



mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

**FINAL BASIC 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: THE SOURCE MINERAL GROUP (PTY) LTD
("TSMG")

TEL NO: 071 343 6145

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POSTAL ADDRESS: Darryl Furman and Associates, Illovo
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FILE REFERENCE NUMBER SAMRAD: GP 30/5/1/3/3/2/(10320) EM (**Annexure A**)



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 uninterpreted information and that it unambiguously represents the interpretation of the applicant.

2 Objective of the basic assessment process

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

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



- i. identify and motivate a preferred site, activity and technology alternative;
- ii. identify suitable measures to manage, avoid or mitigate identified impacts; and
- iii. identify residual risks that need to be managed and monitored.



PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

INTRODUCTION

The Source Mineral Group (Pty) Ltd (herein referred to as “TSMG”) has lodged an application for a Mining Permit in terms of section 27 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002). The proposed Minnaar Diamond Mine located 6 km north-west of Cullinan and 21 km south-west of Pretoria on portion 0 of the farm Minnaar 292 JR in the Gauteng Province. The project site covers an area of about 5 hectares (ha) in extent and lies at geographical coordinates -25.6463000° south and 28.4425000° east. Access to the site is via a gravel road connect to the R573 main road which traverses through the farm Bynespoort 335 JR. The project area falls under City of Tshwane Metropolitan Municipality.

The proposed small-scale mining operation will involve mining of Concrete sand (Silica)- QO, Building sand (Silica)- QB, Crusher sand (Silica)- QC, Filling sand (Silica) QL, Foundry sand (Silica)- QF, Glass sand (Silica)- QG, Sand (General)- QY, Silica sand- QD, Diamond (DIA), Diamond (Alluvial-DA), Diamond (General-D), Diamond (In Kimberlite), Aggregate (RM), Dimension Stone (M-General), and Clay (general) using truck and shovel mining method. The operation will have following support infrastructure:

- Screening and crushing machine
- Rotary pan washing plant
- Mobile office complex
- Portable water tank (Jojo tanks)
- Ablution facility
- Workshop
- 1 x Komatsu D 155 Bulldozer



- 2 x Volvo 460 Hydraulic Excavators
- 6 x Volvo A30 Articulated 6X6 Dump Trucks
- 6 x Volvo D65 Bulldozer
- 1 x Volvo 72 Motor Grader
- 1 x 12 000 litre Water Browser for dust suppression
- Weight-bridge
- Security gate (boom gate) and fence (five strand barbed wire or Clear-Vu fence)
- General waste bins

The extent of the area applied for covers approximately 5 hectares. The project area is represented in the figure below. The life of mine (LoM) is estimated at 2 (two) years with Run of Mine (RoM) of 29 000 tonnes per month (tpa). The construction phase is expected to commence in the 3th quarter (Q3) of 2019, with first sealable product delivered in Q4 of 2019. Process water supply will be sourced from existing boreholes located within portion 0 of the farm Minnaar 292 JR.

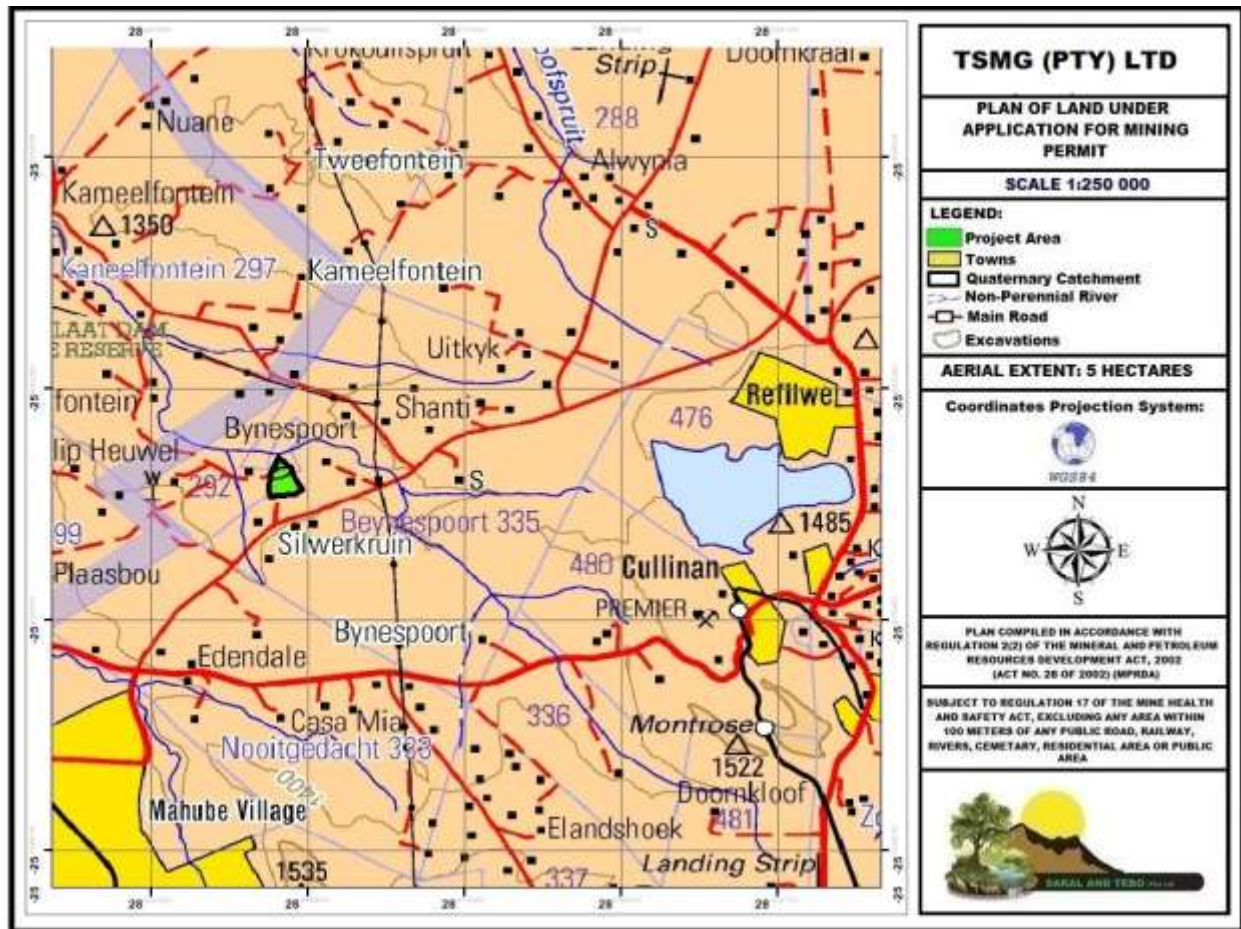


Figure 0-1: Regional Locality of the Study Area

3 Contact Person and Correspondence Address

a) Details of

i. Details of the EAP

Name of the Practitioner: Sakal and Tebo (Pty) Ltd
(Mr. Mandla Masango)

Tel No.: 011 655 7193

Cell No.: 072 714 8556

Fax No.: 086 719 9505



E-mail: mandlamasango@outlook.com

ii. Expertise of the EAP

(1) The qualifications of the EAP

(with evidence)

Please refer to **Annexure B** for the Curriculum Vitae of **Mr. Joubert Bulasigobo** and **Mr. Mandla Masango**.

Mr. Joubert Bulasigobo:

Education:

- ▶ BSc. Chemical Engineering (University of KwaZulu-Natal)
- ▶ MSc. Geohydrology (University of Western Cape (UWC))
- ▶ Post. Grad. Dipl. Integrated Water Resource Management (UWC)

Professional Affiliations:

- ▶ Water Institute of South Africa (WISA)

Mr. Mandla Masango:

Education:

- ▶ BSc. Hons. Hydrology and Water Resources (University of Venda)

Professional Affiliations:

- ▶ South African Council for Natural Scientific Professions (SACNASP)
- ▶ Water Institute of South Africa (WISA)

(2) Summary of the EAP's past experience

(In carrying out the Environmental Impact Assessment Procedure)

Mr. Joubert Bulasigobo is a member of the Water Institute of Southern Africa. His qualifications include a BSc. in Chemical Engineering, a Post Graduate Diploma in Integrated Water Resources Management from University of KwaZulu-Natal and University of Western Cape, respectively. In addition to the tertiary qualifications, he obtained a MSc. in Geohydrology (Environment and Water Science) from UWC.



With over more than 10 years, Mr. Joubert Bulasigobo specializes in environmental decision-making, numerical and statistical groundwater flow and mass transport modelling, resource quantification, surface water-groundwater interaction, mine dewatering, mine water management and development of water management strategies. In addition, his key qualities also involve management and coordination of impact assessment processes, audits and compliance assessments.

Mr. Mandla Masango is an Environmental Assessment Practitioner with 7 years of experience. He has a BSc. Hons. in Hydrology and Water Resources from the University of Venda and registered with SACNASP as a Scientist. Projects he has worked on include Environmental Impact Assessment for the mining sector, riverine and eco-parks rehabilitation, and other developments (residential and industrial developments). He has experience in compiling Environmental Management Plans, Waste License Applications, Prospecting Right Applications, Environmental Risk Assessment and Environmental Legal Compliance Audits. He is experienced in public participation, presenting public meetings, managing specialists and general project management of environmental projects. He has outstanding and working knowledge of the relevant environmental legislation.

Please refer to **Annexure B** for the Curriculum Vitae of **Mr. Joubert Bulasigobo** and **Mr. Mandla Masango**.



b) Location of the overall Activity

The following table represents the location and associated cadastral details for the application area.

Table 3—1: Location and Property Details

Farm Name:	Portion 0 of the farm Minnaar 292 JR
Application area (Ha)	5 Hectares (Ha)
Magisterial District	The site falls under City of Tshwane Metropolitan Municipality in the Magisterial District of Cullinan.
Distance and direction from the nearest town	The proposed project is located approximately 6 km north-west of Cullinan and 21 km south-west of Pretoria on portion 0 of the farm Minnaar 292 JR in the Gauteng Province.
21 digit Surveyor General Code for each farm	TOJR00000000029200000

Table 3—2: SG Digit Surveyor General Codes for the Mining Area

Farm name	Farm Number	Registration Division	Portions	21 SG Code
Minnaar	292	JR	0	TOJR00000000029200000



c) Locality Map

(show nearest town, scale not smaller than 1:250,000)

The proposed mining operation lies on the northern parts of the Gauteng Province within the Magisterial District of Cullinan. The Gauteng Province is located in the heart of South Africa and is bordered by Limpopo Province to the north, Mpumalanga Province on the east, Free State Province to the south, and on North West Province on the western boundary. The project area is located 6 km north-west of Cullinan and 21 km south-west of Pretoria on portion 0 of the farm Minnaar 292 JR in the Gauteng Province. The project site covers an area of about 5 hectares (ha) in extent and lies at geographical coordinates -25.6463000° south and 28.4425000° east. Access to the site is via a gravel road connect to the R573 main road which traverses through the farm Bynespoort 335 JR. The project area falls under City of Tshwane Metropolitan Municipality.

The project area falls within Quaternary Catchment A23B (Pienaars River Catchment) of the Crocodile (West) and Marico water management area (WMA). The project area is represented in the Regulation 2(2) plan below.

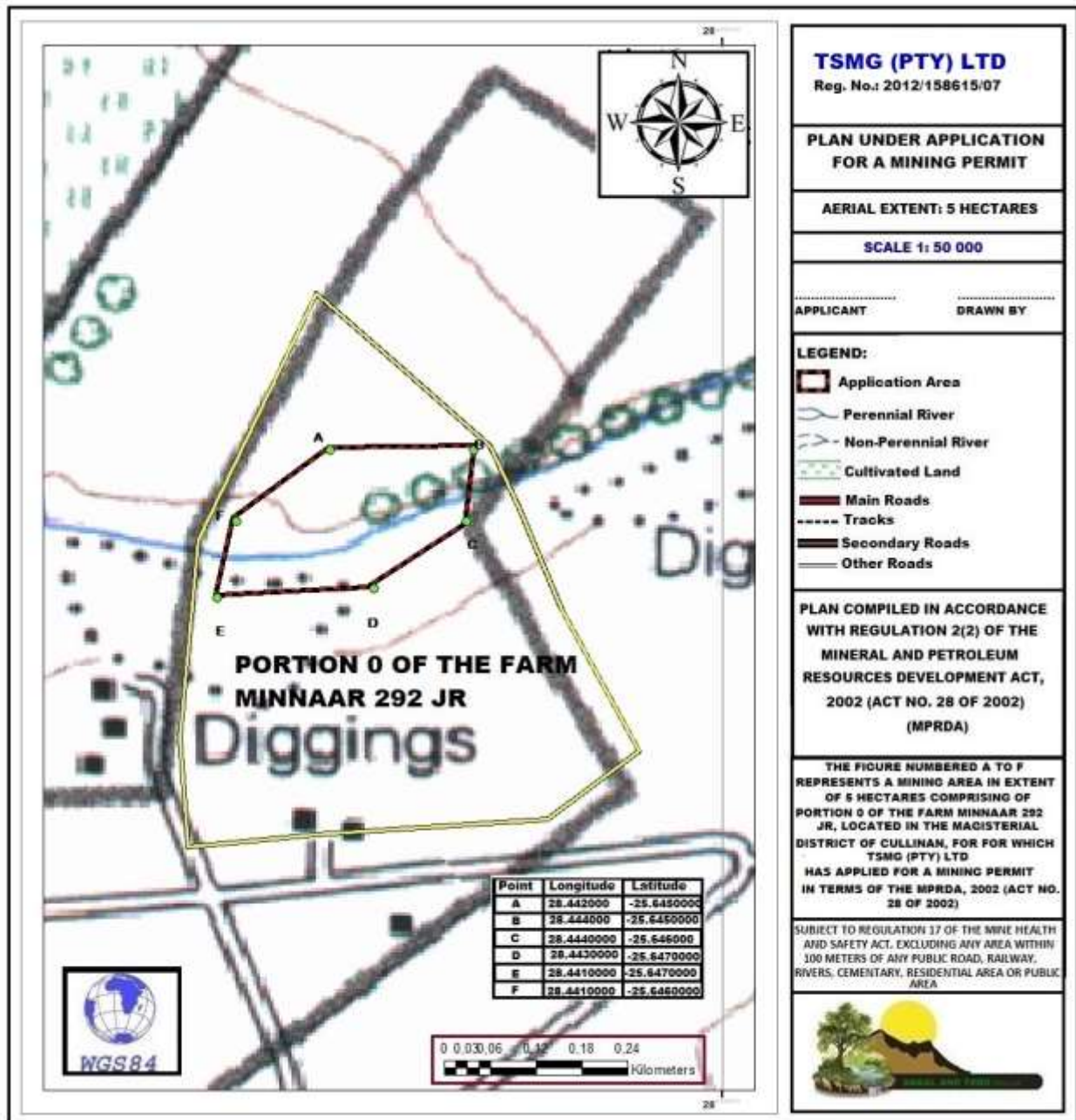


Figure 3-1: Regulation 2(2) Plan



d) Description of the scope of the proposed overall activity

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

The Minnaar Diamond Mine will involve mining of Concrete sand (Silica)- QO, Building sand (Silica)- QB, Crusher sand (Silica)- QC, Filling sand (Silica) QL, Foundry sand (Silica)- QF, Glass sand (Silica)- QG, Sand (General)- QY, Silica sand- QD, Diamond (DIA), Diamond (Alluvial-DA), Diamond (General-D), Diamond (In Kimberlite), Aggregate (RM), Dimension Stone (M-General), and Clay (general) mineral deposits contained within the Rayton Geological Formation. Further to that, the project area falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area.

Mining will commence with the removal of the first 50 mm of topsoil using an excavator and frontend loader. The topsoil from the first block will then be stored in a topsoil berm on the mining area. Due to the rich source of seeds contained in the topsoil, vegetation will usually establish naturally. However, if self-establishment does not occur, the topsoil stockpile will be seeded to ensure the effective management of topsoil. Mining will involve the use of mechanised earth moving equipment (excavator and front-end loader also known as “truck and shovel”) to move the unconsolidated material in bulk. Mining will continue to a depth of approximately ± 15 m.

Diamonds will be recovery in the rotary pan processing plant whilst the sand will be mined, stockpiled and sold to road construction companies and building companies. No sand washing activities will be required and no wash plant will be constructed on the proposed mine site. The mining process will only require 10 full time workers on site, and 2 – 4 drivers transporting mined sand from the site to clients. The excavator and front-end loader that will be used on site

will be stored in a small workshop to be developed on site. Only support equipment and infrastructure required to conduct mining will be on site.

The excavations will be sloped after mining and covered with the topsoil (concurrent rehabilitation) to ensure establishment of vegetation on site after mining. The proposed land use after mine rehabilitation will include cattle grazing.

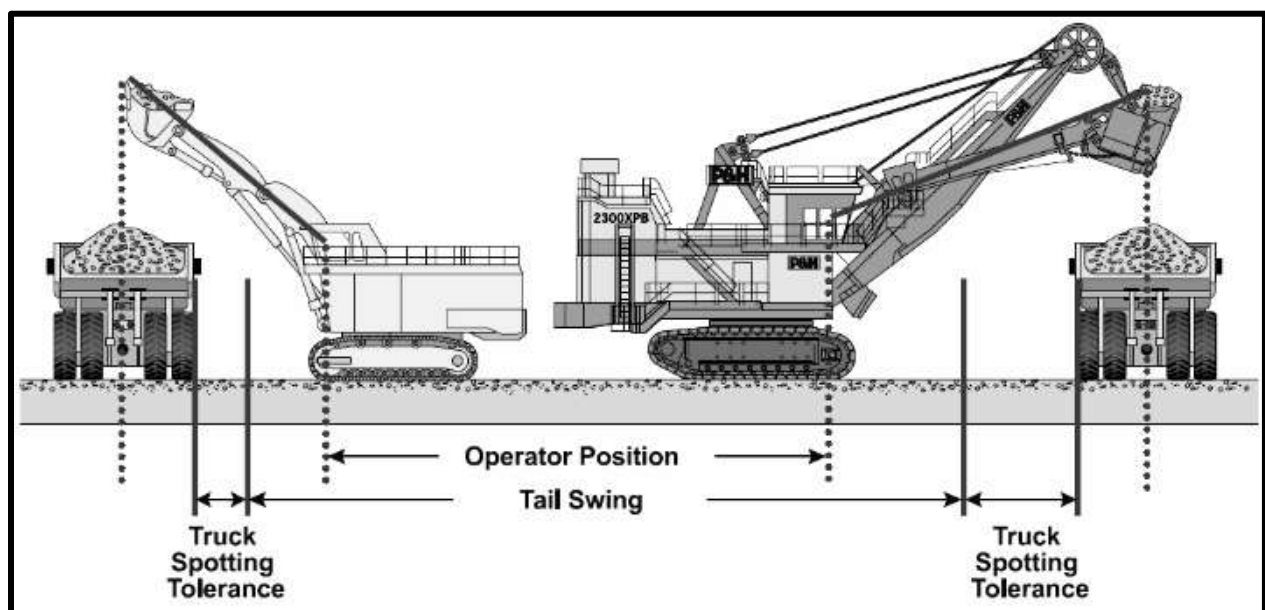


Figure 3-2: Truck and Shovel Mining Method

Construction Phase

The proposed Minnaar Diamond Mine Life of Mine (LoM) is estimated at two (2) years with a possibility for extension (additional 3 years) of the LoM. Construction is expected to commence in the third quarter (3rd) of 2019, whilst the operational phase (production) is scheduled for October (fourth quarter) 2019.



ITEM	TIMEFRAMES
Fencing of the Mining Area	2 weeks
Preparation of Access Road	1 week
Establishment of ablution facilities	3 weeks
Establishment of Contractor's yard	1 week
Construction of Mine haul roads	1 week
Box-cut development	1 week

- **Access Roads**

Existing access road will be used on site. No new roads will be constructed. Access to the site is via a gravel road connect to the R573 main road which traverses through the farm Bynespoort 335 JR.



Figure 3-3: Access road to Portion 0 of the farm Minnaar 292 JR



- **Security and Access Control**

A permanent security house and boom gates will be constructed at the mine entrance. The structures will comprise of brick and mortar and will be supplied with electricity from a diesel driven generator.

- **Water Supply**

Process water supply for the operation will sourced from existing boreholes on-site and water service providers and will be carted onto the site in a tanker. A 2000 litre water cart will be adequate for the size of this operation. The water will be used for dust suppression of access roads. Dust suppression will be conducted as and when necessary.

- **Potable Water Supply**

Potable water required for the proposed mining operation is approximately 40 litres per day (ℓ/day). The water will be used for drinking purposes and will be sourced from local water vendors within Rayton, Refilwe and nearby areas such as Cullinan. The water will be supplied in cooled water dispensers.

- **Ablution**

Ablution facility at the mine will utilize a package sewage treatment plant. All raw sewage from these mobile toilets will be disposed of into the nearest wastewater treatment works within the Magisterial District of Cullinan.

- **Mine Office Complex**

Mine office complex will be established on site and will include the following:

- Vehicles and equipment area
- Ablution facility (chemical mobile toilet)
- Mobile office (mobile container)

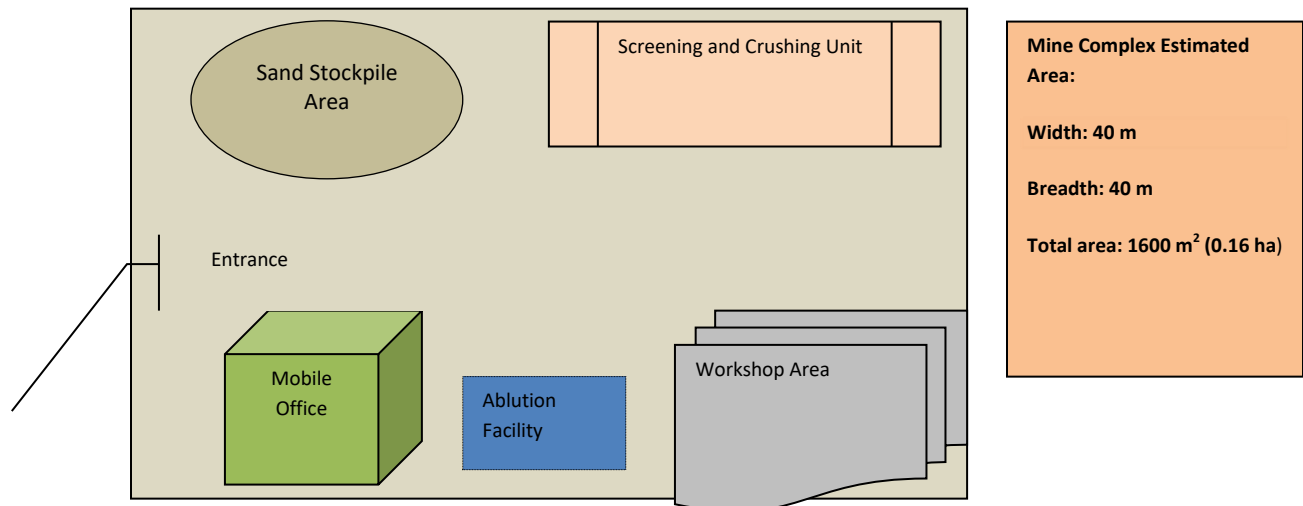


Figure 3-4: Site Layout Plan

- **Accommodation**
No accommodation for workers will be provided on site. Employment will be sourced from Rayton, Refilwe and Cullinan which is a walking distance from the site.
- **Blasting**
No blasting will take place on site.

Operational Phase

- Given the soil profile of the land, the topsoil layer is about 50 mm thick.
- The target diamonds and sand material will be mined in a box cut method to ensure systematic mining in linear progression to allow for practical concurrent rehabilitation. The box cuts will be developed in phases of 20 m x 20 m each to ensure systematic progression. An excavator will be used to break hard matter and load it into a tipper truck.
- Mined material will be loaded into dump trucks directly from the excavations and hauled to the screening (sieving) plant, where the material will be screened into different mesh sizes and then to the rotary pan plant for diamond recovery.
- The proposed mining operation will employment 10-20 full-time employees



- The Run of Mine (RoM) is estimated at 29 000 tonnes per month
- Material will be screen into the correct mesh size and then loaded into trucks and transported to the market (buyers).
- No industrial or mine waste is generated during the mining process. All material consisting mainly of silica (sand) and diamonds will be removed from the box-cut. No processing is taking place except for limited stockpiling so no mining waste or overburden and Fine Residue Dumps (FRD) will be created.
- The depth of the mining operations will be an average depth of ± 15 metres as only the top layer of sand is mined. The total area under excavation will be approximately 4 ha and sand as well as diamonds will be removed over the total area. Backfilling is not an option as the sand is completely removed.
- Only minor repairs are done on site. A PVC lining and drip trays are used during maintenance and accidental spills are cleaned up immediately by removing of the contaminated sand. The small volume of contaminated sand will be disposed of in a registered hazardous landfill facility such as the Holfontein Hazardous Landfill Site.
- The trucks will transport sand from the site 5 days a week, operating during the week only between 7h30 and 17h00 during normal working hours. No operations will take place over weekends or during the builder's break at year end.
- As part of this phase training of personnel in the implementation of the EMPr will be undertaken and the implementation of the environmental awareness plan as part of the EMPr will be an on-going process.

Decommissioning and Closure Phase

Planning for closure and restoration from the beginning of an operation makes the process more efficient:

- Waste will be removed as it is created,
- Excavation will be planned so that topography restoration is less complicated, and
- Topsoil can be re-used at shorter interval.



- Site rehabilitation will ensure that the land more valuable and attractive for resale.
- Concurrent rehabilitation will commence with the completion of each box. The material salvaged out of screening (discard) will be used as backfill. Rehabilitation of the site will be done in accordance with a rehabilitation plan.



(i) Listed and specified activities

In terms of the 2014 Environmental Impact Assessment (EIA) Regulations enacted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended), the proposed Minnaar Diamond Mine will involve activities that fall within the ambits of Government Notice (GN) 983 (08 December 2014). The proposed project will require authorisation from the Department of Mineral Resources (DMR) through the Basic Assessment Process outlined in GNR 982.

A Basic Assessment Process (BAR) is an effective planning and decision-making tool, which allows for the identification of potential environmental consequences of a proposed project, and its management through the planning process. The process will involve consultation with interested and affected parties (I &APs) and submit a Basic Assessment and Environmental Management Plan Report to the DMR.



Table 3—3: Project Listed Activities in terms GNR 983

<p>NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>Aerial extent of the Activity</p> <p>Ha or m²</p>	<p>LISTED ACTIVITY</p> <p>Mark with an X where applicable or affected.</p>	<p>APPLICABLE LISTING NOTICE</p> <p>(GNR 544, GNR 545 or GNR 546)</p>
<p>Mining of silica (sand) including:</p> <ul style="list-style-type: none"> • Removal of topsoil • Accessing the site via existing farm tracks and roads • Temporary stockpiling of extracted sand prior to hauling in trucks. • Refuse collection containers. • Mobile ablution facilities. • Removal of natural and alien vegetation. • Workshop area • Mine office complex 	<p>5 Ha</p>	<p>X</p>	<p>Activity 21 of GN 327 (April, 2017)</p>
<p>Mining of sand and diamonds will require the clearance of an area of 1 hectare or more of indigenous vegetation.</p>	<p>5 hectares</p>	<p>X</p>	<p>Activity 27 of GN 327 (April, 2017)</p>



(ii) Description of the activities to be undertaken

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

Construction Phase

ITEM	TIMEFRAMES
Fencing of the Mining Area	2 weeks
Preparation of Access Road	1 week
Establishment of ablution facilities	3 weeks
Establishment of Contractor's yard	1 week
Construction of Mine haul roads	1 week
Box-cut development	1 week

- **Access Roads**

Existing access road will be used on site. No new roads will be constructed. Access to the site is via a gravel road connect to the R573 main road which traverses through the farm Bynespoort 335 JR.

- **Security and Access Control**

A permanent security house and boom gates will be constructed at the mine entrance. The structures will comprise of brick and mortar and will be supplied with electricity from a diesel driven generator.

- **Water Supply**

Process water supply for the operation will sourced from existing boreholes on-site and water service providers and will be carted onto the site in a tanker. A 2000 litre water cart will be adequate for the size of this operation. The water will be used for dust suppression of access roads. Dust suppression will be conducted as and when necessary.



- **Potable Water Supply**

Potable water required for the proposed mining operation is approximately 40 litres per day (ℓ/day). The water will be used for drinking purposes and will be sourced from local water vendors within Rayton, Refilwe and Cullinan. The water will be supplied in cooled water dispensers.

- **Ablution**

Ablution facility at the mine will utilize a package sewage treatment plant. All raw sewage from these mobile toilets will be disposed of into the nearest wastewater treatment works within the Magisterial District of Cullinan.

- **Mine Office Complex**

Mine office complex will be established on site and will include the following:

- Vehicles and equipment area
- Ablution facility (chemical mobile toilet)
- Mobile office (mobile container)

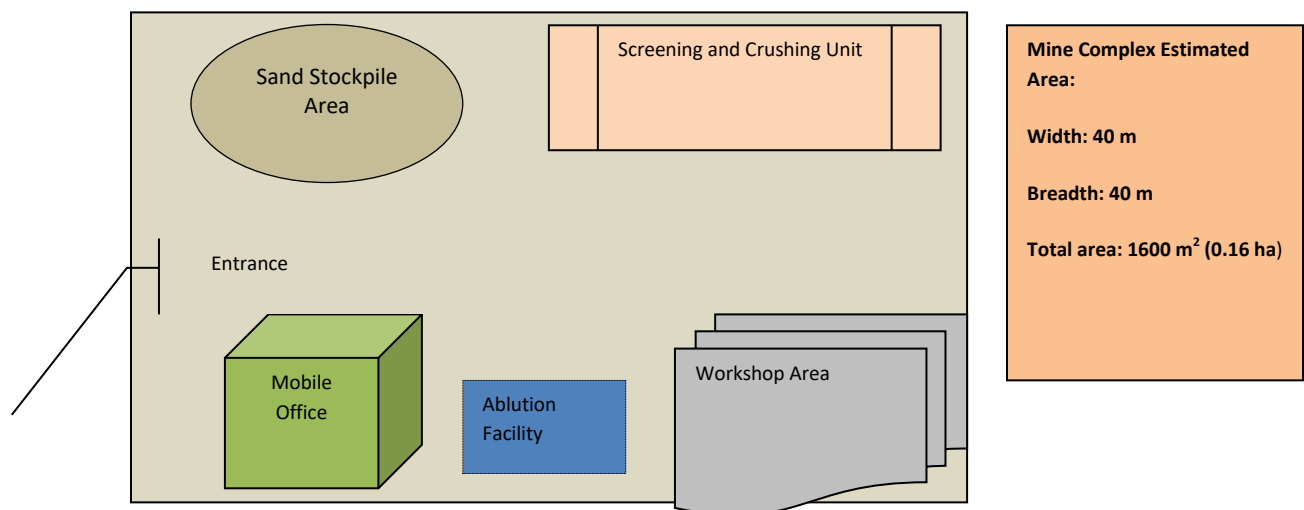


Figure 3-5: Site Layout Plan



- **Accommodation**

No accommodation for workers will be provided on site. Employment will be sourced from Rayton, Refilwe and Cullinan which is a walking distance from the site.

- **Blasting**

No blasting will take place on site.

Operational Phase

- Given the soil profile of the land, the topsoil layer is about 50 mm thick.
- The target diamonds and sand material will be mined in a box cut method to ensure systematic mining in linear progression to allow for practical concurrent rehabilitation. The box cuts will be developed in phases of 20 m x 20 m each to ensure systematic progression. An excavator will be used to break hard matter and load it into a tipper truck.
- Mined material will be loaded into dump trucks directly from the excavations and hauled to the screening (sieving) plant, where the material will be screened into different mesh sizes and then to the rotary pan plant for diamond recovery.
- The proposed mining operation will employment 10-20 full-time employees
- The Run of Mine (RoM) is estimated at 29 000 tonnes per month
- Material will be screen into the correct mesh size and then loaded into trucks and transported to the market (buyers).
- No industrial or mine waste is generated during the mining process. All material consisting mainly of silica (sand) and diamonds will be removed from the box-cut. No processing is taking place except for limited stockpiling so no mining waste or overburden and Fine Residue Dumps (FRD) will be created.
- The depth of the mining operations will be an average depth of ± 15 metres as only the top layer of sand is mined. The total area under excavation will be approximately 4 ha and sand as well as diamonds will be removed over the total area. Backfilling is not an option as the sand is completely removed.



- Only minor repairs are done on site. A PVC lining and drip trays are used during maintenance and accidental spills are cleaned up immediately by removing of the contaminated sand. The small volume of contaminated sand will be disposed of in a registered hazardous landfill facility such as the Holfontein Hazardous Landfill Site.
- The trucks will transport sand from the site 5 days a week, operating during the week only between 7h30 and 17h00 during normal working hours. No operations will take place over weekends or during the builder's break at year end.
- As part of this phase training of personnel in the implementation of the EMPr will be undertaken and the implementation of the environmental awareness plan as part of the EMPr will be an on-going process.

Hydrocarbon Storage

During mining on site, limited quantities of diesel fuel, oil, and lubricants will be stored on site. Diesel fuel will be stored in significant quantities in above ground diesel storage tanks with a gross storage capacity of approximately 40 m³. In the event of a significant hydrocarbon spill, the following procedure is required:

- The source of the spillage shall be isolated
- The spillage must be contained using sand berms, sandbags, pre-made booms, saw dust or absorbent materials.
- The area shall be cordoned off, secured and made safe.
- The incident will be recorded and reported to the Department of Mineral Resources (DMR), Gauteng Department of Agriculture and Rural Development (GDARD) and Department of Environmental Affairs (DEA), Department of Water and Sanitation (DWS) as well as property owners.
- Depending on the nature of and extent of the spill, contaminated soil will be removed and disposed of in a waste deposit receptacle for final disposal at a licensed hazardous landfill site.



- Where relevant, the polluted soil will be treated using absorbent material as well as oil-digestive powders.
- If necessary, oil absorbent sheeting or pads or similar alternatives will be attached to leaky machinery or equipment.
- Material used for the remediation of petrochemical spills must be used according to the product specification and guidance for use.
- Contaminated remediation materials will be carefully removed from the area of the spill so as to prevent further release of hazardous substance to the environment, and stored in adequate containers until appropriate disposal.

Decommissioning and Closure Phase

Planning for closure and restoration from the beginning of an operation makes the process more efficient:

- Waste will be removed as it is created,
- Excavation will be planned so that topography restoration is less complicated, and
- Topsoil can be re-used at shorter interval.
- Site rehabilitation will ensure that the land more valuable and attractive for resale.
- Concurrent rehabilitation will commence with the completion of each box. The material salvaged out of screening (discard) will be used as backfill. Rehabilitation of the site will be done in accordance with a rehabilitation plan.

e) Policy and Legislative Context

Table 3—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
Specific Environmental Management Acts (SEMAs)		



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 Legislation		
Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)	Section 27 and 39 of MPRDA	The conditions and requirements attached to the granting of Mining Permit will apply to the proposed mining operation.
National Environmental Management Act, 1998 (Act No 107 of 1998) as amended (NEMA): Environmental Impact Regulations (2014)	Listed Activity 21 and 27 of Regulation 321 (April, 2017)	The appropriate environmental authorisation will be obtained before proceeding with any mining activities. Measures will be implemented to prevent any pollution that may occur during mining activities. The disturbed area shall be rehabilitated in such a way that is stable, non-polluting, non-eroded, free from alien invasive species and suitable for agreed post closure land use.
National Water Act, 1998 (Act 36 of 1998) (NWA)	Not applicable	None of the planned mining activities falls within the ambit of section 21 of the National Water Act, 1998 (Act No. 36 of 1998). No water use license is required for this application.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004): National Dust Control Regulations (GN 827)	Not applicable	Appropriate dust extractions/suppression equipment will be a condition imposed on the drill contractor for their drill rigs.



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
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)(NEMWA) as amended</p>	<p>Waste management on site</p>	<p>The generation of potential waste will be minimised through ensuring that mine employees are subjected to the appropriate environmental awareness campaign before commencement of mining.</p> <p>All waste generated during the mining activities will be disposed of in a responsible legal manner. Proof of legal disposal will be maintained on site.</p>
<p>National Heritage Resources Act, 1999 (Act No. 25 of 1999)(NHRA)</p>	<p>Section 38 of NHRA</p>	<p>A heritage case will be opened with the South African Heritage Resources Agency</p>
<p>Constitution of the Republic of South Africa (Bill of Rights), 1996</p>	<p>Chapter 2 section 24</p>	<p>Mining activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together be avoided, be minimised and mitigated in order to protect the environmental right of South Africans.</p>

f) Need and desirability of the proposed activities

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

South Africa is known for its abundance of mineral resources. It is estimated to have the world's fifth-largest mining sector in terms of gross domestic product value and its mining companies are key players in the global industry. South African mining and



mining real estate remains attractive for development. Mining creates an environment that lead the community to be more involved in the projects and result in more sustainable job creation strategies within the surrounding communities as well as attracting foreign investment.

In addition, the South African economy heavily relies on the mining sector. Mining for Concrete sand (Silica)- QO, Building sand (Silica)- QB, Crusher sand (Silica)- QC, Filling sand (Silica) QL, Foundry sand (Silica)- QF, Glass sand (Silica)- QG, Sand (General)- QY, Silica sand- QD, Diamond (DIA), Diamond (Alluvial-DA), Diamond (General-D), Diamond (In Kimberlite), Aggregate (RM), Dimension Stone (M-General), and Clay (general) minerals will boost the current struggling national economy. The mining sector has provided more employment opportunities for the citizens in general. The provincial citizens of the Gauteng Province will be awarded more employment opportunities. Should the proposed mining operation be authorized, the following economic development activities will result:

- Job creation
- Development of skills
- Potential for business opportunities
- Establishment of bursaries and scholarships
- Stimulate economic activities in the local vicinity

Employment

The proposed mine development will lead to jobs for 10-20 semi-skilled workers for 2 years of the proposed mine (A mining permit is granted for two years, renewable for another 3 years and cannot extend over 5 ha).



Minnaar Diamond Mine is committed to the socio-economic empowerment of people who were previously disadvantaged and believes that gender equity is critical to economic growth and wealth creation in South Africa. Minnaar Diamond Mine is committed to creating a workplace in which employees of ability and application can develop rewarding careers at all levels, regardless of their background, race, gender or disability. The mine will therefore advance non-discrimination employment practices and supports the principles of employment, development and advancement of HDSA's. This plan is applicable to all employees who are South African citizens or permanent residents.

Participation of Women in Mining

The Source Mineral Group (Pty) Ltd will offer women an equal opportunity to participate in all of its operations, and at all levels of responsibility.

- The 10% target for women in mining will be met through the Employment Equity Plan;
- Female employees will have the opportunity to participate in suitable responsibilities and challenges equal to those afforded to male employees;
- Mentorship programmes will provide equal opportunities for the participation of female candidates;
- The career progression plan will include a women-specific element to ensure that females with potential for progress are considered fully alongside their male counterparts, and are not inadvertently passed over in the promotion process.

Environmental Impact

The impacts on the environment have been evaluated as part of this assessment (basic assessment) of the project. Low to moderate impacts are expected in terms of air quality, noise and visual character. It is the role of the independent environmental practitioner to assess the impact of the development project on the environment, assess the benefit / disadvantage of the project to the people of South Africa and to provide clear mitigation measures and



recommendations under which conditions such a project could be a sound development project in the best interest of South Africa (including the economy, the environment and its people). The environmental impacts and economical gains need to be carefully weighed in order to assess whether the proposed project can contribute to a better South Africa for all.

Rehabilitation Capacity

The project applicant has indicated and demonstrated a willingness and ability to make financial provision for rehabilitation of the project area.

Recommendation

Period for which the environmental authorisation is required is 5 years.

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

The project area falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource. Refer to the Site Plan above. The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.

- The preferred and only location of the sand mining activity is on the earmarked section of the application area- Portion 0 of the farm Minnaar 292 JR
- The preferred and only activity is the mining of sand and diamonds
- The preferred and only technology is the use of a Front End Loader to remove the sand and for trucks to transport the sand to the clients (buyers).

There are therefore no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other



than the mandatory “no-go” alternative that must be assessed for comparison purposes as the environmental baseline.

Siting or Site Selection

The proposed sand and diamond mining operation will be conducted within a non-perennial watercourse (Premiermyntloop stream). However, in the selection of the mining area consideration were made to only conduct mining activities within non-perennial watercourses in order to avoid or disturb water supply to adjacent land owners or agricultural activities. The Premiermyntloop stream which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.

Access Roads

The access criteria considered by the applicant include:

- The dirt road has to be less than 5 km of dirt / un-surfaced road to contend with; and
- There must not be a need for new roads to be constructed for access to the site
- A short access road was preferable, and access to loading sites had to be near an existing road.

Alternatives of Land Ownership

The alternatives considered were:

- Find useable land (a viable mineral resource) owned by another party (entering into a royalty agreement);
- Find useable land (a viable mineral resource) owned by another person and not living on the property for a long time (leasing the land)
- Find a suitable site (a viable mineral resource) on property owned by the applicant.



- During the operational phase of the mine, the landowners are unable to have free access across the property. This could continue for the duration of the permit and is not convenient to landowners.

Alternative considered

- The alternatives considered was to find properties where the applicant is the property owner. In other words, to operate on land owned by the applicant. The applicant intend to acquire or purchase the property- portion 0 of the farm Minnaar 292 JR.

Alternative to Processing

When the applicant was asked to consider processing there were two options for consideration, a large scale expansive mining operation or a small mine with a small footprint. The alternatives that informed the final decision were:

- Do not establish a wash-plant on the site and process the sand off-site.
- Develop a small rotary pan plant for diamond recovery.
- Use a small fleet so that the impact on roads is smaller.

It was ultimately decided to use a small fleet to transport sand to buyers directly and to develop a small rotary pan plant for diamond recovery

No “go” Alternative or No to mine the site

The alternative of not establishing this project was considered by the applicant. There will be no impact on the noise levels and the dust generation will be limited to the land occupiers frequenting the property.

The business would need to look at opportunities to find sand and diamonds elsewhere. Employment opportunities will not be generated on the site. The land would remain fallow and not economically viable (as it is too small for crop farming or commercial animal husbandry. The national assets (in this case, sand and diamonds), that will not be made available for economic benefit to the South African people, will remain on the property. The ecological



services will not be temporarily altered by mining and the social benefits will not be obtained from the creation of 10-20 employment opportunities for 2 years.

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

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

i) Details of the development footprint alternatives considered

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

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

The proposed Minnaar Diamond Mine is located on portion 0 of the farm Minnaar 292 JR. This property falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes.

The property is privately owned and managed by Mr. Eduan Du Plessis. No record of land claims has been made on this property at this stage. The property deed enquiry documents are attached as Annexure B.

Table 3—5: Property Details

Property Name	Property Number	Registration Division	Property Portion	Extent (Hectares)	21-SG Code
Minnaar	292	JR	0	5 Ha	TOJR00000000029200000

Please note: Mining will be limited to portion 0 of the farm Minnaar 292 JR.



The development of support infrastructure and mining activities take into consideration the following measures:

- Infrastructure such as houses (including lodges, fences, electricity pylons, gates) will be avoided;
- No mining activities will take place at horizontal distance of 100 m from any infrastructure or water bodies;
- Any boreholes, sewer pipelines, etc will be marked-off prior to site establishment and avoided during mining operation;
- Existing access roads will be utilized to access the mining area.

(b) The type of activity to be undertaken;

Mining will involve the use of mechanized earth moving equipment (an excavator and front-end loader) to move the unconsolidated material in bulk. The proposed mining area will be less than 5 hectares. Because of the small scale and size of the proposed mining area, no other mining method will be feasible.

(c) The design or layout of the activity

The proposed Minnaar Diamond Mine is located on portion 0 of the farm Minnaar 292 JR. This property falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes.

The layout and technology of this sand and diamond mining project has been determined by the shape, position and orientation of the mineral resource. Refer to the Site Plan above. The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.



- The preferred and only location of the sand mining activity is on the earmarked section of the application area- portion 0 of the farm Minnaar 292 JR.
- The preferred and only activity is the mining of sand and diamonds
- The preferred and only technology is the use of a Front End Loader to remove the sand and for trucks to transport the sand to the clients (buyers).

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

Mining will involve the use of mechanized earth moving equipment (an excavator and front-end loader- truck and shovel) to move the unconsolidated sand material. Due to the small scale of the sand and diamond mining activity other technologies have not been considered as it is not feasible for the small scale of the proposed mine. The topsoil will be removed and stockpiled for rehabilitation and the sand material mined will be stockpiled and sold to the market (building or construction companies and other sand suppliers). In case of diamonds, there are two markets, namely industrial and jewellery;

- In the industrial market the demand is for small size non gem quality diamonds with the lowest price. This is a relatively simple market driven by industrial growth.
- The jewellery market exclusively requires gem quality diamonds. This market is more complex than the industrial market as jewellery is a luxury item. The jewellery market is more prone to instability in times of economic instability, such as the current economic recession that is being experienced globally.

(e) The operational aspects of the activity; and

Operational Phase

- Given the soil profile of the land, the topsoil layer is about 50 mm thick.
- The target diamonds and sand material will be mined in a box cut method to ensure systematic mining in linear progression to allow for practical concurrent rehabilitation. The box cuts will be developed in phases of 20 m x 20 m each to ensure systematic



progression. An excavator will be used to break hard matter and load it into a tipper truck.

- Mined material will be loaded into dump trucks directly from the excavations and hauled to the screening (sieving) plant, where the material will be screened into different mesh sizes and then to the rotary pan plant for diamond recovery.
- The proposed mining operation will employment 10-20 full-time employees
- The Run of Mine (RoM) is estimated at 29 000 tonnes per month
- Material will be screen into the correct mesh size and then loaded into trucks and transported to the market (buyers).
- No industrial or mine waste is generated during the mining process. All material consisting mainly of silica (sand) and diamonds will be removed from the box-cut. No processing is taking place except for limited stockpiling so no mining waste or overburden and Fine Residue Dumps (FRD) will be created.
- The depth of the mining operations will be an average depth of ± 15 metres as only the top layer of sand is mined. The total area under excavation will be approximately 4 ha and sand as well as diamonds will be removed over the total area. Backfilling is not an option as the sand is completely removed.
- Only minor repairs are done on site. A PVC lining and drip trays are used during maintenance and accidental spills are cleaned up immediately by removing of the contaminated sand. The small volume of contaminated sand will be disposed of in a registered hazardous landfill facility such as the Holfontein Hazardous Landfill Site.
- The trucks will transport sand from the site 5 days a week, operating during the week only between 7h30 and 17h00 during normal working hours. No operations will take place over weekends or during the builder's break at year end.
- As part of this phase training of personnel in the implementation of the EMPr will be undertaken and the implementation of the environmental awareness plan as part of the EMPr will be an on-going process.



(f) The option of not implementing the activity.

If the mining permit is not approved, the opportunity to utilize these reserves will be lost as well as valuable economic and socio-economic opportunities. Employment opportunities for 10-20 people will be lost and illegal mining of sand and diamonds may be triggered due to lack of job opportunities.

ii) Details of the Public Participation Process Followed

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

The public participation process (PPP), also known as the Stakeholders Engagement Process (SEP) is a fundamental component of the Environmental Impact Regulation (2014). Not only is public participation a statutory requirement in terms of Section 56 of the NEMA, but a process which is designed to lead a joint effort by interested and affected parties to evaluate all aspects and issues of the proposed development, with the ultimate goal of improving the project by minimizing adverse effects and maximizing the benefits of the project. Public participation is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them to:

- Be acquainted with the proposed mining permit application;
- Raise issues of concern and make suggestions for alternatives and enhanced benefits;
- Contribute local knowledge;
- To obtain stakeholder views and concerns;
- Verify and validate that their issues have been captured and considered in the Basic Assessment Report



Regulation 2(4)f under the principles of NEMA further states that: *the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantage persons must be ensured.*

The following media of communication with interested and affected parties (I & APs) were used:

- A **newspaper advert** was published on the local newspaper “**Streeknuus**”, giving notice to I & APs of the applicant’s intention to prospect the area as well as inviting all affected parties to a meeting where the applicant would provide full details of the project. The Streeknuus Newspaper is distributed in areas including the towns of Bronkhorstspuit, Delmas, Rayton, and Cullinan.
- **Registered letters** were sent via SA Post Office to the following authorities:
 - Department of Water and Sanitation
 - Department of Agriculture and Rural Development
 - City of Tshwane Metropolitan Municipality
 - Gauteng Regional Land Claims Commissioner
 - South African Heritage Resources Agency
 - Eskom
 - Gauteng Department of Roads and Transport
 - Gauteng Department of Economic Development
 - Gauteng Growth and Development Agency
 - Gauteng Tourism Authority



- **Site notices** written in English (A3 sized) were placed in strategic areas such Local Supermarkets, Rayton and Cullinan Community Library and project area- portion 0 of the farm Minnaar 292 JR.
- E-mail and telephonic communication with I & APs;
- **Comment and registration sheet:** I & APs were requested to provide written comments, concerns and inputs that would be consolidated into the BAR;
- **Questionnaires:** Property owners in particular were provided with an environmental aspect questionnaire to complete to assist in identifying features on their respective farms that may require protection or special attention;
- The public meeting with interested and affected parties was held as follows:
Venue: **Cullinan Community Sports Centre, Cullinan**
Date: **08th June 2019 (Saturday)** Time: **11:00 am to 13:00 pm**
- A register of I & APs was kept and as such the following information was distributed to them:
 - Background Information Document (BID). The BID is comprised of the following information:
 - The description of the land concerned;
 - The location of the project;
 - Mining method
 - The minerals applied for;
 - Timeframes for submission of reports to the DMR;
 - Request to target audience to register as I & APs;
 - Contact details of the applicant and EAP
 - The Basic Assessment Report and Environmental Management Plan (BAR & EMPr) for the proposed project was made available for public review and comment from the **24th of May 2019 to the 22nd of June 2019** at the following places:



-Venue: Rayton Community Library, Refilwe Community Library and Cullinan Library

-Online at: www.sakalandtebo.co.za

Other Interested and Affected Parties

It is important that I & APs represent all relevant sectors of the society and various relevant organs of state who work together to make better decisions. A stakeholder database has been compiled for this project. The I & APs currently identified for the proposed project include the following categories (for full list of I & APs refer to **Appendix C**):

- Land owners-Mr. Eduan Du Plessis
- Relevant authority including the following:
 - Department of Water and Sanitation
 - Department of Agriculture and Rural Development
 - City of Tshwane Metropolitan Municipality
 - Gauteng Regional Land Claims Commissioner
 - South African Heritage Resources Agency
 - Eskom
 - Gauteng Department of Roads and Transport
 - Gauteng Department of Economic Development
 - Gauteng Growth and Development Agency
 - Gauteng Tourism Authority



iii) Summary of issues raised by I &APs

This section will be completed after the Stakeholder Consultation process (*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.
Interested and Affected Parties				
Mrs. Getrude Ndindane	08 th June 2019	What measures will be put in place with regard to the impact of noise?	Mandla Masango mentioned that the applicant has made a commitment in the EMPr to regularly service the trucks and other machines as well as to operate only during daylight hours (from 07H00 in the morning up to 18H00).	Minutes of the public participation meeting held on the 08 th June 2019 at the Cullinan Community Sports Centre.
Mrs. Getrude Ndindane	08 th June 2019	What measures will be put in place to mitigate the impact of dust due to the proposed mining activities?	Mandla Masango indicated that dust suppression will be conducted regularly and dust monitoring bucket will be placed within the	Minutes of the public participation meeting held on the 08 th June 2019 at the Cullinan Community Sports Centre.



			vicinity of the site e.g within the radius of 1 to 5 km from the project site.	
Landowners or lawful occupiers on adjacent proper ties				
No comments, suggestions, or issues have been received to date.				
Municipal Councillors				
No comments, suggestions, or issues have been received to date.				
Municipality				
No comments, suggestions, or issues have been received to date.				
Organs of state (Responsible for infrastructure that may be affected Roads Department)				
No comments, suggestions, or issues have been received to date.				
Eskom, Telkom,				
No comments, suggestions, or issues have been received to date.				
Communities				
No comments, suggestions, or issues have been received to date.				
Department of Land Affairs				
No comments, suggestions, or issues have been received to date.				
Traditional Leaders				
No comments, suggestions, or issues have been received to date.				
Department of Environmental Affairs				
No comments, suggestions, or issues have been received to date.				
Other Competent Authorities affected				



No comments, suggestions, or issues have been received to date.				
Other Affected Parties				
No comments, suggestions, or issues have been received to date.				
Interested Parties				
No comments, suggestions, or issues have been received to date.				



iv) The Environmental attributes associated with the alternatives.

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

1) Baseline Environment

a) Type of environment affected by the proposed activity.

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

1.1 Climate

The project area consists of summer rainfall with dry winters. Effectively three seasons, namely a cool dry season from May to mid-August, a hot dry season from mid-August to about October and a hot wet season from about November to April. Mean Annual Precipitation (MAP) is about 678.98 mm. Frost fairly infrequent.

Average daily maximum temperatures are 32°C in January and 22°C in July. Average daily minimum for the area ranges from 18°C in January to 4°C in July, whilst extremes can reach 8°C and -7°C respectively. Mean monthly maximum and minimum temperatures is about 35.3 °C and – 3.1°C for November and June, respectively (Mucina and Rutherford, 2006).

1.2 Regional Climate

The project area falls within the summer rainfall region, which is characterized by thunder storms with occasional hail storms. The rainy season range from about November to April, with peak precipitation in December. About 50 to 80 rain days per year may be expected. The area receives a mean annual rainfall of about 678.98 mm.

1.1.1 Rainfall

Historical rainfall records obtained from the South African Weather Station number A2E013 located at the Roodeplaas Dam (located about 8 km south-east from the project area) was used to compute the mean annual precipitation. The average monthly rainfall is calculated from the



year 1980-2013 (34 years). The vicinity of the project area receives a mean annual precipitation of about 678.98 mm as shown in tabulation below.

Table 3—6: Average monthly rainfall depth (mm)

Month	Mean Monthly Rainfall (mm)
January	136.918
February	87.853
March	90.515
April	36.818
May	16.521
June	8.112
July	2.400
August	4.371
September	17.579
October	68.729
November	92.406
December	116.759
Total	678.98

Maximum recorded storm events are summarized in tabulation below.

Table 3—7: Maximum recorded storm events

Month	1 hour Rainfall (mm)	24 hour Rainfall (mm)
January	47.8	83.5
February	34.4	48
March	34	83.2
April	39.8	68



Month	1 hour Rainfall (mm)	24 hour Rainfall (mm)
May	18.7	37.4
June	6.5	37.2
July	3.1	6
August	7.2	13
September	80.7	31
October	31.2	80.1
November	30.2	80.7
December	39.4	70
Total	372.2	638.1

The figure below shows average rainfall depth (mm) for the proposed project area. The monthly rainfall trend is in line with the seasonal rainfall distribution with the summer months having the highest rainfall intensity (92-37 mm).

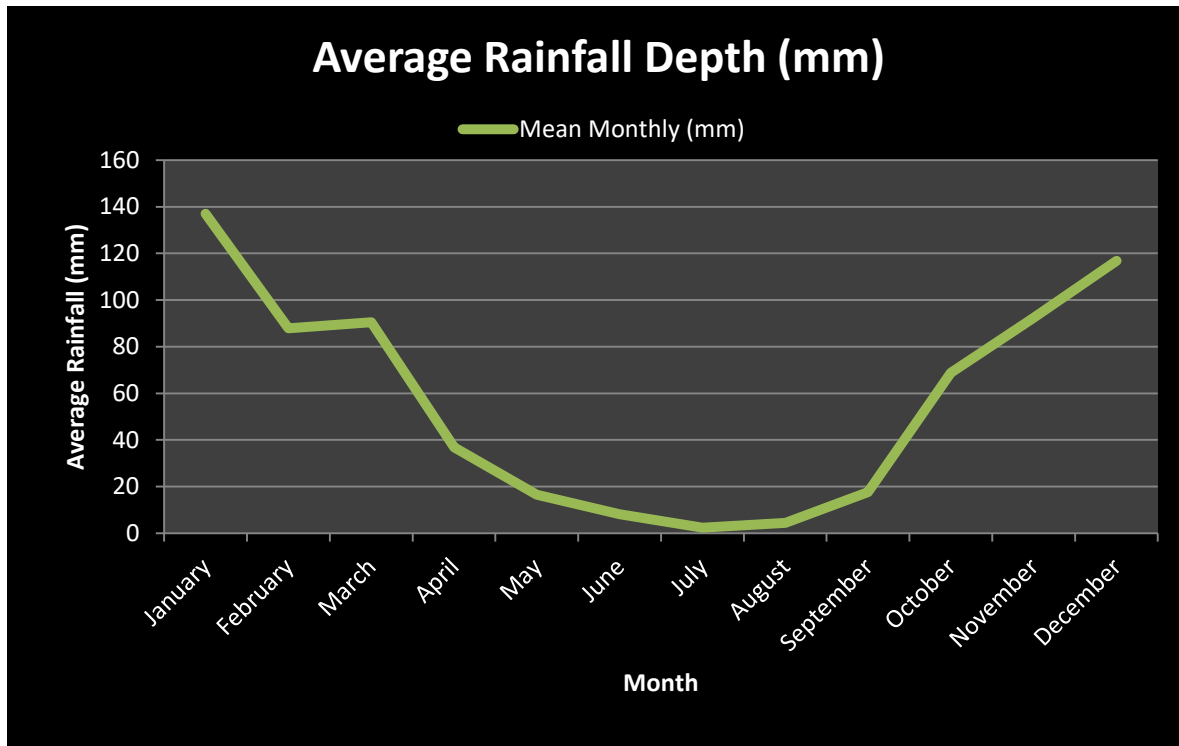


Figure 3-6: Average monthly rainfall depth (mm)

1.2 Evaporation

The mean annual precipitation for Quaternary Catchment A23B (Pienaars River Catchment) is in the range between 1700-1800 mm.

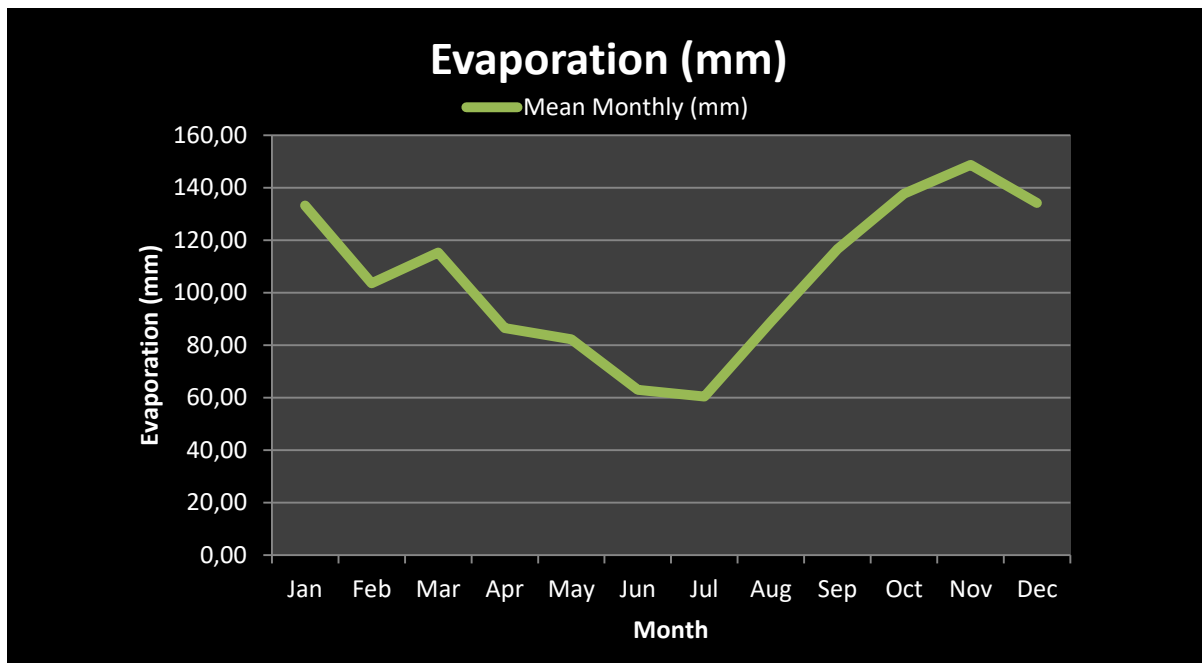


Figure 3-7: Average Monthly Evaporation

1.3 Topography and Geography

The project area lies within ward 99 and 100 of the City of Tshwane Metropolitan Municipality. The project area is located 6 km north-west of Cullinan and 21 km south-west of Pretoria on portion 0 of the farm Minnaar 292 JR in the Gauteng Province. The project site covers an area of about 5 hectares (ha) in extent and lies at geographical coordinates -25.6463000° south and 28.4425000° east. Access to the site is via a gravel road connect to the R573 main road which traverses through the farm Bynespoort 335 JR. The project area falls under City of Tshwane Metropolitan Municipality.

The project area falls within Quaternary Catchment A23B (Pienaars River Catchment) of the Crocodile (West) and Marico water management area (WMA).

The immediate surrounding environment includes the town of Cullinan itself, its suburbs, Refilwe Township, Rayton, plots and agricultural holdings. Cullinan is synonymous with the



discovery of what was once the world's largest diamond (crown diamond) that was discovered on the farm Elandsfontein where diamonds are still being mined at Cullinan Mine.

The highest altitude is about 1528 m above mean sea level (amsl), whilst the lowest is in the range between 1340-1399.2 m amsl.

Further afield to the north-east is the Ekandustria (in Ekangala), an industrial precinct characterized by a relatively high concentration light industry flanked mainly by farming activities. The industrial activities have an impact on the catchment in the Cullinan area.



Figure 3-8: Access Road to the Project Area

1.4 Wind

The study areas experience consistent pattern of wind mainly from the NW to N during Summer and SSW during Autumn and Winter. Strong winds are normally experienced during August and September from NNW.



1.5 Land Uses

1.5.1 Regional Land Uses

The whole Cullinan District comprises of the following land uses: agriculture, mining, industrial, recreational, eco-tourism, nature reserves, conservancies, game farms, open spaces, and settlements. Most prominent of these are conservancies and agricultural lands with ownership largely being private.

Natural: There are a number of environmentally sensitive areas ranging from highly sensitive areas, such as ridges, dams, watercourses, grasslands and wetlands, to non-sensitive areas which have been impacted on by agricultural activity and human settlement amongst others. In most areas the environmentally sensitive areas are being highly impacted and are currently are not statutorily protected.

Agriculture: Extensive farming and subsistence activities exist alongside each other as the area consists of both small holdings as well as large farms. Agricultural activities include the production of maize, sorghum, beans, vegetables, lucerne, kikuyu (lawn grass), and fodder. Borehole water is mainly used to irrigate these crops. Animal husbandry is also prominent in this area. Other farm produce from this area includes beef, milk and processed dairy products, e.g. cheese, processed ostrich products such as sausage and salami, pecan nuts, protea cut flowers for the export market, soft fruit and vegetables.

Industrial: The principal mining activity is carried out by Petra Diamonds on the old Cullinan Mine where diamonds are extracted from a kimberlite pipe. Other industries include steel production and light industrial activities. In the Dinokeng area, diamonds, lead, fluorspar, clay and sand has been mined and sand and aggregate mines still operate widely. A number of lead mines existed, but none are in operation at present.



Urban/rural ratio: Approximately 95% of the region is rural and the land is utilized for agricultural, mining and industrial activities. The urban areas are strictly confined to the town centers.

Recreational and Conservation: The surrounding environment is known for its rich history, biodiversity and sensitive environments. There are several recreational and tourist attractions around the vicinity of Cullinan in the “Dinokeng complex”. The landowners have organized themselves into conservancies that aim to protect the environment from loss of biodiversity and subsequent degradation by haphazard development.

Portion 0 of the farm Minnaar 292 JR

The project area is largely comprised of open spaces which are currently not utilized for any land use. The Premiermynloop stream (non-perennial) which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.

1.6 Biodiversity

1.6.1 Grassland Biome

Approximately 72% of the province falls under the Grassland Biome (SOER, 2009). The grasslands in the north-western and north-eastern areas of the province are identified as priority conservation areas in the National Biodiversity Strategy and Action Plan (2005). The Grassland Biome covers primarily the high central plateau of South Africa. Its levels of biodiversity are only second to that of the Cape Floristic Region. It includes approximately 3 370 plant species of which one in six is grass. The remainder includes bulbous plants such as Arum Lilies, Orchids, Red-Hot Pokers, Aloes, Watsonias, Galdioli and Ground Orchids. Grasslands (also known locally as Grassveld) are dominated by a single layer of grass. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized



habitats. Geophytes (bulbs) are often abundant. Frost, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The proposed project area falls within the Marikana Thornveld, the Rand Highveld Grassland, and the least threatened Gold Reef Mountain Bushveld.

1.6.1 Flora

The application area includes a number of sensitive geographic areas including threatened vegetation types, namely, the Marikana Thornveld, the Rand Highveld Grassland, and the least threatened Gold Reef Mountain Bushveld.

The National Environmental Management Act: Biodiversity Act (NEMBA) makes provision for a list of threatened ecosystems and activities or processes/activities described as threatening. Marikana Thornveld and Rand Highveld Grassland are listed as vulnerable ecosystems in terms of the NEMBA, and prospecting or mining for minerals has also been listed as a threatening activity/process. As such, any prospecting or mining activity within these vegetation types needs to comply with the requirements of the NEMBA.

Class 1 and Class 2 ridges

The Gauteng Department of Agriculture and Rural Development (GDARD) have developed draft guidelines with respect to Ridges within the Gauteng Province due to the rich biodiversity supported by this geological feature. Ridges. They are characterized by a unique plant species composition that is found nowhere else in South Africa or the world (Bredenkamp & Brown, 1998), and should be regarded as one of the most important natural assets in the entire region of the northern provinces of South Africa (Policy on ridges). The policy calls for a full Scoping and EIA as per the NEMA for any developments which occur on Class 1, 2 and 3 Ridges. While the Draft policy on Ridges has not yet been formally adopted, it is strongly recommended, considering the sensitivity of these landscape features, that in the event of the Mining Permit being granted, no access or impact whatsoever is allowed on ridges.



The application area is located on three main vegetation types, namely, Marikana Thornveld, Gold Reef Mountain Bushveld, and the Rand Highveld Grassland (Mucina & Rutherford, 2006). A brief description of these vegetation types are provided below:

Marikana Thornveld

Marikana Thornveld is open Acacia karroo woodland occurring in valleys and slightly undulating plains and lowland hills. Scrubs are denser along drainage lines, on termitaria and rocky outcrops. The conservation target is 19%. Less than 1% is conserved in statutory reserves such as Magaliesberg Nature Area.

The unit is considered impacted, with 48% transformed, mainly by urbanization and cultivation. Towards the east industrial development is the greater threat. The Marikana Thornveld vegetation unit falls within a summer-rainfall region with very dry winters and frequent winter frosts. The conservation status of this vegetation unit is Vulnerable in terms of the NEMBA. Note however that Mucina & Rutherford (2006) have categorised this vegetation type as Endangered, illustrating the sensitivity of this vegetation type.

Rand Highveld Grassland

This vegetation unit is described as high variable, with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains (Mucina & Rutherford, 2006). The vegetation is species rich, consisting of wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes (Mucina & Rutherford, 2006). The conservation status of this vegetation unit is Vulnerable in terms of the NEMBA. Note however that Mucina & Rutherford (2006) have categorized this vegetation type as Endangered, illustrating the sensitivity of this vegetation type.

Gold Reef Mountain Bushveld

The Gold Reef Mountain Bushveld occurs mostly on rocky hills and ridges that are often west-east facing slopes. It occurs along a thin band of east-west running quartzite ridges. The tree



and shrub layers are typically continuous with a herbaceous layer dominated by grasses. The endemic succulent shrub *Aloe peglera* and the succulent herb *Frithia pulchra* are represented in this vegetation type. Some of the representative tree species include: *Cathium gilfilani*, *Mystroxyton aethiopicum*, *Acacia caffra*, and *Protea caffra*. The herbs include the *Helichrysum nudifolium*, *Pellaea calomelanos*, and *Senecio venosus* (Mucina and Rutherford, 2006).

Conservation Status:

This vegetation type is listed as **Least threatened** with approximately 22 % of the 24 % conservation target conserved in nature reserves such as Wonderboom and Suikerbosrand Nature Reserves in the Gauteng Province.

Protected Tree Species

In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Agriculture (now Department of Agriculture, Forestry and Fisheries) developed a list of protected tree species. In terms of Section 15 (1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. No protected tree species or indigenous tree species were observed or occur on the proposed site.



Table 3—8: List of Red Data Species that could possibly occur in the larger Cullinan area

Genus	Species	Family	National Status	Comments
<i>Alepidea</i>	<i>attenuata</i>	APIACEAE	NT	Habitat not suitable
<i>Aloe</i>	<i>cooperi</i> subsp <i>cooperi</i>	ASPHODELACEAE	Declining	Habitat not suitable
<i>Aloe</i>	<i>integra</i>	ASPHODELACEAE	VU	Habitat not suitable
<i>Aloe</i>	<i>kniphofioides</i>	ASPHODELACEAE	VU	Habitat not suitable
<i>Boophone</i>	<i>disticha</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Brachystelma</i>	<i>villosum</i>	APOCYNACEAE	Rare	Habitat not suitable
<i>Crinum</i>	<i>bulbispermum</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Crinum</i>	<i>stuhmannii</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Gnidia</i>	<i>variabilis</i>	THYMELAEACEAE	VU	Habitat not suitable
<i>Haworthia</i>	<i>koelmaniorum</i> var <i>mcmurtryi</i>	ASPHODELACEAE	EN	Habitat not suitable
<i>Lotononis</i>	<i>difformis</i>	FABACEAE	VU	Habitat not suitable
<i>Miraglossum</i>	<i>davyi</i>	APOCYNACEAE	VU	Habitat not suitable
<i>Pachycarpus</i>	<i>suaveolens</i>	APOCYNACEAE	VU	Habitat not suitable
<i>Senecio</i>	<i>eminens</i>	ASTERACEAE	DD	Habitat not suitable
<i>Trachyandra</i>	<i>erythrorrhiza</i>	ASPHODELACEAE	NT	Habitat not suitable

1.3.2 Red Data Flora Information

Below is a list of species which may occur within the study area, with a greater than ‘Near Threatened’ rating (SANBI). The following floral species with a higher than ‘Near Threatened’ rating that may occur within the study area:

- Amaryllidaceae (*Crinum moorei* or Ngomi lily)
- Begoniaceae (*Begonia dregei* or wild begonia)
- Ericaceae (*Erica baueri* subsp. *baueri* or Albertinia white heath)
- Hyacinthaceae (*Bowiea volubilis* subsp. *volubilis* or Zulu potato)
- (Proteaceae (*Diastella divaricata* subsp. *montana* or Mountain Silky puff)
- Proteaceae (*Leucadendron chamelaea* or Glutinous Protea)
- Proteaceae (*Leucadendron corymbosum* or Brunia-leaf Protea)
- Proteaceae (*Leucospermum catherinae* or Catherine's Pincushion)



- Proteaceae (*Leucospermum saxosum* or Escarpment Pincushion)
- Zamiaceae (*Encephalartos dolomiticus* or Wolkberg cycad)
- Zamiaceae (*Encephalartos dyerianus* or Lowveld cycad)
- Zamiaceae (*Encephalartos senticosus* or Lebombo cycad)

Local Conservancies have also been involved in establishing the existence of the above-listed species in their areas. Refer to Appendix 1 for a comprehensive list.

The Cullinan Conservancy records as rare and vulnerable the flower *Ceropegia decidua* subsp. *Pretoriensis*

Rare plant species such as *Frithia humilis* and *Combretum moggii* have been observed in the Tweedespruit Conservancy.

1.3.4 Fauna

There are a number of common wild animals such as springbok, blesbok, waterbuck, etc. in the nature reserves. Baboons and monkeys also roam the woodlands where wild fruits are abundant.

A search was made on the South African National Biodiversity Institute (SANBI) database for threatened species within the quarter degree of the application area. The following list of species identified which may occur within the application area study area with a greater than 'Near Threatened' rating:

- Ranidae (*Pyxicephalus adspersus* or Giant Bullfrog)
- Ciconiidae (*Ciconia nigra* or Black Stork)
- Falconidae (*Falco naumanni* or Lesser Kestrel)
- Falconidae (*Falco peregrinus* or Peregrine Falcon)
- Gruidae (*Anthropoides paradiseus* or Blue Crane)
- Gruidae (*Bugeranus carunculatus* or Wattled Crane)



- Otididae (*Eupodotis senegalensis* or White bellied Korhaan)
- Rallidae (*Crex crex* or Corn Crane)
- Tytonidae (*Tyto capensis* or Grass Owl)
- Accipitridae (*Aquila rapax* or Tawny Eagle)
- Accipitridae (*Circus ranivorus* or African Marsh Harrier)
- Accipitridae (*Gyps africanus* or White backed Vulture)
- Accipitridae (*Polemaetus bellicosus* or Martial Eagle)

These species should be regarded as sensitive and disturbance of such species should be avoided. It is understood that there may be other sensitive species (specifically mammals, amphibians and reptiles), which are not specifically identified in the SANBI database, which may occur on site.

Once again locals have done a great deal of work in recording species of fauna in their respective areas of concern. It is recorded that in the Tweedespruit Conservancy alone the following were observed and can be found, amongst others, large numbers of avian (265 species), mammalian (37 species), amphibian, reptilian and invertebrate species. In the Elands River 9 of Gauteng's original 14 endemic fish species still occur in the conservancy.

1.3.4.1 Birds

A large number of birds have been observed by watchers who have over the years assisted Birds Societies (such as the Pretoria Bird Club) in the compilation of lists of birds. The area is habitat to the following birds:

Waterfowl (African Finfoot), African Fish Eagle, Whitebacked Duck Knobbilled Duck, Halfcollared Kingfisher, and Osprey around water features; Tinkling Cisticola; Greencapped Eremomela; Pallid Flycatcher; Bushveld Pipit; Striped Pipit; Buffy Pipit; Lizard Buzzard on telephone posts; Cuckoo Hawk; Pied Babbler; Barred Warbler; Great Sparrow; Gabar Goshawk; Great Crested Grebe; Whitewinged Terns; Purple Gallinule; Black Crane; Thickbilled Weaver and



several duck species, warblers; prinias; weavers; Whitethroated Robins and other robins; Lazy Cisticolas, Striped Pipits; Cape Rock Thrush and Shorttoed Rock Thrush along rocky ridges; Brown Snake Eagle; Lazy Cisticola; Tinkling Cisticola, especially two species of eremomela in broadleaved woodland; Striped Kingfishers; Pallid Flycatcher; Purple Roller; Redthroated Wryneck; Fawncoloured Lark; Rufousnaped Lark; Sabota Lark; Flappet Lark; Melodious Lark; Coqui Francolin and buttonquail also on the roadsides; Pearlbreasted Swallows and various bee-eaters; grassland species such as Longtailed Widow and other grassland species; Secretarybird; Mocking Chat; Green Pigeon, Klaas's Cuckoo, Striped Pipit, Barthroated Apalis; Whitebacked Duck and Knobbilled Duck around water pans, African Jacana, African Rail and Redchested Flufftail in wataer features; and Cliff Swallows may be found in the rocky ridge areas.

1.12 General Hydrogeology

Pretoria Group

The quartzite members, if fractured, offers a viable potential for groundwater development. The shale members are not considered viable as aquifer units due to the presence of swelling clays and poor water quality. The absolute potential will depend on the presence of secondary alteration and fracturing.

Rooiberg Group

There is no aquifer potential for quartzite and lavas in the primary state. Deep seated weathering and fracturing may increase the aquifer potential, thus zones of weathering and fracturing will act as targets for groundwater in lava.

Bushveld Complex

The aquifer potential of igneous rock in the primary state is very poor, however in areas of deep weathering the aquifer potential is likely to increase. Due to intrusions the rocks are shattered and fissured which accelerates the process of decomposition. In these areas the potential is good for aquifer development. Where the basic rocks are banded, weathering has generally



been more rapid with borehole being more successful. Weathering proceeds further in the basic rocks than the acid granites.

In the latter, the weathered and fissured zones have been found to be the best target for groundwater. Recent intrusions, contacts with the basic rocks, major joints, faults lines and absorption zones close to sedimentary strata are also useful targets. Most of the boreholes in this geology have high yielding boreholes, but the percentage of failure is also high, indicating the difficulties involved in selecting suitable sites. The granophyres weathers into soft material close to fault zones where subsequent movement has taken place, the most likely sites for boreholes are to be found in these faulted zones.

Waterberg Group

The Waterberg sandstones have a medium porosity and have not suffered the same degree of alteration as the older rocks. The yields of boreholes drilled into this formation are not very high. The average yield subsequently increases in areas with a higher precipitation. The presence of diabase dykes and sills are known to improve the yield in general.

1.13 Geology

The characteristics inherent in diamonds which include its hardness and resistance to wear, its reflective index of (2.42 to 2.43) its dispersive powers (violet: 2.465 and red 2.407), which result in a remarkable brilliance and play of prismatic colours (fire) when the stone is properly faceted. Turning a stone into a gem only through the cutting and polishing by skilled professional craftsmen has made the diamond the pre-eminence gemstone in Jewellery. Once polished the value of a gem diamond is dependent on Colour, Clarity, Cut and Carat weight (the four C's). Diamonds have been prized due to their rarity, exceptional brilliance and lustre.

A diamond is a naturally occurring mineral on earth formed at high temperature and pressures, at depths exceeding 150 km below the earth's surface and are brought to surface through



violent igneous eruptions arising from the earth's mantle known as Kimberlites. It is a naturally occurring isometric mineral of carbon which has crystallised into a face-centred cubic crystal structure, consisting of tetrahedrally bonded carbon atoms.

Diamonds can be classified as either primary, alluvial or marine. They have been known to occur in variety of rocks, including high-pressure metamorphic rocks, alpine-type peridotites and meteorites. However to date the only known economically significant primary sources of diamonds are Kimberlites and lamproite. No examples of significantly diamondiferous lamproites are known in South Africa. The main primary sources of diamonds in South Africa are Kimberlites and they occur as pipes or dykes. The largest producer of diamond in lamproites, is the Argyle pipe in north-western Australia.

A Kimberlite has been classified by Clement et al (1984) as a volatile rich, potassic, ultrabasic igneous rock which occurs as small volcanic pipes, dykes and sills. It is described by a equianagular/porphyritic texture composed of olivine in association with some phlogopite, calcite, serpentine, diopside, monticellite, apatite, perovskite, and ilmenite and commonly contains well-rounded fragments of upper-mantle-derived ultramafic rocks, such as peridotite and eclogite and xenocrysts such as pyrope, garnet, micro-ilmenite, chromian, spinel and chrome diopside. Therefore in Kimberlites, diamonds often occur as a rare constituent.

Kimberlites are classes in two types, Group I (olivine rich, monticellite-serpentine-calcite Kimberlite/basaltic Kimberlites) and the Group II (micaceous Kimberlites/micaceous lamprophyric Kimberlites). Smith (1983a) determined that these groups are derived from sources of the earth's mantle which are slightly depleted (Group I) or enriched (Group II) with respect to light rare earth elements. According to Clifford's Rule (Janse, 1991), the occurrence of Kimberlites is associated with regions of the Archean Craton (regions of continental crust older than 2.5 billion years) and in South Africa this refers to the Limpopo, Northwest, Mpumalanga, Free-State Gauteng and Northern Cape Provinces. All these areas are related to



the diamondiferous Kimberlites of South Africa. Kimberlites formed away from the craton do not sample the diamond window and thus are not likely to be diamondiferous.

In South Africa, the Limpopo Province has been the most important producer of diamonds, followed by the Northern Cape, Gauteng, Free-state and Northwest Provinces. The Western Cape is a minor producer, with the west-coast alluvial and marine deposits extending into the north-western corner of the province. In the Gauteng province, the Cullinan Kimberlite (previously named Premier) has been the most significant deposit in cluster of 12 Group I Kimberlites which includes the National, Schuller, Montrose and Franspoort pipes associated with it. Also in association with the Kimberlite is the occurrence of some minor alluvial deposits in and around the Cullinan area.

The Cullinan Kimberlite is the largest known Kimberlite in South Africa at 32 hectares and is the producer of the largest gem diamond (Cullinan diamond) ever recovered, which weighed 3106 carats. The Cullinan mine is situated on the farm Elandsfontein 480 JR in the Cullinan area, some 25 kilometres east-northeast of Pretoria. The Cullinan Kimberlite intrudes the rocks of the Transvaal Supergroup (Pretoria and Rooiberg), Bushveld and the younger Waterberg Group of the greater Karoo Supergroup. Large rafts of the Waterberg Quartzite and Conglomerates occur within the Cullinan Kimberlite pipe, and although there is no longer any evidence of these quartzite exposed around the pipe, these provided evidence of the intrusion of the pipe into the Waterberg some 1200 Ma ago, making the oldest viable Kimberlite in the world.

In association with the Cullinan Kimberlites is the cluster of smaller pipes being the Schuller, Annexe and National Kimberlite, situated towards the eastern margin of the farm Rietfontein 388 JR, about 4 kilometres south of Rayton in the Cullinan District. The pipes were discovered in 1897 and are said to measure 1.12; 0.15; and 0.47 hectares with reported grades of about 10.0; 0.5 and 2.0 cpht (curats per ton). The Lenna/Schuller mine operated between 1898 and 1926 until it was forced to close due to low commodity prices, and is reported to have produced



approximately 32.59 carats from 179 210 tons of Kimberlite ore. Three additional Kimberlites known as the Montrose Pipes are located on the farm Elandsfontein 337 JR, about 5 Kilometres south of Cullinan. The Montrose No.3 pipe was once investigated by the company “Global Diamond Resources Inc”, for feasibility for mining. The deposit is said to possess a surface area of about 4.25 hectares and is said to be highly weathered. A small pipe measuring 0.4 hectares occurs on the farm Franspoort 332 JR, located about 3 kilometres east of Mamelodi. The pipe has been mined to shallow levels in the past but has been reported to have been sterilized by spread of urban development.

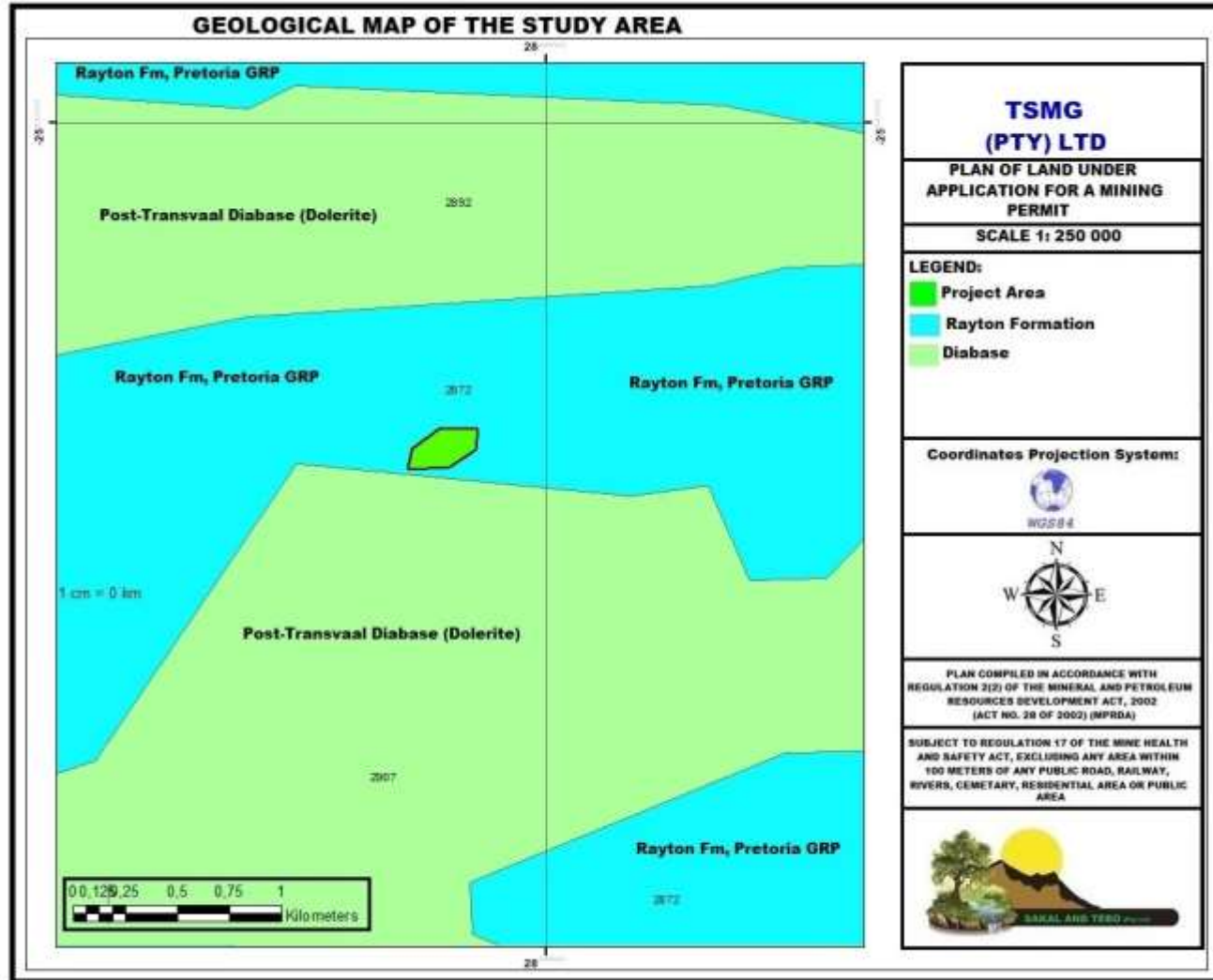


Figure 3-9: Geological Map of the Study Area



1.14 Crocodile (West) and Marico Water Management Area

The farm Beynespoort 335 JR falls with Quaternary Catchment A23B (Pienaars River Catchment) of the Crocodile (West) and Marico water management area (WMA). The Crocodile (West) and Marico Water Management Area lies primarily within the North West Province with parts of it in the northern region of Gauteng and the south-western periphery of the Limpopo Province. The Crocodile and Marico rivers are the two main rivers in this WMA, which at their confluence forms the Limpopo River that flows eastwards to the Indian Ocean. The CM-WMA comprises of Sub-WMA's, that is, the Lower Crocodile, Apies/Pienaars, Elands, Upper Crocodile, Upper Molopo, and Marico. The Mining Permit application area is located within the Apies/Pienaars Sub-WMA.

More than half of the total water use in the CM-WMA comprises urban, industrial and mining use, approximately a third is used by irrigation and the remainder of the water requirements is for rural water supplies and power generation.

In order to meet the current demand, much of the water in the WMA is being imported mainly from the Vaal River system for domestic and industrial use purposes. Rand Water, which is the largest water board in South Africa, together with Magalies Water and Botshelo Water (the North West Water Supply Authority), are the three water boards that supply water in this WMA.

The natural mean annual runoff (MAR) of the down the Crocodile River, while the Marico catchment contributes 20 % and the Upper Crocodile (West) Marico WMA is 855 million m³/yr. Approximately 75 % of the total surface runoff from the WMA flows Molopo catchment 5 %.

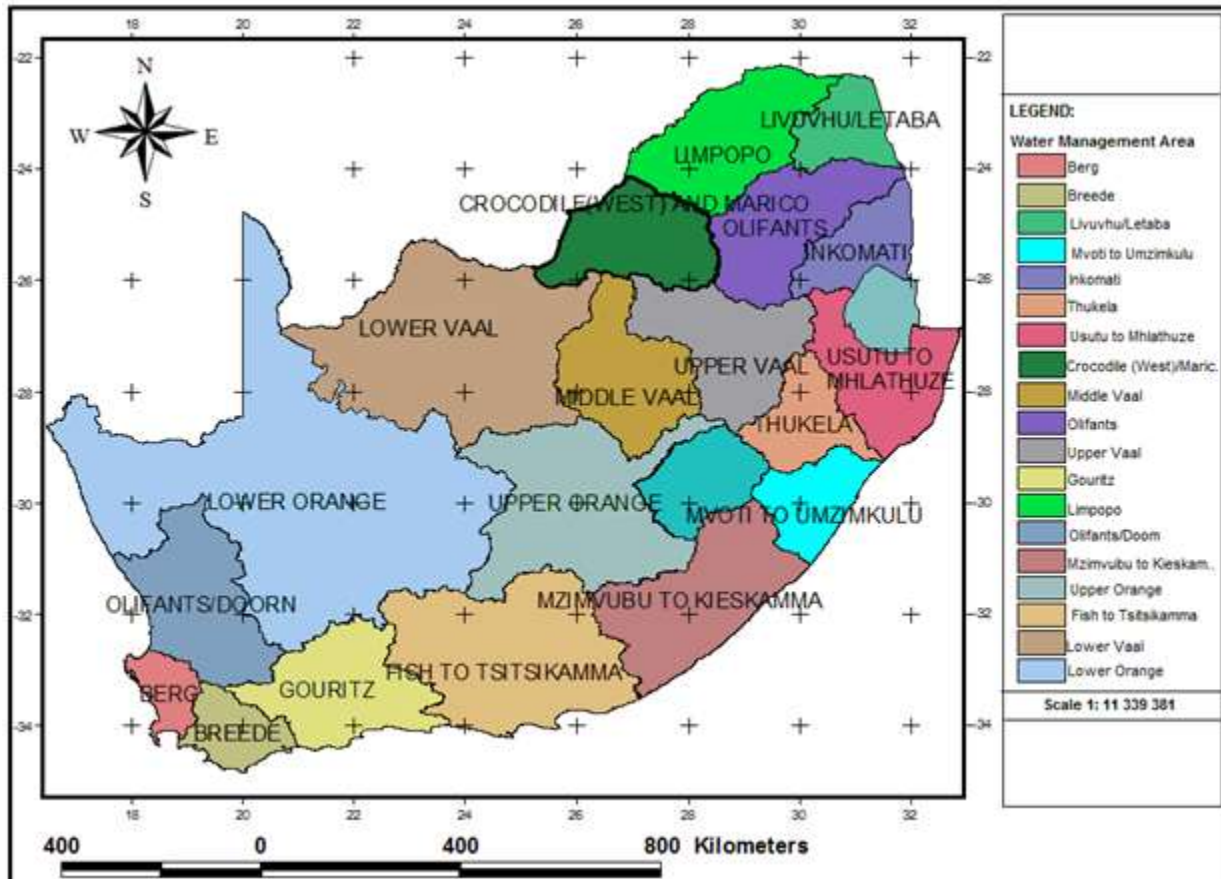


Figure 3-10: Crocodile (West) and Marico WMA Locality Map

1.15 Air Quality

Potential sources of dust may be caused by moving vehicles and earthworks during drilling. Dust could also emanate from mining activities on the adjoining area. Parts of the region suffer from poor air quality and elevated concentrations of 'criteria pollutants' due to concentration of industrial activities.

Major industrial air emissions sources impacting on the application area can be grouped into these categories:

- metallurgical operations (including Brick Manufacturers)
- Other Industrial Sources

Smaller air emissions sources categories include:



- Motor vehicles
- Biomass burning (wood fires)
- sand mining and cross-boundary transport of pollutants

Effects of poor air dispersion conditions in winter are more evident in this area.

1.16 Sites of archaeological and cultural interest

Site Specific Description

No sites of archaeological or cultural interest were identified on site during a site reconnaissance visit. Property owners will be provided with a registration and comment sheet in order to raise or highlight cultural or archaeological features that may be occurring on site. The project area is comprised of open-spaces. As a matter of precaution, should any further information confirm existence of such sites, steps will be taken to put measures in place for preservation thereof in line with the National Heritage Resources Act, 1999 (Act No. 25 of 1999). The South African Heritage Resources Agency (SAHRA) will also be notified of such findings.

Regional Description

According to the Dinokeng EMF there are about 22 cultural and heritage sites within Nokeng Tsa Taemane (Tshwane Metropolitan Municipality).

Cemeteries

The Dinokeng area has numerous small farm cemeteries yards of which most are neglected, as family farms have been sold. On these farms there are also cemeteries of black farm workers. In many cases no one knows who is buried where. Ancestral cemeteries occur on almost every farm. Some of the cemeteries are still visited while many have been forgotten. Most of these cemeteries sites are those of farm workers who used to live and work on the farms, for example on **Elandshoek 337 JR which is located south-east from the farm Minnaar 292 JR.**



Another Second World War cemetery is situated in Cullinan, where South African soldiers have been buried. This cemetery forms part of the town cemetery.

McHardy House Museum

This museum is situated in Cullinan and is one of the oldest houses in town. The house is fully furnished, with furniture of the beginning of the 20th century.

Zonderwater Museum

This museum is situated in the cemetery for Italian Prisoners of War at Zonderwater, approximately 10 km south-east from the project area.

Willem Prinsloo Agricultural Museum (Kaalfontein 513 JR)

This museum is a satellite of the Northern Flagship Institution, which manages a number of National Museums. In the past the museum also had the largest collection of examples of early domesticated animals of Africa. These included the Namakwa fat-tailed sheep, which are listed on the red data inventory for endangered domesticated animals.

Stone Age sites

Though early Stone Age implements are found throughout the region in riverbeds and eroded areas, the only important site known is on the farm **Kaalfontein 513 JR** near the Willem Prinsloo Agricultural Museum.

The farm Tweedespruit 418 JR is cited amongst some of the farms that should yield good information on the Later Stone Age. This site is located approximately 15 km north-east from the proposed mining area.

At present, no stratified, sealed site dating to the Stone Age is known for the study area. However, it is quite feasible that it would exist in the area, and that detailed surveys would reveal such sites. Similarly, no sites containing rock art are known from the region. The existence of numerous Ndebele sites found in many parts of Dinokeng lead to this assumption.



Concentration Camps

During the Anglo-Boer War, just east of Pienaarspoort at Van der Merwe station on the farm Elandshoek 337 JR as well as at Elands River on the farm Kaalfontein concentration camps were erected for black farm workers where a total 116 000 black women and children died.

Sacred Water

The source of the Elands River is on the farm Kaalfontein 513 JR. Unfortunately the site is divided by the N4 and the R104. The Ndebele (Manala) see this site as a sacred place, which is mentioned in their chief's praise songs. The Elands River is known as Ndubijana and water is collected from this source for royal ceremonies.

Seltzbach Springs

The Seltzbach Springs are near the Van der Merwe station. Mr D.S van der Merwe after whom the station had a grocery store and later also a bottle store, where he sold his famous mineral water, called Seltzbach mineral water. This fountain is still today one of the sources of the Pienaarspoort loop, utilised by the Zionist Church for baptising. This bottling plant for the mineral water of Seltzbach was most probably the first industrial development in the Dinokeng area. The spring is situated on the farm Elandshoek 337 JR.

Italian Military Cemetery (Cullinan Heritage Society)

Located just outside Cullinan, about 264 WW2 POW's were buried in the Italian military cemetery just outside Cullinan. Throughout the years the descendants of the many Italian POW's have been making an annual pilgrimage to the Italian War Cemetery.

Diamond Hill Battlefield

Although the site is located 20 km south-east of the site (portion 0 of the farm Minnaar 292 JR) on the farm Kleinfontein 368 JR, it is worth mentioning. The Battle of Diamond Hill or Donkerhoek is a site of remembrance associated with the Anglo-Boer War where troops died.



In 1960 and 1963, troops and fighters from other remote cemeteries were reburied at the Diamond Hill Garden of Remembrance.

The Cullinan Railway Line

The railway line was constructed to create and shortest route from the Pretoria – Witbank – Delagoa Bay (Lourenco Marques, now Maputo) line to the Cullinan mining site

1.17 Surface Hydrology

The farm Minnaar 292 JR falls within Quaternary Catchment A23B (Pienaars River Catchment) of the Crocodile (West) and Marico water management area (WMA). The catchment is bordered on the north by A23C (Pienaars River Catchment) Quaternary Catchment, on the north-eastern boundary by the Elands River Catchment (B31C), to the east by the Klipspruit Catchment (B31B), on the southern-east border by Masokololo River Catchment (B31A), to the south by the Edendalspruit and Moretele River Catchment (A23A), on the west and south-western parts by the Apies River Catchment (A23E), and lastly on the north-western border by the Stinkwaterspruit Catchment (A23F). The A23B catchment covers an aerial extent of approximately 814.100 km².

The Pienaars River, Boekenhoutspruit, Roodeplaatspruit and the Premiermyntloop stream are the most important watercourse in the A23B catchment. The Premiermyntloop stream (non-perennial) which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.. The Premiermyntloop stream has been largely modified due to the development of attenuations dams (farm dams) for agricultural purposes. The Cullinan Dam is located approximately 5 km east of the project area.



(b) Description of the current land uses.

Based on the site reconnaissance visit conducted on the **20th of May 2019**, the project area is largely comprised of open spaces which are currently not utilized for any land use. The project area is largely eroded due to its geological nature. The Premiermyloop stream (non-perennial) which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.



Figure 3-11: Portion 0 of the farm Minnaar 292 JR



Figure 3-12: Portion 0 of the farm Minnaar 292 JR



Figure 3-13: Portion 0 of the farm Minnaar 292 JR



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

Portion 0 of the farm Minnaar 292 JR

The project area is largely comprised of open spaces which are currently not utilized for any land use. The Premiermynloop stream (non-perennial) which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.



(d) Environmental and current land use map.
 (Show all environmental, and current land use features)

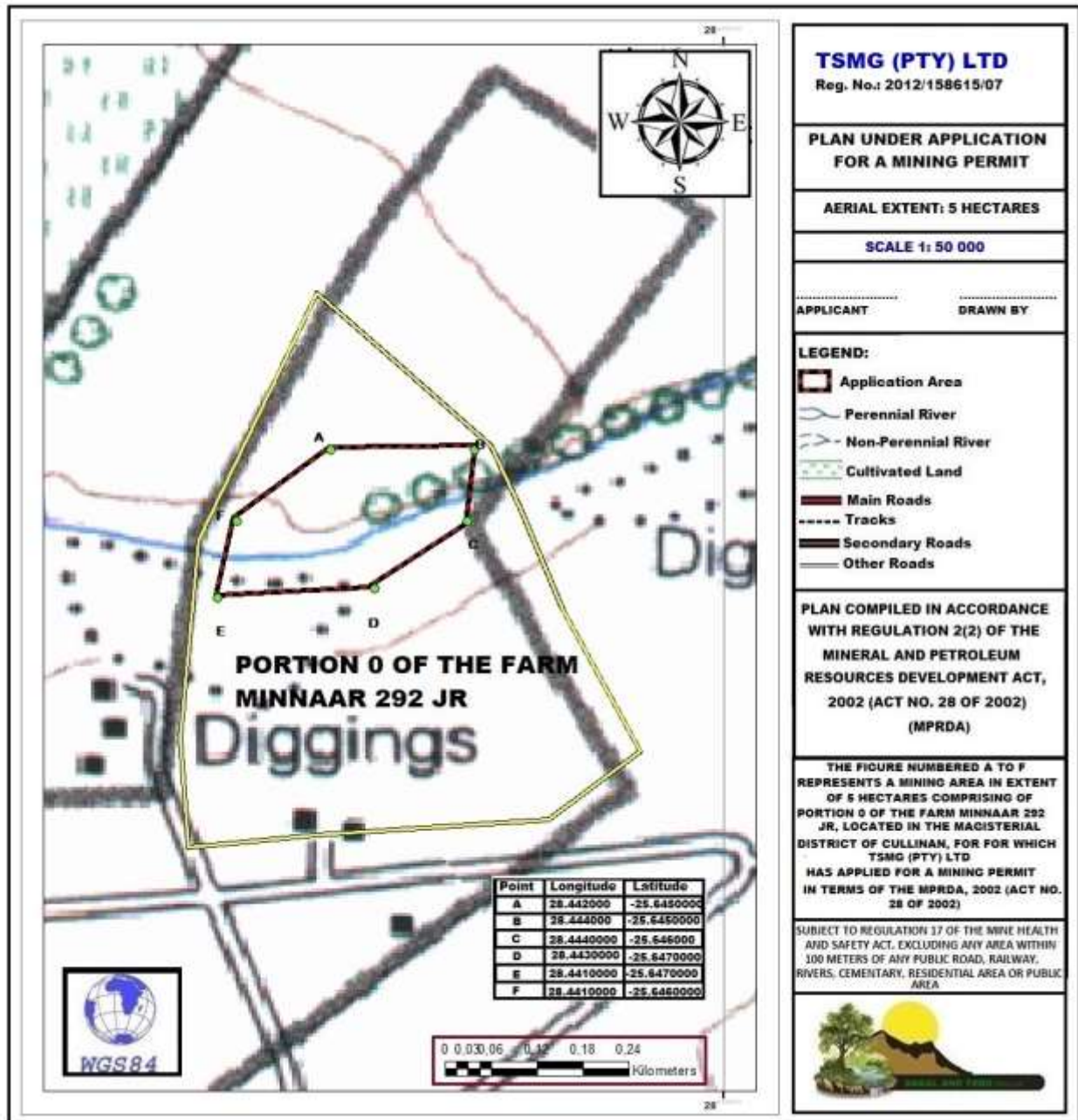


Figure 3-14: Land Use Map of the Project Area



v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impact.

(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).

The potential environmental and social impacts include:

- Noise caused by the trucks, excavators and other mine vehicles during mining activities;
- Dust generated by the mining operation and vehicles travelling gravel roads;
- Disturbance of soil from box-cut preparation and compaction;
- Disturbance of flora and fauna
- Disturbance or damage to cultural and heritage resources such as graves or historical features;
- Potential contamination of soil, surface water and groundwater with hydrocarbons (oil, diesel, grease, etc);
- Friction between local residents/landowners and the mine;
- Altering drainage patterns

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

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

Please refer to Impact Assessment Methodology described below in Section I.



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

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

Table 3—9: List of Potential Impacts

Activity	Phase	Potential impacts (unmitigated)
Site preparation Bush clearing, removal of infrastructure, establishing construction area	Construction Operation Decommissioning	Physical destruction and disturbance of biodiversity Air pollution Disturbing noise Visual impacts
Earthworks (for all infrastructure)	Construction Operation Decommissioning	Hazardous excavations Loss of soil resources and land capability Physical destruction and disturbance of biodiversity Pollution of surface water resources Alteration of natural drainage patterns Contamination of groundwater Air pollution Disturbing noise Visual impacts
Civil works Building activities, erection of structures, concrete work, steel work, electrical installation, establishing pipelines	Construction Operation Decommissioning	Loss of mineral reserves Hazardous structures/excavations/surface subsidence Loss of soil resources and land capability Pollution of surface water resources Contamination of groundwater Air pollution Disturbing noise Visual impacts
Open-pit mining Mining, load, and hauling	Construction Operation	Loss of mineral resources Hazardous excavations Loss of soil resources and land capability



Activity	Phase	Potential impacts (unmitigated)
		Physical destruction and disturbance of biodiversity Pollution of surface water resources Contamination of groundwater Dewatering impacts Air pollution Disturbing noise Visual impact
Waste rock management Storage, final disposal	Operation Decommissioning Closure (final land form)	Hazardous excavations Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Contamination of groundwater Air pollution Disturbing noise Negative landscape and visual impact
Power supply and use Internal site distribution	Construction Operation Decommissioning	Hazardous excavations Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Alteration of natural drainage patterns Contamination of groundwater Visual impacts
Water supply and use Delivery on site, storage of clean water	Construction Operation Decommissioning	Hazardous excavations Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Alteration of natural drainage patterns Contamination of groundwater Air pollution Visual impacts
Dirty water management Collection, storage of dirty	Construction Operation	Hazardous excavations Loss of soil resources and land capability



Activity	Phase	Potential impacts (unmitigated)
water for re-use, recycling	Decommissioning	Pollution of surface water resources Contamination of groundwater Disturbing noise
Stormwater management Stormwater channels and berms, collection of dirty water, storage for re-use	Construction Operation Decommissioning	Hazardous excavations Loss of soil resources and land capability Alteration of drainage patterns Pollution of surface water resources Contamination of groundwater Disturbing noise
Transport systems Use of access points, road transport to and from site for employees and supplies, movement within site boundary (haul roads, conveyors, pipelines), taxi areas	Construction Operation Decommissioning	Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Alteration of natural drainage patterns Contamination of groundwater Disturbing noise Traffic impacts Visual impacts
Non-mineralized waste management Transportation of waste materials to waste facility	Construction Operation Decommissioning Closure (limited)	Air pollution Disturbing noise Visual impacts
Site / contract management Appointment of workers/contractors, site management (monitoring, inspections, maintenance, security, access control), awareness training, emergency response, implementing and maintaining programmes	Construction Operation Decommissioning Closure	Management of the site plays a significant role in all identified impacts
Storage and maintenance services/ facilities	Construction Operation	Loss of soil resources and land capability Pollution of surface water resources



Activity	Phase	Potential impacts (unmitigated)
Washing vehicles and machinery, storage and handling non-process materials	Decommissioning	Contamination of groundwater Disturbing noise
Site support services Operating offices, parking vehicles	Construction Operation Decommissioning	Loss of soil resources and land capability Disturbance of biodiversity Air pollution Visual impacts
Demolition Dismantling, demolition, removal of equipment	Operation (as part of maintenance) Decommissioning	Hazardous structures/excavations Loss of soil resources and land capability Disturbance of biodiversity Air pollution Disturbing noise Visual impacts
Rehabilitation Replacing soil, slope stabilization, landscaping, re-vegetation, restoration	Construction Operation Decommissioning Closure	Hazardous excavations Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Alteration of natural drainage patterns Contamination of groundwater Air pollution Disturbing noise Visual impacts
Maintenance and aftercare Inspection and maintenance of remaining facilities and rehabilitated areas	Closure	Loss of soil resources and land capability Disturbance of biodiversity Pollution of surface water resources Air pollution Visual impacts



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

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

Table 3—10: Management Measures for Impact Mitigation

Potential Impact	Technical and Management Measures
Mineral sterilization	Mine workings will be developed and designed taking cognisance of potential sand reserves Extraction of all possible minerals prior to final disposal
Hazardous structures	Establish and maintain site security measures Control site and facility access Backfill open pits Appropriate design of stockpiles with the potential to fail (and by qualified person) Implement monitoring programme Implement an emergency response
Loss of soil resources and land capability through pollution	Implement hazardous waste, dirty water and mineralised and non-mineralised waste management procedures Permanent infrastructure designs to take long-term soil prevention, land function and confirmatory monitoring into account
Loss of soil resources and land capability through physical disturbance	Implementation of a soil management plan Limit disturbance of soil to what is necessary Stripping, storing, maintenance and replacement of topsoil in accordance with soil management procedures
Physical	Implement a biodiversity management plan



Potential Impact	Technical and Management Measures
destruction of biodiversity	Restrict project footprint Provide alternative habitat (where appropriate and necessary) Implement a monitoring programme Rehabilitate disturbed areas
General disturbance of biodiversity	Prevention of the killing of animal species and harvesting of plant species Implementation of dust control measures Pollution prevention measures (water, soil etc.) Prevention of the disturbance of ecosystems
Alternation of drainage patterns	Avoid alteration of watercourses as far as practically possible Implement and maintain stormwater controls that meet regulatory requirements Authorise all water uses as defined in the NWA Compliance with relevant license requirements
Surface water pollution	Appropriate design of polluting facilities and pollution prevention facilities (by qualified person) Implement and maintain stormwater controls that meet regulatory requirements Implement site-specific soil management plan Implement a monitoring programme (water use, process water quality, rainfall-related discharge quality) Implement emergency response Authorise all water uses as defined in the NWA Compliance with relevant licence requirements
Groundwater contamination	Appropriate design of polluting facilities (by qualified person) Correct handling of hazardous wastes, mineralised and non-mineralised



Potential Impact	Technical and Management Measures
	<p>wastes</p> <p>Compensation for loss</p> <p>Implementation of a monitoring programme</p> <p>Implement emergency response</p> <p>Authorise all water uses as defined in the NWA</p> <p>Compliance with relevant license requirements</p>
Dewatering	<p>Compensation for loss</p> <p>Implementation of a monitoring programme</p> <p>Authorise all water uses as defined in the NWA</p> <p>Compliance with relevant license requirements</p>
Air pollution	<p>Implementation of air quality management plan</p> <p>Implementation of an air quality monitoring plan</p> <p>Control dust plumes</p> <p>Implementation of an air complaints procedure</p> <p>Maintenance of abatement equipment</p> <p>Implement an emergency response</p>
Noise pollution	<p>Maintenance of equipment and machinery in good working order</p> <p>Equip machinery with silencers</p> <p>Construction of noise attenuation measures</p> <p>Implementation of noise monitoring programme</p> <p>Implementation of a noise complaints procedure</p> <p>Reducing operational hours</p> <p>Educate workers</p>
Visual impacts	<p>Limit the clearing of vegetation</p> <p>Limit the emissions of visual dust plumes</p>



Potential Impact	Technical and Management Measures
	<p>Use of screening berms</p> <p>Concurrent rehabilitation</p> <p>Painting infrastructure to compliment the surrounding environment</p> <p>Implementation of a closure plan</p> <p>Management through care and aftercare</p>
Traffic increases	<p>Implementation of a traffic safety programme</p> <p>Implement speed allaying measures where appropriate, e.g. speed humps where necessary</p> <p>Education and awareness training of workers</p> <p>Enforce strict speed limits on mine access roads</p> <p>Ensure dust is effectively controlled on unpaved roads so as not to reduce visibility</p> <p>Placement of signage to create awareness</p> <p>Maintenance of the transport systems</p> <p>Implementation of traffic complaints procedure</p> <p>Implement an emergency response</p>
Heritage (and cultural)	<p>Limit project infrastructure, activities and related disturbances as far as practically possible</p> <p>Avoid heritage and cultural resources as far as practically possible</p> <p>Apply for the relevant permits to remove or destroy heritage sites (if applicable)</p> <p>Exhumation and relocation of graves according to legal requirements (if applicable)</p> <p>Mark remaining heritage sites on plan</p>



Potential Impact	Technical and Management Measures
	<p>Inspect sites for encroachment and/or damage</p> <p>Education and awareness training of workers</p> <p>Implement emergency response with respect to the chance find procedure for heritage, cultural and paleontological resources</p>
Economic impact	<p>Hire people from closest communities as far as practically possible</p> <p>Extend the formal bursary and skills development to closest communities</p> <p>Implement a procurement mentorship programme</p> <p>Local procurement of goods and services as far as practically possible</p> <p>Compensation for loss of land use</p> <p>Closure planning will consider skills, economic consideration and the needs of future farming</p>
Inward migration	<p>Good communication in terms of recruitment, procurement and training</p> <p>Number of temporary and permanent new job opportunities and procurement will be made public</p> <p>Employment and procurement opportunities provided to closest communities as far as practically possible</p> <p>No recruitment at the mine</p> <p>Notify unsuccessful job seekers</p> <p>Encourage formal housing of employees and implement contractual requirement for contractors to ensure formal housing for workers, both temporary and permanent</p> <p>Maintain a skills profile for the nearest communities</p> <p>Monitor and prevent the development of informal settlements through the interaction with neighbours, local authorities and law enforcement officials</p> <p>Implement a health policy of HIV/AIDS and tuberculosis to promote</p>



Potential Impact	Technical and Management Measures
	<p>awareness and training</p> <p>Implement an emergency response</p>
Land uses	<p>Implementation of EMP commitments that focus on environmental and social impacts</p> <p>Take necessary steps to prevent negative impact on surrounding land</p> <p>Compensation for loss</p> <p>Closure planning to incorporate measures to achieve future land use plans</p>

ix) Motivation where no alternative sites were considered.

The project area falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource. Refer to the Site Plan above. The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.

- The preferred and only location of the sand mining activity is on the earmarked section of the application area- Portion 0 of the farm Minnaar 292 JR
- The preferred and only activity is the mining of sand and diamonds
- The preferred and only technology is the use of a Front End Loader to remove the sand and for trucks to transport the sand to the clients (buyers).

There are therefore no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other than the mandatory “no-go” alternative that must be assessed for comparison purposes as the environmental baseline.



Siting or Site Selection

The proposed sand and diamond mining operation will be conducted within a non-perennial watercourse (Premiermyntloop stream). However, in the selection of the mining area consideration were made to only conduct mining activities within non-perennial watercourses in order to avoid or disturb water supply to adjacent land owners or agricultural activities. The Premiermyntloop stream which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.

Access Roads

The access criteria considered by the applicant include:

- The dirt road has to be less than 5 km of dirt / un-surfaced road to contend with; and
- There must not be a need for new roads to be constructed for access to the site
- A short access road was preferable, and access to loading sites had to be near an existing road.

Alternatives of Land Ownership

The alternatives considered were:

- Find useable land (a viable mineral resource) owned by another party (entering into a royalty agreement);
- Find useable land (a viable mineral resource) owned by another person and not living on the property for a long time (leasing the land)
- Find a suitable site (a viable mineral resource) on property owned by the applicant.
- During the operational phase of the mine, the landowners are unable to have free access across the property. This could continue for the duration of the permit and is not convenient to landowners.



Alternative considered

- The alternatives considered was to find properties where the applicant is the property owner. In other words, to operate on land owned by the applicant. The applicant intend to acquire or purchase the property- portion 0 of the farm Minnaar 292 JR.

Alternative to Processing

When the applicant was asked to consider processing there were two options for consideration, a large scale expansive mining operation or a small mine with a small footprint. The alternatives that informed the final decision were:

- Do not establish a wash-plant on the site and process the sand off-site.
- Develop a small rotary pan plant for diamond recovery.
- Use a small fleet so that the impact on roads is smaller.

It was ultimately decided to use a small fleet to transport sand to buyers directly and to develop a small rotary pan plant for diamond recovery

No “go” Alternative or No to mine the site

The alternative of not establishing this project was considered by the applicant. There will be no impact on the noise levels and the dust generation will be limited to the land occupiers frequenting the property.

The business would need to look at opportunities to find sand and diamonds elsewhere. Employment opportunities will not be generated on the site. The land would remain fallow and not economically viable (as it is too small for crop farming or commercial animal husbandry. The national assets (in this case, sand and diamonds), that will not be made available for economic benefit to the South African people, will remain on the property. The ecological services will not be temporarily altered by mining and the social benefits will not be obtained from the creation of 10-20 employment opportunities for 2 years.



No “go” Alternative or No to mine the site

The alternative of not establishing this project was considered by the applicant. There will be no impact on the noise levels and the dust generation will be limited to the land occupiers frequenting the property.

The business would need to look at opportunities to find sand elsewhere. Employment opportunities will not be generated on the site. The land would remain fallow and not economically viable (as it is too small for crop farming or commercial animal husbandry. The national asset (in this case, sand), that will not be made available for economic benefit to the South African people, will remain on the property. The ecological services will not be temporarily altered by mining and the social benefits will not be obtained from the creation of 10-20 employment opportunities for 2 years.

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

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

The project area falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource. Refer to the Site Plan above. The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.

- The preferred and only location of the sand mining activity is on the earmarked section of the application area- Portion 0 of the farm Minnaar 292 JR
- The preferred and only activity is the mining of sand and diamonds



- The preferred and only technology is the use of a Front End Loader to remove the sand and for trucks to transport the sand to the clients (buyers).

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

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

The impact assessment methodology is adopted from the Department of Environmental Affairs (DEA) Environmental Risk Assessment (ERA) approach. The ERA method assesses the significance of potential impacts in terms of Occurrence (Probability and Duration) and Severity (Magnitude/Intensity and Scale). The combined effect of these two aspects defines the Significance of each potential impact, as expressed below:

$$\text{Significance Rating (SR)} = (\text{Magnitude} + \text{Duration} + \text{Scale}) \times \text{Probability}$$

Ratings for the other variables in the Significance Rating formula are determined from the tabulation below.

Table 3—11: Impact Rating Methodology

Probability (P)	Duration (D)
5 – Definite / don't know	5 – Permanent
4 – High probable	4–Long-term (ceases with operational life)
3 – Medium probability	3 – Medium-term (6 – 15 years)
2 – low probability	2 – Short-term (0 – 5 years)
1 – Improbable	1 – Immediate
0 – None	
Scale (S)	Magnitude (M)



5 – International	10 – Very high / Don't know
4 – National	8 – High
3 – Regional	6 – Moderate
2 – Local	4 – Low
1 – Site	2 – Minor
0 – None	

The significance of the impact is then categorised as Low, Medium or High depending on the Total Score for the Significance Rating. The categorisation is described in tabulation below.

Table 3—12: Impact Categorisation

Rating (SR)	Category
SR>60	High (A)
SR 30-60	Medium (B)
SR<30	Low (C)

The approach for identifying potential impacts is as follows:

- Review of the project description to understand operations, processes and activities, as well as services and infrastructure throughout the entire project lifecycle (i.e. Planning, Construction and Operation, Decommissioning);
- Study environmental context and possible exposure pathways;
- Identify possible impacts on water resources and other pertinent environmental media using Environmental Risk Assessment (ERA) approach;
- Determine significance of each impact



j) 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).

Table 3—13: Impact Assessment for Construction Phase

Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
Box-cut development	Soil	Soil erosion	1	4	4	2	18 (Low)
	Groundwater quantity	Groundwater dewatering and lowering of groundwater levels	1	2	6	3	27 (Low)
	Groundwater quality	Groundwater contamination	1	2	6	2	18 (Low)
	Topography	Change in topography due to topsoil stockpiles	1	4	6	5	55 (Medium)
	Geology	Change in geological profile	1	5	8	5	70 (High)



Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
	Soil	Soil pollution from hydrocarbon spills (petrol, diesel, and oil)	1	4	4	2	18 (Low)
Clearing of vegetation cover	Surface water resources	Contamination of surface water resources silt-laden runoff	1	2	2	2	10 (Low)
	Surface runoff	Increase runoff volumes to due to the removal of vegetation cover	1	4	6	2	22 (Low)
	Soil	Soil erosion	1	4	4	2	18 (Low)



Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
Stripping and stockpiling of topsoil	Topography	Change in topography through soil mounds	1	4	8	4	52 (Medium)
	Surface water resources	Contamination of surface water resources	1	2	4	1	7 (Low)
Site establishment	Soil	Soil pollution from hydrocarbon spills (petrol, diesel, and oil)	1	2	8	2	22 (Low)
	Soil	Compaction of soil	1	4	6	4	44 (Medium)



Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
Construction of package sewage treatment plant	Groundwater	Groundwater contamination	1	2	4	2	14 (Low)

Table 3—14: Impact Assessment for Operational Phase

Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
Opencast mining (truck and shovel)	Soil	Soil erosion	1	4	4	2	13 (Low)
	Groundwater quantity	Groundwater dewatering and lowering of groundwater levels	1	3	6	3	30 (Medium)
	Groundwater quality	Groundwater contamination	2	3	6	3	33 (Medium)
	Topography	Change in topography due to topsoil stockpiles	1	4	6	5	55 (Medium)



Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
	Geology	Change in geological profile	1	5	8	5	70 (High)
	Soil	Soil pollution from hydrocarbon spills (petrol, diesel, and oil)	1	4	6	3	33 (Medium)
	Water supply	Shortage of water supply to other groundwater users	2	4	6	3	36 (Medium)
Movement of mine vehicles, transportation of minerals to the crushing plant	Soil	Compaction of soil	1	4	6	4	44 (Medium)
	Groundwater quantity	Reduced groundwater recharge	1	4	6	3	33 (Medium)



Activity	Environmental Aspect	Impact	Scale (Extent)	Duration	Magnitude	Probability	Significance Rating
	Groundwater quality	Groundwater contamination from hydrocarbon spills (petrol, diesel, and oil)	1	4	4	2	18 (Low)
Topsoil stockpiles	Surface water resources	Contamination of surface water resources	2	4	8	5	70 (High)
	Topography	Change in topography due to waste rock and topsoil stockpiles	1	4	6	5	55 (Medium)
	Soil	Loss of topsoil soil due to erosion	1	4	4	2	18 (Low)



k) 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.
No specialist studies have been undertaken. A desktop analysis has been followed that informs the compilation of this assessment.	N/A	N/A	N/A



I) Environmental impact statement

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

The possible environmental impacts associated with the proposed sand mining are considered low. Mining will involve the use of mechanized earth moving equipment (excavator and front-end loader) to move the unconsolidated material in bulk. Support infrastructure such as ablution facility, mine office complex, package sewage treatment plant, workshop, and security office will be required at the mine.

The proposed mine will create 10-20 full-time jobs and the sand and diamonds mined will be an important resource for the construction, manufacturing and jewellery industry. Excavations will be shaped and the perimeter of the mine site will be rehabilitated to support the future land use activities.

The assessed impact ratings for both construction and operational phase are as follows:

Table 3—15: Summary of Impact Rating for the Construction Phase

Activity	Environmental Aspect	Significance Rating
Box-cut development	Soil	18 (Low)
	Groundwater quantity	27 (Low)
	Groundwater quality	18 (Low)
	Topography	55 (Medium)
	Surface hydrology	70 (High)



Activity	Environmental Aspect	Significance Rating
	Geology	70 (High)
	Soil	18 (Low)
Clearing of vegetation cover	Surface water resources	10 (Low)
	Surface runoff	22 (Low)
	Soil	18 (Low)
Stripping and stockpiling of topsoil	Topography	52 (Medium)
	Surface water resources	7 (Low)
Site establishment	Soil	22 (Low)
	Soil	44 (Medium)
Construction of	Groundwater	14 (Low)



Activity	Environmental Aspect	Significance Rating
package sewage treatment plant		

Table 3—16: Summary of Impact Rating for the Operational Phase

Activity	Environmental Aspect	Significance Rating
Opencast mining (truck and shovel)	Soil	13 (Low)
	Groundwater quantity	30 (Medium)
	Groundwater quality	33 (Medium)
	Topography	55 (Medium)
	Geology	70 (High)
	Soil	33 (Medium)
	Water supply	36 (Medium)
Movement of mine vehicles, transportation of minerals to the	Soil	44 (Medium)
	Groundwater	33 (Medium)



Activity	Environmental Aspect	Significance Rating
crushing plant	quantity	
	Groundwater quality	18 (Low)
Topsoil stockpiles	Surface water resources	70 (High)
	Topography	55 (Medium)
	Soil	18 (Low)

(ii) Final Site Map

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

Refer to baseline environmental situation. The Source Mineral Group will comply with the following commitments:

- Infrastructure such as houses (including lodges, fences, electricity pylons, gates) will be avoided;
- Any boreholes, sewer pipelines, etc will be marked-off prior to site establishment and avoided during operations;
- Existing access roads will be utilized to access the potential mining site.

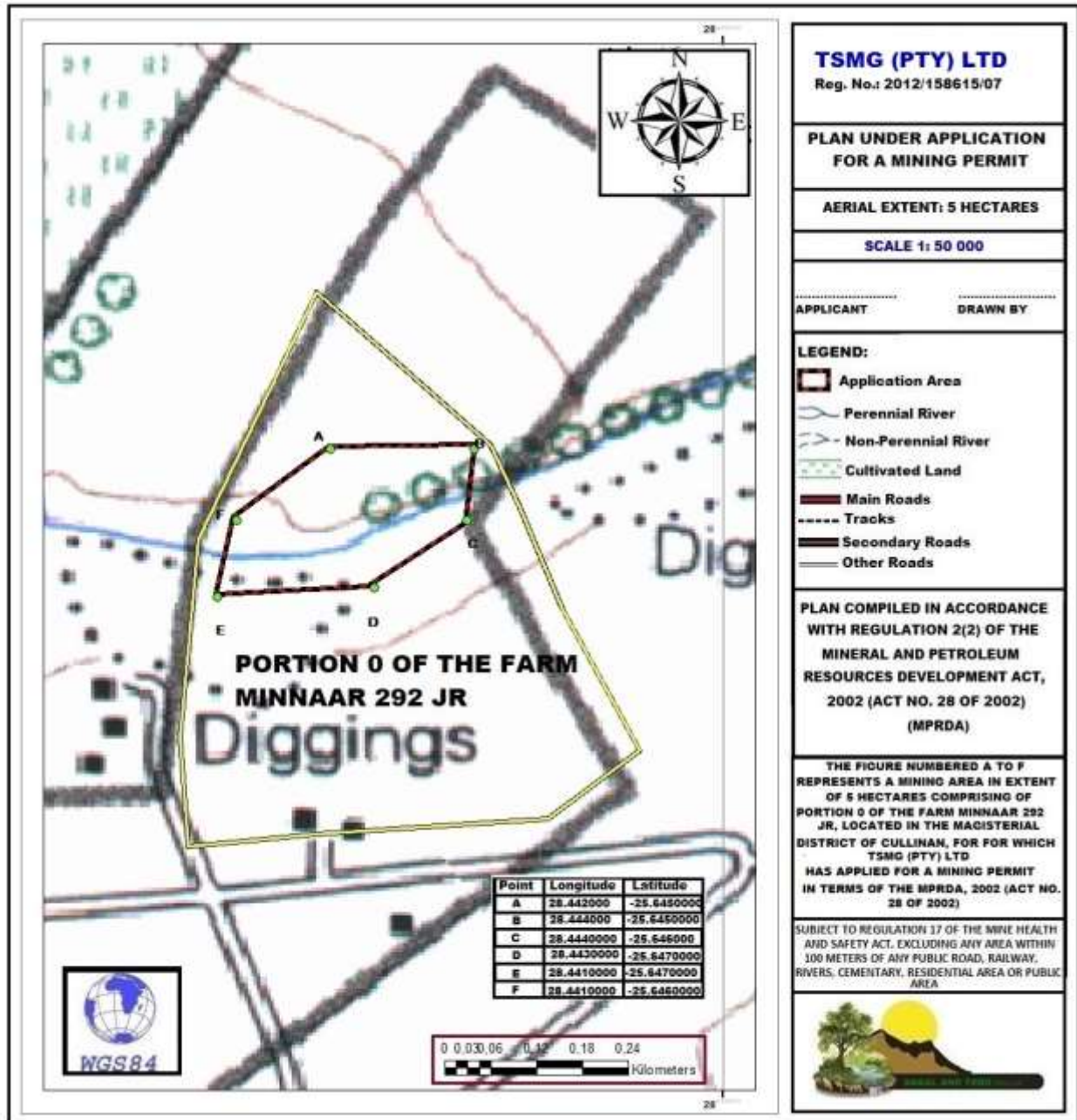


Figure 3-15: Proposed Mining Area



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

Positive Impact associated with the proposed Mining Permit:

- Creating 10-20 full-time permanent jobs
- Job creation
- Development of skills
- Potential for business opportunities
- Establishment of bursaries and scholarships
- Stimulate economic activities in the local vicinity
- Sand will be used for construction (development) and manufacturing (glass), whilst diamonds will be used in the jewellery industry.

Construction Phase

- Generation of fugitive dust
- Removal of existing vegetation
- Potential negative impact on top soil seed bank if not stockpiled correctly.

Operational Phase: Excavation of Pits

- Generation of fugitive dust
- Potential hydrocarbon spillage through leaking equipment
- Change of current land use, 2-5 year mining permit period

Preparation of vehicle maintenance concrete padding

- Fugitive dust generation
- Spillage of carbonaceous material on roads or other areas

Decommission and Closure Phases

- Fugitive dust generation
- Mixing of sub soils with topsoil
- Poor compaction



Other identified negative environmental impacts

- Increased ambient noise levels resulting from the mining activities;
- Loss or destruction of heritage and cultural resources (features)
- Increased vehicle movements within the area resulting in possible destruction and disturbance of flora and fauna;
- Potential visual impacts caused by mining activities;
- Influx of persons (job seekers) to site as a result of the proposed project and the possible resultant increase in opportunistic crime;
- Potential water (surface and groundwater) and soil pollution impacts resulting from hydrocarbon spillages;

m) 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.

The objectives of the EMPr will be to:

- Provide sufficient information to strategically plan mining activities as to avoid unnecessary social and environmental impacts.
- Provide sufficient information and guidance to plan for mining activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
- 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.

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



- To ensure that the mining activities do not have an adverse impact on the current biodiversity. Areas of ecological significance will be avoided and if disturbance is required, it will be undertaken in accordance with legislation.
- Heritage/cultural resources can be managed by avoidance of known resources and through consultation with landowners/stakeholders. Contractor personnel will also be briefed of these sensitivities and consequences of any damage/removal of such features;
- Noise generation can be managed through consultation and restriction of operating hours and by maintaining equipment and applying noise abatement equipment if necessary;
- Visual intrusion can be managed through consultation with landowners/stakeholders;
- To limit the visual impact of the mining activities. Concurrent rehabilitation to be implemented
- Dust fall can be managed by application of wet suppression on exposed surfaces;
- Soil, surface water and groundwater contamination by hydrocarbons can be managed by conducting proper vehicle maintenance, refuelling with care to minimise the chance of spillages and by having a spill kit available on each site where mining activities are in progress;
- To ensure that the proposed mining operation adopts and implements waste management principles that are environmentally responsible. Ensure compliance with relevant waste legislation and regulations and municipal requirements.
- Social friction with landowners can be managed by employing strong, experienced personnel with proven skills in public consultation and conflict resolution during stakeholder consultation phases.

n) Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

It is the opinion of the EAP that the following conditions should form part of the authorisation:



- Maintain a minimum 50 m (preferably 1000m) buffer from any infrastructure or dwelling;
- Landowners should be engaged (re-consulted) at least 1 month prior to any site activities being undertaken.
- Vegetation clearance limited to the mining area
- Indigenous plant species must be removed and kept for rehabilitation before commencement
- No employees will be permitted to stay on the site.
- Collection of firewood will not be allowed.
- Existing gravel roads will be used
- Dust-fall monitoring programme to be implemented
- Mine area will be fenced to prevent animal access to the mine area

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

Which relate to the assessment and mitigation measures proposed.

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

- It is assumed that the proposed mitigation measures as listed in this report and included in the EMPr will be implemented and adhered to. Mitigation measures are proposed which are considered to be reasonable and must be implemented in order for the outcome of the assessment to be accurate.
- Details regarding the presence and status of land claims from the Land Claims Commissioner are not yet available

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

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

It is the opinion of the EAP that the proposed sand mining activity should be authorised. In reaching this conclusion the EAP has considered that:



- The “preferred alternative” takes into account location alternatives, activity alternatives, layout alternatives, technology alternatives and operational alternatives.
- The approach taken is that it is preferable to avoid significant negative environmental impacts, wherever possible. There are no significant environmental impacts associated with the proposed activity.
- A mining permit will ensure that the sand and diamonds is mined legally and provisions will be made for the rehabilitation of the disturbed area after sand mining has been completed. The applicant is applying for a mining permit and it will be a small scale operation. The area of application does not exceed 5 hectares. A mining permit means that the approval is granted for a period of two years but not exceeding five years. Since the scale of this operation is small and the commodities of interest (sand and diamonds)
- No negative impacts have been identified that are so severe as to prevent the proposed mining activity from taking place. The activity has been assessed to have a positive socio-economic impact, especially in terms of the creation of employment and the provision of building sand at a local and district level.
- Provided the recommended mitigation measures are implemented and mining activities are managed in accordance with the stipulations of the EMPr, and Rehabilitation, Decommissioning and Closure Plan

ii) Conditions that must be included in the authorisation

Any aspects which must be made conditions of the Environmental Authorisation

It is the opinion of the EAP that the following conditions should form part of the authorisation:

- Maintain a minimum 50 m (preferably 1000m) buffer from any infrastructure or dwelling;
- Landowner should be engaged (re-consulted) at least 1 month prior to any site activities being undertaken- in this case the landowner is the applicant.
- Vegetation clearance limited to the mining area



- Indigenous plant species must be removed and kept for rehabilitation before commencement
- No employees will be permitted to stay on the site.
- Collection of firewood will not be allowed.
- Existing gravel roads will be used
- Dust-fall monitoring programme to be implemented
- Mine area will be fenced to prevent animal access to the mine area

q) Period for which the Environmental Authorisation is required.

The Environmental Authorisation is required for a **period of 5 years.**

r) Undertaking

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

The Source Mineral Group (Pty) Ltd herewith confirms both its capacity and willingness to make the financial provision required should the mining permit be granted. .

s) Financial Provision

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

A financial provision of approximately **R 63 850. 5415** has been budgeted for rehabilitation of negative environmental impacts associated with the planned mining operation as shown in the tabulation below.



Table 3—17: Budgetary Costing for the Financial Provision for Rehabilitation of Negative Environmental Impacts

CALCULATION OF THE QUANTUM							
Applicant:	The Source Mineral Group (Pty) Ltd				Ref No.:	GP 30/5/1/3/2/(10320) MP	
Evaluators:	Sakal and Tebo (Pty) Ltd				Date:	May 2019	
No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	11,57	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	161,17	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	237,51	1	1	0
3	Rehabilitation of access roads	m2		28,84	1	1	0
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	279,92	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	152,68	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	322,33	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	0	164050,47	1	1	0
7	Sealing of shafts adits and inclines	m3	0	86,52	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0	112646,86	1	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	140299,62	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	407496,61	1	1	0
9	Rehabilitation of subsided areas	ha	0	94324,78	1	1	0
10	General surface rehabilitation	ha	0,52	89235,31	1	1	45510,0081
11	River diversions	ha	0	89235,31	1	1	0
12	Fencing	m	0	101,79	1	1	0
13	Water management	ha	0	33929,78	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	0	11875,42	1	1	0
15 (A)	Specialist study	Sum	0			1	0



15 (B)	Specialist study	Sum				1	0
					Sub Total 1		45510,0081
1	Preliminary and General		5461,200972		weighting factor 2		5461,200972
					1		
2	Contingencies			4551,00081			4551,00081
					Subtotal 2		55522,21
					VAT (15%)		8328,3315
					Grand Total		63850,5415



i) Explain how the aforesaid amount was derived.

The financial provision for the execution of the EMPr is **R 63 850. 5415** as determined by the quantum calculation. The financial provision includes cost for premature mission and financial closure and post closure management of the environmental impacts. The financial guarantee was calculated using the DMR official **Financial Quantum Calculator**.

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

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

It is hereby undertaken that the amount of **R 63 850. 5415** in the form of a bank guarantee for rehabilitation purposes as required in terms of section 41 of the MPRDA as read with regulation 53 and 54 of the said Act, will be provided to the DMR upon granting of the requested mining permit.

t) Specific Information required by the competent Authority

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

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

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

A full consultation process is being implemented during the environmental authorisation process. The purpose of the consultation is to provide affected persons the opportunity to raise any potential concerns. As part of the consultation process the land claims commissioner will be contacted to identify if there are any claims on land covered by this application.

Concerns raised will be captured and addressed within the public participation section of this report once finalised and submitted to the authorities.



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

Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

Not applicable. No sites of archeological or cultural interested were identified on site during a site reconnaissance visit. The project area is an open space and is largely natural. However, as a matter precaution, should any further information confirm existence of such sites, steps will be taken to put measures in place for preservation thereof in line with the National Heritage Resources Act, 1999 (Act No. 25 of 1999). The South African Heritage Resources Agency (SAHRA) will also be notified of such findings.

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

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

The applicant had considered several alternatives and these criteria are captured below:

Alternatives in terms of;

- Siting
- Access Roads
- Land Ownership
- Processing
- No mine

The project area falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites. Numerous kimberlites, including diamond alluvial fields, are known in the local region. The Cullinan Premier Mine is located approximately 10 km south-east from



the project area. The site was selected as it contains good quality sand and diamonds located in a convenient position in close proximity to transport routes. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource. Refer to the Site Plan above. The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.

- The preferred and only location of the sand mining activity is on the earmarked section of the application area- Portion 0 of the farm Minnaar 292 JR
- The preferred and only activity is the mining of sand and diamonds
- The preferred and only technology is the use of a Front End Loader to remove the sand and for trucks to transport the sand to the clients (buyers).

There are therefore no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other than the mandatory “no-go” alternative that must be assessed for comparison purposes as the environmental baseline.

Siting or Site Selection

The proposed sand and diamond mining operation will be conducted within a non-perennial watercourse (Premiermyloop stream). However, in the selection of the mining area consideration were made to only conduct mining activities within non-perennial watercourses in order to avoid or disturb water supply to adjacent land owners or agricultural activities. The Premiermyloop stream which traverse/crosses the project area originates in one of the Quartzite hills near Cullinan and flows in a north-westerly direction until it forms a tributary of the Roodeplaatspruit which in turn recharge the Pienaars River north of the Roodeplaat Dam.

Access Roads

The access criteria considered by the applicant include:

- The dirt road has to be less than 5 km of dirt / un-surfaced road to contend with; and



- There must not be a need for new roads to be constructed for access to the site
- A short access road was preferable, and access to loading sites had to be near an existing road.

Alternatives of Land Ownership

The alternatives considered were:

- Find useable land (a viable mineral resource) owned by another party (entering into a royalty agreement);
- Find useable land (a viable mineral resource) owned by another person and not living on the property for a long time (leasing the land)
- Find a suitable site (a viable mineral resource) on property owned by the applicant.
- During the operational phase of the mine, the landowners are unable to have free access across the property. This could continue for the duration of the permit and is no convenient to landowners.

Alternative considered

- The alternatives considered was to find properties where the applicant is the property owner. In other words, to operate on land owned by the applicant. The applicant intend to acquire or purchase the property- portion 0 of the farm Minnaar 292 JR.

Alternative to Processing

When the applicant was asked to consider processing there were two options for consideration, a large scale expansive mining operation or a small mine with a small footprint. The alternatives that informed the final decision were:

- Do not establish a wash-plant on the site and process the sand off-site.
- Develop a small rotary pan plant for diamond recovery.
- Use a small fleet so that the impact on roads is smaller.

It was ultimately decided to use a small fleet to transport sand to buyers directly and to develop a small rotary pan plant for diamond recovery



No “go” Alternative or No to mine the site

The alternative of not establishing this project was considered by the applicant. There will be no impact on the noise levels and the dust generation will be limited to the land occupiers frequenting the property.

The business would need to look at opportunities to find sand and diamonds elsewhere. Employment opportunities will not be generated on the site. The land would remain fallow and not economically viable (as it is too small for crop farming or commercial animal husbandry). The national assets (in this case, sand and diamonds), that will not be made available for economic benefit to the South African people, will remain on the property. The ecological services will not be temporarily altered by mining and the social benefits will not be obtained from the creation of 10-20 employment opportunities for 2 years.



PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. Final Environmental Management Programme

a) Details of the EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART

A, section 1(a) herein as required).

The requirements for the provision of the details and expertise of the EAP are included in Part A as section 1(a)

b) Description of the Aspect 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).

Refer to Part A, Section 1(h) of this Basic Assessment Report.

c) Composite Map

(Provide a map (**Attached as an Appendix H**) 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)

This has already been covered. Refer to Part A as well as **Appendix D** of this document.

d) Description of impact management objectives including management statements

The overall goal for closure of the 5 ha sand mining site is to shape the excavations to avoid damming of water, ensuring that the land is stable and safe in the long-term. For post closure, the pit will be shaped and rehabilitated and proposed future use after mining will be grazing.

Closure objectives relate to the following:

Physical stability: To level and shape excavations.



Environmental quality: To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contaminants arising from the mining after completion of mining activities.

Health and safety: To limit the possible health and safety threats to humans and animals. Level and shape excavations to avoid damming of water.

Land capability/land-use: To ensure continuation or to the re-instate a suitable land capability over as large as possible area affected during mining.

Aesthetic quality: To leave behind a rehabilitated site that is neat and tidy, giving an acceptable overall aesthetic appearance.

Biodiversity: To encourage the re-establishment of indigenous and/ or appropriate vegetation on the rehabilitated mining site such that the biodiversity is largely re-instated over time, as well as protect the undisturbed areas to maintain/enhance the biodiversity of these areas. Mining area rehabilitated to limit impact on current land use.

i. Determination of closure objectives

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

Closure objectives relate to the following:

Physical stability: To level and shape excavations.

Environmental quality: To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contaminants arising from the mining after completion of mining activities.

Health and safety: To limit the possible health and safety threats to humans and animals. Level and shape excavations to avoid damming of water.

Land capability/land-use: To ensure continuation or to the re-instate a suitable land capability over as large as possible area affected during mining.

Aesthetic quality: To leave behind a rehabilitated site that is neat and tidy, giving an acceptable overall aesthetic appearance.



Biodiversity: To encourage the re-establishment of indigenous and/ or appropriate vegetation on the rehabilitated mining site such that the biodiversity is largely re-instated over time, as well as protect the undisturbed areas to maintain/enhance the biodiversity of these areas. Mining area rehabilitated to limit impact on current land use.

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

Process water supply for the operation will be required for the recovery of diamonds. Process water supply will be sourced from the existing boreholes on site. The water will also be used for dust suppression of access roads. Dust suppression will be conducted as and when necessary.

iii. Has a water use licence has been applied for?

The proposed mining activities falls within the ambit of section 21 water uses in terms of the National Water Act, 1998 (Act No. 36 of 1998). Therefore, a water use licence application will be lodged with the Department of Water and Sanitation. The following water use activities will take place on site:

- Section 21 (a): Abstraction of water from a borehole
- Section 21 (b): Storage of water
- Section 21 (c) and (i): Mining within 100 m from a river (premierloop stream)
- Section 21 (g): Package sewage treatment works and dust suppression.



iv. Impacts to be mitigated in their respective phases

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

Table 3—16: Impacts to be Mitigated

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc)</p> <p>E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>(of operation in which activity will take place.</p> <p>State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).</p>	<p>(volumes, tonnages and hectares or m²)</p>	<p>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>
Establishment / construction of camp site	Construction Phase	0.16 ha	<p>Dust suppression</p> <ul style="list-style-type: none"> •Speed limits • Service equipment regularly 	NEMA Air Quality Act Mine Health & Safety Act	Concurrently with the completion of mining activities in an area.
Food preparation	All phases	100 cubic meter space required to prepares 0.01 ton of food	<ul style="list-style-type: none"> •Restrict open fires *Maintain firebreaks 	Mine Health and Safety Act National Veld and Forest Fires Act MPRDA Reg 65	Concurrently with the completion of mining activities in an area.
Maintenance of vehicles	All phases	200 cubic	Use oil trays	MPRDA Reg 68 NEMA Waste Act	Concurrently with the



ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>(of operation in which activity will take place.</p> <p>State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).</p>	<p>(volumes, tonnages and hectares or m²)</p>	<p>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>
		meters			completion of mining activities in an area.
Disposal of Waste	All phases	200 litre bins	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68	Concurrently with the completion of mining activities in an area.
Preparation of vehicle maintenance concrete padding	Operational Phase	0.25 ha	Concurrent rehabilitation	MPRDA Regulations 61 & 62	Concurrently with the completion of mining activities in an area.
Excavation of Pits	Operational Phase	0.5-1 ha per time	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Mining.	Concurrently with the completion of mining activities in an area.
De-establishment and removal of infrastructure/rehabilitation	Decommissioning and Closure Phases	2 - 5 ha	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure	Concurrently with the completion of mining activities in an area.



Impact Management Outcome

Table 3-17: Management Outcomes

ACTIVITY (whether listed or not listed). (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, , storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring • Remedy through rehabilitation.. 	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
Establishment / construction of camp site	Dust, Noise	Loss soil resources	Construction Phase	Dust suppression <ul style="list-style-type: none"> •Speed limits • Service equipment regularly 	NEMA Air Quality Act Mine Health & Safety Act
Food preparation	Air pollution	Loss soil resources	All phases	<ul style="list-style-type: none"> •Restrict open fires *Maintain firebreaks 	Mine Health and Safety Act National Veld and Forest Fires Act MPRDA Reg 65
Maintenance of vehicles	water contamination	Loss soil Resources	All phases	Use oil trays	MPRDA Reg 68 NEMA Waste Act



ACTIVITY (whether listed or not listed). (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, , storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring • Remedy through rehabilitation.. 	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
Disposal of Waste	dust, water contamination	Loss of Fauna and Flora	All phases	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Loss soil resources	Operational Phase	Concurrent rehabilitation	MPRDA Regulations 61 & 62
Excavation of Pits	Dust, Noise, water contamination	Dust emissions	Operational Phase	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Mining.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	None	Decommissioning and Closure Phases	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure



f) Impact Management Actions

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

Table 3—18: Impact Management Actions

ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
<p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, , storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>E.g.</p> <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring <p>Remedy through rehabilitation..</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity</p> <p>or.Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>
Establishment / construction of camp site	Dust, Noise	Dust suppression •Speed limits • Service equipment regularly	Construction Phase	NEMA Air Quality Act Mine Health & Safety Act
Food preparation	Air pollution	•Restrict open	All phases	Mine Health and Safety Act



ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
<p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, , storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>E.g.</p> <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring <p>Remedy through rehabilitation..</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity</p> <p>or.Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>
		<p>fires *Maintain firebreaks</p>		<p>National Veld and Forest Fires Act MPRDA Reg 65</p>
Maintenance of vehicles	water contamination	Use oil trays	All phases	MPRDA Reg 68 NEMA Waste Act
Disposal of Waste	dust, water contamination	Use waste Receptacles	All phases	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Concurrent rehabilitation	Operational Phase	MPRDA Regulations 61 & 62
Excavation of Pits	Dust, Noise, water	Concurrent rehabilitation	Operational Phase	Procedures for Managing



ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
<p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, , storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>E.g.</p> <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring <p>Remedy through rehabilitation..</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity</p> <p>or.Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>
	contamination			Significant Impacts Related to Mining.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	Systematic rehabilitation	Decommissioning and Closure Phases	Procedure for Emergency Preparedness and Response Procedure
Specific Mitigation Measures				



Maintenance of Road	<ul style="list-style-type: none"> Dust pollution 	<ul style="list-style-type: none"> Control through dust suppression Control through minimisation of vehicle movement Control through monitoring of dust fall to determine if measures are effective 	All phases	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded
	<ul style="list-style-type: none"> Soil erosion, compaction and contamination 	<ul style="list-style-type: none"> Prevent through restricting the disturbed area Prevent through restricting spillage from haulage vehicles Control through removal of all utilisable soil and storage of the same class Control through implementation of storm water management measures Remedy through treatment of contaminated soils 		Rehabilitation standards/objectives
	<ul style="list-style-type: none"> Loss of vegetation Invasion by alien invasive species 	<ul style="list-style-type: none"> Modify by vegetating soil stockpiles Control through alien invasive eradication programme 	All phases	Rehabilitation standards/objectives
	<ul style="list-style-type: none"> Visual impact 	<ul style="list-style-type: none"> Avoid/prevent leaving any building material or waste on site 		Rehabilitation standards/objectives



	<ul style="list-style-type: none"> Heritage 	<ul style="list-style-type: none"> Prevent through reporting and evaluation of any archaeological or heritage features found 		Impact avoided
	<ul style="list-style-type: none"> Social impact 	<ul style="list-style-type: none"> Control through appropriate management measures; Prevent through HSEC management measures 		Objectives of Labour and safety laws
Clearing of vegetation within the footprint of the topsoil stockpile and the proposed mining area	<ul style="list-style-type: none"> Dust pollution 	<ul style="list-style-type: none"> Control through dust suppression Control through minimisation of vehicle movement Control through monitoring of dust fall to determine if measures are effective 	All phases	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded
	<ul style="list-style-type: none"> Soil erosion, compaction and contamination 	<ul style="list-style-type: none"> Prevent through restricting the disturbed area Prevent through restricting spillage from haulage vehicles Control through removal of all utilizable soil and storage of the same class Control through implementation of storm water management measures Remedy through treatment of contaminated soils 		Rehabilitation standards/objectives
	<ul style="list-style-type: none"> Loss of vegetation Invasion by alien invasive species 	<ul style="list-style-type: none"> Control through restricting the footprint to be cleared Control through alien invasive eradication programme 	All phases	Rehabilitation standards/objectives



	<ul style="list-style-type: none"> • Visual impact 	<ul style="list-style-type: none"> • Avoid/prevent leaving any building material or waste on site 		Rehabilitation standards/objectives
	<ul style="list-style-type: none"> • Heritage 	<ul style="list-style-type: none"> • Prevent through reporting and evaluation of any archaeological or heritage features found 		Impact avoided
	<ul style="list-style-type: none"> • Social impact 	<ul style="list-style-type: none"> • Control through appropriate management measures; • Prevent through HSEC management measures 		Objectives of Labour and safety laws
Hauling and transport of sand during operations	<ul style="list-style-type: none"> • Dust pollution 	<ul style="list-style-type: none"> • Control through dust suppression • Control through minimisation of vehicle movement • Control through monitoring of dustfall to determine if measures are effective 	All phases	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded
	<ul style="list-style-type: none"> • Soil erosion, compaction and contamination 	<ul style="list-style-type: none"> • Prevent through restricting the disturbed area • Prevent through restricting spillage from haulage vehicles • Control through removal of all utilisable soil and storage of the same class • Control through implementation of storm water management measures • Remedy through 		Rehabilitation standards/objectives



a) Financial Provision

(1) Determination of the amount of Financial Provision.

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

The overall goal for closure of the 5 ha sand mining site is to shape the excavations to avoid damming of water, ensuring that the land is stable and safe in the long-term. For post closure, the pit will be shaped and rehabilitated and proposed future use after mining will be grazing. Closure objectives relate to the following:

Physical stability: To level and shape excavations.

Environmental quality: To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contaminants arising from the mining after completion of mining activities.

Health and safety: To limit the possible health and safety threats to humans and animals. Level and shape excavations to avoid damming of water.

Land capability/land-use: To ensure continuation or to the re-instate a suitable land capability over as large as possible area affected during mining.

Aesthetic quality: To leave behind a rehabilitated site that is neat and tidy, giving an acceptable overall aesthetic appearance.

Biodiversity: To encourage the re-establishment of indigenous and/ or appropriate vegetation on the rehabilitated mining site such that the biodiversity is largely re-instated over time, as well as protect the undisturbed areas to maintain/enhance the biodiversity of these areas. Mining area rehabilitated to limit impact on current land use.



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

It is confirmed that the objectives have been compiled in taking into cognizance the inputs of the landowners and I & APs. **The following media of communication with interested and affected parties (I & APs) were used:**

- A **newspaper advert** was published on the local newspaper “**Streeknuus**”, giving notice to I & APs of the applicant’s intention to prospect the area as well as inviting all affected parties to a meeting where the applicant would provide full details of the project. The Streeknuus Newspaper is distributed in areas including the towns of Bronkhorstspuit, Delmas, Rayton, and Cullinan.
- **Registered letters** were sent via SA Post Office to the following authorities:
 - Department of Water and Sanitation
 - Department of Agriculture and Rural Development
 - City of Tshwane Metropolitan Municipality
 - Gauteng Regional Land Claims Commissioner
 - South African Heritage Resources Agency
 - Eskom
 - Gauteng Department of Roads and Transport
 - Gauteng Department of Economic Development
 - Gauteng Growth and Development Agency
 - Gauteng Tourism Authority
- **Site notices** written in English (A3 sized) were placed in strategic areas such Local Supermarkets, Rayton and Cullinan Community Library and project area- portion 0 of the farm Minnaar 292 JR.
- E-mail and telephonic communication with I & APs;
- **Comment and registration sheet:** I & APs were requested to provide written comments, concerns and inputs that would be consolidated into the BAR;



- **Questionnaires:** Property owners in particular were provided with an environmental aspect questionnaire to complete to assist in identifying features on their respective farms that may require protection or special attention;
- The public meeting with interested and affected parties was held as follows:
Venue: Cullinan Community Sports Centre, Cullinan
Date: 08th June 2019 (Saturday) Time: 11:00 am to 13:00 pm
- A register of I & APs was kept and as such the following information was distributed to them:
 - Background Information Document (BID). The BID is comprised of the following information:
 - The description of the land concerned;
 - The location of the project;
 - Mining method
 - The minerals applied for;
 - Timeframes for submission of reports to the DMR;
 - Request to target audience to register as I & APs;
 - Contact details of the applicant and EAP
 - The Basic Assessment Report and Environmental Management Plan (BAR & EMPr) for the proposed project was made available for public review and comment from the **24th of May 2019 to the 22nd of June 2019** at the following places:
 - Venue:** Rayton Community Library, Refilwe Community Library and Cullinan Library
 - Online at:** www.sakalandtebo.co.za



Other Interested and Affected Parties

It is important that I & APs represent all relevant sectors of the society and various relevant organs of state who work together to make better decisions. A stakeholder database has been compiled for this project. The I & APs currently identified for the proposed project include the following categories (for full list of I & APs refer to **Appendix C**):

- Land owners-Mr. Eduan Du Plessis
- Relevant authority including the following:
 - Department of Water and Sanitation
 - Department of Agriculture and Rural Development
 - City of Tshwane Metropolitan Municipality
 - Gauteng Regional Land Claims Commissioner
 - South African Heritage Resources Agency
 - Eskom
 - Gauteng Department of Roads and Transport
 - Gauteng Department of Economic Development
 - Gauteng Growth and Development Agency
 - Gauteng Tourism Authority

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

- The removal, decommissioning and disposal of all mining infrastructure, will comply with all conditions contained in the Mineral and Petroleum Development Act, 2002 (Act No. 28 of 2002).
- To this end the decommissioning and rehabilitation of all infrastructure areas will follow the following principles:



- All vehicles, plant (crusher and screening plant) and workshop equipment will be removed for salvage or resale;
- All fixed assets that can be profitably removed will be removed for salvage or resale;
- Any item that has no salvage value to the mine but could be of value to individuals will be treated as waste;
- All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level;
- The excavations will be filled in with soil, the top 100 mm being topsoil (from stockpiles);
- Paved roads will be ripped up, the wearing course treated as waste and the sub-base ripped or ploughed and covered with 100 mm topsoil;
- Inert ceramic waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility;
- All disturbed and exposed surfaces will be covered with at least 100 mm of topsoil and re-vegetation must be allowed to take place naturally;
- Water quality will be monitored until it reaches a steady state or for two years after closure;
- Dismantle and remove redundant fence for salvage;
- Demolish all concrete fence foundations to 500 mm below the original ground level;
- Cover the fence line with topsoil; and
- All services such as the water supply line and the power line will be demolished only for the section on the mine's property.



SUBMISSION OF INFORMATION

- All facilities that become redundant during the life of the mine must be rehabilitated concurrently to lighten the rehabilitation process at the end of the mine's life;
- Attention must be paid to the latest developments in the mine rehabilitation sciences;
- The mine closure plan must always keep pace with the current best practices so it must be reviewed every five years; and
- All information as required by the various government departments should be captured and be readily available for submission when required.

MAINTENANCE

The necessary agreements and arrangement will be made by The Source Mineral Group (Pty) Ltd to ensure that all natural physical, chemical and biological processes for which a closure condition have been specified are monitored until they reach a steady state or for two years after closure or as long as deemed necessary at the time; and

- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

CLOSURE GOALS AND TARGETS

"That all residual environmental impacts associated with the mining method employed, including possible final voids, infrastructure, and stockpile will be neutralized or minimised such that the post-mining environment is able to function in a manner which conforms to the concept of sustainable development." Implement operational control measures as indicated and required by the EMP:

- Ensure post mining provision (financial) is documented and available;
- Initiate first stage rehabilitation with the aim of establishing low yield graze land, simultaneous acknowledgement of structural and service related factors for the later residential development objectives;



- Establish a close working relationship with adjacent operational institutions and facilitate a common long term closure objective;
- Address post mining objectives as stipulated in the section below; and
- Establish and conform to a frequent monitoring and reporting programme, such that liability assessments as well as legal compliance is tested and screened for improvements.

PERFORMANCE ASSESSMENTS

The proposed mining activities are only temporary on the land, so it is vital that rehabilitation of land takes place once mining operations have stopped. However, concurrent rehabilitation should take place where applicable. Mine reclamation activities are undertaken gradually;

- with the shaping and contouring of excavated areas,
- removal of infrastructure,
- replacement of topsoil,
- seeding with grasses and planting of trees taking place on the mined-out areas, and
- Care is taken to relocate wildlife, and other valuable resources.

The above is largely achieved through bulldozers and scrapers which is used to reshape the disturbed area. Drainage within and off the site should be designed to make the new land surface as stable and resistant to soil erosion as the local environment allows.

INFRASTRUCTURE AREA

The removal, decommissioning and disposal of all mining infrastructure, will comply with all conditions contained in the MPRDA, 2002 (Act No. 28 of 2002). To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:



- Dismantle project related infrastructure. Load and remove from site for re-sale or disposal at an approved waste site;
- Any item that has no salvage value to the mine but could be of value to individuals will be treated as waste;
- Demolish and remove concrete foundations and slabs to an approved waste disposal facility, also to opencast voids;
- Dismantle and remove redundant fence for salvage;
- Cover the fence line with topsoil;
- The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities;
- All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level;
- Rip and grade the above areas for placement of topsoil;
- Rip and grade mine roads for placement of topsoil;
- Maintenance of roads required for maintenance and monitoring;
- Load from stockpile, haul, place and spread a layer of topsoil on all areas on which vegetation will be established;
- Establish vegetation on topsoiled surfaces, including analysis of topsoil, application of fertilisers, application of seed and hand planting as necessary;
- Active maintenance of planted areas for a period of at least a year, including re-seeding and replanting, weed and alien vegetation control as required;
- Passive maintenance of planted areas, including re-seeding and re-planting, weed and alien vegetation control as required;
- Undertake complete groundwater quality and water level monitoring in order to establish long-term groundwater levels and quality trends;



- Haul roads will have consolidated basement materials lifted and disposed in to pit. Footprint of haul roads will be ripped to a depth of 1.0 meters. Topsoil will be spread over the ripped haul road footprint to a depth of 300 mm and reseeded; and
- Piping and water treatment infrastructure will be maintained on site until water quality monitoring data proves that the water quality is acceptable for direct release to the receiving environment. The detailed closure plan that will be developed at end of mine life will address Long water monitoring and maintenance requirements.

MINE RESIDUE

Topsoil deposit will be capped where necessary and vegetated with the seed mix proposed above. *Stoloniferous* grasses are included to bind the topsoil and soils and prevent erosion. The following basic principles of rehabilitation form the basis of the truck and shovel mining method:

- Prepare a rehabilitation plan prior to the commencement of mining;
- Agree on the long-term post - mining land use objective for the area with the relevant government departments, local government councils and nearby community members. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation;
- Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- Prevent the introduction of noxious weeds and pests;
- Minimise the area cleared for mining and associated facilities to that absolutely necessary for the safe operation of the mine;



LEADING CLOSURE OBJECTIVES

- **Socio Economic**

Closure Management Objectives

The retrenchment processes will be followed as per requirements of the applicable legal process.

Specific Performance Criteria

- The rehabilitated mining environment shall be made safe and deemed safe;
- Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated Development Plan (IDP) of the area and the local authorities (i.e. municipality). The soils and land capability will be rehabilitated.
- The location and details of any buried hazards will be clearly defined and robust markers will be installed and maintained.
- All fences erected around the mine will be dismantled and either disposed of at a permitted disposal site or sold as scrap (provided these structures will no longer be required by the post-mining landowner). Fences erected to cordon-off dangerous excavations will remain in place and will be maintained as required.

Monitoring and Reporting

- Commitments made by the mine to I&APs in the issues register will be followed up on a regular basis.
- PPP reports and meeting minutes will be made available to all who attended and copies kept on site. This will include an issues and response register.
- The stakeholder engagement manager will be responsible for keeping all records and following up on commitments made to affected parties.

Action Required

- Any commitments made to I & APs will be attended to the relevant I&AP satisfaction as agreed upon between the I & APs and the mine.



- **Traffic and Safety**

Closure Management Objective

- Ensure that all roads rehabilitated and or left behind is safe in good working condition, ensuring public safety and access to site and monitoring points.

Monitoring and reporting

- The site manager will inspect the roads for degradation and spillages.
- Speed limits will be enforced on site where appropriate and feasible.
- All incidences and issues will be recorded, as will the actions taken to address issues and records of such actions kept on site.

Action required

- Any degradation to roads will be repaired with consultation of the roads department.

- **Topography and erosion control**

Closure Management Objectives

- Former Digital Terrain Measurements (DTM) will be used to establish what contours were present prior to topsoil dumps and these will be used to help shape the area according to the final topographical plan.
- The area will have contours constructed to prevent soil erosion.

Specific Performance Criteria

- Surface water bodies shall not be left in any mining voids unless the operations manager demonstrates there will be no significant environmental impact (such as salinization, reduction in water availability, toxicity, algal problems, attraction to pest species or a local safety hazard).
- All slopes which may incur erosion will be profiled in such a way that a preferential down drain can be installed.



- Rehabilitated profiles must ensure free drainage of water and should be contoured to fit in with the catchment dynamics.
- Erosion control measures such as contour banks and cut off berms should be constructed and soil vegetated in rehabilitated areas. On gentle slopes, water will be encouraged to flow off the rehabilitated surface as surface flow, as quickly as possible without causing erosion.
- Where areas of potential ponding are noted, is to be re-profiled to be free draining thereby minimising the potential for ponding.
- All other slopes will have contour drains installed to prevent erosion at intervals of no more than 5 m vertical and have a slope of no steeper that 1:250. These contour drains will have an upslope basin with down slope berms.
- Batter board positions at 50m intervals will be set out with the desired slope; these batter boards are to ensure that rehabilitation is completed to within 10% of the final landform. Grid pegs will be set out using the detailed 10m grid in the final profiling to achieve compliance.
- On achieving the profile to within 10% of the final elevation, the fill areas can be pegged out with stakes and these cut off on the elevation of the final profile. The final fill material will be placed around these until the stakes are covered.
- Erosion control measures such as contour banks and cut off berms should be constructed and soil vegetated in rehabilitated areas. On gentle slopes, water will be encouraged to flow off the rehabilitated surface as surface flow, as quickly as possible without causing erosion.

Monitoring and Proposed Actions

- During decommissioning, the environmental site manager together with the site manager will monitor construction activities at least weekly to ensure the trenches and dams are in accordance with the specification as per design.



- After rehabilitation the site will be monitored for any pooling or erosion on site, especially after rainfall. This will be the responsibility of the environmental site manager.
- The area needs to be surveyed every two months to monitor differential settlement.
- The environmental site manager will ensure annual soil assessments be conducted by specialist pedologists after rehabilitation of the site.
- Weekly inspections will be conducted by the environmental site manager for any erosion which must be addressed immediately if observed, and together with the site manager will inspect all pipelines and associated dirty water channels/compartments to ensure no leaks or damage to these.
- All dirty water separation and containment facilities will also be inspected at least weekly (and after each rainfall event), to ensure adequate functioning of all systems to prevent leaks into the environment which will negatively impact on the soils.
- The environmental site manager will ensure monthly inspection of surrounding areas for soil compaction.
- Ensure surface water monitoring and action plans are implemented.
- Rehabilitated sites will be inspected for soil erosion on a monthly basis, together with the visual inspection regards to the vegetation cover abundance.
- The rehabilitated areas must be monitored for the type and depth of soil cover used.
- Monitoring of any ecologically sensitive species should they be observed on site will be done as and when required.
- The site will be monitored for alien invasive species at least every 6 months. This will, however, be dependent on the species of alien invasive species on site.
- Floral surveys will be conducted on rehabilitated areas on an annual basis, together with the soil quality and depth monitoring.



- All reports will be kept at the mining offices. All incidences and issues will be recorded, as will the actions taken to address issues. The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.
- The site manager is responsible for ensuring that all vehicles, remaining on site during the decommission phase, are serviced on a regular basis in terms of the maintenance plans.

Action Required

- Any pooling will be addressed by filling depression and / or grading areas and re-vegetating such sites.
- Any erosion will also be addressed utilising contour berms, gabion structures if necessary or a specialist will be consulted if necessary. Any eroded soils will be lifted and returned to the affected area.
- Any deficiencies will be corrected by placing material in these areas as per the rehabilitation plan.
- Additional material or soil will be brought in if required.
- Where topographical areas are exceeded and create storm water drainage issues, excess material will be removed and area rehabilitated as per the rehabilitation plan.
- Any recommendations made by specialist pedologist after annual surveys of rehabilitated areas will be considered for implementation as proposed.
- Any eroded soil will be lifted and replaced to the area which has been eroded.
- The area will be rehabilitated as per the rehabilitation plan.
- Erosion control measures, such as gabion structures, will be considered at areas where erosion is persistent.
- Records of soil placement and package thickness will be kept on a monthly basis during the mining phase.
- Where the soil depth is compromised the areas will be filled with topsoil.



- Material will be brought in if necessary.
- Silt build-up in water management facilities will be cleared and deposited in residue deposits if dirty.
- Any compacted soils will be ripped and re-vegetated with indigenous flora. Vegetation will then be monitored in these areas.
- Should any erosion be observed on site, it will be reported to the site manager and environmental site manager. The issue will be addressed and consideration given to:
 - Increasing vegetative cover in problem areas through manual seeding/planting.
 - Implementing erosion control measures such as contour berms or gabion baskets.
 - Consulting specialists.
 - Should soil depth be inadequate in the rehabilitated areas, then more soil will be brought in and deposited on the site.
 - The area will also be inspected for erosion to determine the reason for soil loss. This will be addressed immediately.
 - All recommendations made by the specialists will be implemented where deemed appropriate.
 - Manual seeding or planting should vegetative cover be inadequate.
 - An alien invasive management program will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised will be used responsibly. Where required Department of Water and Sanitation (DWS) will be consulted with regards to the use of certain chemicals.

- **Surface Water Control**

Closure Management Objectives

- Surface water will be managed as per GN704 and all clean water will be diverted around the rehabilitated area.



- All water that falls on the rehabilitated area will be managed in such a way that no erosion will occur through the use of contour drains.
- Potential dirty water will be directed to containment dams or silt dams.
- The filled and rehabilitated area will be shaped to facilitate run-off towards the catchment area.
- There shall be no long term reduction in the availability of water to meet local environmental values.

Specific Performance Criteria

- Actions shall be taken during rehabilitation to ensure that surface and groundwater hydrological patterns/flows will not be adversely affected by the rehabilitation.
- Surface and groundwater levels and quality will reflect original levels and water chemistry;
- Clean water diversion drains are to be installed around the area. Once the final re-profiling has been completed and the clean water diversions are constructed on the rehabilitated ground.
- Run-off from un-rehabilitated areas will be directed away from any rehabilitated areas. Runoff from rehabilitated areas will be channelled to sedimentation structures so that eroded soil does not leave the property.
- Where seepage/decant may occur deep cut off trenches will be created to intercept the ground water where it daylights downstream and directed or pumped to the containment dam upslope of the void.
- Natural drainage lines will be followed to reduce loss of water in the natural catchments.

Monitoring and Proposed Actions

- The environmental site manager will ensure that surface water quality is monitored on a monthly basis during the closure phase.



- A water quality report will be compiled on a quarterly basis and will show all the high risk areas and areas deviating from current background water quality.
- Specialists recommendations with regard to water quality issues observed, will be implemented as appropriate.
- Water management features will be upgraded as necessary if water quality issues arise from these structures.
- The rehabilitated area will be monitored for ponding.
- Any areas where ponding occurs will be filled and reshaped as per the rehabilitation plan to ensure surface water runoff from the area and discourage ponding.

Water Quality Monitoring and Reporting

- This monitoring program will include various upstream and downstream monitoring points and various sources on site.
- Database of results will be maintained by the environmental site manager and quarterly and annual reports will be compiled and submitted to the mine management and will be submitted to DWA.
- All samples will be submitted to an accredited laboratory for analysis.
- The following water quality parameters are recommended for the closure phase analysis:
 - ✓ Total Dissolved Solids;
 - ✓ Electrical Conductivity;
 - ✓ pH level;
 - ✓ Alkalinity;
 - ✓ Carbonates;
 - ✓ Magnesium;
 - ✓ Calcium;
 - ✓ Sodium;
 - ✓ Potassium;



- ✓ Sulphate;
- ✓ Chloride;
- ✓ Fluoride;
- ✓ Iron;
- ✓ Manganese;
- ✓ Aluminum
- ✓ Water use and consumption on site must be monitored at various strategic locations on site.

- **Ecology**

- **Closure Management Objectives**

- Areas will be fenced off once seeded to prevent surface disturbance to the site and allow for vegetation to establish and stabilise.

- **Specific Performance criteria**

- Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems.
- The rehabilitated ecosystem will have equivalent functions and resilience as the target ecosystem.
- Soil properties will be appropriate to support the target ecosystem.
- The rehabilitated areas will provide appropriate habitat for fauna
- Fauna utilisation, abundance and diversity appropriate to specified post mining land use.
- Berms will be maintained. This will be undertaken by vegetating all berms to ensure that they are stable. The berms will also be inspected to ensure that there are no cracks, which could cause leakage. The berms will only be demolished should the area prove to be free draining with no pollution potential after rehabilitation.



Monitoring and Proposed Actions

- Services of a qualified person will be used to monitor the re-vegetation of the rehabilitated areas.
- Records of the monitoring will be kept on site.
- The environmental site manager will ensure that an alien invasive monitoring, eradication and control programme is established during closure and the area will be inspected at least every 3 months and more frequently in areas where alien species were observed.
- The environmental site manager will be responsible for inspecting and managing any protected flora that may be identified by specialists. Specialists will be consulted regarding relocation of these species if necessary during rehabilitation or closure.
- All incidences and issues during closure will be recorded, as will the actions taken to address issues. These will be filed and kept at the mine offices.
- Rehabilitation will be visually inspected at least monthly with regards to vegetation cover abundance.
- The rehabilitated area will be inspected monthly for general erosion and vegetative cover.
- Rehabilitated areas will be monitored for soil quality and depth annually.

Action Required

- Should it be noted that designs are not being followed, rehabilitation activities will be amended to ensure corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.
- The specialist's recommendations from bio-monitoring and from annual floral surveys of rehabilitated areas will be implemented as soon as possible.
- Should any erosion be observed on site, it will be reported to the site manager and environmental site manager. The issue will be addressed and consideration given to:
 - Increasing vegetative cover in problem areas through manual seeding/planting.



- Implementing erosion control measures such as contour berms or gabion baskets.
- Consulting specialists.
- Should soil depth be inadequate in the rehabilitated areas, more soil will be brought in and deposited on the site.
- The area will also be inspected for erosion to determine the reason for soil loss.
- All recommendations made by the specialists will be followed.
- Manual seeding or planting should vegetative cover be inadequate.
- An alien invasive management programme will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised must be used responsibly.

- **Land use**

Closure Management objectives

- To ensure that rehabilitation (physical and chemical) is done to such an extent that land use potential is regained.

Specific Performance Criteria

- Soil samples will be taken from rehabilitated areas annually over the full period of closure to determine soil fertility, depth compaction, acidity and mine related pollution. This should be conducted by qualified specialist who will also recommend actions and remedial measures to correct any issues observed on site.
- Only after the levelled areas have been inspected and approved by the Mine Manager/Site Manager will topsoil be placed to a depth of 0.5 m (where possible the original topsoil types should be placed back into the area where it was found). The topsoil layer must be as even as possible, i.e. it must be smooth and the depth must remain consistent throughout.



- Once the topsoil has been replaced, vehicle movement will be restricted to prevent compaction of the topsoil. All runoff from freshly top soiled areas will be channelled to pollution control structures so that eroded soil does not leave the property.
- Rehabilitated areas will be vegetated within the same growing season (before or during the rainy season). A suitable seed bed will be prepared to enhance the penetration and absorption of water, thereby giving the seed the best possible chance to germinate. The seeding depth should be very shallow to provide better germination. For most grass species seeding depth is approximately 5- 15mm.
- Rehabilitated areas will be re-vegetated with local indigenous flora as far as possible.
- Once the seed mixture has been sown the land must be rolled using to ensure consolidation around the seeds and effective moisture retention. Access to seeded areas will be restricted to protect the newly established pasture.

Monitoring and Measurement

- A detailed monitoring and reporting programme will be established and followed.
- Rehabilitated areas will be monitored for vegetation cover and alien invasive encroachment at least monthly by visual means.
- Areas of failed growth will be fertilised if necessary and re-seeded or planted with seedling plugs. All exotic and invasive vegetation should be removed.
- **Ground water**

Closure Management Objective

- A cut-off intercept drain will be constructed to capture any seepage.
- Monitoring will continue to detect and report on changes in ground water regime

Groundwater Quality and Quantity Monitoring and Reporting

- Up slope and down slope groundwater monitoring will be conducted on a quarterly basis during the closure phase;



- Water management features will be upgraded as necessary if water quality issues arise from these structures.
- The environmental site manager will be responsible for the implementation and maintenance of the groundwater monitoring and results obtained.
- The groundwater quality and levels will be monitored on a quarterly basis.
- All monitoring boreholes must be demarcated and protected to prevent damage or tampering.
- All samples will be submitted to an accredited laboratory for analysis.
- The following chemical parameters are recommended for the analysis during the closure phase:

Total Dissolved Solids / Electrical Conductivity;

- ✓ pH level;
- ✓ Alkalinity;
- ✓ Carbonates;
- ✓ Magnesium;
- ✓ Calcium;
- ✓ Sodium;
- ✓ Potassium;
- ✓ Sulphate;
- ✓ Chloride;
- ✓ Fluoride;
- ✓ Iron;
- ✓ Nitrate;
- ✓ Manganese; and
- ✓ Aluminium
- ✓ Water use and water consumption on site will be monitored at various strategic areas on site.



General Monitoring and Reporting

- The environmental site manager and site manager will inspect all water management facilities and associated pipelines at least weekly to ensure there are no leaks which would result in loss of water and that they are functioning optimally.
- The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.
- All incidences and issues will be recorded, as will the actions taken to address issues. These will be kept at the mine offices.

Action Required

- Should significant changes in qualities or levels be observed then:
- All high risk facilities will be inspected to ensure no severe problems occur in these areas which have resulted in poor quality leachate.
- Any issues observed will be reported to the environmental site manager and respective site manager.
- A geo-hydrologist will be consulted with regards to any additional mitigation or management activities which can assist in resolving potential pollution, such as cut-off drains.
- Should substantial decreases in groundwater levels or quality be observed in boreholes utilised by surrounding community then the applicant will need to find solutions in conjunction with affected parties.
- Should spikes be observed in water consumption then these will be investigated immediately and sources identified.
- All leaks identified will be repaired.
- Silt build-up in water management facilities / dams will be cleared and deposited in soil stockpiles if clean or in residue deposits if dirty.



- **Air Quality and Noise**

Closure Management Objectives

- Dust suppression should be undertaken at site especially during the dry season and during windy conditions.

Monitoring and proposed actions

- Dust suppression techniques and/or frequency will be altered as necessary should dust levels become excessive and exceed target values during rehabilitation.
- Air quality monitoring and reporting will be conducted according to the GNR 827 – Dust control regulations;
- The environmental site manager will be responsible for managing the air quality database and implementing actions, should target levels and frequencies be exceeded. PM10 and PM2.5 monitoring will be conducted if required as per the air quality act and also fall within the responsibility of the environmental site manager.
- Ambient noise will be monitored bi-annually on the mine boundary in at least four compass directions.
- Occupational noise will be monitored on a monthly basis as part of Safety, Health and Environment.
- The environmental site manager will be responsible for managing noise level database and implement actions should acceptable noise levels be exceeded.
- The site manager will be responsible for ensuring that all vehicles, including those of contractors, are maintained as per their maintenance plan.
- All incidences and issues will be recorded, as will the actions taken to address issues. These will be kept at the mine offices.
- Specialists will be consulted where necessary.



Action required

- Should ambient dust levels exceed recommended standards and frequencies as per the Air Quality Act, then the management plan for dust will be re-evaluated and assessed to improve dust control on site. Actions could include:
 - Use of dust binding agents in areas of high dust generation.
 - Consideration of sprinkler systems in areas of high dust generation.
 - More frequent spraying.
- Should ambient noise levels exceed target levels:
 - Additional noise measurements will be taken at all sensitive receptors beyond the mine boundary in question, initially those nearest to the mine and working further away until levels are within acceptable levels.
- Should levels at sensitive receptors still exceed target levels, and it is due to mining activities, then the noise management plan will be re-evaluated to reduce noise at these sensitive receptors to within acceptable limits.
- Additional actions can include:
 - ✓ Utilisation of sound buffers or screens around noise sources.
 - ✓ Enclosing point sources in sound-proof enclosures if possible.
 - ✓ Utilising silencers on equipment.
 - ✓ Considering quieter equipment.

DOMAIN SPECIFIC CLOSURE CRITERIA

The following is a list of domain specific criteria which can be tested and quantified. These closure criteria include post-closure environmental outcomes which must be linked to the monitoring and measurement schedule and program. Please refer to the financial provision for mine closure for the cost associated with these domains.



Domain 1: Mobile Office

The contractor will provide a mobile office (4 x 10 m), the price of which has been included in the contractor's site establishment costing. A mobile office for the weighbridge will be established by the contractor and is included in the site establishment costing.

Domain 2: Screening and Crushing Plant and Associated Infrastructure

- Clean water trenches must remain where necessary and should be maintained by continuous inspections. The cut off trenches should be clean at all times, ensuring that they contain no obstructions. The cut off trenches will only be demolished should the area prove to be free draining with no pollution potential after rehabilitation.
- All pollution control structures will remain on site during closure to ensure the protection of the surrounding environment. These will only be rehabilitated once water runoff quality is of adequate quality to release into the environment.

Domain 3: Waste and Water Related Infrastructure

- All pollution control structures will remain on site during closure to ensure the protection of the surrounding environment. These will only be rehabilitated once water runoff quality is of adequate quality to release into the environment.
- The storm water diversion trench will remain in place after decommissions to reduce run-off over the rehabilitated area and reduce erosion.

Domain 4: Mine and Mine Associated Infrastructure

- Any excavations will be filled where appropriate unless demonstrated as necessary to support future land use.
- During rehabilitation it is imperative that the material placed against the high wall is compacted so as to prevent differential settlement, cracking and water ingress. Compaction can be achieved by redirecting the flow of traffic using either marker poles or drums to ensure proper tyre coverage and thus tyre compaction.



- All voids to be closed and rehabilitated at final closure of the mine.
- Ensuring water does not infiltrate too quickly and come into contact with carbonaceous material.
- Where areas of potential ponding are noted, these are to be re-profiled to be free draining thereby minimising the potential for ponding. Where seepage /decant may occur deep cut off trenches will be created to intercept the ground water where it daylights and this water will be diverted to dirty water containment areas.

Domain 5: Traffic Impact Assessment

The proposed development of the mine can be supported from a traffic flow point of view. It is further recommended that:

- Provision will be made on site to accommodate the safe loading and off-loading of staff using public transport.
- Since the proposed development will generate less than 100 vehicles per hour during the peak hours, only a Traffic Impact Statement (TIS) is required.
- Analyses of existing traffic conditions on the external road network and intersections surrounding the proposed residential development showed that generally the traffic conditions during typical weekday AM and PM peak hours are good with very little congestion during peak hours.
- The analyses of the existing plus development generated traffic showed that the additional traffic generated by the proposed development will not have an impact on the surrounding road network. The surrounding road network is currently operating well below its capacity. Therefore, the generated traffic volumes will easily be accommodated by the existing road network without reducing the levels of service on the surrounding road network. These additional trips will have little or no effect on public transport or pedestrian activities in the area.



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

Due to the nature of the activities, the impacts will be very limited and of short duration. The management plan is provided in such a manner as to ensure concurrent rehabilitation. The areas for mining purposes will be the main area experiencing impacts. In this event the activities will be temporary in nature, and a detailed management plan has been provided to address potential impacts associated with these activities.

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

The quantum of financial provision for the rehabilitation of negative environmental impact was determined in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998): Regulation (GNR 940) pertaining to the financial provision for the rehabilitation, closure and post closure of prospecting, exploration, mining or production operations (DEA, 2014). A total amount of **R 63 850.5415** will be set aside for rehabilitation purposes.

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

Refer to section (s) (ii) of part A and section (j) (1) (e) of part B of this report.



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

Table 3-19: Monitoring of Impact Management Actions

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment / construction of camp site	Visual inspect of soil erosion and compaction	<ul style="list-style-type: none"> ▪ Dust suppression ▪ Speed limits ▪ Service equipment regularly 	Mine Manager	<ul style="list-style-type: none"> ▪ Once-off upfront consultation with affected parties. ▪ Consultation to be signed off by Environmental Management. ▪ All grievances to be signed-off by Environmental Management
Food preparation		<ul style="list-style-type: none"> ▪ Restrict open fires ▪ Maintain fire breaks 	Mine Manager	<ul style="list-style-type: none"> ▪ Weekly and after rain events
Maintenance of vehicles		<ul style="list-style-type: none"> ▪ Use oil trays 	Mine Manager	<ul style="list-style-type: none"> ▪ Weekly and after rain events



SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Disposal of Waste	Visual inspection of soil erosion and compaction	<ul style="list-style-type: none"> Use waste receptacles 	Mine Manager	<ul style="list-style-type: none"> Weekly and after rain events
Preparation of vehicle maintenance concrete padding	Visual inspection of soil erosion and / or compaction	<ul style="list-style-type: none"> Concurrent rehabilitation 	Mine Manager	<ul style="list-style-type: none"> Weekly and after rainfall events
Excavation of box-cuts or open-pits	Visual inspection of soil erosion and compaction	<ul style="list-style-type: none"> Concurrent rehabilitation 	Mine Manager	<ul style="list-style-type: none"> Once-off upfront consultation with affected parties. Consultation to be signed off by Environmental Management. All grievances to be signed-off by Environmental Management
De-establishment and removal of infrastructure	Follow up inspections	<ul style="list-style-type: none"> Systematic rehabilitation 	Mine Manager	<ul style="list-style-type: none"> Monthly for a period of 6 months after



SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
(rehabilitation)	and monitoring of rehabilitation			rehabilitation activities are concluded. <ul style="list-style-type: none"> ▪ Monthly monitoring reports to be signed-off by the Environmental Manager. ▪ Corrective action to be confirmed and signed-off by the Environmental Manager. ▪ Consolidated monthly monitoring reports (including the corrective action taken) to be submitted to the



SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
				Department of Mineral Resources. Assessment report for site closure to be submitted to the Department of Mineral Resources for approval.



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

High level monitoring:

- Bi-annual performance assessment must be conducted in line with the MPRDA (Regulation 55).
- Establish a structured system of internal and external communication of incidents.
- Any changes to the approved EMP which have an impact on interested and affected parties to be communicated to them and the EMP amended accordingly.
- Complaints register to be established and kept up to date.
- Interested and affected parties concerns to be incorporated into the project implementation.

Operational Level monitoring:

- On a regular basis all registers, procedures and records are checked against the prescripts of the EMP. Corrective action must be taken in cases of transgress where necessary.
- Internal audits to be conducted by an environmentalist when deemed necessary.
- Employees assigned to specific tasks.
- Should the mitigation measure not be in line with the prescripts, amendments will be made and the employees will be made aware of the changes and encouraged to adhere to such.
- On commencement of the project, all site personnel will be inducted at the site and will be taken through the EMP and other relevant legal requirements to familiarize them with same.
- Simplified signalling will be placed on site to sensitize the workers of the legal requirements attached to this EMP.

Noise:

- The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) – Section 7.



- The Mine Health and Safety Act, 1996 (Act No. 39 of 1996) as amended.
- The Road Traffic Act, 1997 (Act No. 93 of 1997);
- The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) – Section 34. and
- Regulations of the Mineral and Petroleum Resources
- Development Act, 2002 (Act No. 28 of 2002) – Regulation 66.

Air quality:

- The National Environment Management: Air Quality Act, 2004 (Act No.39 of 2004) (All Sections of this Act, except Section 21,22,36 to 49, 51 (1)(e), 51(1)(f), 51(3), 60 and 61 have taken effect on 11 September 2005);
- The Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965) (This Act will be repealed by the national Environment management: Air Quality Act, 2004 (Act No. 39 of 2004);
- Regulations to the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) – Regulation 64.
- The Mining Health and Safety Act, 1996 (Act No. 29 of 1996) as amended; and
- The Occupational Diseases in Mines and Works Act, 1973 (Act No 78 of 1973)

m) Environmental Awareness Plan

The Source Mineral Group (TSMG) Environmental Awareness Training will be part of its Induction process and environmental Management System (EMS). The induction includes:

- Awareness training for contractors and employees;
- Job specific training – training for personnel performing tasks which could cause potentially significant environmental impacts;
- Comprehensive training – on emergency response, spill management, etc;
- Training verification and record keeping.



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

- Communication channels will be made and will cascade from the Site Manager through to the general workers.
- On a regular basis, all aspects of the operation will be checked against the prescripts of the EMP and its supporting procedures and, if established that certain of the aspects are not addressed or impacts on the environment are not mitigated properly, it will be immediately communicated to the operational team by management.
- Should the mitigation measure not be in line with the prescripts, amendments will be made and the employees will be made aware of the changes and encouraged to adhere to such.
- All site personnel will be inducted at the site and will be taken through the EMP and other relevant legal requirements to familiarize them with same.
- Simplified signage will be placed on site to sensitize the workers of the legal requirements attached to this EMP.

All personnel will undergo environmental awareness training programme as shown in the tabulation below.

Type of training	Training Targets	Standards
<ul style="list-style-type: none"> • Induction programme – legal aspects • Specific environmental aspects: waste, water, hydro carbons, dust, material handling rehabilitation • Competency • Health and safety – dust 	<ul style="list-style-type: none"> • Management • Supervisors • Operators • Visitors • Contractors 	<ul style="list-style-type: none"> • Records • Standard operating procedures • Signage • Personal Protection Equipment



management, emergency preparedness, first aid. <ul style="list-style-type: none"> • Fauna and flora protection 		
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(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

Environmental risks and how to manage them are dealt with in the induction course referred to in section (m) (i) above. If an incident of environmental pollution or damage does occur it is analysed and appropriate prevention and mitigation measures are developed. These measures are added to the EMP and conveyed to the relevant personnel.

All unplanned incidents with the potential to cause pollution or environmental degradation or conflict with local residents will be reported to Department of Mineral Resources within 24 hours.

Hydrocarbon Spills

Hydrocarbon spills that are considered to be emergency incidents are largescale spills (cover a surface area >1m²), resulting from situations such as; a leaking diesel bowser, an oil drum that is knocked over, large spillages from equipment, etc. Activities that are involved in the clean-up of such instances include:

- The containment of the spill,
- The removal of all contaminated material, and the disposal (at a licenced hazardous disposal facility) or bioremediation (at a licenced facility) of this material.



Fire

There is the potential for fire to occur in the following locations of the drill site:

- Mine office complex and
- Vehicles, machinery and equipment.

Veld fires: Any person who observes the fire must report it to the fire brigade immediately and then to their supervisor. If possible, additional personnel may be sent to contain the fire, but only if the lives of the personnel will not be endangered.

Vehicles and Equipment: Fire extinguishers will be available at the site where mining activities will take place and in the vehicles.

In addition to the above negative impact and risk management strategies, The Source Mineral Group (Pty) Ltd will further enforce the following management options.

Table 3-20: Technical and Management Options

Potential impact	Technical and management options
Mineral sterilisation	<ul style="list-style-type: none"> ▪ Mine workings will be developed and designed taking cognisance of potential sand reserves.
Hazardous structures	<ul style="list-style-type: none"> ▪ Establish and maintain site security measures ▪ Control site and facility access ▪ Appropriate design of stockpiles with the potential to fail (and by qualified person) ▪ Implement monitoring programme ▪ Implement an emergency response
Loss of soil resources and land capability	<ul style="list-style-type: none"> ▪ Implement hazardous waste, dirty water and mineralised and non-mineralized waste management procedures



Potential impact	Technical and management options
through pollution	
Loss of soil resources and land capability through physical disturbance	<ul style="list-style-type: none"> ▪ Implementation of a soil management plan ▪ Limit disturbance of soil to what is necessary ▪ Stripping, storing, maintenance and replacement of topsoil in accordance with soil management procedures
Physical destruction of biodiversity	<ul style="list-style-type: none"> ▪ Implement a biodiversity management plan ▪ Restrict mining activities to the authorized footprint (5 hectares) ▪ Provide alternative habitat (where appropriate and necessary) ▪ Implement a monitoring programme ▪ Rehabilitate disturbed areas
General disturbance of biodiversity	<ul style="list-style-type: none"> ▪ Prevention of the killing of animal species and harvesting of plant species ▪ Implementation of dust control measures ▪ Pollution prevention measures (water, soil etc.) ▪ Prevention of the disturbance of ecosystems
Alternation of drainage patterns	<ul style="list-style-type: none"> ▪ Avoid alteration of watercourses as far as practically possible ▪ Implement and maintain stormwater controls that meet regulatory requirements
Surface water pollution	<ul style="list-style-type: none"> ▪ Appropriate design of polluting facilities and pollution prevention facilities (by qualified person) ▪ Implement and maintain stormwater controls that meet regulatory requirements



Potential impact	Technical and management options
	<ul style="list-style-type: none"> ▪ Implement site-specific soil management plan ▪ Implement a groundwater and surface water monitoring programme ▪ Implement emergency response
Groundwater contamination	<ul style="list-style-type: none"> ▪ Appropriate design of polluting facilities (by qualified person) ▪ Correct handling of hazardous wastes, mineralised and non-mineralised wastes ▪ Compensation for loss ▪ Implementation of a monitoring programme ▪ Implement emergency response
Dewatering	<ul style="list-style-type: none"> ▪ Compensation for loss ▪ Implementation of a monitoring programme
Air pollution	<ul style="list-style-type: none"> ▪ Implementation of air quality management plan ▪ Implementation of an air quality monitoring plan ▪ Control dust plumes ▪ Implementation of an air complaints procedure ▪ Maintenance of abatement equipment ▪ Implement an emergency response
Noise pollution	<ul style="list-style-type: none"> ▪ Maintenance of equipment and machinery in good working order ▪ Equip machinery with silencers ▪ Construction of noise attenuation measures ▪ Implementation of noise monitoring programme ▪ Implementation of a noise complaints procedure ▪ Reducing operational hours



Potential impact	Technical and management options
	<ul style="list-style-type: none"> ▪ Educate workers
Visual impacts	<ul style="list-style-type: none"> ▪ Limit the clearing of vegetation ▪ Limit the emissions of visual dust plumes ▪ Use of screening berms ▪ Concurrent rehabilitation ▪ Painting infrastructure to compliment the surrounding environment ▪ Implementation of a closure plan ▪ Management through care and aftercare
Traffic increases	<ul style="list-style-type: none"> ▪ Implementation of a traffic safety programme ▪ Implement speed allaying measures where appropriate, e.g. speed humps where necessary ▪ Education and awareness training of workers ▪ Enforce strict speed limits on mine access roads ▪ Ensure dust is effectively controlled on unpaved roads so as not to reduce visibility ▪ Placement of signage to create awareness ▪ Maintenance of the transport systems ▪ Implementation of traffic complaints procedure ▪ Implement an emergency response
Heritage (and cultural)	<ul style="list-style-type: none"> ▪ Limit project infrastructure, activities and related disturbances as far as practically possible ▪ Avoid heritage and cultural resources as far as practically possible ▪ Inspect sites for encroachment and/or damage



Potential impact	Technical and management options
	<ul style="list-style-type: none"> ▪ Education and awareness training of workers ▪ Implement emergency response with respect to the chance find procedure for heritage, cultural and paleontological resources
Economic impact	<ul style="list-style-type: none"> ▪ Hire people from closest communities (Rayton, Refilwe and Cullinan) as far as practically possible ▪ Extend the formal bursary and skills development to closest communities ▪ Implement a procurement mentorship programme ▪ Local procurement of goods and services as far as practically possible ▪ Compensation for loss of land use ▪ Closure planning will consider skills, economic consideration and the needs of future farming
Inward migration	<ul style="list-style-type: none"> ▪ Good communication in terms of recruitment, procurement and training ▪ Number of temporary and permanent new job opportunities and procurement will be made public ▪ Employment and procurement opportunities provided to closest communities as far as practically possible ▪ No recruitment at the mine ▪ Notify unsuccessful job seekers ▪ Encourage formal housing of employees and implement contractual requirement for contractors to ensure formal housing for workers, both temporary and permanent



Potential impact	Technical and management options
	<ul style="list-style-type: none"> ▪ Maintain a skills profile for the nearest communities ▪ Monitor and prevent the development of informal settlements through the interaction with neighbours, local authorities and law enforcement officials ▪ Implement a health policy of HIV/AIDS and tuberculosis to promote awareness and training ▪ Implement an emergency response
Land uses	<ul style="list-style-type: none"> ▪ Implementation of EMP commitments that focus on environmental and social impacts ▪ Take necessary steps to prevent negative impact on surrounding land ▪ Compensation for loss ▪ Closure planning to incorporate measures to achieve future land use plans

n) Specific information required by the Competent Authority

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

The Source Mineral Group will annually declare financial statements to the Department of Mineral Resources (DMR).



.2) UNDERTAKING

The EAP herewith confirms

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

Signature of the environmental assessment practitioner:

Sakal and Tebo (Pty) Ltd

Name of company:

22nd June 2019

Date: