleaned immediately after such an event. • Appoint a specialist to develop a hydrocarbon spill procedure for all possible areas of spillages. • Spill kits to be freely and readily available. • All vehicles to be parked and serviced in and on a bunded area, which is included in the Storm Water Management system. • All storage and service areas of vehicles to drain into a sump with an oil separator.	L
	Soils	Deterioration of topsoil quality due to salt contamination at the stockpile and crushing and screening plant area.	M	• Proper runoff control structures should be in place which channels all polluted water into a pollution control facility.	L
	Land capability	Complete cease in land capability at the footprints of all structures	L	• No mitigation of loss in land capability is possible during the construction and operational phase because the	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		that covers the surface during the operational phase.		land capability will remain ceased as long the structures covers the surface.	
	Land use	Stockpiling of overburden will result in the current possible land use (agriculture) to cease completely in an area covered by surface mining operations.	L	• Rehabilitate as soon as possible and create a land use of agriculture although the land capability will be arable.	L
	Surface water	Loose material as well as the contaminated overburden material can contaminate surface water during rainfall events resulting in dirty water runoff. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	L	• Clean and dirty water trenches separation measures such as trenches will be constructed around the stockpile area to separate the dirty areas from the clean areas. • The contaminated water will be collected and diverted via a pipeline to the pollution control dam. • Ensure that spills are cleaned up immediately to avoid surface water contact and contamination. • Implementation of the Storm Water Management Plan (SWMP) as per water use.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Groundwater	Seepage from the overburden stockpile can contaminate the groundwater immediately below the stockpile as well as adjacent areas.	H	• Ensure that the trenches are established and that any surface seepage be contained and diverted to the pollution control dam (PCD). • Implementation of the SWMP and IWWMP	L
	Air quality	Dust will be generated due to vehicle and machinery movement.		• Conduct dust suppression using Bowsers.	L
	Air quality	**Use and maintenance of access roads** Transportation of the workers and materials in and out of mine site will be a constant feature during the operational phase. This will however result in the production of fugitive dust due to suspension of friable materials from earth roads. It is anticipated this activity will be long-term and regional and will seize once the life of mine has been reached.	L	• Planting plenty of trees or hedges as shelterbelts/windbreaks to eliminate or minimise wind disturbance. • Planning operations to maximise the benefit of wind breaks • Disturbed areas such as those caused by stripping off grass and topsoil should be kept to a minimum. • Roads and standing(Picking points) areas should be sealed or concreted where possible • Use water sprays with bowsers to settle dust. Care must be taken to	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Substantial secondary emissions may be emitted from material moved out from the site during grading and deposited adjacent to roads. Passing traffic can thus loosen and re-suspend the deposited material again into the air.		ensure that the water used is free from pollution by noxious matter. There are additives available that reduce the volume of water used, and increase its effectiveness, but approval to use them should be obtained DWS. • Use of a global positioning system (GPS) as a tool to track the locations of mining and dust suppression equipment (e.g. water carts) and cross-referencing this information with real-time weather monitoring to assist with dust control. • Use of water sprays (Bowsers) at each contact or transfer point along the conveyance system which have adjustable rates of application depending on dust levels. • Automatic water sprays installed at the ROM hopper bin that produce a fine mist to suppress dust generated with the triggering of sensors when a truck enters the dump zone and	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				automatic sprays activated until a set time following the departure of the truck. • Use of a retractable telescopic chute with curtains to load minerals into transport trucks • Speed restrictions should be imposed and enforced • Cabs of machines should be swept or vacuumed regularly to remove accumulated dust. • Exhaust pipes of vehicles should be directed sideways so that they do not raise dust. • Engine cooling fans of vehicles should be shrouded so that they do not raise dust. • Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust.	
	Noise	During the operational phase, increased noise levels can be	H	Proper and clear open communication between the	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		expected especially on surface operations.		communities and the developer need to be implemented and maintained. • Ensuring that equipment's are well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts. A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FELs etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.	
	Visual	**Potential visual impact on the viewpoints that had a visual**	M	• The visual impact can be minimized by the creation of a visual barrier more especially near the road.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken. Although the surface mining activities will be limited to a small area, the stockpiles, waste rock dumps and related surface infrastructure will be visible for the entire life of mine.		• The area will be rehabilitated after mining is concluded and thus the visual impact will be removed and the area will be restored.	
	Groundwater	**Underground (Lowering of groundwater levels-boreholes)** The mining operation in the operational phase may draw down the water table, affecting boreholes of adjacent property owners (The two identified windmills).	H	• Monitor static groundwater levels on a monthly basis in all boreholes within a zone of two kilometre surrounding the mine to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be reacted on appropriately. • If it can be proven that the mine is indeed affecting the quantity of	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply. • The numerical model should be updated during operation of the mine by using the measured inflows, water levels and drilling and pump test information to recalibrate and refine the impact prediction.	
	Groundwater	**Contamination during mining (sewage, oil spills and mine material)** Groundwater can become contaminated due to sewage spills, oil spills or mining material spills.	L	• Groundwater quality must be monitored on a monthly basis. • The monitoring results must be interpreted quarterly by a qualified hydrogeologist and the monitoring network should be audited annually to ensure compliance with regulations DWS. • The numerical groundwater model must be updated by calibrating the model with monitoring data.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				• Water retention dams should be lined to prevent ingress of contamination to the groundwater. • Geochemical testing of the backfill material and pillar material should be conducted to aid in the prediction of contaminant release and potential geochemical changes induced in the subsurface, by means of geochemical modelling. • Clean and dirty water trenches should be separated as planned. • It must be ensured that a credible company removes used oil after vehicle servicing. • A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills • Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				• Sewage effluent emanating from latrines or ablution blocks should be treated to acceptable levels before discharge into the environment s required by DWS.	
	Groundwater	**The formation of Acid Mine Drainage (AMD) in groundwater resources** The formation of the AMD could occur as a result of the ingress of water and oxygen into strata containing sulphide minerals. Local patches of mine water in contact with only carbonaceous material will be acidic as the carbonate minerals are not efficient to neutralize the acid produced. As the mine gets flooded these acidic parts will come within contact with the neutral-alkaline drainage from the silicate minerals.	M	• Develop a groundwater monitoring programme in order to assess the groundwater quality. Frequency of monitoring to take place as per the groundwater monitoring plan. • Should pollution be identified within the groundwater resources, the source of the pollutants will be identified, and the applicable remediation measures will be implemented.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
Operation of the surface mining (Boxcut)	Drilling and Blasting	**Blasting activities.** Blasting activities will result to: • Permanent alteration of geology • Possible contamination from hydrocarbons • Harm to possible surrounding fauna • Poor visibility, Dust creation, Air blast disturbances and Fly rock creation • Water contaminated • Groundwater contamination from contaminated water seepage • Noise • Fire hazards due to drilling	H	• Blasting will only be employed if the Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite is deep in the strata, however truck and shovel mining will be used to mine since the level is considered shallow. • Ensure that machinery used is up to standard and no leakages exists • Hydrocarbon spillages must be cleaned immediately Contain any spillages by removing the affected soil surface and dispose at the designated waste bin to be disposes at a designated landfill site by service provider. • Blasting will only be employed if the Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite is deep in the strata, Fauna of the surrounding area has already being affected by mining and	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				agricultural activities within the property. • Site Environmental Control Officer and Mine Personnel will be informed and notified before any blasting operation • The should be reduced charge mass per delay and different initiation system must be tight to the drilling and charging mechanisms • Stemming control will be in place to avoid air blast and fly rock • Drilling and blasting where a pond of water exists from possible rain water will be avoided. If found, such water will be diverted to the relevant designated control dam • Operators will use safety PPE such as ear plugs and the activity will take place during the day. Stakeholders will be notified of all blasting schedules if blasting is employed	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				• Fire extinguishers will always be available on the site.	
Operation of the Mine in general	Socio-Economic Impacts: Local economic impacts	**Employment at the mine.** The mine will employ and estimated 25 permanent employees, with skills levels that vary from skilled, semi-skilled to unskilled. Skilled employment will include managerial positions, Mine Planners, Environmental and other Specialists, Geologists, administrative and financial personnel, certain Operators, Engineers, Boilermakers and so forth. Semi-skilled positions relate to Foreman positions and Operators such as Diesel Attendants, whereas unskilled positions are usually associated with manual labour (gardeners, etc.).	M	• Targets 26% for the mining operation for BEE spend are set by the Department of Mineral Resources (DMR) in the Mining Charter. Implementation of the SCMP will ensure that local economic benefits are maximised and the social performance of Contractors (local employment, local procurement targets, skills development, etc.) are managed through the CSMP. • Should Contractors not comply with the social management plan that was submitted or the KPIs (breach of contract), the contract may be terminated. • Local employment is once again emphasised and workers that reside closest to the mining area should first be considered for employment.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		It is anticipated that most of the positions could be filled by locals from the Municipal area as mining and industrial related skills should be available. Locals closer to the project site would likely expect to be considered especially for unskilled and semiskilled positions. Tertiary education levels in Ward 10 are much lower. In addition to permanent positions, temporary employment and contractors could be added. Temporary employment would include: • Cutting and clearing of vegetation within the used mine area • Maintenance of firebreaks • Maintenance of gravel roads, regular grading and watering to suppress dust		• Community forums must work hand-in-hand with the mine during selection process. • Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		• Repairing of fences as required • Repair and maintenance of buried and surface pipelines in the servitudes, various valves • Regular cleaning of silt traps drying bed, oil traps, dams, etc.			
	Socio-Economic Impacts: Local economic impacts	**Impacts on procurement / supporting industries / local SMMEs** The Mining Charter sets BEE compliance guidelines and as such Mine will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE's compliant as well as black owned and/or black empowered, strategies are identified in the	M	• Establish a labour desk in collaboration with the Community Forum, Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Mine's SLP. It is expected that most goods and services will be available locally from within the Municipal area. Supporting industries, local SMMEs and contractors include: • Contractors to transport and dispose of domestic and industrial waste • Maintenance and repairs of infrastructure, road, etc. • Operation of tuck shops • Laundry and catering services • Gardening • Security, etc.			
	Socio-Economic Impacts: Local economic impacts	**Impacts on current non-mining related employment levels of the area.** The proposed mine is surface operation and current land uses will to a large extent be unaffected as minimal extent on	M	• Appoint Groundwater specialist or company to implement the 'Groundwater Management Strategy' and any recommendation made as part of the Geohydrological Report. • Appoint consultancy to test boreholes on all affected private properties at	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		surface mining is applied for. However, should negative impacts usually have associated with Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite mining (impacts on water resources, air/dust pollution, crime, etc.) manifest and affect current land uses (farming) to such an extent that existing operations cease or are downscaled, then job losses would be inevitable. It was not at this stage possible to determine the existing employment numbers within the study area and the extent of potential job losses, should it occur, is not known.		regular intervals, make the results known to the property owners and keep record of test results by land owners, the mine operator and independent specialists and conduct quarterly meetings where issues relating to the environment and water pollution can be discussed.	
	Socio-Economic Impacts:	**Impacts on land values / market values of affected land portions**	M	• The mine should contact property value surveys and compare it with the municipality property value evaluation.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Local economic impacts	A variety of factors could impact land values of affected land portions and include: • The availability and quality of ground and or surface water for domestic and farming purposes • Intrusion impacts, such as noise and dust, which could have an impact on crops, livestock and infrastructure • Occurrence of criminal activities (theft, vandalism, etc.) • Occurrence of informal settlements, trespassing on private land, grazing practices, etc • Restrictions that are set by the mining company for future infrastructure developments on private properties due to mining		• The mine should improve the area by establishment things such as (building community clinics, Multipurpose status) and the mine should provide houses to low income earners as a way of fighting with poverty and inequality and crime. • Should boreholes be affected, implementing an Action Plan that will ensure that clean water (on-tap) is available to all the affected landowners without disruptions. • Ensure that all affected landowners are familiar with the procedure to lodge complaints and attend to the issues at hand expediently. Update affected landowners of new developments and attempt to communicate with them directly by minimising the use of Consultants for this purpose. • Monitoring programmes for groundwater need to be implemented and if ground water quality or quantity is affected, water will need to be	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		operations, safety issues, and so forth.		supplies by the mine for use by users affected. • Communication and further consultation to be initiated with surrounding landowners regarding the way forward. No commitments for indirect impacts can be made that is not already included in the mitigation strategies of environmental specialist reports such as visual, noise, air quality and ground water, and as adopted into the EMPr.	
	Socio-Economic Impacts: Skills development and social responsibility	**Skills development, training and skills equity** A 'Skills, training and development Policy and Plan' has been drawn up as part of the SLP with the purpose to provide guidelines for the implementation and maintenance of comprehensive training and development strategies and procedures.	M	• SLP consultant/ external Officer to conduct a monthly audit and submit an annual monitoring to the DMR. •Do a skills analysis of the local community members in collaboration with the local Municipality, Community Forums and Ward Councillor to ensure that locals are considered for employment and training. •Take locals from surrounding villages, towns and settlements close to the	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Funds for Human Resource Development for individual career development and in-service training are will be provided. Training includes ABET to illiterate employees, learnerships registered with the Department of Labour, internal and external bursaries and internships to be provided in accordance the Mining Charter guidelines. Management will be responsible to develop career development and succession plans and to assess the potential of employees and establish a career path for each to ensure the development of each employee. The mine aims to exceed the compliance targets set by DMR for HDSA employment.		project site into consideration for all potential training opportunities. Engage continuously with all stakeholders on employment and training opportunities should they arise. This will also form part of the overall Mine mine 'Stakeholder Engagement Plan', SLP and the 'Socio-economic Assessment Tool', which will be managed by Mine Mine. • Legislation stipulates that specific levels of training and skills are required to work for a mine. Only if skills are not available locally (nearby settlements and local Municipal area) will personnel be sourced elsewhere.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Socio-Economic Impacts: Skills development and social responsibility	**Impacts on the local community / community projects** As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality.	M	•Set aside a budget for smaller ad-hoc community requested projects should individual community members require funding/loans to start-up small businesses, etc.	M
	Socio-Economic Impacts: Population impacts	**Impacts of an 'outside' workforce / migrant labourers** The Mining Charter requires that most permanent employees be sourced from the "local" area. Local employees are in turn defined as people that originate/live within a 50 km radius of the project site. In terms of the Mine mine this would also include people from outside the Local Municipal area	M	• Mine Mine must commit to work with the Ward Councillors, Community Forums and Local Municipality to establish the skills database and to set up a labour desk to source local workers as far as possible. • Only if skills are not available locally should outsiders be considered. • Define the definition of a "local workforce" and communicate this and the skills requirements to the local communities. Work with the local Municipality and Councillors to	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		and would include people from as far and Other neighbouring areas. This definition of a local workforce could thus be in conflict with the perception of a "local workforce" as seen by people living in close proximity to the Mine. Locals could thus perceive "outsiders" as stealing employment opportunities that should be reserved for them. Negative impacts that can manifest as a result of a migrant and/or "outside" workforce include: Impacts on population changes, as the "outside" /migrant workforce impacts on the population size, gender, racial and age composition of the local and regional municipalities Additional pressure on local government for housing and associated infrastructure and		ensure that no unrealistic job expectations are created.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		services if workers are retrenched and unemployed A rise in the number of size of informal settlements if workers are retrenched; impacts on the HIV/AIDS prevalence rate, unwanted pregnancies and the subsequent pressure on health core services, if short-term relations were established with local women and the migrants return to their families in the sending areas An increase in unemployment placing pressure on the local municipality to provide jobs if the workers are retrenched Safety and security issues for the surrounding communities due to a growth in the number of unemployed people			

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Impacts on the size and structure of the local Municipal area Employment opportunities associated with Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite mining and commercial and industrial developments contribute to population growth in Madibeng Local Municipality. These factors add to the fact that Madibeng is one of the fastest growing municipalities in South Africa. Mining and industry also affect the gender and age ratio of the local population, as employment is primarily male dominated. The Municipality population consisted of a lot of female that are not employed or that are staying at home	L	• Females must be employed in numbers.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Impacts on the size and structure of the Municipal population have already manifested, and further changes as a result of the Mine are not anticipated. Emphasise is once again placed on the employment of locals.			
	Socio-Economic Impacts: Impacts on infrastructure and services	**Impacts associated with blasting** Information received from the applicant indicates that blasting will be done on the opencast mining. Blasting operations and the associated ground vibrations have the potential to affect structures in the study area.	L	• When blasting take place, landowners and the community will be informed of the blasting schedule and limit blasting to daytime hours. • A full blasting impact assessment study has been undertaken in order to address the aspects and to put proper controls in place. (See appendix 13)	L
		Impact on servitude Potential damage on water pipelines which belongs to farm householders and electricity power lines.		• On-going consultation with farms and Eskom to relocate the power lines and if ever there is no need to relocate, thud the mine should adhere to Eskom standards which states that operations should take place 30m away from power lines.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Impacts on road infrastructure It is anticipated that impact on the road surfaces due to trucks and large vehicles from Mine during the operational phase will be minimal.	L	• Mine will continuously upgrade and maintain the roads around the mine, more especially those that will be used by the trucks from the mine. • Inform the Municipality of damage to road surfaces and potholes	L
	Socio-Economic Impacts: Community / Institutional arrangements	**Attitude formation and mobilization against the project (adjacent private landowners)** Negative attitude formation and mobilisation against the proposed mining operation has already manifested, a conflict between one of the land owners and the applicant, the land owner stating that there are granite blocks that were stolen from site.	M	• Finalise the forum and community structure and submit the resolution to DMR before commencement of operations. • Ensure that land owners and affected communities are continuously updated with regards to new developments that might affect them.	M
	Socio-Economic Impacts: Community /	**Attitude formation for or against the project (local communities)**	M	• Be aware not to raise unrealistic expectations amongst the local communities with regards to	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Institutional arrangements	At this stage the local communities who would benefit through employment, perceive the project as positive. However, issues that transpired during the operational phases of similar mining projects and that affected the community's relationship with the mining companies negatively included: • Community with regards to employment and if "locals" are not considered fairly for employment; • Perceptions of nepotism during the employment process • Perceptions that locals do not benefit from projects that were identified in the consultation process. • The attitudes of local communities towards the project are at this stage largely positive, as employment is		employment, skills requirements and new community projects. • The mine should enforce skills analysis for local communities, train and employ locals. • Continuously engage with the local communities and provide updates through the Councillors, Forums and other structures with regards to the implementation of SLP projects and targets. Make the annual SLP progress reports available for public scrutiny if required.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		expected. Mobilisation and negative attitude formation against the project is however possible and has been defied from adjacent farm dwellers.			
	Socio-Economic Impacts: Individual and family level impacts	**Disruptions in daily living and movement patterns** Factors that could contribute negatively towards disruptions in daily living and movement patterns include: • Trucks and other mine vehicles that are not roadworthy and negligent drivers that disobey traffic rules, disregard speed limits and cause obstructions • Damage to the road infrastructure and relocation resulting in an increase in accidents, frustrated motorists and financial	M	• Trucks will be used to transport the mineral, the potential impact on living and movement patterns are regarded as low. • Announce disruptions, road closures and detours by using the local media, road sign boards and other Municipal structures. • Implement and Enforce golden rule penalties for reckless drivers to enforce compliance to traffic rules and speed limits. This is particularly pertinent for trucks and other vehicles that travel on the roads near sensitive receptors (farmhouses, local businesses, communities, etc.). • Inspect trucks and other heavy vehicles on a regular basis to avoid	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		implications for local and provincial government • An increase in traffic on the local access and haul roads (gravel roads), resulting in impacts for locals, farmhouses and crops (dust pollution) and health impacts (respiratory diseases). • On site machinery and equipment will potentially also increase dust and noise pollution that could result in impacts on the 'sense of place' for surrounding landowners.		oil spillages and un-roadworthy vehicles that could result in accidents. • Where relevant install silencers on machinery and trucks. • Limit operations and the movement of trucks on the access and haul roads to reasonable daytime hours. • Display a contact number on trucks where motorists can report reckless driving. • The mine to consult with adjacent and other affected landowners whose private residences, crops and other infrastructure could be affected by dust, noise, blasting and other impacts that result from traffic movement and the mining activities. • The mine should develop traffic management plan.	
	Socio-Economic Impacts:	**Relocation of individuals and families**	M	• On-going communication between the current lessee and the landowner	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Individual and family level impacts	No forced relocation of individuals and families would manifest. However, disruption on the current lessee who is using the land for agricultural activities has been identified due to impacts on land use competition', potential groundwater impacts, financial impacts and land use changes for current farming. The proposed mining operation could result in the 'voluntary' relocation of landowners with negative economic impacts (devaluation of properties, costs associated with relocation, loss of incomes, etc.) and disruptions in social, economic and cultural ties and activities for affected parties.		which is the department of public works. • Proper allocation of the land between two lessees (Agricultural activity lessee and Mining Lessee). • The mine to consult with adjacent and other affected landowners whose private residences, crops and other infrastructure could be affected by dust, noise, blasting and other impacts that result from traffic movement and the mining activities which have commenced.	
	Socio-Economic Impacts:	**Illegal trespassing** Illegal trespassing will occur at stockpile area due mining tools	H	• Implement and increase security measures control access to the mine and avoid trespassers.	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Individual and family level impacts	and equipment attracting criminal activities		• Fencing of the mining area.	
	Socio-Economic Impacts: Individual and family level impacts	**Security impacts** Crime activities are common in and around the mining areas. The in-migration of 'outsiders' (jobseekers) during the operational phase could contribute to an escalation of illegal informal settlements and an increase in local unemployment levels, which would have a negative effect on crime.	M	• Should crime escalate and unacceptable levels of crime and safety-related issues occur during the operational phase, collaborate with the Ward Councillors and SAPS and compile an action plan that would address the implementation of additional and stricter security measures. • Establish a channel where incidences of illegal trespassing and the occurrence of illegal settlements can be reported as soon as it occurs.	L
	Socio-Economic Impacts: Land use impacts	**Impacts on land and land use changes** The proposed mining area's extent is 373.230119 hectares and will affect portion 181, 853, 854, 855, 856, 857 and 1098 of the farm Hartebeestpoort ''C''	L	• Disturbance to occur only on the development path areas. • Restrict development over unprotected or sensitive areas unless if it is approved by the relevant regulators.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		419 JQ. Current land uses on this property include: • Farming • Farm residential plots • The construction of the associated infrastructure will result in the loss of arable soils and current agricultural land uses could be affected. • Impacts associated with mining, such as groundwater pollution, dust, health impacts, traffic impacts and impacts on the 'sense of place' could result in the voluntary relocation of locals.			
	Socio-Economic Impacts: Land use impacts	**Impacts on agricultural practices** The deterioration and contamination of groundwater quality, dust and security issues would be the greatest threat to current agriculture in the area.	M	• Make procedures to lodge complaints available to private landowners. Prompt landowners to make use of these channels, maintain open communication, attend to issues as soon as possible and provide feedback on a regular basis.	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Significant negative economic impacts for the landowners are possible, resulting in job losses for existing employees.		• Implement all the mitigation and management measures as proposed by the Geohydrologist as the availability and quality of groundwater and the protection of surface water would mitigate land use impacts to a large extent.	
	Socio-Economic Impacts: Land use impacts	**Impacts on future land developments** Similarly, it is possible that future investments to be made by other land owners, whether residential or agricultural related, would be impacted due to the uncertainties of the mining right and the possible impacts it might have on their property values. Should the mining right be awarded, restrictions by the Mine with regards to the erection of new buildings and structures on private owned land is probable (structures could negatively	M	• The likelihood of the impact occurring is definite, as it has already manifested. With mitigation the impact on future land developments are still possible with a moderate overall significance for affected parties. • Communication and further consultation to be initiated with surrounding landowners regarding the way forward. No commitments for indirect impacts can be made that is not already included in the mitigation strategies of environmental specialist reports such as visual, noise, air quality and ground water, and as adopted into the EMPr.	M

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		impact the mine development and mining activities).			
	Socio-Economic Impacts: Land use impacts	**Land claims** At this stage there is one known land claim on the affected land portion and was confirmed by Regional Land Claims Commissioner. The rightful land claimants are yet to be identified included in the consultation process.	H	• Ongoing communication with the Regional Land Commission is underway to finalize the letter. • Once the rightful land claimants are given the land back, there should form part of the shareholding.	H
	Socio-Economic Impacts: Health and safety impacts	**Health and safety risks for workers** Mining activities could impact on the health and safety of workers: • Use of the continuous mechanical miners may generate dust, resulting in respiratory diseases • Employees working near mine machinery will be exposed to high levels of	H	• Dust monitoring at the mine workings and implement enough dust suppression. • Employees are provided with dust masks that minimize dust inhalation. • Issue employees with PPE and instructions how to use it. • Ensure all vehicles and machinery are maintained regularly and enforce speed limits on site.	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		noise, which may, in the long term, be detrimental to their health. • An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. Employees that live away from their families tend to have long-term relationships with multiple partners and often do not consistently use condoms. The risk of contracting HIV is also significant when women aim to start or extend their families;		• Provide safe and clean drinking water and provide regular Fatigue breaks to keep workers hydrated. • Appoint mine Mobile clinic to implement awareness campaigns (HIV/AIDS/TB, blood pressure, Body Mass Index, Fatigue management, overall emphasis on healthy lifestyle, chronic disease management and wellness) to improve knowledge in the workplace and in the surrounding communities, provision of home-based care and counselling and educating the people at schools and in the community about the pandemic. • Encourage employees on health and wellness screening by providing initiatives of gifts for those that will volunteer.	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
	Socio-Economic Impacts: Traffic	**Traffic accidents on access and haul roads** There is a possibility of accident occurring between LDV's and haul trucks. Road accidents (it is anticipated that large construction vehicles will leave the site only for major overhaul and maintenance purposes.	H	• Mine to develop VMP (vehicle management plan) which will assist by separating light vehicles from heavy vehicle. • Install signage's in all access and haulage roads • Improve visibility by watering the access and haulage roads to reduce dust. • Restrict speed limits to (30-40km/h) • Implement and enforce golden rules • Mine to offer defensive driving training • Conduct alcohol tasting in all mine entrances to ensure drivers are not operating mine vehicles or equipment's under alcohol influence. • Mine to test drivers and issue them with mine driving permits.	H
		Community health and safety risks	H	• Dust suppression and monitoring is conducted on the gravel roads, mine	H

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		Surrounding landowners, residents and road users in and around the proposed office, stockpile areas and settlement dams (PCD) could be subject to community health and safety impacts if the operation of the mine is not managed adequately. Possible impacts during the operational phase are not unlike those that could be experienced during construction, albeit with a lower severity and could include: • Unauthorised access/trespassing at the mine, resulting in theft and related public safety issues • Veld fires and the possibility of fires spreading and damaging surrounding farmland, private properties and infrastructure. • Dust generation and air pollution caused by gravel		processing plant, stockpile areas, etc. • Limit the number of access gates and ensure 24-hour security and other relevant security measures. • Fence and prevent access to mining areas, borrow pits, etc. where safety hazards could occur. • Stability of pillars in workings to be monitored. • Post information boards about public safety hazards and emergency contact information. • Fire breaks to prevent the spreading of veld fires, should it occur. • Ensure that the personnel on site are trained in first aid and procedures to follow in case of fire breakouts and other emergency situations. • Procedures set out in the mine Emergency Response Manual to be followed, such as emergency response drills carried out	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		roads and vehicle emissions and machinery resulting in respiratory diseases • Possible subsidence of undermined areas during the operational phase and thereafter		throughout the year and regular auditing and questioning of the key personnel involved in emergency responses.	

10.3 Impacts and proposed mitigation measures of activities in the Closure phase of the Mining project

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
Closure and rehabilitation of surface mining (Box cut)	Biodiversity	**Topsoil, Overburden and ROM Stockpiles** **Landscaping and Replacement of Soils** • Surface mining activities usually mix the originality of the soil. **Box cut, opencast mining with a Roll over Rehabilitation Sequence** • Large area covered by box cut or open pit. **Access and Haul Roads Construction** • Compacted access and haulage rods they sterilize the soil due to compaction.	L	**Topsoil, Overburden and ROM Stockpiles** **Landscaping and Replacement of Soils** ▪ Final mitigation to reshape the landscape as close as possible to its original topographic features (e.g. slope and drainage lines, wetlands). ▪ Rehabilitation activities to place the plinthic and grey clay material in the sub-soils and the original A and B horizon material on top. Create an environment	L

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
		• Imported road materials usually hamper fertility of the soil. **Mobile offices, toilets and sanitation** • Structures erected can cause completion on soil. **Pollution Control Dam (PCD)** • PCD covers large areas where vegetation has to grow. **Demolished structures prior mining and post mining** • There are currently demolished cemented housing structures. • The structures prior and post mining if they are not removed, they cannot sustain the ecosystem.		where the topsoil is at least 40- 60cm deep for proper aeration water holding capacity and drainage, resulting in proper root development. **Seeding with Grass Species and Legume Crops** ▪ Rehabilitation strategy to consider a three-stage approach where pioneer species is planted to create a soil environment for sub-climax species. After some time, climax species can be introduced. There are many case studies where reseeding is necessary because the sub-climax and climax grass species die back after the first or second season. ▪ Post rehabilitation land use to consider legume crops like soya, cow peas, Dolichos, or Lucerne to improve the soils microbial activity and soil structure. ▪ Application of compost and other organic humic substances can be used to speed up the process of restoring soil Biodiversity **Box cut, opencast mining with a Roll over Rehabilitation Sequence**	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				The excavated area must serve as a final depositing area for the placement of all waste and above mentioned stockpiles during mining. ▪ Rocks and coarse material removed from the excavation must be dumped into the excavation. ▪ Once excavations have been refilled with overburden, rocks and coarse natural materials and profiled with acceptable contours and erosion control measures, the topsoil previously stored, shall be returned to its original depth over the area. ▪ The area shall be fertilized if necessary, to allow vegetation to establish rapidly. ▪ The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora. **Access and Haul Roads Construction** • Roads shall be ripped or ploughed, appropriately fertilized (based on a soil analysis study) to ensure the re-growth of vegetation. • Imported road construction materials which may hamper re-growth of vegetation must be removed and	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				disposed of in an approved manner prior to rehabilitation. • Roads that can and will be used by other users post closure should, however, be left provided this is agreed upon by all parties concerned. **Mobile offices, toilets and sanitation** On completion of operations, all buildings, structures or objects on the office site shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): ▪ Where office sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped. ▪ Areas containing sanitation drains shall be compacted and covered with a final layer of topsoil to a height of 10cm above the surrounding ground surface. ▪ The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora. ▪ Photographs of the office sites, before and during the mining/ operation and after rehabilitation, shall be taken at selected fixed points and kept on record for	

Activity	Environmental aspect	Potential impact	Significance before mitigation	Mitigation type	Significance after mitigation
				the information of the Regional Manager. **Pollution Control Dam (PCD)** • The PCD and associated structures (pipelines) erected will be removed at closure. • The plastic lining must be removed and can be recycled. • The earth walls will be flattened, and the area profiled and re-vegetated. **Demolished structures prior mining and post mining** • The rubbles from prior and post mining structures will be returned or used to backfill the box cut upon closure. • Once the entire mine site infrastructure is demolished (including new infrastructure discussed above), the areas must be covered with a minimum of 300 mm of uncontaminated topsoil and vegetated with vegetation that is suitable for the type of soil and climate.	

10.4 Cumulative impacts

Activity	Environmental aspect	Potential Impact	Significance before mitigation	Mitigation type	Significance after mitigation
Mine Project	Visual	The construction of the proposed Mine with its associated infrastructure will increase the cumulative visual impact of mining/industrial type infrastructure within the region. In context of the existing mining and agricultural character, the construction phase of the mine will contribute to a regional increase in heavy vehicles on the roads in the region, with construction activity noticeable. In context of the existing mining and agricultural character, the operational phase of the mine will contribute to a regional increase in small vehicles on the roads in the region.	H	• The visual impact can be minimized by the creation of a visual barrier along the roads. The area will be rehabilitated after mining is concluded and thus the visual impact will be removed, and the area will be restored. • The cumulative visual intrusion of the proposed mining activities will be medium as the main mining activities will happen underground and the footprint of the proposed surface infrastructure is relatively small. • The visual impact and impact on sense of place of the proposed project will contribute to the cumulative negative effect on the aesthetics of the study area.	M
	Biodiversity	The impacts on the ecology of the area will be significant more especially on the surface mining or box cut area, if highly sensitive areas are disturbed such as wetlands. It is expected that there will be losses of vegetation and flora along with associated faunal habitat. The primary impacts will be fragmentation and edge effects with a reduction in	M	• Construction of all above surface infrastructure on agricultural land • Implement or adopt mitigations by biodiversity study.	L

Activity	Environmental aspect	Potential Impact	Significance before mitigation	Mitigation type	Significance after mitigation
		movement of remaining naturally occurring and isolation of pockets of vegetation.			
	Soil and topography	Sinkholes are commonly associated with underground mining is subsidence.	H	• Monitor of the ground level movements.	L
	Ground water	The groundwater quality will be contaminated due to mining activities.	M	• Monitoring of ground water to form a baseline • Update hydro census	M
	Socio Economic	Project, together with other existing and planned mining operations will result in several economic benefits for local communities through direct and multiplier effects. These effects are usually stimulated by wage bills, local and regional procurement spend, and investment into LED. The proposed Project will add to the existing positive effect of mining on local economic development by applying best practice in terms of local employment and procurement, as well as LED.	P	• No mitigation for this positive impact needed.	P
		Population influx is also likely to exacerbate pressure on existing infrastructure and services, and the growth or establishment of informal settlements.	H	• Communication with the municipality • Formalisation of informal settlement	M

The supporting impact assessment conducted by the EAP will be attached as an appendix, marked **Appendix 05**

11 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.

12 Environmental impact statement

12.1 Summary of the key findings of the environmental impact assessment;

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
Construction	Construction of the pollution control dam.	Surface water	• Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of these facilities. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality. • Blasting of surfaces, footprint clearance on the sites of the proposed processing plant and other infrastructure, and other excavations in the mining area are likely to lead to increased sediments in runoff water.	High (-)	Medium (-)
	Infrastructure	Surface water	• Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	High (-)	Low (-)
		Noise	• Construction activities may cause an increase in background noise levels. Blasting and ramp material may cause structural damage to property and be a danger to people and animals within 500 m of the blast area. Drilling of blast holes can potentially cause an increase in background noise levels. It also has the potential to cause deterioration in air quality due to generation of dust and vehicle emissions. • Noise impact that would only occur in the operational phase.	High (-)	Medium (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			• Noise level can be controlled by means of berms and shielding structures.		
		Heritage structures	• Construction activities have the potential to impact the historical structures.	High (-)	Medium (-)
		Noise	• Noise impact that would only manifest in the operational phase but that can be avoided in the construction phase by implementation of measures in construction. • Impacts of noise need to be controlled by means of berms and shielding structures.	High (-)	Medium (-)
	Socio-economic impact of the Mine project as a whole		**Health and safety risks for workers** • Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers, manifesting in the following ways: • Construction related accidents due to structural safety of project infrastructure. • Dust generation and air pollution resulting in respiratory diseases • High ambient noise levels caused by machinery and construction equipment resulting in health issues for workers. • Poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), fly's rodents and pests and possible contamination of water sources. • Unsafe and insufficient drinking water	High (-)	Medium (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			• An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. • Dehydration and sunburn, as high temperatures could be experienced during summer months.		
	Socio economic of the Mine project as a whole		**Community health and safety** • Residents, surrounding landowners and road users could be subject to community health and safety impacts if the construction process is not managed adequately. This could include: • Road accidents, subsequently placing pressure on local emergency, disaster management and health services (fire, ambulance, police services, etc.) • Unauthorised access/trespassing at the construction site, resulting in theft, public safety issues and even death • Fire hazards at the construction site and the possibility of fires spreading and damaging surrounding farmland and infrastructure. • Dust generation and air pollution caused by gravel roads, and machinery resulting in respiratory diseases.	High (-)	Medium (-)
Operational	Infrastructure	Surface water	Loose material as well as the contaminated overburden material can contaminate surface water during rainfall events resulting in dirty water runoff. Runoff from areas where hydrocarbon spills are present may also cause deterioration in surface water quality.	High (-)	Low (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
		Ground water	Seepage from the overburden stockpile can contaminate the groundwater immediately below the stockpile as well as adjacent areas.	High (-)	Low (-)
		Air quality	**Dust from Material Handling** Material handling of Dimension Stone (general), Diorite/syenite, Gabbro/norite and Granite/syenite are potential sources of dust emissions at the various handling stations. Various climatic parameters e.g. Wind speed and precipitation influence the amount dust generated from material handling operations. The volume of material being moved and height that the material is dropped at also influence the dust generation at the various handling points. Dust can influence adjacent roads and households	High (-)	Medium (-)
		Noise	During the operational phase, increased noise levels can be expected	High (-)	Medium (-)
		Groundwater	**Underground (Lowering of groundwater levels- boreholes)** The mining operation in the operational phase may draw down the water table, affecting boreholes of adjacent property owners	High (-)	Medium (-)
Operational	Infrastructure and mining	Air quality	**Emissions by means of crushing and screening** In this activity, the use of the primary and secondary crusher and Discard handling are the most likely to have implications on ambient air quality. The crushing process releases fugitive dust, especially if there are no enclosure and water sprays. Dust contained within the RoM ore can be	High (-)	Low (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			released into the atmosphere during this process i.e. fugitive dust (containing TSP, as well as PM10 and PM2.5). Wind erosion from stockpiles can be a perennial source of dust if not properly managed during and post mining operations. The plant, crushing and screening areas all have the potential to generate dust and therefore specific mitigation measures can be assigned to each of these activities.		
	Operation of the Mine in general	Socio-economic Impacts: Local economic impacts	**Impacts on procurement / supporting industries / local SMMEs** The Mining Charter sets BEE compliance guidelines and as such Mine will have to procure all products and/or services from BEE compliant outlets. In order to ensure and promote the procurement of products and/or services from SMMEs who are BEE compliant as well as black owned and/or black empowered, strategies are identified in the Colliery's SLP. It is expected that most goods and services will be available locally from within the Municipal area. Supporting industries, local SMMEs and contractors include: • Contractors to transport and dispose of domestic and industrial waste • Equipment cleaning (trucks) • Maintenance and repairs of infrastructure, roads, etc. • Operation of tuck shops • Laundry and catering services • Security, etc.	Medium positive	High positive

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
		Socio-economic Impacts: Skills development and social responsibility	**Impacts on the local community / community projects** As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. Mine is however not in the position to get involved with the day-to-day running of a LED project.	Medium positive	High positive
		Socio-economic Impacts: Individual and family level impacts	**Illegal trespassing** Illegal trespassing could occur at the mine, resulting in safety (death) and security issues (theft, vandalism, etc.). Should the recruitment process not be managed adequately, illegal informal settlements could be established on private land if workers and contractors want to reside close to their place of employment.	High (-)	High (-)
		Socio-economic Impacts: Individual and family level impacts	**Health and safety risks for workers** Mining activities could impact on the health and safety of workers: Use of the continuous mechanical miners may generate dust resulting in respiratory diseases Employees working near mine machinery will be exposed to high levels of noise, which may in the long run be detrimental to their health Traffic accidents on access and haul roads	High (-)	High (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			An increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services. Employees that live away from their families tend to have long-term relationships with multiple partners and often do not consistently use condoms. The risk of contracting HIV is also significant when women aim to start or extend their families; Accidents due to structural safety of project infrastructure and so forth		
		Socio-economic Impacts: Health and safety impacts	**Community health and safety risks** Surrounding landowners, residents and road users in and around the proposed mine, stockpile areas and settlement dams could be subject to community health and safety impacts if the operation of the mine is not managed adequately. Possible impacts during the operational phase are not unlike those that could be experienced during construction, albeit with a lower severity and could include: • Road accidents (it is anticipated that large construction vehicles will leave the site only for major overhaul and maintenance purposes. • Unauthorised access/trespassing at the mine, resulting in theft and related public safety issues • Veld fires and the possibility of fires spreading and damaging surrounding farmland, private properties and infrastructure	High (-)	High (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			• Dust generation and air pollution caused by gravel roads and vehicle emissions and machinery resulting in respiratory diseases. • Possible subsidence of undermined areas during the operational phase and thereafter.		
Closure	Closure of the mine	Groundwater	**Deterioration of groundwater quality** Leaching/Seeping of contaminants into sub-surface	High (-)	Medium (-)
			Decant Rise of water table	High (-)	Medium (-)
			Formation of Acid Mine Drainage (AMD) • At the closure and decommissioning phase, ingress of water and oxygen into the voids could lead to AMD due to sulphide minerals present. • Local patches of mine water in contact with carbonaceous material will be acidic as the carbonate minerals are not efficient to neutralize the acid produced. As the mine gets flooded this acidic water will meet the neutral-alkaline drainage from the silicate minerals. • Although the heterogeneity and the probable mixing of different geochemical units give uncertainty to the exact quantification of the groundwater parameters, the average mine water will only be slightly acidic over the long term in the post-closure mine system under the conditions assumed in the modelling.	High (-)	High (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			• Should the contaminated mine water decant onto surface and then be allowed to enter into the surface water resources of the area, it would have a significant impacting potential, resulting in pollution of the surface water resource.		
		Socio-economic	**Loss of employment due to closure of mine** Due to the closure of the mine, job losses will occur	High (-)	Medium (-)
	Rehabilitation	Topography	Subsidence of the rehabilitated area will cause ponding that will cause an increase in the recharge into the mined-out workings	High (-)	Medium (-)
	Closure of the mine	Groundwater	**Formation of Acid Mine Drainage (AMD)** At the closure and decommissioning phase, ingress of water and oxygen into the voids could lead to AMD due to sulphide minerals present. Local patches of mine water in contact with carbonaceous material will be acidic as the carbonate minerals are not efficient to neutralize the acid produced. As the mine gets flooded this acidic water will meet the neutral-alkaline drainage from the silicate minerals. Although the heterogeneity and the probable mixing of different geochemical units give uncertainty to the exact quantification of the groundwater parameters, the average mine water will only be slightly acidic over the long term in the post-closure mine system under the conditions assumed in the modelling.	High (-)	High (-)

Phase	Activity	Aspect	Potential impact	Pre-mitigation	Post-mitigation
			Should the contaminated mine water decant onto surface and then be allowed to enter the surface water resources of the area, it would have a significant impacting potential, resulting in pollution of the surface water resource.		
		Socio-economic	**Loss of employment due to closure of mine** Due to the closure of the mine, job losses will occur	High (-)	Medium (-)
	Rehabilitation	Topography	Subsidence of the rehabilitated area will cause ponding that will cause an increase in the recharge into the mined-out workings	High (-)	Medium (-)

12.2 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

To be updated with continuous consultation process.

12.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

Oikonomia Granite has applied for Mining Right covering the entire application area. There are no areas excluded within the proposed site. The impact identification and assessment was therefore focused on the entire application area.

No alternative sites were assessed for the project mainly because the proposed site is the only accepted area by the Department of Mineral Resources and Energy (DMRE).

12.3.1 Positive Impacts

- The proposed mining site strategically excludes all agricultural areas. There are no cultivated areas that will be directly affected by the proposed mining;
- The proposed mining layout excludes the site farm houses, rather than covering the entire farm portions, the mining area was reduced to focus on unoccupied areas;
- The mining layout is restricted to dry areas, there are no surfaces water resources to be directly impacted by the proposed activities;
- The proposed mining site is located approximately 3 km west of the closest established community. Most of the mining related impacts will not reach the communities.
- The Igneous Rock industry contribute largely to the North West Province GDP, the igneous products are mostly processed locally.

12.3.2 Negative Impacts

- The proposed site layout restrict the mining activities to naturally vegetated area (the threatened Marikana Thornveld) avoiding the cultivated area. The Marikana Thornveld is under threat and the proposed mining activities will clear the vegetation for mine establishment;
- There is a large population of the nationally protected *Sclerocarya Birrea (*Marula Tree). This plant species will be greatly impacted by the proposed mining activities;

- Destruction of habitats: the site is characterised by naturally growing vegetation providing habitats to various species;
- One of the land owner has lodged a dispute, in which he alleged that the applicant, Oikonomia Granite have removed Granite Blocks that were on their property illegally;
- The proposed mining will make use of drilling and blasting techniques to extract rock blocks. The blasting activities have health and safety related risks including the following:
    - Ground tremors that can reach as far as 5 km;
    - Flying rocks;
    - Generation of dust; and
    - Generation of noise.
- Increased heavy trucks within the Lethlabile Road as delivery trucks enter and exit the mining site. However, the number of trips per day have little significance;
- Theft – the mining equipment and tools will be available on site 24/7 attracting criminals to the mining site. This could include theft of explosives that could be potentially used to commit crimes elsewhere outside the mining site.

13 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.

Impact management objectives are described in terms of the Mitigation Hierarchy of the ERM Impact Assessment Standard. The mitigation hierarchy is as follows:

Avoid at Source: Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).

Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).

Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).

Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.

Compensate in Kind; Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

13.1 The project impact management objectives:

- ✓ Provide sufficient information to strategically plan the waste management activities as to avoid unnecessary social and environmental impacts;
- ✓ Provide sufficient information and guidance to plan the mining activities in a manner that would reduce impacts (both social, environmental, health and safety) as far as practicable;

- ✓ Ensure an approach that will provide the necessary confidence in terms of environmental compliance;
- ✓ Provide a management plan that is effective and practical for implementation;
- ✓ Ensure that the mining activities are undertaken such that the Diphiri River is not impacted;
- ✓ Ensure that the mining activities are undertaken in a safe manner, and health and safety risks are identified and mitigated;
- ✓ Conservative use of resources: water and power (electricity);
- ✓ Recording and reporting of accidents to relevant authorities; &
- ✓ Maximum recovery of ore.

Through the implementation of the proposed mitigation measures, it is anticipated that the identified social and environmental impacts can be managed and mitigated effectively.

13.2 Impact management Outcome

- ✓ Site fully rehabilitated on mining closure;
- ✓ An Environmental Control Officer is designated,
- ✓ Risk impact register with management options,
- ✓ Site File compiled and kept on site,
- ✓ Dirty and clean water separation;
- ✓ Stormwater control drains are constructed;
- ✓ Waste disposal certificates kept on site;
- ✓ Access into the site is controlled;
- ✓ Employees provided with personal protective equipment (PPE);
- ✓ Safety drills are conducted and records kept;
- ✓ Firefighting equipment provided;
- ✓ Complains and Impact Register up to date and kept on site;
- ✓ Environmental Management Programme and EA kept on site;

- ✓ Work conducted according to approved method statements; &
- ✓ A developed and operating monitoring programme for air and water quality.

14 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 mine layout is chiefly dictated to by the distribution and burial depth of the dimension stone. The mine is aimed at extracting the dimension stone at shallow depth, therefore a surface mine is the final proposed alternative.

15 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 EMPr has identified all aspects for the proposed Mining activities. The following aspects must be addressed by the EA conditions:

- ✓ Protection and controlled usage of water resources;
- ✓ Ensure health and safety of mine workers and local community
- ✓ Access agreement contracts;
- ✓ Impact monitoring and auditing;
- ✓ Mining scheduling; and
- ✓ Waste handling and management.

16 Description of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

The competent Person Report has not yet been completed, the available quantity of the igneous rock has since not been verified.

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

It is the opinion of the EAP that the proposed rock quarry be authorised.

17.1 Reasons why the activity should be authorized or not

Oikonomia holds a prospecting right over the proposed quarry, they have conducted prospecting activities with bulk sampling over the last three years. The prospecting activities established that site have abundant rock deposit mineable through surface mining method. The prospecting right will expire in 2022 hence the need for a mining right;

The proposed site is located away from the high density communities of the Brits Town, with the closest located approximately three kilometres to the east of the proposed site;

According to the conducted Heritage Study for the site, there are no Heritage and Cultural Resources on site and there are also no cultural and heritage significant sites;

The site is on a hard rock with very low yield of ground water with moderate ground water transmissivity. There is a low potential for ground water potential. Quarry uses unsophisticated mining and processing methods with low risks of groundwater contamination. The quarry have very low content of sulphides and therefore less likely to generate acid mine drainage.

There is no stream flowing through the site, the site is relatively dry. The potential for surface water contaminations.

Agricultural activities are located outside the proposed mining site.

17.2 Conditions that must be included in the authorisation

17.2.1 Specific conditions to be included into the compilation and approval of EMPr

To ensure compliance with, and implementation of the EMPr by:

- The land owners access agreement must be signed before the mining activities can be undertaken;
- Appointing of a suitably qualified individual to oversee implementation of the EMPr during all phases of the project; and
- Appointing a suitably qualified Environmental Control Officer to undertake audits on a monthly basis throughout the construction phase;
- To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the EMPr and environmental issues in relation to their individual areas of work by:
    - Developing an induction and training program covering the EMPr, environmental awareness, dealing with environmental incidents and waste management; and
    - Advising staff commissioned during pre-construction and construction, including subcontractors, of EMPr requirements through the induction program as well as on notice boards at the contractor's camps during construction and notice boards during operation. These notice boards should cover the EMPr, environmental awareness, dealing with emergencies and waste management.
    - Authorization should be subject to the undertaking of a ground water monitoring programme with associated updated hydro census. The monitoring programme should cover pre and post mining conditions to evaluate and determine the effect of mining on ground water supply, and pollution.

17.2.2 Rehabilitation requirements

The requirements of the final rehabilitation, decommissioning and mine closure plan are stated in Appendix 4 of the NEMA Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GNR 1147). The purpose is to identify a post mining land use that is feasible through the following:

- Providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- Outlining the design principles for closure;
- Explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- Committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- Identifying knowledge gaps and how these will be addressed and filled;
- Detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- Outlining, monitoring, auditing and reporting requirements.

17.2.2.1 Principles for setting objectives

The objectives should aim at ensuring that the following criteria are met:

- ✓ Sustainability of post-closure land use.
- ✓ Mitigation of operational impacts identified during the EIA and maximization of (social and environmental) benefits to local communities.

- ✓ Economic viability and possible positive economic impact to local communities.
- ✓ Consideration for the needs of stakeholders, both internal and external.
- ✓ Reintegration of the site into the surrounding area – how the quarry should 'blend' with the environment.
- ✓ Opportunities to rehabilitate, restore and enhance biodiversity.

Progressive rehabilitation is the preferred option for the site. This has the advantage of reducing open areas within the quarry, reducing potential soil erosion and increasing confidence in the rehabilitation plan among stakeholders. It also provides a timely and positive visual impact, allowing stakeholders to see and anticipate future rehabilitation outcomes.

18 Period for which the Environmental Authorisation is required.

The proposed mining activities including rehabilitation will be undertaken up to a period of 30 years. The Environmental Authorisation must be therefore aligned to the Mining Period. A competent person report is being compiled, it will detail how long the mining period will be.

19 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 Environmental Impact Assessment Report and the Environmental Management Programme report.

The EAP declares that the undertaking at the EMPR is applicable to both the EIR and EMPr.

20 Financial Provision

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

To be calculated.

20.1 Explain how the aforesaid amount was derived.

The aforesaid amount was derived using the department of mineral resource "guideline document for the evaluation of the quantum of closure-related financial provision provided by a mine".

20.2 Confirm that this amount can be provided for from operating expenditure.

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

The Environmental Management cost has been accounted for as an operating expense. The mine will contribute monthly to the rehabilitation fund as calculated. Since Oikonomia is an Emerging Black Owned mining company, a down payment for the Rehabilitation fee will not be readily available and as such will require to be paid as instalments.

21 Deviations from the approved scoping report and plan of study.

21.1 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).

The EIR Phase deviated from the approved "**Description of aspects to be assessed by specialists".** There are specialist studies that were identified during the Scoping Phase that were not undertaken as planned during the EIR Phase. The studies not conducted are as follows:

21.2 Motivation for the deviation.

21.2.1 Air Quality

The proposed quarry mine is located three kilometres away from the community. The proposed quarry is surrounded by other existing quarries and agricultural areas. Dimension stone mines have low potential for air contamination. There are no toxic gases and plumes that will be emitted from the proposed quarry. The mine will use the basic mining technique to extract the rock.

21.2.2 Socio-Economic Impact

The proposed mine will operate at a small scale creating less than 50 employment opportunities for the skilled, semi-skilled and unskilled labour. The impact on the livelihood of the surrounding community will be low – medium. The social and economic wellbeing of the surrounding community was investigated by this EIR Process. The Social Labour Plan (SLP) for the proposed quarry will also assess the social and economic wellbeing of the local communities.

21.2.3 Hydrology

The site is located on a dry area, there are no streams that were identified through field and GIS investigation on site. The closest streams is located

21.2.4 Pedology, Land Capability and agricultural Potential

The site is located on rocky granite outcrops. The agricultural activities are strategically located on relatively flat areas outside the mining area. The mining area was designed such that the agricultural areas are outside the mining area.

20.2.8 Aquatic and Wetland Biodiversity

There are no wetlands and streams to investigate within the proposed area. There are man-made ponds within the site which will be marked as no go areas.

21.2.5 Visual

The proposed site is located outside the town. There are other quarries located close to the proposed mine. Quarries are a common theme in the area and visual impact is less significant.

21.2.6 Traffic Study

The proposed quarry will generate less than four trips in an hour. The injection of the four trips to and from the mine in an hour will not affect the local traffic flow. The traffic will move from the mine into the Letlhabile Road to the Brits CBD.

21.2.7 Blasting and vibration

22 Other Information required by the competent Authority

22.1 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:-

22.1.1 Impact on the socio-economic conditions of any directly affected person.

The proposed site is owned by different private owners. There are no active economic activities within the perimeter of the proposed mining site. Since the land is privately owned, the land owners will lose access into their properties for the entire duration of the mining activities.

Any planned economic activities by the land owners will not be feasible during the mining period.

Oikonomia must engage with the land owners, and establish access agreements contracts and reimburse the land owners for the anticipated losses.

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

A heritage study was conducted for the site during application for prospecting right by the previous right holder (Knockout Trading). The study did not identify any heritage significance resources and sites.

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

The requirements of the Act in terms of section 24(4) (b) (i) – (vii) as guided by section 24(4A).

- ✓ The conducted EIR Process have identified the potential impacts, provided mitigation measures and identified monitoring requirements for the mining operation. The project alternatives as well as the need and desirability have been investigated and reported on.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 Environmental Management Programme

1.1 Details of the EAP,

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

The details and expertise of the EAP are detailed in Part A Section 1(1.1 & 1.2).

1.2 Description of the Aspects of the Activity

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

All aspects of the project were described in PART A.

1.3 Composite Map

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

2 Description of Impact management objectives including management statements

2.1 Determination of closure objectives.

(ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

The closure objectives for mining, internationally and in South Africa focuses on the restoration of previous land use capabilities, the zero-net loss of biodiversity, and the satisfaction of community requirements. Project closure objectives for Mine will be in line with the above mentioned and is as follows:

- Re-establishment of the pre mining land use and land capability to a level as close as possible to the pre-mining environment;
- Re-establishment of function to any biodiversity areas of concern that could and have been affected by the mining operations;
- Prevent any form of contamination of soils, surface water and ground water;
- Implementation of on-going rehabilitation to regulated standards;
- Implementation of sustainable community projects that will be self-driven after mine closure; and
- Maintenance and Monitoring of rehabilitated areas.

2.2 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.

2.3 Potential risk of Acid Mine Drainage.

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

The mine has the least potential for acid mine drainage. There will be no processing plant located on site. The mining activities will be based on non-complex mining techniques for removal of the granite rock.

Acidic water flow is mainly from metal and coal mining operations. The proposed mining is for granite rock.

The proposed mine will result in temporary ponds that may be filled with stormwater, the stormwater will be contained on site for recycling. The ponding has very low risk of groundwater contamination as the site is on a hard rock with no aquifers.

The exposure of fresh rock surfaces, water and oxygen may however generate acidic water. The acid mine drainage will emanate from Ca, Mg, Cl and SO_4. The Acid Mine Drainage has been fully investigated and mitigation measures provided.

2.4 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage.

A model is being constructed to quantify potential impacts on receptors such as groundwater users and rivers as part of water balance report. This model will as an important step be undertaken once enough chemical information is available on the Dimension Stone. Once this is available the applicant will undertake the necessary specialist inputs to address the problem.

2.5 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage.

Quarry operations are non-complex operations with low AMD generation potential. The accumulated storm water will be recycled within the site. The site is located on a hard rock reducing the potential for ground water contamination. There are no streams on site that will be impacted by the proposed quarry.

The quarry activities will be undertaken over a small surface area at a time and mined out areas will be immediately rehabilitated.

2.6 Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

The proposed site is relatively dry, on a hard rock with no aquifer. There are also no surface streams within a kilometre of the proposed site. The water input into the mining area will be the stormwater. All stormwater will be diverted away from the disturbed areas. Storm water accumulating within the disturbed areas will be recycled for usages such as dust suppression and washing of rock blocks.

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

The mining operation will require water for washing of granite blocks, dust suppression and domestic purpose. Water for domestic purpose will be brought to site from drinking water supplies.

The mining operations will use approximately 1.33 kilolitres a day and approximately 40 kl a month for washing and dust suppression

2.8 Has a water use licence has been applied for?

A water use license has not been applied for, based on the following:

- The proposed site is located on a hard rock with no aquifer. Water storage in hard rocks can be in the fissures and faults. The proposed mining activities have very low potential for ground water contamination;
- There are no surface water resources to be impacted by the proposed mining activities; and
- The quantity of the water to be used at the mine will be approximately 1.33 kl a day. The water will be sourced from the registered source.

Should the water usage exceeds the planned water usage, a Water Use License will be applied for.

3 Impacts to be mitigated in their respective phases

3.1 Rehabilitation Measures and Impact Management Outcomes and Action

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Construction of access road and haul roads	Construction	2ha	Soils will be stripped to construct proper roads. This could lead to and mixing of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	•	• Roads will be constructed with rock material not containing any carbonaceous rock. • Spill kits to be stored on site, and staff will be trained to know how to act when spills occur. • Contaminated soil to be removed and transported to a treatment facility. • Drip trays to be used for vehicles that stand overnight.	Prevent soil contamination	Implement a monitoring programme Adhere to: GN 37603: Norms and standards for remediation of contaminated soils	
Stripping and stockpiling of topsoil	Construction	34.35 ha	Topsoil will be stripped and stockpiled; this may cause deterioration in soil quality. During the stripping process topsoil may be mixed. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	•	• Topsoil and subsoil to be stockpiled separately and documented. • Stockpiles should not be allowed to be higher than 2 metres to preserve any potential seeds and regrowth potential . • Contaminated soil to be removed and transported to a treatment facility • Drip trays to be used for vehicles that stand overnight.	Prevent soil contamination	Implement a monitoring programme Adhere to: GN 37603: Norms and standards for remediation of Contaminated soils	
Construction of the pollution control dam.	Construction	1 ha area	Topsoil will be stripped as part of clearing the footprint of the dam. This may cause deterioration in soil quality. During the stripping process topsoil may be mixed. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	•	• Soils to be stripped in horizons and stockpiled separately. • All spills to be cleared • Use of drip trays for overnight storage of vehicles	Prevent soil contamination	Implement a monitoring programme Adhere to: GN 37603: Norms and standards for remediation of Contaminated soils	

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
infrastructure area containing stockpile areas	Operational	Infrastructure	During operation of the mine, it is anticipated that carbonaceous material may be spilled which will contaminate soils. Contamination by dirty water run-off and/or spillage of hydrocarbons and/or chemicals is also expected from operations vehicles and machinery.	•	• All spills to be cleaned immediately after such an event. • Develop a hydrocarbon spill procedure for all possible areas of spillages. • Spill kits to be freely available • All vehicles to be stored and services in and on a bunded area, which is included in the Storm Water Management system. • All storage and service areas of vehicles to drain into a sump with an oil separator.			
infrastructure area containing stockpile areas	Operational	Infrastructure	Deterioration of topsoil quality due to soil contamination	•	• Structures that involve coralliferous material should have a compacted base layer which serves as a sealing layer to prevent contaminated water from seeping into the ground water system. • Proper runoff control structures should be in place which channels all polluted water into a pollution control facility.			
Ablution and changing houses		0.5ha area	Spillages can result in contamination of soils and ground water.		Spillages to be contained in the Storm Water Management Structures of the Infrastructure area. All sewage related impact and mitigations to be addressed as part of the water use license application			
Removal of infrastructure area.	Decommissioning	Infrastructure	Potential for compaction and contamination from heavy vehicles usage and spillage of hydrocarbons, reagents (from infrastructure and machinery), raw materials and dirty water runoff, and		Re-instatement of the stored soils (most probably as berms) onto areas of disturbance where infrastructure has been demolished and removed. Contour and stabilise slopes to be free draining and limit/control vehicle movement and dirty water outflows.			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			the loss of soil due to erosion by wind and or water.		Planting of required vegetative cover and irrigation if required, will reduce/mange erosion, decrease compaction and stabilise the landform. This will once cover has been obtained, effectively see the sites returned to a grazing land capability rating.			
Rehabilitation	Decommissioning	Infrastructure area.	Topsoil will be loaded from the stockpiles and loss of topsoil as well as compaction can occur. Topsoil will be mixed during the placement procedures.		Place material from the B horizons first and overlay it with the A horizon soils. Do not overload trucks to prevent spillages of topsoil. Limit driving over the topsoil areas to limit compaction and rip the topsoil after placemen.			
Stripping and stockpiling of topsoil	Construction	Within mining infrastructure area	Stripping and stockpiling of topsoil will result in the original land capability to cease completely until rehabilitation takes place.		Land capability to be restored as far as possible in the rehabilitation stage to arable land.	Restore land capability	n/a	
Construction of the pollution control dam	Construction	Within mining infrastructure area	During the construction and operation of the pollution control dam and water management infrastructure the original land capability classified as agricultural to cease completely. Note that these measures will remain post closure and will be of a permanent nature.		Limit the area of the PCD vegetation clearance to a minimum			
Infrastructure area containing stockpile areas	Construction and post closure	Infrastructure	Stripping and stockpiling of topsoil will result in the original land capability to cease completely until rehabilitation takes place.		Land capability to be restored in the rehabilitation phase of the project.			
Infrastructure area	Operational	Infrastructure	Complete cease in land capability at the footprints of all structures that covers the		No mitigation of loss in land capability is possible during the construction and operational phase because the land			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
containing stockpile areas			surface during the operational phase.		capability will remain ceased as long the structures covers the surface			
Stripping and stockpiling of topsoil	Construction	Infrastructure	Stripping of topsoil will result in the current possible land use to cease completely.		Land use currently mining and agricultural orientated. Land use to be determined after mining and rehabilitation has been concluded.	Restore land use	SPLUMA	
Construction of the pollution control dam		Infrastructure	Construction of the water management measures and pollution control dam will result in the current possible land use to cease completely.		Rehabilitate area back to arable land			
infrastructure area containing stockpile areas	Construction	Infrastructure	Stripping of topsoil will result in the current possible land uses to cease completely.		Land use to be restored for arable land. Rehabilitation of areas should be conducted as soon as possible.			
infrastructure area containing stockpile areas	Operational	Infrastructure	Stockpiling of overburden will result in the current possible land use (agriculture) to cease completely.		Rehabilitate as soon as possible and create a land use of agriculture although the land capability will be arable.			
Construction of access road and haul roads	Construction	2 ha	Vegetation will be removed during the construction of the roads where they are not situated within agricultural lands		Removal and storage of all usable soils to be used in rehabilitation. Access roads and haul roads to avoid sensitive areas	Re-vegetation	Biodiversity management plan	
Stripping and stockpiling of topsoil	Construction	Infrastructure	Vegetation will be removed during the stripping of the topsoil and will also be affected during the stockpiling process. Note that no red data species were identified within the proposed mining area or at the stockpile area.		Only vegetation directly in the path of the proposed access roads and haul roads to be removed. Removal and storage of all usable soils to be used in rehabilitation.			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Construction of the pollution control dam and sewage	Construction	Infrastructure	Vegetation will be removed from the dam footprint area as well as where the cut off drains will be located.		pollution control dam and water management infrastructure. Infrastructure area to be located on cultivated land			
Removal of infrastructure area	Decommissioning	Infrastructure	Failure to establish vegetation would lead to an increase in alien vegetation of the site. Ensure that vegetation is established on the rehabilitated area of this site and control alien vegetation in this area.		Re-establish indigenous vegetation as soon as possible after the placement of the topsoil. Ensure the area remains free of exotic species. Establishment of an Alien Invasive management plan and implementation thereof on a yearly basis.			
Rehabilitation	Decommissioning	Infrastructure	Transport activities can damage/destroy vegetation. Failure to establish vegetation on the areas where the infrastructure was removed can enhance the possibility of the establishment of alien vegetation.	•	• Trucks should remain on roads and designated areas • Re-establish indigenous vegetation as soon as possible after the placement of the topsoil. Ensure the area remains free of exotic species. • Pre mining land use was agriculture.			
Infrastructure	Construction	Infrastructure	Loss of species of conservation concern	•	• No clearance of indigenous vegetation in the 100m buffer zone will be allowed within the high and medium sensitive areas. • The unnecessary clearance of indigenous vegetation should be avoided as far as possible • Maintenance should not extend beyond the proposed study site. • Declared alien species should be prevented from occurring on site, as disturbance in natural habitat and compaction of soil usually leads to the establishment of alien plant species.	Prevent loss of Red Data species	Biodiversity management plan Implementation of EMPr and monitoring programme	

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					• Construction activities should be restricted to the immediate area of development; • The recommendations of the ecological and botanical specialist studies must be strictly implemented; • Sensitive areas such as obvious wetlands and drainage lines need to be avoided where possible; • Minimising the destruction of or disturbance to vegetation within the proposed area of activity, as well as in the surrounding areas; • Preventing the unnecessary destruction of any natural habitat and animal life within the boundaries of the proposed area of development and adjacent areas; • Avoiding initial construction activity during spring/summer as most birds reproduce and disperse or migrate during this period; • Animals may under no circumstances be handled, removed, killed or interfered with by the • Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site. • Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for noncompliance. • Measures must be taken to ensure that workers are aware of laws and			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					restrictions governing the hunting, capturing or trapping of animals and should be advised on the penalties associated with the needless destruction of wildlife.			
stockpile areas	Operational	Infrastructure	Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken.		The visual impact can be minimized by the creation of a visual barrier. The area will be rehabilitated after mining is concluded and thus the visual impact will be removed and the area will be restored.	Lower visual impacts	n/a	
Rehabilitation	Decommissioning	Infrastructures	Final rehabilitation, after care and maintenance of the vegetation and to ensure that the final landform is maintained.	•	• Plant some indigenous trees to create a barrier between the neighbours and roads. • Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust. • A wind barrier system that encloses the stockpiles and tailing dumps; • Stockpiles and waste rock dumps should not exceed 20m in height. • Rehabilitation of the area must be done as the mining is completed.			
Construction of access road and haul roads	Construction		Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads. Runoff from areas where hydro-carbon spills are	•	• All hydrocarbon spills to be contained and soils removed. • Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the construction of berms/ stockpiles to			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			present may also cause deterioration in surface water quality.		shield any surface water from mining activities.			
Stripping and stockpiling of topsoil	Construction	Infrastructure	Loose material can contaminate surface water in the event of a storm water run-off occurring during the stripping and stockpiling of topsoil. Runoff from areas where hydrocarbon spills are present may also cause deterioration in surface water quality.	•	• All hydrocarbon spills to be contained and soils removed. • Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the activity of stripping and stockpiling of topsoil.	Prevent pollution of surface water SWMP implementation Monitoring	Implementation of EMPr and monitoring programme	
Construction of the pollution control dam	Construction	Infrastructure	Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of these facilities. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality. Blasting of surfaces, footprint clearance on the sites of the proposed processing plant and other infrastructure, and other excavations in the mining area are likely to lead to increased sediments in runoff water.	•	• Construction of cut off drains • Encourage vegetation of topsoil and subsoil stockpiles • Design all blasts by a professional and use electronic blasting techniques to limit the impact as far as possible;			
Construction of the pollution control dam	Construction	Infrastructure	The transport, handling and storage of fuels, chemicals, construction materials and waste could lead to spills that	•	• Waste must be discarded in an approved manner; • Fuel and oil storage areas should be bunded; and			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			contaminate soil surfaces and water resources.		• Spills should be cleaned up immediately			
infrastructures	Construction		Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	•	• Measures to be implemented to separate clean and dirty water to ensure that dirty water does not contaminate clean water. • Contaminated water to be pumped to the PCD. • Surface water monitoring to be conducted			
Infrastructure area and stockpile areas	Operational		Loose material as well as the contaminated overburden material can contaminate surface water during rainfall events resulting in dirty water runoff. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	•	• Clean and dirty water separation measures will be constructed around the stockpile area to separate the dirty areas from the clean areas. • The contaminated water will be collected and diverted via a pipeline to the pollution control dam. • Ensure that spills are cleaned up immediately to avoid surface water contact and contamination. • Implementation of the SWMP			
Removal of infrastructure area	Decommissioning		Surface water runoff from the bare soil surface areas (demolishment of the infrastructure) can potentially cause deterioration in water quality due to erosion and contamination of hydrocarbons. The area will be without a vegetation cover until being seeded.	•	• Ensure that the area is covered with topsoil and that vegetation is established as soon as possible • Ensure that spills are cleaned up immediately to avoid surface water contact and contamination • Services of broken-down vehicles to be undertaken on bunded hard surfaces. • Contaminated surfaces and soils to be extracted and cleaned up before decommissioning of structures			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Removal of infrastructure area.	Decommissioning		Silt and other sediments arising on site could contaminate local surface water resources. Sedimentation will reduce effective storage capacity and increase downstream silt loads	•	• Waste must be discarded in an approved manner • Fuel and oil storage areas should be bunded; and • Spills should be cleaned up immediately			
Construction of access road and haul roads	Construction		Construction activities may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality.		Dust depressing methods to be implemented while construction of the access roads and haul roads take place. Water cars to be used to make sure dust impact are minimized	Minimize dust fallout to keep dust fallout levels at key receptor sites around the project area.	Dust monitoring programme. GNR 893 Minimum Emission Standards.	
Stripping and stockpiling of topsoil	Construction	Infrastructure	Stripping and stockpiling of topsoil may cause dust due to vehicle movement that will influence the quality of air. Material handling (topsoil) will generate dust and this and vehicle emissions can potentially cause deterioration in air quality.	•	• Dust depressing methods to be implemented while construction of the access roads and haul roads take place. • Water cars to be used to make sure dust impact are minimized. • Material handling must be limited to as little as possible to prevent the generation of dust.			
Construction of the pollution control dam.	Construction	Infrastructure	Material handling during the construction of the pollution control dam, sewage treatment facilities and surface water management structures will generate dust and this and vehicle emissions can potentially cause deterioration in air quality.	•	• Ensure that vehicles are maintained • Implement dust depression • Monitoring of fallout dust on a monthly basis	within guideline levels.		
Construction of Infrastructure area.	Construction		Site clearing, removal of topsoil and vegetation	•	• Topsoil should not be removed during windy months (August to January) due to associated wind erosion heightening dust levels in the atmosphere.			

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					• The area of disturbance must be kept to a minimum and no unnecessary clearing of vegetation must occur. • Topsoil should be re-vegetated to reduce the exposure areas. • During the loading of topsoil onto trucks or stockpiles, the dropping heights should be minimised. • Water or other binding agents such as (petroleum emulsions, polymers and adhesives) can be used for dust suppression on earth roads. • When using bulldozers and graders, there is need to minimise travel speed and distance and volume of traffic on the roads. • Stockpiles should not be left for prolonged periods as wind energy generates erosion and causes more dust to form • It should be noted that emissions generated by wind are also dependent on the frequency of disturbance of the erodible surface and therefore covering the stockpiles with vegetation would reduce the negative erosion effect • Any crusting of the surface binds the erodible material • All stockpiles should be damped down, especially during dry weather or re-vegetated (hydroseeding is a good option for slope revegetation) • Successful trialling of broadacre temporary rehabilitation of unshaped overburden emplacement areas by aerial sowing of a cover crop, providing			

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					an established vegetative stabilisation to minimise the potential for windblown dust generation • Constricting the areas and time of exposure of pre-strip clearing in advance of mining development			
Construction of Infrastructure area.			General transportation, hauling and vehicle movement on site	•	• Hauling of materials and transportation should take place on roads which is being watered and/or sprayed with dust suppressant • Material being transported can be watered or the back of the vehicles can be covered with plastic tarpaulin covers • In order to mitigate the impacts of the activity, the speed limit should be kept to the low as more dust will be generated at higher wind speeds. • Speed limits need to be observed and adhered to. • Management should fit roads with speed humps to ensure adherence • Application of wetting agents or application of dust suppressant to bind soil surfaces to avoid soil erosion • The drop heights should be minimised when depositing materials to the ground • Encourage car-pool and bulk delivery of materials in order to reduce the number of trips generated daily			
Infrastructure area containing stockpile areas	Operational		Dust will be generated due to vehicle movement		Conduct dust suppression			

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Infrastructure area containing stockpile areas	Operational		Transportation of the workers and materials in and out of mine site will be a constant feature during the operational phase. This will however result in the production of fugitive dust due to suspension of friable materials from earth roads. It is anticipated this activity will be long-term and regional and will seize once the life of mine has been reached. Substantial secondary emissions may be emitted from material moved out from the site during grading and deposited adjacent to roads. Passing traffic can thus loosen and re-suspend the deposited material again into the air. In order to minimize these impacts the stockpiles should be vegetated for the duration that it is exposed.	•	• Formulation and implementation of sound management plans for all operations likely to create dust • Planting plenty of trees or hedges as shelterbelts to eliminate or minimise wind disturbance • Planning operations to maximise the benefit of wind breaks • Disturbed areas such as those caused by stripping off grass and topsoil should be kept to a minimum • Roads and standing areas should be sealed or concreted where possible • Use water sprays or water carts to settle dust. Care must be taken to ensure that the water used is free from pollution by noxious matter. There are additives available that reduce the volume of water used, and increase its effectiveness, but approval to use them should be obtained from the local territorial authority. • Use of a global positioning system as a tool to track the locations of mining and dust suppression equipment (e.g. water carts) and cross-referencing this information with real-time weather monitoring to assist with dust control • Automatic water sprays installed at the ROM hopper bin that produce a fine mist to suppress dust generated with the triggering of sensors when a truck enters the dump zone and automatic sprays activated until a set time following the departure of the truck			

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					• Use of a retractable telescopic chute with curtains to load minerals into transport trucks • Speed restrictions should be imposed and enforced • Cabs of machines should be swept or vacuumed regularly to remove accumulated dust • Exhaust pipes of vehicles should be directed so that they do not raise dust • Engine cooling fans of vehicles should be shrouded so that they do not raise dust • Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust			
infrastructure area containing stockpile areas	Operational		Dust from Material Handling	•	• Water sprays at the material handling points. • Material wetting before being transferred • Traffic control by restricting vehicle speed • Implementation of a dust monitoring programme			
infrastructure area containing stockpile areas	Operational		Windblown dust from stockpile area	•	• Dust suppression spraying of transfer points • Install wind barriers on upwind side •			
Removal of infrastructure area	Decommissioning		Demolition & Removal of all infrastructure (incl. transportation off site)	•	• Demolition should not be performed during windy periods (August, September and October), as dust levels and the area affected by dust fallout will increase.			

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					• The area of disturbance must be kept to a minimum, as demolition should be done judiciously avoid the exposure of larger areas to wind erosion. • Speed restrictions should be imposed and enforced. • Cabs of machines should be swept or vacuumed regularly to remove accumulated dust • Exhaust pipes of vehicles should be directed so that they do not raise dust • Engine cooling fans of vehicles should be shrouded so that they do not raise dust • Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust • Dust suppression of roads being used during rehabilitation should be enforced			
Rehabilitation	Decommissioning		Rehabilitation (spreading of soil, re-vegetation & profiling/contouring)	•	• Plants with roots that bind the soil, and vegetation cover should be used that breaks the impact of falling raindrops, thus preventing wind and water erosion. • Plants used for re-vegetation should be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and should easily be propagated by seed or cuttings. • The area of disturbance must be kept to a minimum, as demolition should be done judiciously avoid the exposure of larger areas to wind erosion.			

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					• Spreading of soil must be performed on less windy days. • The bare soil will be prone to erosion and therefore there is need to reduce the velocity near the surface of the soil by re-vegetation. • Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. • Additional mitigation measures include keeping the soil moist using sprays or water tanks, using wind breaks. • The best time to re-vegetate the area must be linked to the distribution and reliability of the rainfall. • Speed restrictions should be imposed and enforced. • Cabs of machines should be swept or vacuumed regularly to remove accumulated dust. • Exhaust pipes of vehicles should be directed so that they do not raise dust. • Engine cooling fans of vehicles should be shrouded so that they do not raise dust. • Dust suppression of roads being used during rehabilitation should be enforced. • It is recommended that the rehabilitation by vegetating should begin during the operational phase already as the objective is to minimise the erosion. • These measures should be aimed to reduce the potential for fugitive dust			

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					generation and render the impacts on ambient air quality negligible.			
Construction of access road and haul roads			Construction activities may cause increase in background noise levels.		Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery.			
Stripping and stockpiling of topsoil	Construction		Stripping and stockpiling activities may cause an increase in background noise levels.		The construction of the stockpiles will limit noise beyond the mine.	identified noise receptors	Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise SANS 10328 of 2008 Noise Control Regulations – General Notice R154 of 10 January 1992	
Construction of the pollution control dam	Construction	Infrastructure	Activities may cause an increase in background noise levels.	•	• The construction of the stockpiles will limit noise beyond the mine • Baffling of machinery			
Removal of infrastructure area	Construction		Construction activities may cause an increase in background noise levels. Blasting may cause structural damage to property and be a danger to people and animals within 500 m of the blast area. Drilling of blast holes can potentially cause an increase in background noise levels. It also has the potential to cause deterioration in air quality due to generation of dust and vehicle emissions.	•	• Machinery to be baffled • Construction of a berm around the boundary of the mining areas to limit impacts of blasting • Evacuate anyone within 500 metres of a proposed blasting site • Place seismographs in specific surrounding areas to monitor vibrations in terms of blasting.			

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Removal of infrastructure area	Operational		During the operational phase, increased noise levels can be expected	•	• Pre-planning phase mitigation as discussed in the operational phase impact assessment options are adhered to. • Communication between the receptors and the developer need to be implemented and maintained • Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts. A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FELs etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.			
Removal of infrastructure area	Decommissioning		This activity has also the potential to increase noise levels.	•	• Pre-planning phase mitigation options be adhered to. • Communication between the receptors and the developer need to be implemented and maintained, highlighting the outcome of this study. The developer should consider coordinate the working time with periods when the receptors are likely not at home. An example would be to work within the 8 am to 2 pm time-slot to minimise the significance of the impact due to:			

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					• Potentially receptors are most likely at school or at work, minimizing the probability of an impact happening; and			
Operation and infrastructure area containing stockpile areas	Operational		Seepage from the overburden stockpile can contaminate the groundwater immediately below the stockpile as well as adjacent areas.	•	• Ensure that the cut-off drains are established and that any surface seepage be contained and diverted to the pollution control dam. • Implementation of the SWMP			
Operation and infrastructure area containing stockpile areas	Operational		Underground (Lowering of groundwater levels-boreholes)	•	• Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometre surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be reacted on appropriately. • If it can be proven that the mines are indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply. • The numerical model should be done during operation of the mines by using the measured inflows, water levels and drilling and pump test information to re-calibrate and refine the impact prediction.			
Operation and infrastructure area containing stockpile areas	Operational		Contamination during mining (sewage, oil spills and mine material)	•	• Groundwater quality must be monitored on a quarterly basis. • The monitoring results must be interpreted annually by a qualified hydrogeologist and the monitoring			

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					network should be audited annually to ensure compliance with regulations. • The numerical groundwater model must be updated by calibrating the model with monitoring data. • Water retention dams should be lined to • prevent ingress of contamination • Geochemical testing of the backfill material and pillar material should be conducted to aid in the prediction of contaminant release and potential geochemical changes induced in the subsurface, by means of geochemical modelling. • Clean and dirty water systems should be separated as planned. • It must be ensured that a credible company removes used oil after vehicle servicing. • A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills • Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment. • Sewage effluent emanating from latrines or ablution blocks should be treated to acceptable levels before discharge into the environment			
Closure of the mine	Decommissioning		Decant- Rise of water table	•	• Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine.			

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					• Major fractures encountered while mining must be sealed by grouting, both on inflow and outflow areas • A detailed decant management plan will be developed at mine closure. Ultimately water treatment solutions, either passive or active, will be implemented. • Monitoring of the water table rebound will continue post-closure and the modelling updated to quantify the long-term impacts. If necessary, the management measures should be revised based on the modelling results. • Treated water will be discharged to the river system.			
Closure of the mine	Decommissioning		Formation of Acid Mine Drainage (AMD)	•	• Monitoring of water levels and water quality • The rise of water will be closely monitored to ensure that the environmental safe level is not exceeded and that appropriate extraction works and treatment facilities are constructed in time to treat the surplus water once the environmental safe level is reached. The water will then be actively maintained at or below the environmental safe level. • A detailed decant management plan will be developed at mine closure. Ultimately water treatment solutions, either passive or active, will be implemented. • Monitoring of the water table rebound will continue post-closure and the modelling updated to quantify the long-			

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					term impacts. If necessary, the management measures should be revised based on the modelling results. • Treated water will be discharged to the river system.			
Infrastructure area and stockpile areas	Construction and Operational		Potential visual impact on the viewpoints that had a visual exposure rating of 5 or higher. The operational impact on the surrounding agricultural farmers and land users will be more significant, due to the visual intrusion and activities being undertaken.		The visual impact can be minimized by the creation of a visual barrier. The area will be rehabilitated after mining is concluded and thus the visual impact will be removed, and the area will be restored.	Minimum visual impact	Creation of barriers	
Construction of the Mine project	Construction		As a result of construction of the buildings and other mine related infrastructure, supply chain opportunities will be created that could benefit local suppliers	•	• Procurement of suppliers must be as per the SLP and standards; • Conduct a local skills assessment to ascertain what skills are available that may meet supply chain requirements; • Communication with local suppliers to register on the suppliers list to manage expectations;	Sustainable opportunities for social and economic growth	Social and community programmes	
Construction of the Mine project	Construction	N/a	Employment at the Colliery	•	• Targets for the mining operation for BEE spend are set by the Department of Mineral Resources (DMR) in the Mining Charter. Implementation of the SCMP will ensure that local economic benefits are maximised and the social performance of Contractors (local employment, local procurement targets, skills development, etc.) are managed through the CSMP. • Should Contractors not comply with the social management plan that was submitted or the KPIs (breach of			

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					contract), the contract may be terminated. • Local employment is once again emphasised and workers that reside closest to the mining area should first be considered for employment. • Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".			
Construction of the Mine project	Construction	N/a	Impacts on local employment	•	• Communicate available opportunities at the Mine Project in advance, to manage employment expectations; • Apply employment/procurement policies and procedures (e.g. do not employ at the mine gate) to prevent unnecessary influx by jobseekers; • The start date of the Mine Project needs to be communicated to prevent early or long term influx; • Address concerns with and ensure local job and procurement opportunities; • Ensure compliance with socio-economic tools and legal requirements (BBBEE and Mining Charter);			
Construction of the Mine project	Construction	N/a	Impacts on local economy Definite positive impacts for the local economy during the construction phase may occur	•	• Employment of locals and an increase in salary earners; • Contracts with SMMEs and local service • providers; • Local procurement of material and goods, • where possible;			

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					• Positive impacts for the retail market (groceries, goods and services, food suppliers, etc.) for local merchants, shops and informal traders; and • Accommodation for temporary skilled employees in local establishments and its associated spin-offs. • It is recommended that a Social Steering • Committee be established to implement the objectives of the CSMP and to address socioeconomic development issues in a more structured manner. • Formulation of a 'Contractor Social Management Plan' (CSMP) and implementation of its requirements for the duration of the construction period to: • Ensure communication between the various sectors that deal with 'social' issues, such as Human Resources (employment), Supply Chain (contractors), Corporate Affairs (communities); • Address concerns with and ensure local job and procurement opportunities; and • Ensure compliance with legal requirements (BBBEE and Mining Charter). • As part of the tender documents the contractor has to provide subcontracting values per package and the plan on how he will meet BEE procurement and SMMEs targets assigned.			

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					• Monitor the social performance of contractors and determine how contractors fair on each KPI. • Implement relevant measures should the contractors not comply with the social management plan they submitted (impose penalties, termination where necessary, review of future prospective work and so forth). • Cost of remedial work associated with the social incident is borne by the contractor. • Erect signboards along the road that display the timeframe of the construction period.			
Construction of the Mine project	Construction	N/a	Impact on tourism activities		Construction in winter months or times when tourism is low.			
Construction of the Mine project	Construction	N/a	Influx of jobseekers	•	• Take care not to create unrealistic expectations and communicate accurate details of the construction period to the local communities. Establish a labour desk and ensure that the local Councillor(s) are involved. • Set guidelines in the CSMP for local employment and ensure implementation thereof for the duration of the construction period. • The provision of accommodation for contractors and the erection of a construction camp are not allowed. Each contractor is required to submit his own accommodation and transport plan.			

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Construction of the Mine project	Construction	N/a	Disruptions in daily living and movement patterns	•	• Announce disruptions, road closures (if any) and so forth by using the local media, road sign boards and other Municipal structures and collaborate with the Local Municipality in this regard. • Erect signboards indicating accesses to the construction site. • Impose penalties for reckless drivers to enforce compliance to traffic rules. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un road worthy vehicles that could lead to accidents. • Limit all activities to the development footprint of the proposed construction site. • Fence off the development footprint of the proposed construction site prior to the commencement of site-clearing and construction activities. • Display a contact number on the construction vehicles where motorists can report reckless driving. • The mine to consult with adjacent landowners whose private residences, crops, livestock and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement. Provide a schedule of the construction activities to landowners and relevant I&APs. • Keep the local SAPS in Komati and Ward Councillors informed about the construction progress and time-lines to ensure that they would be able to			

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					adequately deal with any type of disruptive behaviour.			
Construction of the Mine project	Construction	N/a	Security impacts	•	• Provide workers with identity tags and prohibit the access of unauthorized people to the construction site. • Workers should not be allowed to remain in the construction area when they are off duty. • Implement safety and security measures, such as fencing, 24-hour security guards, CCTV cameras, random security checks and access control.			
Construction of the Mine project	Construction	N/a	Impacts on road infrastructure		Communicate with the local Municipality with regards to potholes and possible repairs to the road surfaces that might be required.			
Construction of the Mine project	Construction	N/a	Disruptions of services (water/electricity/sewerage	•	• Inform surrounding landowners and other • affected parties in advance of possible service interruptions and restore the service as soon as possible. • Ensure that surrounding landowners and residents are aware of procedures to raise complaints and make the contact numbers of the Main Contractor available to them, should issues arise.			
Construction of the Mine project	Construction	N/a	Health and safety risks for workers	•	• Address complaints speedily. • Implement measures to suppress dust - spraying of gravel roads, surfaces and stockpiles with water on a regular basis. • Construction workers to wear protective clothing (e.g. masks that minimize dust inhalation and clothing that protects against sunburn).			

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					• Enforce the use of earplugs where relevant. • Lock away dangerous plant, equipment and material when not supervised or in use. • Dispose of the various types of waste generated in the appropriate manner at licensed waste fill sites at regular intervals. • Provide safe and clean drinking water and instil regular water breaks to keep workers hydrated. • Provide enough ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Keep the local police and ambulance services informed of construction times and progress. • Ensure that the Colliery has an ambulance that remains on stand-by for the duration of the project. • Store any materials away from sensitive locations in fenced-off areas. • Accommodation and facilities of security guards and any other personnel that may stay on site should comply with health and safety standards. • Inform the Municipality and emergency services if harmful substances are spilled. • Utilise and increase existing mine security and procedures and 24-hour security in and around the mining area.			

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					• Fence off the construction site where possible to avoid illegal trespassing. Close off any excavation areas to prevent access.			
Construction of the Mine project	Construction	N/a	Community health and safety	•	• Identifiable tags and clothing for construction workers and the implementation of security measures at the entrance to the construction site. • Designate a suitable area for cooking fires (if required). • Display "danger" warning signs and "no public access" signs at all potential accesses and paths. • Adhere to the Emergency and Safety plan procedures for the duration of the construction phase. • Make the procedure to lodge complaints available to the surrounding property owners and Ward Councillors to enable them to lodge complaints when problems with regards to community and/or environmental health arise. • Heavy vehicles to keep headlights always switched on to improve visibility. • Inspect vehicles on a regular basis and impose penalties for reckless driving. • Implement all mitigation measures as proposed in the Specialist Noise and Air Pollution Assessment Reports. • Ensure good visibility at the accesses to the site.			
Operation of the Mine in general	Operational	N/a	Employment at the mine	•	• Targets for the mining operation for BEE spend are set by the Department of			

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					Mineral Resources (DMR) in the Mining Charter. • Implementation of the SCMP will ensure that local economic benefits are maximised and the social performance of Contractors (local employment, local procurement targets, skills development, etc.) are managed through the CSMP. • Should Contractors not comply with the social management plan that was submitted or the KPIs (breach of contract), the contract may be terminated. • Local employment is once again emphasised and workers that reside closest to the mining area should first be considered for employment. • Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".			
Operation of Mine general	Operational	N/a	Impacts on procurement / supporting industries / local SMMEs		Establish a labour desk in collaboration with the Ward Councillor and local Municipality to determine the skills that are available locally before considering "outsiders".			
Operation in the Mine in general	Operational	N/a	Impacts on current NON-MINING RELATED employment levels of the area	•	• Implement the 'Groundwater Management Strategy' and any recommendation made as part of the Geohydrological Report. • Test boreholes on all affected private properties at regular intervals, make the results known to the property owners and keep record of test results.			

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					• represented by landowners, the mine operator and independent specialists and conduct quarterly meetings where issues relating to the environment and water pollution can be discussed.			
Operation of Mine general		N/a	Impacts on land values / market values of affected land portions	•	• Should boreholes be affected, implementing an Action Plan that will ensure that clean water (on-tap) is available to all the affected landowners without disruptions. • Ensure that all affected landowners are familiar with the procedure to lodge complaints and attend to the issues at hand expediently. Update affected landowners of new developments and attempt to communicate with them directly by minimising the use of Consultants for this purpose • Monitoring programmes for groundwater need to be implemented and if ground water quality or quantity is affected, water will need to be supplies by the mine for use by users affected.			
Operation of the Mine in general	Operational	N/a	Impacts on tourism activities		No tourism will be affected as the area is far from tourism activities.			
Operation of the Mine in general	Operational	N/a	Skills development, training and skills equity	•	• Do a skills analysis of the local community members in collaboration with the local Municipality and Ward Councillor to ensure that locals are considered for employment and training. • Take locals settlements close to the project site into consideration for all potential training opportunities. Engage continuously with all stakeholders on			

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					employment and training opportunities should they arise. This will also form part of the overall Mine Stakeholder Engagement Plan', SLP and the 'Socio-economic Assessment Tool', which will be managed by Mine. • Legislation stipulates that specific levels of training and skills are required to work for a mine. Only if skills are not available locally (nearby settlements and local Municipal area) will personnel be sourced elsewhere.			
Operation of the Mine project in general	Operational	N/a	Impacts on the local community / community projects	•	• As part of a mine's Social and Economic Development responsibility, the mine must get involved with a relevant Local Economic Development Projects as identified in the IDP of a municipality. • Mine project is however not in the position to get involved with the day-to-day running of a LED project, but will make a financial contribution towards a project of the municipality's choice, over a period of 5 years. Set aside a Corporate Social Investment (CSI) budget for smaller ad-hoc community requested projects should individual community members require funding/loans to start-up small businesses, etc.			
Operation of the Mine in general	Operational	N/a	Impacts of an 'outside' workforce / migrant labourers	•	• Mine project must commit to work with the Ward Councillors and Local Municipality to establish the skills database and to set up a labour desk to source local workers as far as possible. • Only if skills are not available locally should outsiders be considered.			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					• Define the definition of a "local workforce" and communicate this and the skills requirements to the local communities. Work with the local • Municipality and Councillors to ensure that no unrealistic job expectations are created.			
Operation of the Mine in general	Operational	N/a	Impacts on the size and structure of the local Municipal area		The potential impact on population changes (size and structure of the local Municipality) is regarded as insignificant.			
Operation of the Mine in general	Operational	N/a	Impacts associated with blasting	•	• The potential impact of blasting activities on community infrastructure is rated as insignificant as it is unlikely to occur. • Should blasting take place, inform landowners of the blasting schedule and limit blasting to daytime hours. Undertake a full risk assessment in order to address the aspects and to put proper controls in place			
Operation of the Mine in general	Operational	N/a	Impacts on road infrastructure	•	• The potential impact on road surfaces is deemed to be insignificant, although it may still occur. • Inform the Municipality of damage to road surfaces and potholes			
Operation of the Mine in general	Operational	N/a	Attitude formation and mobilization against the project (private landowners	•	• Ensure that landowners and affected communities are continuously updated with regards to new developments that might affect them. • Use a single line of communication and make the communication channels known to the affected parties, in case			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					they want to raise complaints or make enquiries. • reported, especially issues that relate to the environment, water and issues that could affect the 'sense of place'			
Operation of the Mine in general	Operational	N/a	Attitude formation for or against the project (local communities)	•	• Be aware not to raise unrealistic expectations amongst the local communities with regards to employment, skills requirements and new community projects. • Encourage the local communities to do a skills analysis of their available workforce and train and employ locals wherever possible. • Continuously engage with the local communities and provide updates through the Councillors and other structures with regards to the implementation of SLP projects and targets. Make the annual SLP progress reports available for public scrutiny if required.			
Operation of the Mine in general	Operational	N/a	Disruptions in daily living and movement patterns	•	• Announce disruptions, road closures and so forth by using the local media, road sign boards and other Municipal structures. • to enforce compliance to traffic rules and speed limits. This is particularly pertinent for trucks and other vehicles that travel on the roads near sensitive receptors (farm houses, local businesses, communities, etc.). • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					and un- roadworthy vehicles that could result in accidents. • Where relevant install silencers on machinery and trucks. • Limit operations and the movement of trucks on the access and haul roads to reasonable daytime hours and not on Sundays and public holidays. • Display a contact number on trucks where motorists can report reckless driving. • The mine to consult with adjacent and other affected landowners whose private residences, crops and other infrastructure could be affected by dust, noise, blasting and other impacts that result from traffic movement and the mining activities.			
Operation of the Mine in general	Operational	N/a	Community	•	• Fencing of the mining area. • Erect signboards that warn of the dangers and indicate areas that are off limits for the public.			
Operation of the Mine in general	Operational	N/a	Relocation of individuals and families		The mine to consult with adjacent and other affected landowners whose private residences, crops and other infrastructure could be affected by dust, noise, blasting and other impacts that result from traffic movement and the mining activities.			
Operation of the Mine in general	Operational	N/a	Illegal trespassing	•	• Implement and increase security measures to address the unauthorized movement of cattle and trespassers. • Fencing of the mining area.			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Operation of the Mine in general	Operational	N/a	Security impacts	•	• Should crime escalate and unacceptable levels of crime and safety-related issues occur during the operational phase, collaborate with the Ward Councillors and SAPS and compile an action plan that would address the implementation of additional and stricter security measures. • Establish a channel where incidences of illegal trespassing and the occurrence of illegal settlements can be reported as soon as it occurs.			
Operation of the Mine in general	Operational	N/a	Impacts on land and land use changes	•	• Keep the development footprint and areas necessary for the optimal operation of the mine as small as practically possible. • Restrict vehicle movement over unprotected or sensitive areas.			
Operation of the Mine in general	Operational	N/a	Impacts on agricultural practices		Make procedures to lodge complaints available to private landowners. Prompt landowners to make use of these channels, maintain open communication, attend to issues as soon as possible and provide feedback on a regular basis. Implement all the mitigation and management measures as proposed by the Geohydrologist as the availability and quality of groundwater and the protection of surface water would mitigate land use impacts to a large extent.			
Operation of the Mine in general	Operational	N/a	Impacts on future land developments		Communication and future consultation with land developers			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Operation of the Mine in general	Operational	N/a	Land claims		Verify land claims that transpire during the process with the Regional Land Claims Commissioner and include the rightful claimants in the consultation process.			
Operation of the Mine in general	Operational	N/a	Health and safety risks for workers	•	• Dust monitoring and implement enough dust suppression. • Employees are provided with dust masks that minimize dust inhalation. • Issue employees with earplugs and instructions how to use it. • Ensure all vehicles and machinery is serviced regularly and enforce speed limits on site. • Provide safe and clean drinking water and instil regular water breaks to keep workers hydrated. • Implement awareness campaigns (HIV/AIDS/TB, blood pressure, Body Mass Index, Fatigue management, overall emphasis on healthy lifestyle, chronic disease management and wellness) to improve knowledge in the workplace and in the surrounding communities, provision of home-based care and counselling and educating the people at schools and in the community about the pandemic.			
Operation of the Mine in general	Operational	N/a	Community health and safety risks	•	• Dust suppression and monitoring is conducted on the gravel roads, mine processing plant, stockpile areas, etc. • Strict monitoring of ambient air quality and open communication to all stakeholders.			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					• Limit the number of access gates and ensure 24-hour security and other relevant security measures. • Fence and prevent access to mining areas, borrow pits, etc. where safety hazards could occur. • Stability of pillars in workings to be monitored. • Post information boards about public safety hazards and emergency contact information. • Fire breaks to prevent the spreading of veld fires, should it occur. • Ensure that the personnel on site are trained in first aid and procedures to follow in case of fire breakouts and other emergency situations. • Procedures set out in the mine's Emergency Response Manual to be followed, such as emergency response drills carried out throughout the year and regular auditing and questioning of the key personnel involved in emergency responses.			
Closure of the mine	Decommissioning	N/a	Loss of employment due to closure of mine	•	• Counselling and assistance are provided, in collaboration with the workers and union representatives, to workers to overcome shock and distress of being retrenched and assistance is necessary in obtaining other employment and manage retrenchment packages. • If possible, at the time of closure, those workers who do not qualify for early retirement, will be redeployed in other ventures owned by the owners should			

ACTIVITY	PHASE	SIZE AND SCALE	POTENTIAL IMPACT	MITIGATION TYPE	MITIGATION MEASURES	STANDARDS TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
					they wish to continue their employment with the owners. The owners are involved within various sectors of the economy where workers with these specific skill sets can easily be redeployed.			
Rehabilitation	Decommissioning	N/a	Subsidence of the rehabilitated area will cause ponding that will cause an increase in the recharge into the mined-out workings	•	• Ensure that the profile of the rehabilitated area is free-draining and establish a slope like the pre-mining slope. Establish vegetation as soon as possible and inspect the areas for possible subsidence areas. Once the subsidence occurs re-grade and fill the area to ensure free draining. • Proper rehabilitation can restore topography to pre-mining conditions as close as possible.	Stop subsidence	Correct mining method Corrects rehabilitation Implement rehabilitation	

3.2 Impact Management Outcomes

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

The EAP confirms that the management outcomes are provided in section 3.1. above of PART B.

3.3 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).

The EAP confirms that the management outcomes are provided in section 3.1. above of PART B.

3.4 Financial Provision

3.4.1 Determination of the amount of Financial Provision.

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

The closure objectives for mining internationally and in South Africa focuses on the restoration of previous land use capabilities, the zero-net loss of biodiversity, and the satisfaction of community requirements.

Project closure objectives for Mine will be in line with the above mentioned and is as follows:

- Re-establishment of the pre mining land use and land capability;
- Re-establishment of function to any biodiversity areas of concern that could and have been affected by the mining operations;
- Prevent any form of contamination of soils, surface water and ground water;
- Implementation of on-going rehabilitation to regulated standards;
- Implementation of sustainable community projects that will be self-driven after mine closure; and
- Maintenance and Monitoring of rehabilitated areas.

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

The environmental objectives are being made in line with the concerns raised by Interested and Affected parties. The stakeholder and Public participation consultation is still on-going and transparent. The EIA report for public view included the Closure objectives, specialist study findings and financial provision for scrutiny. Surface mining will be rehabilitated and once all procedures are done the land will be suitable for agricultural activities to take place again.

3.5 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.

A detailed rehabilitation plan will be developed and attached to this report. Below is a summary of the proposed rehabilitation plan.

(a) Backfilling of the Mining Pit,

The mining pit must be backfilled using the overburden materials as removed from the mining area. The pit must be backfilled to establish the pre-mining conditions.

(b) Removal and levelling of stockpiles;

All excess soils on site (not used for backfilling) must be levelled and profiled to enable revegetation.

(c) Removal of Surface Infrastructures;

All site infrastructures must be removed on decommission of mining activities.

(d) Rehabilitation of created access roads and drill stations

The internal access roads that were created solely for prospecting activities will be ripped to facilitate vegetation regrowth. The drill stations will also be ripped and topsoil will be re-spread for vegetation regrowth. The rehabilitation of access roads will be done in consultation with the land owners and the roads will not be ripped should they want to continue using the access roads. This will be done within the limitations of all the relevant Legislations.

(e) Re-vegetation

It is recommended that a standard commercial fertilizer high in the standard elements is added to the soil before re vegetation, at a rate of 10 -20k g/ha (application rate to be confirmed based on input from a suitably qualified specialist). The fertilizer should be added to the soil in a slow release granular form. A suitably qualified ecologist will be appointed to determine the appropriate veld grass mix for hand seeding.

Re-vegetation efforts will be monitored every second month for a period of six months after initial seeding. An effective vegetation cover of 45% must be achieved. Re-seeding will be undertaken if this cover has not been achieved after six months.

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

The closure objectives aim at restoring the site to its original state, i.e. conditions that were existing before the prospecting activities were undertaken. The closure objectives were identified before the rehabilitation plan was designed to ensure that all aspects are covered. The rehabilitation plan will ensure that the following objectives are met:

- ✓ Management accountability and ownership of closure activity;
- ✓ Comply with relevant or applicable legislative requirements;
- ✓ Ensure the health, safety and welfare of all humans and animals are safeguarded from hazards resulting from mining operations that have been terminated;
- ✓ Limit or mitigate adverse environmental effects to an extent that it is acceptable by all parties;
- ✓ Provide a reasonable basis on which the financial consequences of closure can be estimated, recognised and managed including any tax consequences so that mines are closed efficiently and cost effectively; and
- ✓ Ensure land is rehabilitated to, as far as is practicable, its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development.

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

The closure objectives aim at restoring the site to its original state, i.e. conditions that were existing before the prospecting activities were undertaken. The closure objectives were identified before the rehabilitation plan was designed to ensure that all aspects are covered. The rehabilitation plan will ensure that the following objectives are met:

- ✓ Management accountability and ownership of closure activity;
- ✓ Comply with relevant or applicable legislative requirements;
- ✓ Ensure the health, safety and welfare of all humans and animals are safeguarded from hazards resulting from mining operations that have been terminated;
- ✓ Limit or mitigate adverse environmental effects to an extent that it is acceptable by all parties.

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

TO BE CALCULATED

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

The financial provision for the rehabilitation of the mining is included in the proposed mine operating expense. Oikonomia Granite Pty Ltd is a an Emerging BEE company and will not have the required financial provision all at once. It is proposed that an agreement between DMRE and Oikonomia be established with monthly financial commitments.

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

3.9.1 Monitoring of Impact Management Actions

Monitoring of Impact Management Actions is provided in Table 3-1 below.

3.9.2 Monitoring and reporting frequency

Monitoring and Reporting Frequency is provided in Table 3-1 below.

The Mine must appoint an external Environmental Control Officer who will conduct monthly monitoring covering aspects such as waste management, Water Monitoring, Dust Suppression, Chemical and Hydrocarbon Handling.

3.9.3 Responsible persons

The effective implementation of this EMPr is dependent on established and clear roles, responsibilities and reporting lines within the mining site. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the License remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Responsible Person (s)	Role	Responsibilities
Project Manager (PM)	The applicant (Oikonomia Granite) is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). The Environmental Control Officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the Environmental Authorization (EA). Oikonomia is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and must ensure that the ECO is integrated as part of the project team while remaining independent.	• **<u>Responsibilities</u>** • Be fully conversant with the conditions of the EA; • Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); • Issuing of site instructions to the Contractor for corrective actions required; • Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and • Ensure that periodic environmental performance audits are undertaken on the project implementation.
Site Supervisor (SS)	The SS reports directly to the PM, oversees site works, liaises with the contractor(s) and the ECO. The SS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr.	• Ensure that all contractors identify a contractor's Environmental Officer (cEO); • Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, PM and ECO; • Must ensure that all landowners have the relevant contact details of the site staff, WMO and cEO; • Issuing of site instructions to the Contractor for corrective actions required; • Will issue all non-compliances to contractors; and • Ratify the Monthly Environmental Report.

Responsible Person (s)	Role	Responsibilities
Environmental Control Officer	The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the SS and Project Manager regarding all environmental matters. The Contractor, cEO and AEO are answerable to the ECO for non- compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the SS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the	The responsibilities of the ECO will include the following: • Be aware of the findings and conclusions of all EA related to the development; • Be familiar with the recommendations and mitigation measures of this EMPr; • Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; • Undertake regular and comprehensive site inspections / audits of the construction site according to the approved EMPr and applicable licenses in order to monitor compliance as required; • Educate the construction team and operational phase workers about the management measures contained in the EMPr and environmental licenses; • Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; • Monitoring the performance and ensuring compliance with the EMPr and associated Method Statements; • In consultation with the Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses;

Responsible Person (s)	Role	Responsibilities
	Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required.	• Liaison between the PM, Contractors, authorities and other lead stakeholders on all environmental concerns; • Compile a monthly environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; • Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); • Checking the cEO's record of environmental incidents (spills, breakdowns, impacts, legal transgressions etc) as well as corrective and preventive actions taken; • Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; • Assisting in the resolution of conflicts; • Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor and the applicant; • In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure the matter is addressed. Should no action or insufficient action be taken, the ECO may report the matter to the authorities as non-compliance; • Maintenance, update and review of the EMPr;

Responsible Person (s)	Role	Responsibilities
		• Communication of all modifications to the EMPr to the relevant stakeholders.
Applicant's Environmental Officer (AEO)	The AEO will report to the Project Manager and is responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager and liaising with contractors coordination responsibilities.	• Be fully conversant with the EMPr; • Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; • Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) and facility visitors; • Confine the development site to the demarcated area; • Conduct environmental internal audits with regards to EMPr and authorisation compliance; • Assist the contractors in addressing environmental challenges on site; • Assist in incident management: • Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; • Assist the contractor in investigating environmental incidents and compile investigation reports; • Follow-up on pre-warnings, defects, non-conformance reports; • Measure and communicate environmental performance to the PM; • Conduct environmental awareness training on site together with ECO and cEO; • Ensure that the necessary legal permits and / or licenses are in place and up to date; and

Responsible Person (s)	Role	Responsibilities
		• Acting as Developer's Environmental Representative on site and work together with the ECO and contractor.
Contractors	Contractors will be appointed to conduct the site establishment and construction activities. On completion of the establishment activities the contractor's contract will expire and Oikonomia will be responsible for the operation of the facility. Contractors may be appointed to conduct regular maintenance at the mining site. The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Erothe. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented.	• Project delivery and quality control for the development services as per appointment; • Employ a suitably qualified person to monitor and report to the project developer's appointed person on the daily activities on-site during the construction period; • Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; • Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; • Ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the WMO.
contractor Environmental Officer (cEO)	Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site	• Be on site throughout the duration of the project and be dedicated to the project;

Responsible Person (s)	Role	Responsibilities
	implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Waste Management Officer and the public.	• Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; • Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; • Attend the Environmental Site Meeting;

3.9.4 Time period for implementing impact management actions

Monitoring of Impact Management Actions is provided in Table 3-1 below.

3.9.5 Mechanism for monitoring compliance

Table 3-1 below details the compliance monitoring mechanism for the quarry.

Table 3-1: Compliance Monitoring Mechanism

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
Site establishment	Legal transgression; Accidents and Incidents	✓ Mining Permit; ✓ Environmental Authorisation; ✓ Acts, Regulations and any other site permits; and ✓ Access agreements; & ✓ Emergency Preparedness and Response Plan	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Creation of access roads	Soil Erosion; Vegetation Clearing; Introduction of alien invasive plants.	✓ Existing roads are used as far as practicable; ✓ No multiple tracks are created; ✓ Erosion control beams effectiveness; ✓ Vegetation clearing limited to working area; ✓ Site walk to identify absence/ presence of threatened and/or protected species; ✓ Control of alien invasive plants;	Applicant/ Site EO/ ECO	After creation of each access road; Weekly monitoring; Monitoring reports must be submitted monthly to DMRE.
Establishment of mining area	Loss of vegetation	✓ Vegetation cleared according to approved method statement; ✓ Vegetation clearing limited to approved area; Vegetation clearing limited to working area; ✓ Site walk to identify absence/ presence of threatened and/or protected species; ✓ Control of alien invasive plants;	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Stripping and stockpiling of Topsoil	Loss of fertile soils; Contamination of topsoil; Topsoil stockpile erosion	✓ Topsoil stripping and stockpiled separately; ✓ Topsoil protected against erosion; ✓ Topsoil located away from potential contaminants.	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Operation of site machinery	✓ Noise generation; ✓ Soil contamination;	✓ Dust suppression; ✓ Machinery operational standards;	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring;

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements For Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
	✓ Dust generation	✓ IAPs consultation.		Annual Submission to DMRE
Mining activities and operation of machinery	✓ Health and safety	✓ Provision of PPE; ✓ Environmental awareness programme; ✓ Toolbox talks and inductions	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Mining activities and operation of machinery	✓ Water contamination	✓ Water quality of the Diphiri River; ✓ Biomonitoring of the Diphiri River; ✓ Underground water monitoring.	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Mining activities and operation of machinery	✓ Air Pollution	✓ Monitoring of ambient air quality	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Site Personnel	Security breach	✓ Site employees' identification; ✓ Land owners' complaints; ✓ Access restriction to private properties (beyond prospecting area).	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Ablution facility	Soil and water contamination	✓ Provision of portable chemical toilets; ✓ Disposal of sewage wastes	Applicant/ Site EO/ ECO	Weekly Internal monitoring; Monthly external monitoring; Annual Submission to DMRE
Water requirements	Over extraction of water	✓ Water usage	Applicant/ Site EO/ ECO	Water usage must be recorded on a daily basis and Monitoring reports must be submitted monthly to DMR
Rehabilitation	Erosion;	✓ Backfilling of the mining area; ✓ Re-spreading of topsoil ✓ Rehabilitation rate and success ✓ Vegetation regrowth	Applicant/ Site EO/ ECO	Post closure and findings submitted to DMRE

3.10 Indicate the frequency of the submission of the performance assessment report.

The mining activities must be audited monthly against the conditions of the approved EMPr, the Environmental Authorisations and any other applicable legislations. These reports must also include the assessment of the financial provision. The reports must be consolidated into an annual report for submission to the DMR as per the requirement of section 24P(3) of NEMA (107;1998).

3.11 Environmental Awareness Plan

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

All the employees including visitors will undergo and environmental induction to ensure that all potential impacts, best practice guidelines and policies are communicated. The induction process will be conducted as per the attached Awareness Program (**Appendix 03**). The induction will cover amongst others the following:

- Legal requirements for the site i.e. EA, and EMPr;
- Waste management;
- Incident and accident Management; and
- Emergency Response Procedure.

3.11.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The following steps will be undertaken to ensure that risks are identified at the earliest and ensure that they are avoided:

(f) Appointment of the Environmental Control Officer (ECO)

The applicant must appoint the ECO before the mining activities are undertaken. The ECO will provide monitoring and auditing services to the mining activities.

(g) Delegation of a Project Environmental Officer

An Environmental Officer (EO) must be appointed before any activity can be undertaken on site. The officer must be a qualified environmental Practitioner.

(h) Notice of Commencement

Department of Mineral Resource must be notified in writing 2 weeks before the mining activities are undertaken.

(i) Environmental Documents

Prior to commencement of work on site, the EO is to ensure that the following documents are available on site:

- ✓ The Environmental Authorisation;
- ✓ The final approved Environmental Management Programme (EMPr); and
- ✓ Method statements for different site activities

(j) Environmental Monitoring

The ECO is to undertake monthly environmental compliance audits and prepare monthly environmental audit reports throughout the mining period. The environmental audit must include the following information:

(i) An assessment of the Contractor's compliance with:

- ✓ The relevant conditions of all permits: EA, EMPr, etc.;
- ✓ The approved Environmental Management Programme;
- ✓ The approved Construction Site Plan;
- ✓ The approved Construction Method Statements.

(ii) Provide feedback on:

- ✓ Environmental training undertaken;
- ✓ Any environmental incidents or complaints;
- ✓ Waste type quantities recycled and disposed;
- ✓ Any environmental issues identified;
- ✓ The results of any environmental investigations;
- ✓ Actions undertaken from previous audits; and
- ✓ Recommended actions to be undertaken.

(k) Environmental Training

Prior to working on site, every person that will be undertaking any mining activities must receive training on the relevant environmental management requirements. The EO is to ensure that the environmental training includes the relevant requirements from:

- ✓ All site authorisations; and
- ✓ The final approved Environmental Management Programme.

(l) Development of procedures and checklists

The following procedures will be developed and all staff and workers will be adequately trained on the content and implementation thereof.

Emergency Preparedness and Response: The procedure will be developed to specifically include risk identification, preparedness, response measures and reporting. The procedure will specifically include spill and fire risk, preparedness and response measures. The appropriate emergency control centres (fire department, hospitals) will be identified and the contact numbers obtained and made available on site. The procedure must be developed in consultation with all potentially affected land owners. In the event that risks are identified which may affect adjacent landowners (or other persons), the procedure will include the appropriate communication strategy to inform such persons and provide response measures to minimize the impact.

Incident Reporting Procedure: Incident reporting will be undertaken in accordance with an established incident reporting procedure to (including but not limited to):

- ✓ Provide details of the responsible person including any person who: (i) is responsible for the incident; (ii) owns any hazardous substance involved in the incident; or (iii) was in control when the incident occurred;
- ✓ Provide details of the incident (time, date, location);
- ✓ The details of the cause of the incident;
- ✓ Identify the aspects of the environment impacted;
- ✓ The details corrective action taken, and
- ✓ The identification of any potential residual or secondary risks that must be monitored and corrected or managed.

Environmental and Social Audit Checklist: An environmental audit checklist will be established to include the environmental and social mitigation and management measures as developed and approved as part of the Environmental Management Plan. Non- conformances will be identified and corrective action taken where required.

4 Specific information required by the Competent Authority

(Among others, Confirm that the financial provision will be reviewed annually).

The calculated financial provision for the proposed mine will be recalculated annually and submitted to the DMRE with the Annual Performance Assessment Report to be compiled the an independent external service provider.

No specific information was required by the Competent Authority.

5 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; ☒

-END-