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Beyond Green Environmental Services Pty Ltd

NAME OF APPLICANT: FM Crushers

PROPOSED PROJECT: OPENCAST MINE

FINAL SCOPING REPORT FOR THE PROPOSED MINING RIGHT FOR RHYOLITE MINERAL ON RESERVE 16 OF FARM 15638 IN THE MAGISTERIAL DISTRICTS OF MHLABUYALINGANA, KWA-ZULU NATAL PROVINCE

SUBMITTED FOR ENVIRONMENTAL AUTHORISTAION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY AN APPLICATION IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT 28 OF 2002) (AS AMENDED)

Commodity: Rhyolite

Date: JANUARY 2016

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Executive summary

FM Crushers proposed to mine industrial mineral which is known as Rhyolite. The proposed project will be done in terms of the Mineral and Petroleum Resources Development Act, Act 27 of 2004 and National Environmental Management Act, Act 107 of 1998. FM Crushers proposed to undertake opencast mining should the right/authorization is acquired. The proposed project is located at Ngwavuma, Jozini local municipality. FM Crushers must appoint an independent Environmental Assessment Practitioner before the Department of Mineral Resources can consider the application. An Environmental Impact Assessment (EIA) is being done by BeyondGreen, an independent company, to evaluate the potential environmental and social impacts of the proposed project. The EIA is being done in terms of the NEMA EIA 2014 Regulations.

The first phase of an EIA is the Scoping Phase (see Figure 1 below). This is the phase during which public issues and concerns must be identified so that relevant issues can be evaluated by the EIA technical specialists during the next phase (the Impact Assessment Phase) of the EIA. The EIA Regulations make provision for authority consideration based on the Scoping Phase of the EIA. Therefore this Draft Scoping Report serves the following purpose:

• An introduction to the EIA that is being carried out for the proposed opencast mining

• A description of the regulatory framework for the EIA.

• Description of the proposed project.

• The project alternatives that were considered.

• A description of the way in which the interested and affected parties (I&APs) or stakeholders have been involved.

• To list all issues raised by stakeholders to date.

• To indicate whether all their concerns and suggestions have been considered to date.

Stakeholders could comment on the Draft Scoping Report in the following ways:

• Completing the comment sheet enclosed with the report

• Additional written submissions

• Comment by email or telephone

• Attending public meeting held in Ngwavuma, 11/12/2015.

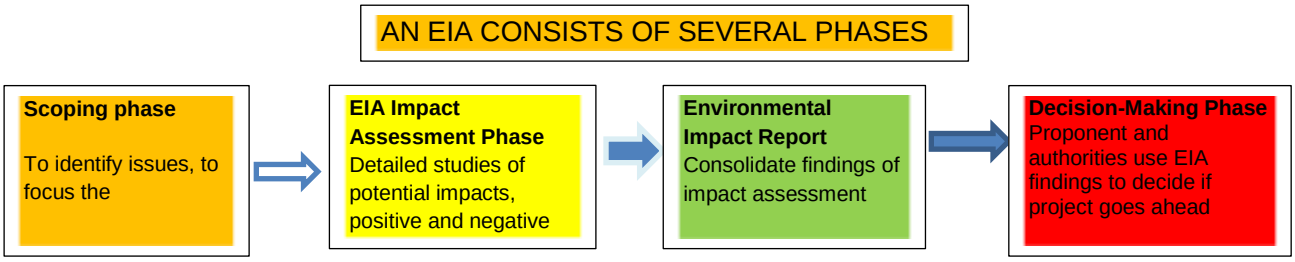

Figure 1. An Environmental Impact Assessment consists of various phases. The EIA for the proposed opencast mining project is currently in the Scoping Phase. This is the first phase of the EIA during which issues are raised that must be evaluated during the next phase.

Project Description

Mining (quarrying) will occur as a drill and blast operation with faces of 9-11m high and a blast size of 3000 – 4000 tons/blast, approximately once per month, with such drilling and blasting will be conducted by contractor. The drilling of holes by hydraulic track rig and the computer controlled blast detonation system represents the latest quarrying technology. Ahead of the face blasting, topsoil (where available outside of exposed bedrock) is removed to topsoil stockpile berms for later use in rehabilitation. Shot rock will loaded by excavator into articulated dump trucks for hauling to the processing plant for crushing and screening of sizes to meet market requirements.

The construction phase will compose of the following activities

• Site establishment 6 months: this include

• Strip Topsoil and stockpile

• Remove Softs and stockpile

• Drill & Blast

• Remove Hards and stockpile

• First rhyolite with temporary stockpile

Legal Framework

In terms of the MPRDA, a mining right cannot be granted until an environmental authorisation has been issued in terms of the National Environmental Management Act, 1998. The EIA Regulations 2014 define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities. This scoping report has been compiled to meet the requirements of the EIA Regulations 2014. In accordance with the EIA Regulations 2014, all legislation and guidelines that have been considered in the preparation of the Scoping Report are documented.

Need and Desirability

BeyondGreen present the needs and desirability of the mining in terms of various national plans and policies. They make the case that mining would result in long-term benefits for South Africa consisting poverty alleviation, development, housing, major in-country investments in a development project. The extraction of stone is in the best interest of the public at large. Rhyolite Stone is classified as an industrial mineral and is mainly used in the construction industry. Government contracts with construction companies in order to develop infrastructure related to health, transport, residences as well as education sector for the development of a nation.

Process followed to reach the preferred Alternatives

A high-level, comparative assessment of the alternatives is presented in the scoping report. This includes consideration of locality, types of activities, the design/layout, technology, operational aspects and the no-go alternative. Residential and subsistence farming methods were investigated. It is concluded that the there is little difference, advantage or disadvantage between the alternatives that are available. Residential area and farming are impossible to have it within the proposed area; the landscape is very much steep and stone seam outcrop.

The project site is determined and delimited by the extent of the aggregate seam and no further site alternatives have been assessed. Currently the infrastructure location has not been finalized and is awaiting findings from the assessment studies which will be completed as part of the EIA/EMP process. Any alternatives which may come from these studies will be further assessed in the EIA/EMP report.

Project activity alternatives have not been further assessed. The aggregate/rhyolite seam of interest is shallow and can only be mined by opencast means.

Land use alternatives

Alternative land uses (No-Go, residential and stock subsistence farming) which were considered during land use alternative assessment and the impacts associated with these land uses, in comparison with that of mining.

Alternative 1 implies that no development will take place and that the environment will remain unchanged and unaltered by the proposed project. The proposed development foot print of the mining project will fall within an area comprising of natural vegetation and livestock subsistence farming. The application area is dominated by natural vegetation, rhyolite stone cropping out throughout the area. If the proposed project does not take place, no additional socio-economic benefits will be created by the mining activities within the area, the mineral resource will be lost, and the additional GDP from the local supply of aggregate will be compromised. Further implications of the No-Go alternative include the loss of economic input into the area and a loss of regional socio-economic benefit. However, the potential impacts on biodiversity and habitat will not occur.

Alternative 2: The three alternative land uses which were considered during land use alternative assessment and the impacts associated with these land uses, in comparison with that of mining. The comparative impact assessment indicates that opencast mining will have the greatest environmental impacts followed by residential development and stock agriculture. Stock subsistence farming will have the least impact to the environment as that is the predominant current land use. Mining and its associated activities will have the greatest impact on the environment and is the least sustainable but upon completion of mining and with proper rehabilitation other land uses can be considered for the area. Most of the mining impacts will also be for a very limited and occurred in a very small area (8ha). Residual impact extent and severity will still need to be assessed, but in general, responsible mining and rehabilitation from the start of the operation can mitigate a lot of the residual impacts associated with mining. Mining will also have a great positive economic impact, and should be considered a viable land use for the area, especially due to the fact that the surrounding area has no sensitive environmental features.

Public Participation

The primary intent of the public participation process was to inform land owners and other I&APs of the proposed project, in sufficient detail, in order that may contribute meaningfully to the scoping and EIA.

Public participation is ongoing, with the following having been undertaken to date:

- Authority consultation to discuss the legislative requirements and the approach to the EIA;
- Identification of land owners of surveyed properties, and subsequent search for their contact details;
- Social scan to identify relevant stakeholders in the area;
- Notification of the EIA process by means of a letter and Background Information Document (by email, fax or post) to land owner and stakeholders whose details BeyondGreen had;
- Site notices were placed at multiple locations in each of the public areas within the area. The locations included municipal offices, libraries, shops etc.
- Press advertisements in the following paper: iSolezwe newspaper on 22 November 2015, iSolezwe was solely chosen because there is no local newspaper other than this. It was clear that the newspaper advert did not receive expected attention. Beyond Green decided that EIR should focus on using more feasible and beneficial consultation method prescribed by NEMA.
- Scoping information meeting at Ngwavuma, community hall on 11 December 2015;
- Maintenance of database of registered I&APs;
- Recording of comments from I&APs.

The process to notify land owners and occupiers is on-going during the course of the scoping and EIA.

Baseline Environment

The status of the baseline environment is described in the scoping report. This assessment aimed to identify the environmental sensitivities within the mining area and surrounding. This has involved a desktop study, site visit and draws extensively on information contained in studies that have been conducted by various

government departments and non-government environmental organizations responsible for the area covered by the mining right application.

Results of Public Consultation

Land owner and IAPs raised several issues with regards to mining, however most issues were more social and economic driven. Full details of the issues raised are included in the main report and all responses are included in the Appendices. Main issues revolve around employment. The area is mainly remote; people are more concern with socio economic issues than those environmental issues. Mining activities will only provide limited employment opportunities to locals as most work is done by specialized contractors, and the project is quite small. There will however be some stimulation of the local economy through the purchase of supplies and equipment. The applicant will, wherever possible, source the materials and equipment needed to operate the drilling equipment and sustain the personnel locally. The employment and training of local persons, even for short-term jobs, should be prioritized by the applicant and all of their sub-contractors

Plan of Study for EIA

This chapter describes the nature and extent of further investigations to be conducted by BeyondGreen and the specialists in the Environmental Impact Assessment, and sets out the proposed approach to the EIA process. The EIA process and reporting thereon will comply with Appendices 3 and 4 of the NEMA EIA 2014 Regulations. The project scope to be considered and assessed in the EIA is the 25-year mining work programme as proposed by the applicant. No further alternatives, other than the no-go, are to be considered beyond the scoping report. The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgment to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the project; views and concerns of interested and affected parties; social and political norms, and general public interest. BeyondGreen will identify potential impacts against relevant environmental aspects (i.e. land use, biodiversity, etc.) and describe

these in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change. BeyondGreen uses an assessment methodology which considers: the intensity, extent, duration of impacts, the probability of the impact occurring, the reversibility and the degree to which the impacts can be mitigated. The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These measures may be planned or additional measures that may arise from the impact assessment and specialist input.

During the EIA phase a public feedback meeting(s) will be held to present and discuss the findings of the EIA with I&APS. This meeting (series of meetings) will include a presentation by the EAP. The EIA / EMP report will be subjected to public review for a period of 30 days. A summary of the findings of the EIA report will be provided in English. Once the DMR has issued a decision on the application, I&APs on the project database will be informed accordingly of the decision, the reasons therefor and the fact that an appeal may be lodged in terms of the National Appeals Regulations, 2014.

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1. INTRODUCTION

FM Crushers (the applicant) is in a process of acquiring aggregate (Rhyolite) stone mining right and environmental authorization on the following property: portion Reserve no. 16 of farm 15836, in terms of section 22 of the MPRDA (Act of 2002) and section 24 of the NEMA (Act 107 of 1998). Beyond Greening Environmental Services Pty Ltd (referred to BeyondGreen here after) has been appointed by FM Crushers to assist in preparing and submitting environmental reports, EIA process and undertaking a Landowner and Public Consultation Process, in support of a Mining Right and Environmental Authorization application. BeyondGreen has submitted an application for environmental authorization to the Department of Mineral Resources (referred to DMR here after) for the proposed Opencast Mine, Ngwavuma, Kwa-Zulu Natal. DMR has since accepted this application and instructed FM Crushers to precede with the Scoping Report process (this report) in terms of the National Environmental Management Act, Act of 107 of 1998 (NEMA) and its Environmental Impact Assessment Regulations, 2014. The following reference number has been assigned to this project: KZN30/1/2/2/10065MR by DMR.

This report details the various mining-related activities, gives a desktop review of the baseline environment, indicates alternative land uses, sites and activities, highlights the way forward with regard to the public participation process and specialists studies required and finally gives a preliminary environmental impact assessment.

BeyondGreen is an independent, environmental consulting company which has been appointed to manage the process in accordance with the NEMA, the National Water Act (NWA) and the Minerals and Petroleum Resources Development Act (MPRDA) in order for FM Crushers to obtain the necessary environmental authorizations in support of its mining right over reserve 16 of farm no. 15836.

1.2. Brief project location and description

This section provides a brief overview of the proposed Mining Right. The proposed application area is located 55 km east of the town of Jozini within the Jozini Local Municipality of the northern portion of Kwa-Zulu Natal Province. The proposed site will be limited to open cast mining (quarry), which will be located on Reserve 16 of farm no.15836. Mining (quarrying) will occur as a drill and blast operation with faces of 9-11m high and a blast size of 3000 – 4000 tons/blast, approximately once per

month or 52 000 per year, with such drilling and blasting will be conducted by contractor. The drilling of holes by hydraulic track rig and the computer controlled blast detonation system represents the latest quarrying technology. Ahead of the face blasting, topsoil (where available outside of exposed bedrock) is removed to topsoil stockpile berms for later use in rehabilitation. Shot rock will be loaded by excavator into articulated dump trucks for hauling to the processing plant for crushing and screening of sizes to meet market requirements.

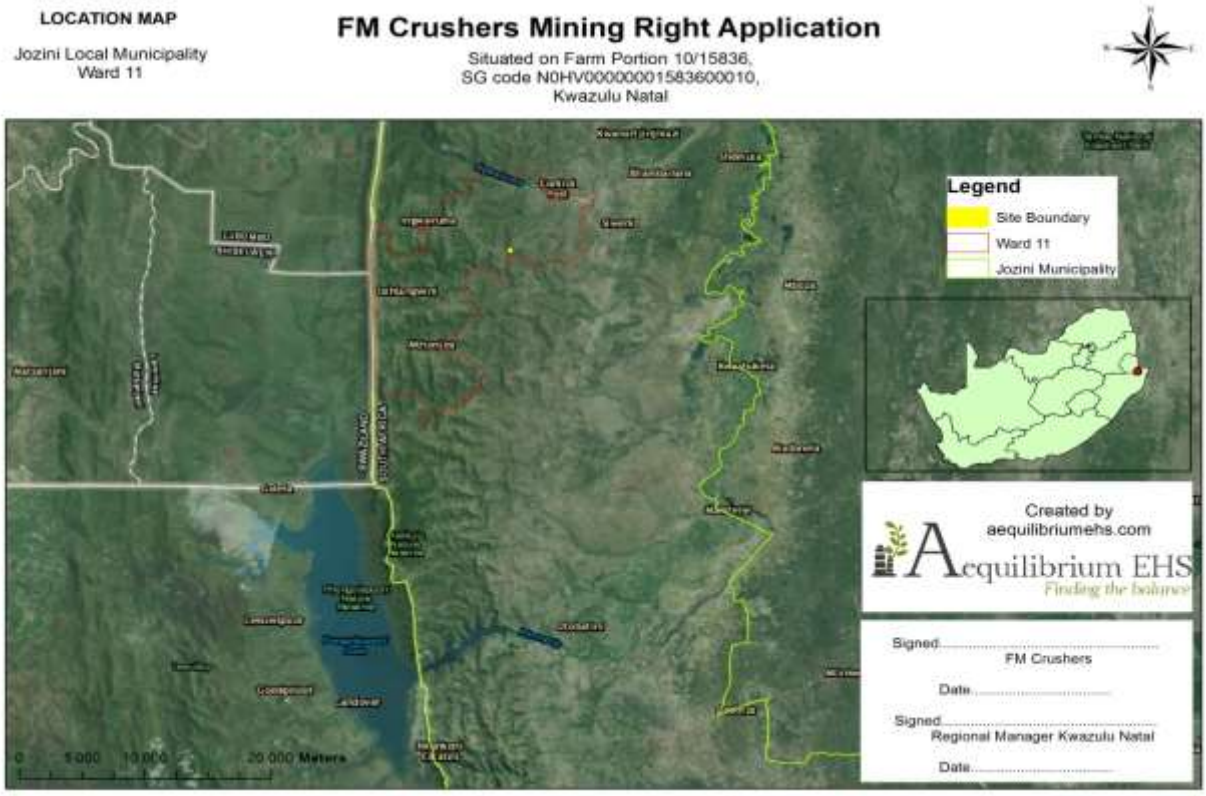


Figure 1: locality map

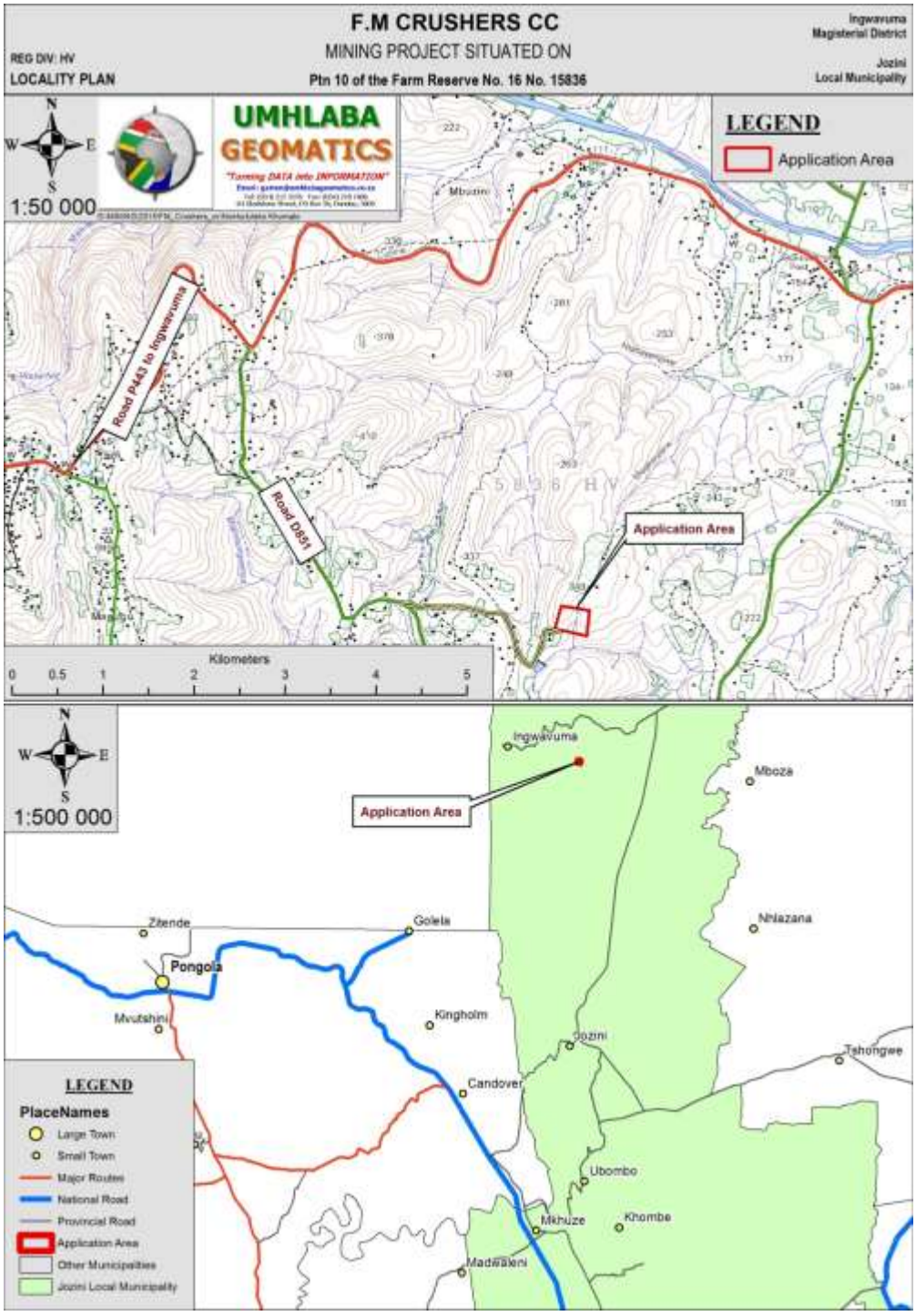


Figure 2: locality map in relation to the proposed mining area

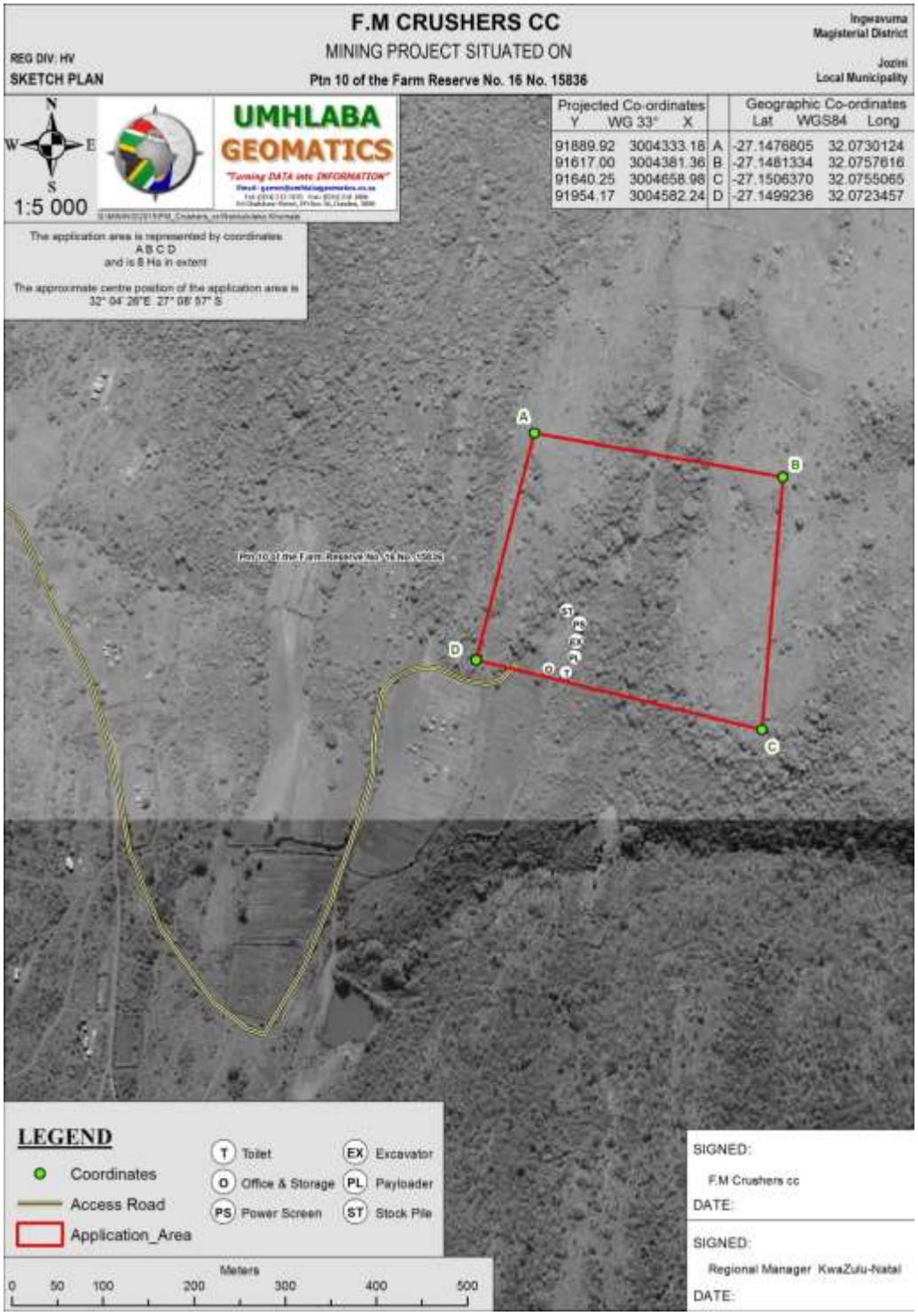


Figure 3: Layout map showing access road, proposed mining site and other structures

1.3 Property and ownership details

The properties described above as the location of the project is owned by Ingonyama Trust. Ingonyama Trust is a board that monitors and regulates traditional affairs of kwaZulu Natal.

Table 1: Property details

Description	Area (HA)	Title deed number	Surface owner	Contact Details
Reserve 16 of farm no.15836	8.00	T144 57/03	INgonyama Trust	033-846 9923 (M)

2. LEGAL AND POLICY FRAMEWORK

2.1 The Minerals and Petroleum Resources Development Act

The Mineral and Petroleum Resources Development Act (Act No 28. Of 2002 - MPRDA) aim is to "*make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources*". The MPRDA outlines the procedural requirements that need to be met to acquire mining rights in South Africa. In this regard, BeyondGreen have compiled and simultaneously submitted an application for a Mining Right and Environmental Authorization in terms of Section 22 of the MPRDA and Section 16 of the NEMA EIA 2014 regulations to DMR on 15 September 2015, which was subsequently accepted on 26 November 2015.

The MPRDA also requires adherence with related legislation, chief amongst them is the National Environmental Management Act (Act No. 107 of 1998, NEMA) and the National Water In terms of the MPRDA, a mining right can only be granted once a Scoping, Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) have been completed for the proposed operation. Furthermore, this process must include a Public Participation Process (PPP).

To date a mining right application for reserve 16 of farm no.15836 has been submitted to the Department of Mineral Resources (DMR), accepted by the DMR on the 26 November 2015. As part of the environmental authorization process a draft scoping report was compiled in accordance with NEMA regulations.

2.2 The National Environmental Management Act

In addition to the MPRDA, the NEMA sets out the requirements for the environmental assessment of a range of activities which are associated with mining. The NEMA aim is "*to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith*." The NEMA outlines the procedural requirements that need to be met to achieve this. The following table identifies the listed activities the proposed project triggers and consequently requires authorization prior to commencement:

TABLE 2: NEMA LISTED ACTIVITIES TO BE AUTHORISED

NEMA Listed activity		
Listing notice	Name of activity	Trigger
GNR 984, activity 17	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	The application of mining right for extraction of industrial mineral, Rhyolite
GNR 983 Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan	Clearance of vegetation for the establishment of the mining operations
GNR 983	The widening of a road by more than 6 metres, or the lengthening of a road	Upgrades to existing roads for transport to and from the mining area.

Activity 56	by more than 1 kilometer- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	
GNR 984 Activity 21	Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.	The crushing and screening of the rhyolite stone
GNR 983 Activity 67	Phased activities for all activities (i)listed in this Notice, which commenced on or after the effective date of this Notice; or (ii)similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; excluding the following activities listed in this Notice-17(i)(a-d);17(ii)(a-d);17(iii)(a-d);17(iv)(a-d);17(v)(a-d);20;21;22;24(i);29;30;31;32;34;54(a-d);55;61;62;64and 65.	Pollution control dams, stockpiling area etc.

2.3 National Environmental Management: Air Quality Act

The National Environmental Management: Air Quality Act (NEMAQA) is the main legislative tool for the management of air pollution and related activities. The objective of the Act is: to protect the environment by providing reasonable measures for-

- the protection and enhancement of the quality of air in the Republic;
- the prevention of air pollution and ecological degradation; and
- securing ecologically sustainable development while promoting justifiable economic and social development; and
- Generally to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and wellbeing of people.

Section 21 of the NEMAQA allows that the Minister to publish a list of activities which may result in atmospheric emissions and which may have a significant detrimental effect on the environment. The NEMAQA further states that no person may, without a provisional atmospheric emissions license or an atmospheric emissions license, conduct an activity which is listed in accordance with Section 21 of this Act. The applicability of the listed activities under Section 21 of the NEMAQA will be determined during the EIA phase of the project. Currently the desktop assessment indicate that section 21 does not apply to this project since there will be no atmospheric emissions other than dust pollution from crusher machine; all production stockpiles will remain within the mining boundary and are therefore excluded from the scheduled activities listed under the Air Quality Act.

In addition, Section 9(1) of the NEMAQA makes allowance for the Minister to publish a list of national ambient air quality standards to be implemented throughout South Africa. GN R. 1210 of December 2009 provides these standards for various ambient pollutants.

The dust fall-out studies will be conducted in accordance with the NEMAQA. The ASTM International measurement system to determine monthly average fallout concentrations and the South African National Standards (SANS) 1929: 2005, Edition 1.1 will be utilized during dust sampling and analysis.

2.4 National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004 - NEMBA) "*provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters conducted therewith*".

In terms of the NEMBA, the applicant has a responsibility for: The conservation of endangered ecosystems and restriction of activities according to the categorization of the area (not just by listed activity as specified in the EIA regulations).

Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity. Limit further loss of biodiversity and conserve endangered ecosystems. Regulations published under NEMBA provides a list of protected species (flora and fauna), according to the Act (GN R. 151 dated 23 February 2007, as amended in GN R. 1187 dated 14 December 2007). Should such species be encountered on site and require relocation, a permit will be required to be submitted to the Competent Authority prior to any disturbance/damage/destruction of any protected flora.

2.5 National Environmental Management: Protected Areas Act

The National Environmental Management Protected Areas Act (ActNo.57 of 2003) is intended to "*provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes*" and creating a "*national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity".*

The NEMPAA defines various kinds of protected areas, namely: "*special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act 63 of 1970)".*

2.6 The National Forest Act

The removal of any indigenous or protected trees or clearing of any woodland, thicket or forest requires a permit, in terms of Section 15 of the National Forest Act (Act No. 84 of 1994 –NFA) and the Nature and Environmental Conservation Ordinance (No. 19 of 1974). Should the project require the removal or any indigenous or protected tree species, a Threatened of Protected Tree Species (TOPS) permit will be required to be submitted to the Competent Authority prior to any disturbance/damage/destruction of any protected flora.

2.7 The National Waste Act

Section 16of the NEMWA must also be considered which states as follows:

1."A holder of waste must, within the holders power, take all reasonable measures to-

a. avoid the generation of waste and where such generation cannot be avoided, to minimize the toxicity and amounts of waste that are generated;

b. reduce, re-use, recycle and recover waste;

c. where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;

e. prevent any employee or any person under his or her supervision from contravening the Act; and

f. prevent the waste from being used for unauthorized purposes."

These general principles of responsible waste management will be incorporated into the EMPR to be implemented for this project.

2.8 The National Water Act

The National Water Act (Act No.36 of 1998 –NWA) provides the law relating to the water resources of South Africa. The purpose of the NWA is to manage and control the means by which all water resources are protected, used, developed, conserved and controlled. Sections 21 of the NWA identify certain water uses which require approval from the Department of Water and Sanitation (DWS) in the form of a relevant water use license. No water uses provided for in the Act, are applicable to the project. The mine intends to use water from the rain, which will be harvested from the mine pit. Ngwavuma is an extremely arid area; hence the mine would not even attempt to use water from the water resources or from the municipality. Water will only be used in small volumes, for dust suppression mainly. There is no need for the application of water use license.

2.9 The National Heritage Resources Act

The primary piece of legislation protecting national heritage in South Africa, is the South African National Heritage Resources Act (Act No. 25 of 1999 -NHRA). Section 38 of the NHRA states that:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as-

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

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

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

(i) Exceeding 5 000 m2in extent; or

(ii) Involving three or more existing even or subdivisions thereof; or

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

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

(d) The re-zoning of a site exceeding 10 000 m2in extent; or

(e) Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

In accordance with Section 38 (Heritage Resources Management) of the NHRA, developers must apply to the relevant authority (KZN Provincial Heritage Resource Agency (AMAFA) and South African Heritage Resources Agency (SAHRA)) for authorization to proceed with their planned activities. This application must be accompanied by documentation detailing the expected impact this will have on national heritage in particular.

Categories of heritage resources recognized as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include among other categories:

- *Geological sites of scientific or cultural importance;*
- *Objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens;*
- *Objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.*

To address concerns relating to the protection of these particular heritage resources, a Heritage Impact Assessment (HIA) will be undertaken as one of the specialist studies in order to assess any potential impacts to archaeological and paleontological heritage within the footprint of the proposed development and be submitted to the South African Heritage Resources Agency (SAHRA).

3. SCOPING REPORT FRAMEWORK AND STRUCTURE

The scoping report comprises the following broad framework:

The project background, including the introduction, project location, project description, and motivation for the project;

The Legal framework;

The existing status of the cultural and heritage, socio-economic, and biophysical environment;

A detailed description of the project;

Potential impacts associated with the project.

Land use and development alternatives;

Stakeholder engagement; and

Finally, a plan of study (PoS) for the EIA phase of the project

In terms of GNR982 of the 2014 NEMA EIA Regulations, Table 3 below provides a guide to the relevant sections where the information is contained.

Table 3: Legal requirements

NEMA Regulation 982: Appendix 2: Requirements for the content of coping Reports as per NEMA EIA Regulations, 2014.	Section in report
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Appendix A
(b) the location of the activity, including- (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Page 16 & 17
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Page 18
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 3
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 2
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	
(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including - (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these	Section 5,6,7,8,9

impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity; a plan of study for undertaking the environmental impact assessment process to be undertaken, including- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	
j) an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Section 12
(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for	Section 14

undertaking the environmental impact assessment)	
(l) where applicable, any specific information required by the competent authority; and	Section 13
(m) where applicable, any specific information required by the competent authority; and	Section 13.1
(n) any other matter required in terms of section 24(4)(a) and (b) of the Act.	Section 11.1

4. METHODOLOGY APPLIED TO SCOPING

4.1 Pre-mining Environmental Baseline Assessments

This scoping report includes the pre-mining baseline environment status. The baseline studies will be initiated during the scoping phase and therefore the current description is considered a general overview from existing information on neighboring areas and a desktop level assessment. The specialist studies which will be conducted as part of the process include:

- Soils, land capability and land use assessment;
- Surface water assessment;
- Groundwater assessment;
- Atmospheric assessment;
- Baseline noise assessment;
- Flora and fauna assessment;
- Aquatic assessments;
- Wetland assessment and delineation; and
- Heritage Study (Phase I assessment).

4.2 Project Description and Alternatives

The scoping report includes a detailed project description, much of which will remain unaltered due to the nature and position of rhyolite stone. Where feasible project alternatives do exist, then these have been elaborated on. Land use alternatives have been assessed under the relevant sections.

4.3 Environmental, Socio-economic and Cultural Impact Assessment

The scoping report includes a preliminary impact assessment. The methodology used for impact assessments will be the same as that in the EIA and EMP report and is described below.

Impact assessment methods were developed to: (1) identify the potential impacts of a proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts.

The methodology used by BeyondGreen is as follows:

Table 4: Impact assessment methods

The status of the impact		
Status	**Description**	
Positive:	a benefit to the holistic environment	
Negative:	a cost to the holistic environment	
Neutral:	no cost or benefit	
The duration of the impact		
Score	**Duration**	**Description**
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
The extent of the impact		
Score	**Extent**	**Description**
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
The reversibility of the impact		
Score	**Reversibility**	**Description**
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The affect (severe or beneficial) of the impact		
Score	**Severe/beneficial effect**	**Description**
1	Slight	Little effect - negligible disturbance/benefit
2	Slight to moderate	Effects observable - environmental impacts reversible with time
3	Moderate	Effects observable - impacts reversible with rehabilitation
4	Moderate to high	Extensive effects - irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration
The probability of the impact		
Score	**Rating**	**Description**
1	Unlikely	Less than 15% sure of an

		impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Consequence		= Severity + Spatial Scale + Duration + Reversibility.
The significance		=Consequence *probability

The rating is described as follows:

Score out of 100	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

Will mitigation be needed (yes/no)?

4.4 Environmental Management Programme

During the evaluation of impacts, consideration was and will be given to information gained through various specialist investigations, through public interaction and through the review of the various environmental documents which will be submitted for public review and comment. Identification of impacts will then assist in formulating the environmental management plan. The environmental management plan will be formulated by considering the mitigation of each negative impact and consolidating these mitigations measures into a management plan which also highlights inspection and monitoring, frequency of inspections and proposed action plans to any potential issues observed.

4.5 Submission of Information

In accordance with the MPRDA the applicant has thus far submitted a mining right application (including a mine works programme and social and labour plan). According to NEMA, an application for environmental authorization has been submitted to DMR. This has since been accepted and the applicant instructed to proceed with the Scoping Report phase of the project. The project has been assigned the reference number: KZN/30/1/2/2/10065MR.

This “Final Scoping report” forms the first phase of the environmental documentation required by the DMR in support of both MPRDA and the NEMA.

The EIA/EMP Report process will follow, and will be submitted to the DMR not later than 30 March 2016.

4.6 Location of Site

4.6.1 Regional setting

The project site is around 55 km east of the town of Jozini within the Jozini Local Municipality of the northern portion of Kwa-Zulu Natal Province. Jozini municipality is located in the northern portion of KwaZulu–Natal, and is bordered by Mozambique to the north, Swaziland to the west, UMhlabuyalingana to the east, Hlabisa to the south and Nongoma and Uphongolo to the west. It consists of four semi formalized towns viz. Jozini, Mkhuze, Ingwavuma and Ubombo. The remaining parts of the municipality are characterized as being rural in nature. Jozini Municipality covers 32% (3057 Square Kilometres) of the total area of 13859 Square Kilometres of uMkhanyakude District Municipality. There is no mining authorization/right within the surrounding of the proposed mining area. The closest mining can be an estimate of 15km away from the proposed mining site that is FM crushers quarrying.

4.6.2 Magisterial district and Municipalities

The project site is situated in the Jozini Local Municipality (ward 11) of uMkhanyakude District Municipality.

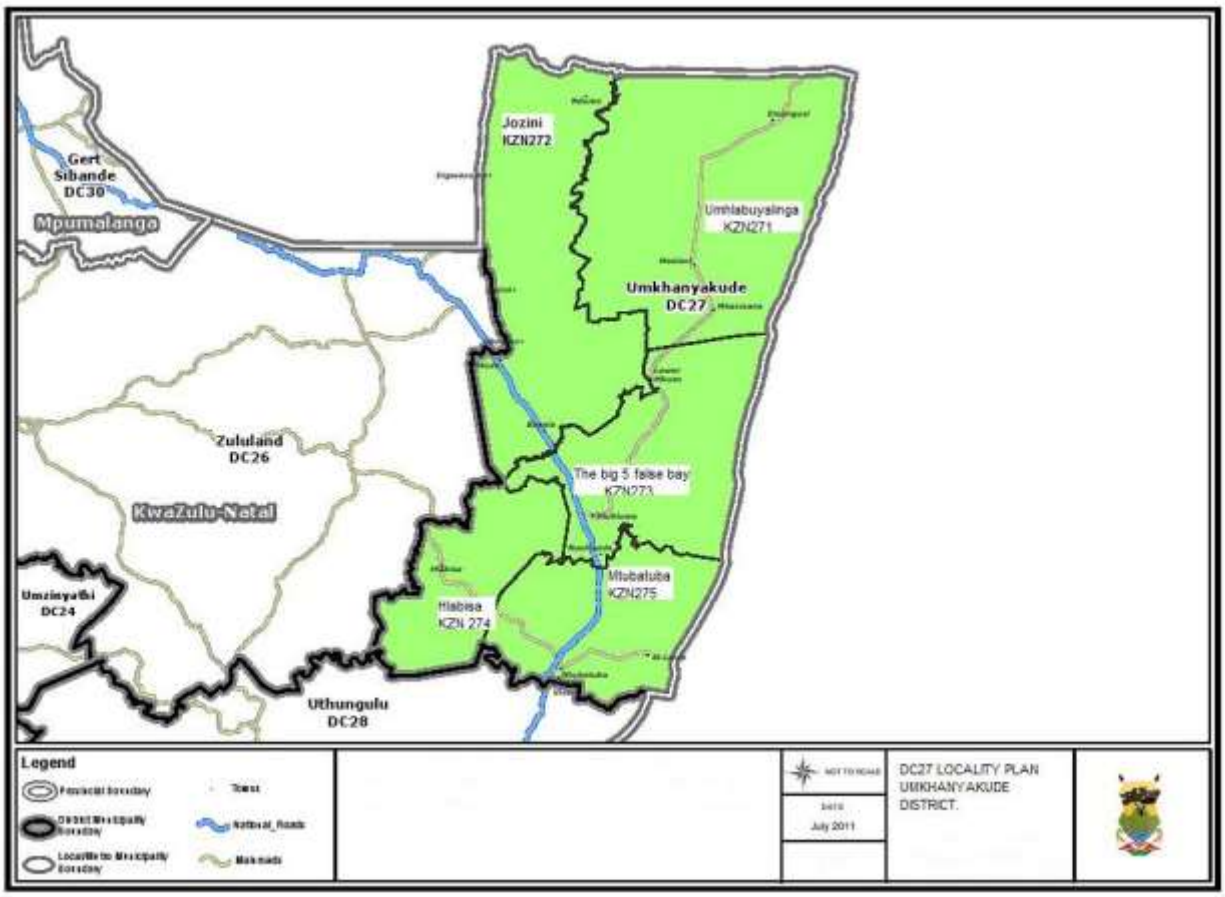


Figure 4: Map showing the municipalities in uMkhanaykude district

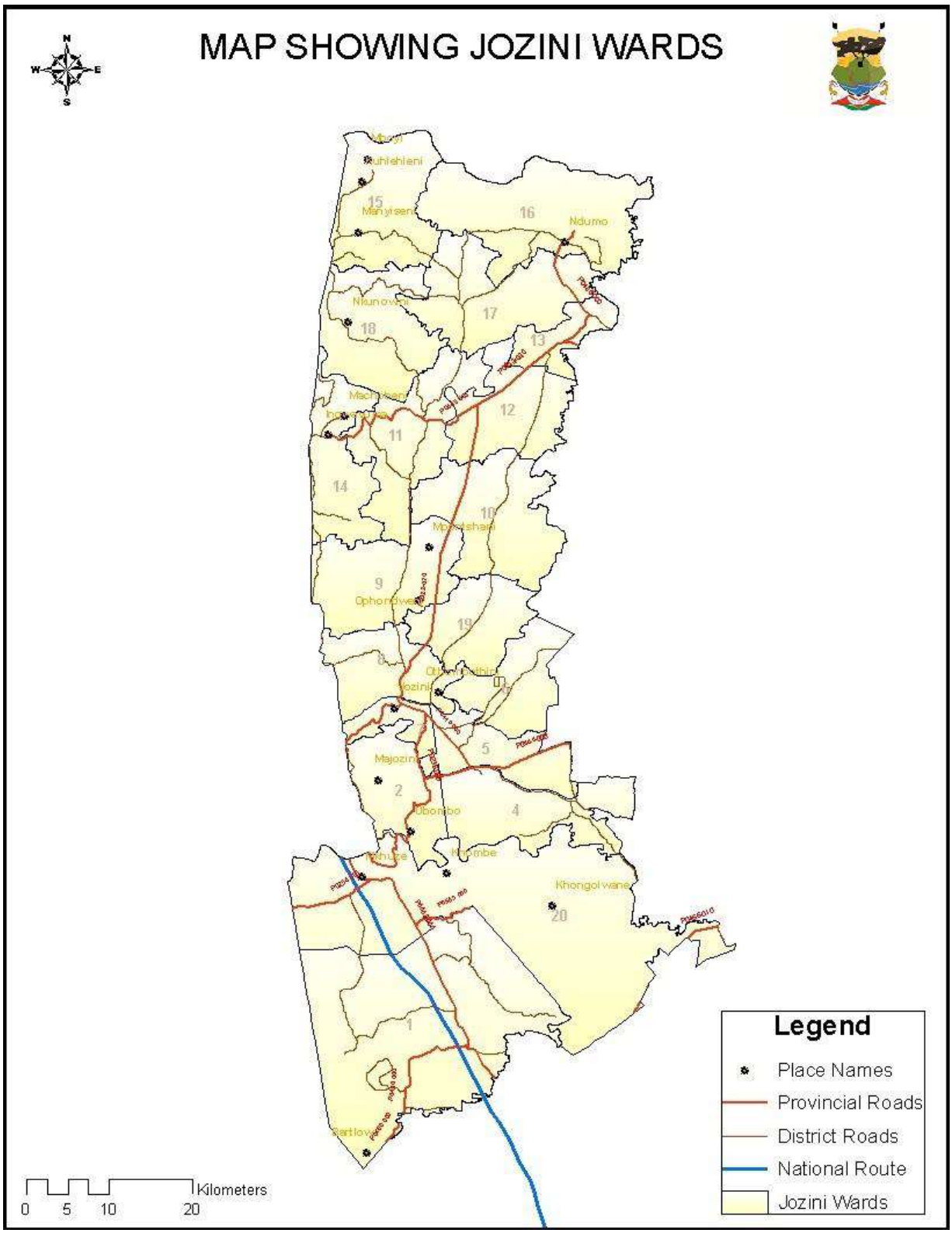


Figure 5: Map showing Jozini wards

4.6.3 Land Tenure and use of immediately adjacent land

The evident land use pattern and settlement pattern in Jozini LM greatly influenced by topography, environmentally sensitive sites and sites of historical significance.

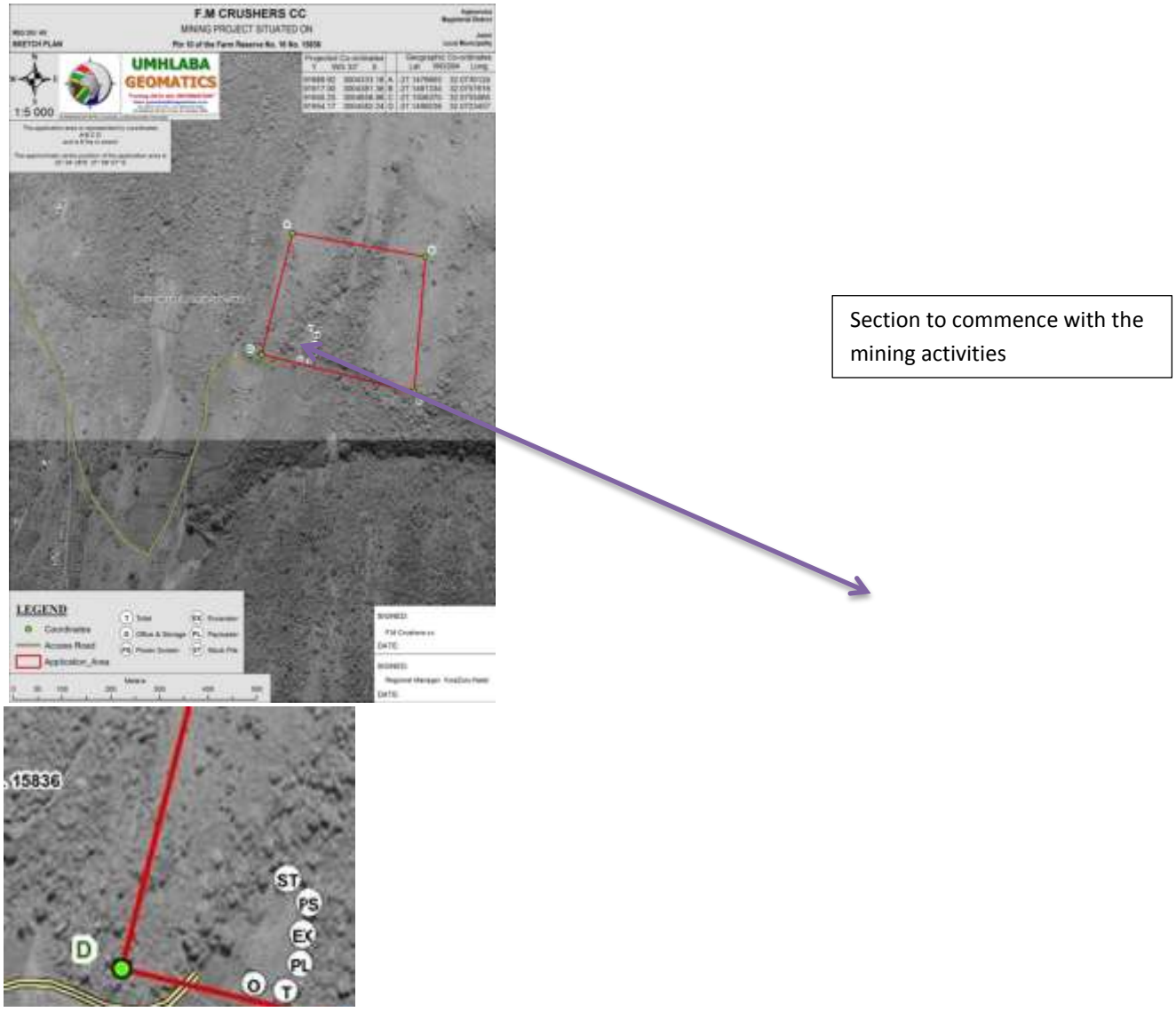
The project site is currently used for grazing, agriculture on natural grasslands with extensive shrubs and thorny vegetation.

4.6.4 Surface infrastructure and servitudes

The site has no infrastructure to consider, the area has no National roads, N2 that link Jozini with Mkuze, Richards Bay is more than 100 km away, and the area has regional gravel roads. There are no servitudes or power lines within the mining area.

5. DESCRIPTION OF THE PROPOSED PROJECT

The project description given below entails a full description of operations for the full life of mine. Opencast mining will be conducted starting from the South to West section of the property as indicated in Plan A (extracted area).



Plan A: Sketch diagram depicting portion of the site to commence with mining activities

5.1 Opencast mining

The area directly affected by mining is around 8.0 ha and contains around 1 367 696 tons in situ rhyolite reserves which will be mined over a 25 year period. Around 52 000 tons per year will be mined with a total yield of around 2/3 will be sold as to Department of Transport.

The construction phase will compose of the following activities

- Site establishment 6 months: this include
- Strip Topsoil and stockpile
- Remove Softs and stockpile
- Drill & Blast
- Remove Hards and stockpile
- First rhyolite with temporary stockpile

Due to shallow depth of the resource, at 1 to 20 m below surface, it is ideal for opencast mining. An opencast strip mining method would be employed through method of drilling and blasting of the deposit, with such drilling and blasting will be conducted by contractor. A number of holes will be drilled into the rhyolite deposit and filled with explosives. The explosives break the rock into fragments.

An excavator feed the broken fragments into the crusher for processing. Ahead of the face blasting, topsoil (where available outside of exposed bedrock) is removed to topsoil stockpile berms for later use in rehabilitation. Shot rock is loaded by excavator into articulated dump trucks for hauling to the processing plant for crushing and screening of sizes to meet market requirements.

5.1.1 Discard handling

As rhyolite will be processed onsite discard will be very minimal, the will be almost 100% recovery. Discard will be used for road maintenance.

5.1.2 Haul and access roads

The mine will expand haul and access roads to link the proposed mine with the municipality road. The positions of the roads will be finalized following the assessment studies that will be conducted as part of the EIA.

5.1.3 Sumps and pumps

Dewatering activities will be carried out on site. In all likelihood, the mine will make use of pumps to dewater the opencast pit and dispose of mine affected water into a pollution control dam.

5.1.4 Power supply

No electricity will be required on site. Mining will be done with diesel driven equipment. Mining equipment, including drills, trucks and shovels, front-end loaders and loading trucks for rhyolite haulage will be diesel operated. Diesel will be supplied from 14000L bulk storage facilities which will be constructed onsite.

5.1.5 Weighbridge

A weighbridge will be constructed at the entrance of the mine.

5.1.6 Workshop

A Workshop will be constructed for the servicing of diesel driven equipment on site. Workshops will have properly constructed oil and silt traps.

5.1.7 Ablution facilities

The mine will construct ablution facilities for the contractors and employees on site.

5.1.8 Security and access

The site will be fenced off and will be patrolled on a 24hr basis.

5.1.9 Admin Block

Park homes will be used as administration blocks.

5.2 Water Requirements

The main water use on site will be the dewatering of pits to allow for the safe mining of the reserve. Water will be pumped out of the pit and stored in pit sump.

5.2.1 Potable water supply

Potable water supply will be by means of abstraction from groundwater supply in the area. Alternative options for potable water supply will be to truck water to site supplied by the municipal water provider.

5.2.2 Process water supply

Water within the in-pit sumps will be utilized for dust suppression on the haul roads, screening and crushing plant. Any water requirements which may be needed for drilling or other on-site activities will be sourced from the water within in-pit sumps. Any additional water will be sourced from the municipality.

5.2.3 Storm water management

All storm water drainage infrastructures will accommodate 1:50 year storm event as required by legislation. Clean and dirty water will be separated and all dirty water will be channeled into the Pollution Control Dam. Clean water falling outside the footprint will be directed to natural drainage lines via berms and channels upslope of the area of activity.

The process water from the wash bay and workshop area will collect within the sump via an oil separator. The mine will enter in a service level agreement with a service provider to maintain and empty the septic tanks and remove sewage from site.

5.3 Gaseous and Solid Waste& Liquid Effluent

5.3.1 Gaseous Emission

No scheduled gaseous emissions will take place on site.

Vehicles and machinery will emit fumes, but will be serviced and maintained regularly to keep these emissions within the relevant vehicle/machine's specifications.

Dust will be monitored and managed on site to ensure these are within the standards set by NEMQA.

6. PROJECT PHASES

The project can be divided into five phases, namely, the planning and design phase, the construction phase, operational phase, decommissioning phase and the post closure phase. The activities associated with these phases are listed below:

Table 6: Project Phases activities

ACTIVITY (Potential NEMA activities which may be triggered)	**SUB ACTIVITY**
PLANNING AND DESIGN PHASE	
Site visits	Vehicle and foot traffic on site Demarcate Mining Right area & No-Go areas and danger sign posting
ACTIVITY (Potential NEMA activities which may be triggered)	SUB ACTIVITY
CONSTRUCTION PHASE	

The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometer- (i) where the existing reserve is wider than 13,5 meters; or(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas. GNR 983 Activity 56	Upgrade selected access road=4km
The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan GNR 983 Activity 27	Site preparation and vegetation clearance Remove topsoil to berms in Plant and Stockpiling area Construct haul road to excavation
Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies. GNR 984 Activity 21	Topsoil removal to perimeter stockpile ahead of face advance Removal and stockpiling of overburden Blasting of rock & Drilling Loading & Hauling of shot rock Crushing and screening of shot rock Stockpiling of product Loading of product for delivery
Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). GNR 984, activity 17	Construct / Place Container for office and store Construct Workshop with oil trap Construct bunded fuel storage tank Construct wash bay with oil trap Cast concrete footings for crushing plant Erect Crushing plant Construct weighbridge Establish storm-water management system Install mist sprays on plant
ACTIVITY (Potential NEMA activities which may be triggered)	**SUB ACTIVITY**
DECOMMISSIONING PHASE	
The decommissioning of any activity requiring - (i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or (ii) a prospecting right, mining right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction in throughput does not constitute closure., GNR 983, Activity 22	Operational Rehabilitation - upper perimeter face splitting (only after phase 4) Dismantling, removal and rehabilitation of unnecessary infrastructure Removal of hydrocarbons from site Removal of infrastructure Filling of access voids Mobilization of overburden and subsoil's Final rehabilitation of roads no longer required Final removal of all berms, trenches Ripping/discing of all leveled or compacted areas where required Reprofiling of all disturbed areas Application of topsoil Amelioration of topsoil Construction of contour berms (where necessary)
CLOSURE AND POST CLOSURE PHASES	

Managing and monitoring for all post mining impacts to prevent any further pollution	Monitoring and addressing problem areas

7. DESCRIPTION OF AFFECTED ENVIRONMENT

Much of the detail provided below is desk-top level studies and generalizations drawn from prior studies conducted by the municipality and other state organs. During the EIA/EMP phase, various studies will be completed for the specific proposed area of interest and included in the EIA/EMP report.

7.1 Surrounding land use and capability

The evident land use pattern and settlement pattern in Jozini LM greatly influenced by topography, environmentally sensitive sites and sites of historical significance. The land use pattern has evolved in response to settlement pattern and it relates to places where people live, play and work. The pattern is however different within the close surrounding of the proposed area. The proposed area is mainly used for livestock; the closest homestead is about 5km away. As such the following are the evident broad land uses in Jozini LM (see table 7 below).

Settlements

Towns

Agricultural

Commercial Farmlands

Conservation Areas

Table 7: Surrounding land use and capability

LAND COVER	HACTARES	PERCENTAGE
Airfields	6.5	0.0
Bare rock and sand	506.2	0.1
Bushland and woodland	191521.8	55.6
Forest	7397.9	2.1
Grasslands	62511.5	18.2
Natural water bodies	2112.0	0.6
Plantations	25.3	0.0
Wetlands	5858.3	1.7
Mines and Quarries	31.9	0.0
Dams	1066.7	0.3
Commercial-orchards	19.2	0.0
Commercial- Pineapples	78.2	0.0
Commercial- Sugarcane	7441.8	2.2
Commercial- Agriculture	972.9	0.3
Dense settlements	1191.0	0.3
Low density settlements	12079.8	3.5
Scattered low density	47658.2	13.8

settlements		
Railways	87.8	0.0
Roads	3612.0	1.0
TOTAL	344179.2	100

The above table illustrates in detail the extent of the various land uses. From the table it is evident that bushland and woodland occupy the majority (55,6%) of the land in Jozini LM and settlements occupy approximately 17,6%.

7.2 **Topography**

The topography can be described as gently undulating. Topography has a local effect on the climate and influences land use. The Jozini area is bounded in the west by the Lubombo mountain range, which reaches an elevation of approximately 600m.This range has commanding views eastwards over the rest of the sub-region, as well as westwards into Swaziland over the Pongola River. The presence of streams and rivers has created a number of gorges and opened up opportunities for the development of adventure tourism activities.

7.3 **Geology and Soils**

The underlying geology of Jozini area has controlled the development of the soils and topography, the latter in turn locally affects the climate and overall land use of the area. The Lebombo Range is composed mainly of acid rhyolitic lavas while marine limestones and calcareous mudstones of lower and middle to upper Cretaceous age underlies the Pongola/Mkuze flood-plain zone. Soil types relate to specific physiographic regions each with particular climatic and hydrological conditions. Soil along the Lebombo Range consists mainly of shallow, stony soils of the Mispah and Glenrosa forms. The soils found along the floodplain and in particular along the west bank of the Pongola River, are derived alluvium, river terraces and the Cretaceous sediments. As a result soils are generally fertile to very fertile. The Makhathini Flats irrigation scheme is located in this area. Soils found in the eastern extreme of the region are mainly deep, acidic, well drained sands of Fernwood and Clovelly forms.

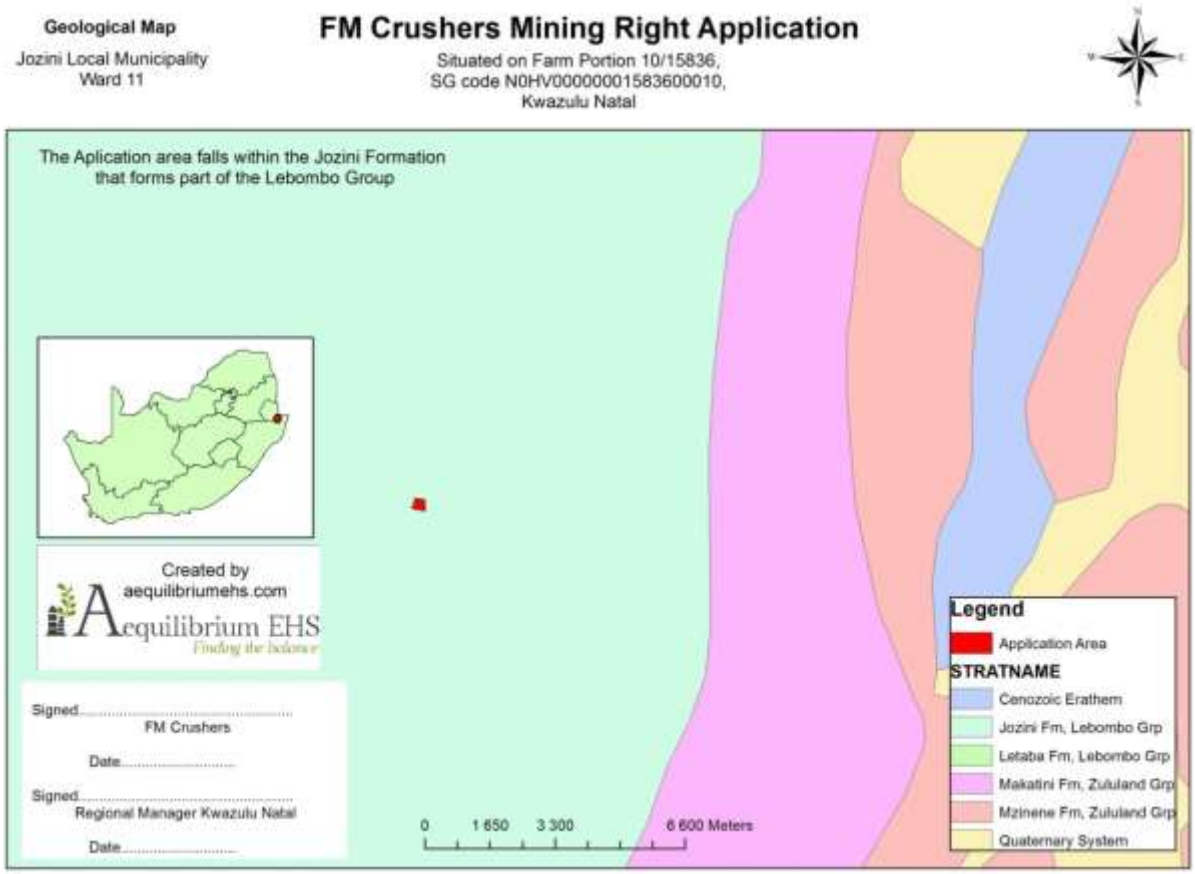


Figure 6: Geological map in relation to soil types

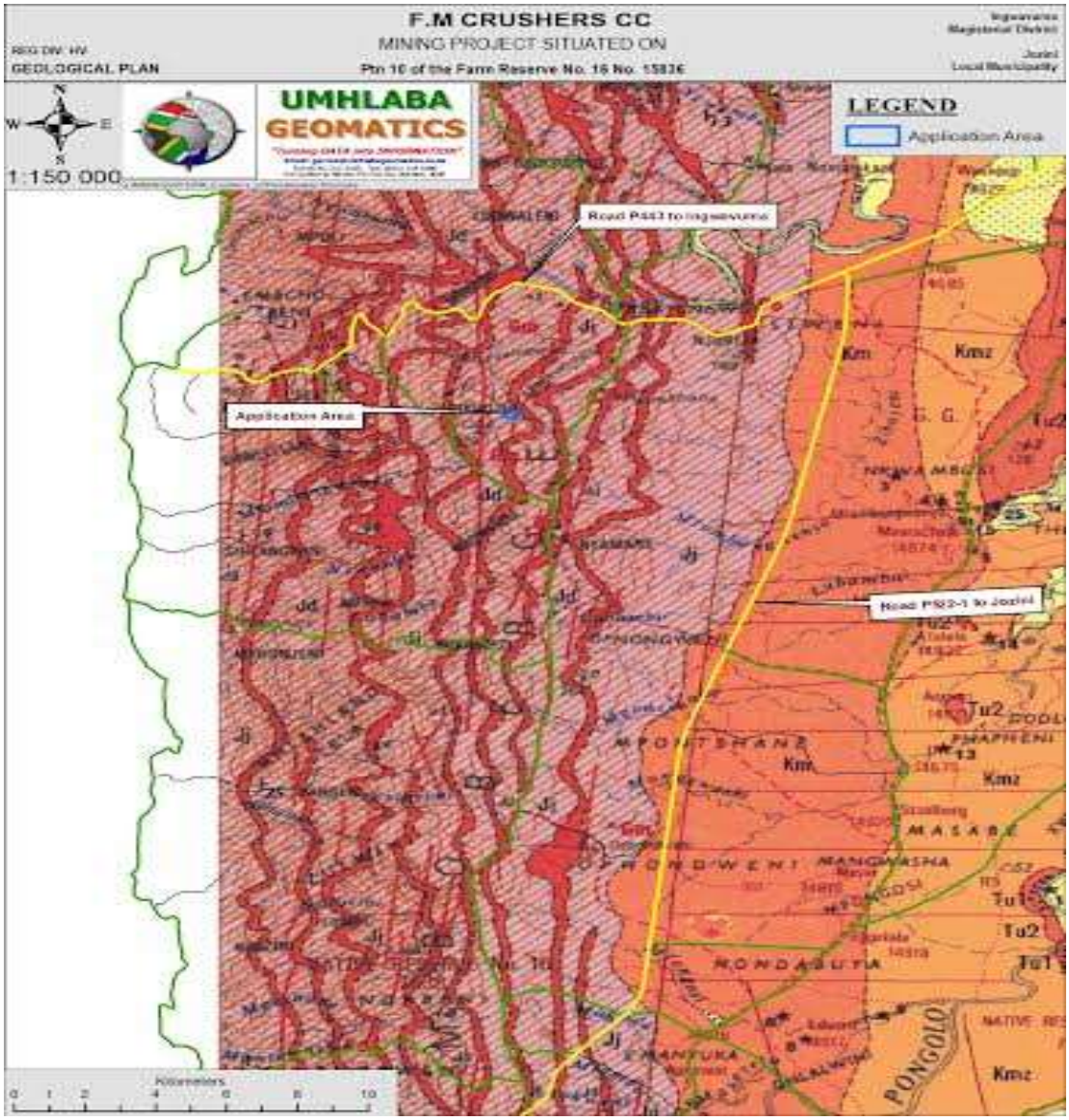


Figure 7: Geological Maps for the proposed project in relation to locality area

7.4 **Surface water**

Jozini has an abundance of natural water resources. Major rivers include the Pongola River, the Ngwavuma River, the Mkuze River, and the Usuthu River, of these only the Usuthu and Pongola Rivers are perennial. The Pongola is the most important river in Jozini as it traverses the full length of the area. The flooding of the Ngwavuma and the USuthu dam up the waters of the Pongola, resulting in an area of deep flooding during peak floods and the infilling of pans. Local Mountain drainage comprises a number of seasonal streams that drain the dip-slope and scarp-slope faces. Some of these streams have perennial pools. In spite of this apparent abundance of water, there is some concern about the provision of potable water to

rural areas. The rivers are however very far from the proposed area. The closest river, (Ngwavuma River), is more than 15 km away from the proposed activity.

7.5 Sensitive Area

The factors responsible for high levels of biodiversity present in the area are also responsible for the high levels of biodiversity present in the vegetation. The uMkhanyakude District is part of the Indian Ocean phytogeography region, and is a regional transition zone and a regional mosaic. Flora comprises a mixture of several floristic elements and communities and differs substantially from that of surrounding regions. Vegetation is exceptionally diverse and ranges from forest, thickets and woodlands to grassland and swamps depending on topography and edaphic conditions. These can be classified into 15 discrete vegetation types. Of at least 2180 vascular plant species, 225 species are endemic or near endemic to the Jozini area.

Biodiversity in the municipality is under pressure because of land conversion, climate change, unsustainable harvesting of natural resources and the wide spread of alien species. Natural resources provide opportunities for economic empowerment through sustained agriculture, ecotourism, indigenous plant use etc.

7.6 Climate change

Jozini area is characterized by seasonal dry winters and wet summers with periodic flooding. The summer temperature range from 23° to 40°, while winter temperatures range from 16° to 25°. Mean annual rainfall is 600 mm and 800mm along the Lebombo Mountains which fall within a moist belt. The average rainfall at various locations in the area has been recorded and is listed below:

- Othobothini 730 mm
- Ndumo 638 mm
- Ingwavuma 808 mm
- Ubombo 836 mm

The annual average evaporation is approximately 1660mm with evaporation highest during the winter and early spring months.

7.7 **Animal life**

7.7.1 Fauna Fish

There is a rich estuarine and freshwater fish community. Freshwater fish of rocky waters such as the rock catlet are found in pools along the Lebombo range. The Tiger fish is the most important game fish in the Pongola River.

7.7.2 Reptiles

High levels of species richness are displayed in the herpetofauna including important species such as the Nile crocodile. The area represents either the southernmost or northernmost limit of a large number of species. The highest concentration of endemic reptiles occurs in the North coast region. More specifically, Rupicolous reptiles such as Warrens girdled lizard, Smith's plated rock lizard and Wilhelm's red tailed rock lizard are resident in the Lebombo Mountain Range. Crocodiles are still abundant within Ndumo Game Reserve however they have largely been exterminated outside of the reserve.

7.7.3 Birds

Jozini area is well known with variety of bird species. The very high species diversity is a consequence of the wide variety of terrestrial, wetland and aquatic habitats in the area and the geographical position either as a destination or stopover for migratory species.

The following birds are known to occur within the Jozini Area:

Table 8: Birds species occurring at Jozini

Area	Species
Lebombo Mountain Range	Rock pigeon, rock thrush, red-wing starling and mocking chat
Pongola floodplain	White-winged plover, black coucal, red-winged pratincole and Heuglin's robin.
Floodplain pans	Wattled plover, purple galinule, white-faced duck, red-bill teals, purwing goose

	and glossy ibis.
Riverine forest	Green coucal, Pel's fishing owl, Heuglin's robin, Natal robin, trumpeter hornbill, green pigeon and wattle- eyed flycatcher.
Riverbank tangles	Peter's finfoot.
Thorn savannah	Grey lourie, yellow-bill hornbill, grey hornbill, Cape glossy starlying, long-tailed shrike and rufous-naped lark.
Thorn thickets	White-breasted sunbird, purple-banded sunbird, red-faced mouse-bird, gorgeous bush shrike and pied barbet.
Sand-forest	Bearded robin, black-helmet shrike, Neegard's sunbird, Rudd's apalis, Woodward's batis, pink-throated twinspot and yellow spotted nicator. A variety of birds occur on the savannah.
(Source: Maputaland Ecological and Conservation Potential, Ubombo-Ingwavuma Structure Plan)	

7.7.4 Mammals

The terrestrial mammal fauna of the Jozini area is particular rich, from the smallest groups such as bats and rodents, to the "big five' within the Game Reserves. The mammal population is a significant component of the biomass of the area, influencing its ecology and forming the basis of much of the tourism in the area. Klipspringer and mountain reedbuck are typical of the Lebombo Range area, with blue duiker occurring in the forests and thickets. Smaller mammals such as red rock rat, Namagua rock rat and the dwarf shrew are found along the Lebombo Range. Hippo, Elephant, black and white rhino, zebra, giraffe, blue wildebeest, nyala, bushbuck, kudu, waterbuck, reedbuck, impala, warthog and bush pig are known to occur within Mkuze and Ndumo Game Reserves.

7.8 **Air quality dust**

Due to the rural nature of the municipality; air quality issues in the Jozini are less prevalent. Farming and residential land-uses within the vicinity of the application area have less to none emission sources, the area has few vehicle, few households which can use fuel combustion, biomass burning and various fugitive dust sources. Few homesteads nearby were identified as sensitive receptors within the vicinity of the application area. One nearby homestead occurs within 500m from the proposed mining area.

Socio economic profile of the area

There is a high rate of poverty and unemployment around the proposed mining area. The proposed mining operation will create employment opportunities for the locals. The area is also a developing area; the locals will have an easy access to the industrial stone at a lower price compared to buying it at the hardware's in town.

The proposed operation will also pay rates and taxes to the appropriate Government institutions. This will help to develop the area and the country at large. According to guide lines prepared by World Bank "Local Economic Development (LED) is the process by which public, business and nongovernmental sector partners work collectively to create better conditions for economic growth and employment generation. The aim is to improve the quality of life for all.

7.8.1 Main Economic Contributors

Agriculture

Tourism

Business: Formal and Informal

7.8.2 Employment and Income Levels

According to the Census 2011 stats, 163 928 of Jozini population have a monthly income of R1600 or less. 79 767 of this population recorded no income at all. There are spatial differences in income – with those living and working in the small towns and in the surrounding game reserves earning little more than grant-dependent - under-capacitated to deal with the developmental challenges it faces. The costs of living keep increasing diminishing the level of disposable income and payment for services

Table 8: Employment and income levels of Jozini population

Income	Number
No Income	79767
R 1 - R 400	63943
R 401 - R 800	6612
R 801 - R 1 600	13606
R 1 601 - R 3 200	3456
R 3 201 - R 6 400	2251
R 6 401 - R 12 800	2605
R 12 801 - R 25 600	1333
R 25 601 - R 51 200	375
R 51 201 - R 102 400	41
R 102 401 - R 204 800	62
R 204 801 or more	

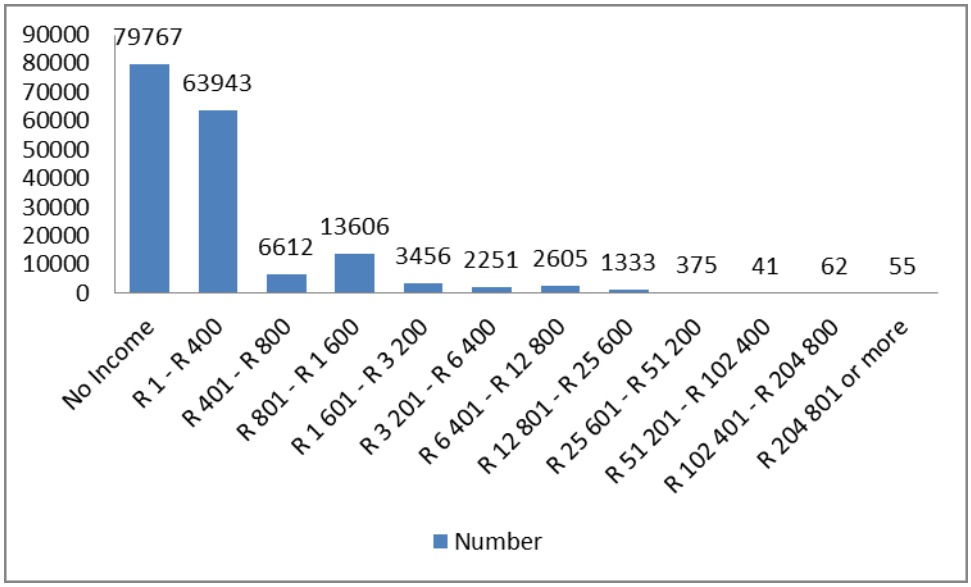


Figure 8 Source: Statistics South Africa (Census 2011)

7.8.3 Community Work Programme

The Community Work Programmes is implemented in 20 wards. The number of Jobs created through the programme is 1080. The reference group as a coordinating body is in place and it sits once a month. Capacity building initiatives to participants are done as to meet some of the objectives for the programme

7.8.4 Agriculture

The climate of the Jozini Local Municipality can generally be described as subtropical, and this varies from moist subtropical along the coast to moderately dry subtropical in the west. The climate (and particularly the rainfall) together with the soils of the area has the greatest influence on agricultural production in the area, and an understanding of the patterns of these parameters is an important predictor of suitable agricultural products for different areas. To respond to the abovementioned conditions the Municipality executed the following programs:

a) Poverty Alleviation projects

In terms of institutional arrangements for all projects that are Agriculture in nature they get coordinated through the Agriculture sector which is comprised of the following stakeholders

Department of Agriculture and Environmental Affairs

LIMA

Department of Social Development (Ingwavuma and Ubombo)

Siyazisiza Trust

Umkhanyakude District

Department of Health

Department of Education

The Municipality has allocated 11 million rands of which portion of it will be used to implement garden and poultry projects as per the needs identified during the IDP processes at ward level. The Sector sits on quarterly basis.

7.8.5 Tourism

Tourism is one the focus areas for economic growth of the area. Jozini is very rich in terms of Natural Resources, Heritage sites, History, Cultural Practices and its location. It became imperative that these attributes are thoroughly looked at to stimulate economic growth. To implement some programs recommended by the tourism sector plan, the following activities were executed:

- Formulation of the Tourism Sector committee comprising of different stakeholders
- Establishment of the Community Tourism Organisation
- Ensuring the effective functioning of the Tourism information Centres (Mkhuze and Jozini)
- The development of the Marketing tools to market Jozini as a tourism destination
- Conducting School awareness programs
- Tourism Ambassador programme
- Tourism Internship programme

7.8.6 Business (Formal and Informal)

- 600 Informal traders were trained on Municipal bi-laws
- Identification of market stalls needed in each town was done
- The programme to support SMME'S and Cooperatives in terms of registration and trainings is in place
- 5 SMME'S and Cooperatives were supported in terms of sourcing finance amounting to 190 000

7.8.7 Local Economic Development: SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
Subtropical Plenty of land under irrigation and without irrigation Enough water Known as fruit basket Existing LED strategy Existing Tourism strategy Fully functional Unit	Limited resources to support Cooperatives, SMME'S and big projects Shortage of staff(capacity) within the Section Shortage of infrastructure (informal traders)	Heritage sites, Monuments (Idlinza Lenkosi Udingane), Caves etc. Natural Resources (Pans, Animals Birds, Gorges, Mountains etc) Location (Swaziland Mozambique , N2) Other attractions(Jozini Dam, Game Reserves)	No revenue base Red tape Political Instability

7.8.8 Social Development Analysis

Broad Based Community Needs	
Ward	**Priorities**
1	Water Electriicity (phase 2) KwaNgwenya Community Care Centre
2	Water RDP Houses Electricity
3	KwaJobe Youth centre
4	Water Electricity Gujini Community hall
5	Water Electricity
6	Electricity Water Agricultural projects
7	Maphaya road and Bridge Emachibini access road Area 17 access roads
8	Othobothini hall Msiyane Library Housing project
9	Water Electricity Roads
10	Water Electricity Housing project
11	Qatha Hall Entuthukweni Access road Ntabayengwe access road

12	Mealie processing

7.8.9 Education

In terms of the Department of Education stats, there are 168 schools under Jozini municipality. According to the public participation meetings that were conducted, many schools need additional classrooms and the upgrading of facilities. Due to their location, some schools do not even have access to basic infrastructure services including access roads. Accommodation for teachers in all areas is also a big problem. Educators are forced to travel far and during the rainy season, many of the schools are inaccessible. Lack of schooling or low levels of education will affect the level of income received in the community and is also a reflection of the standard of living. According to the Business Trust (2207), low education also affects the ability of local residents to actively participate in development programmes. Research indicates that the economic benefits of educating girls are similar to that of educating boys, but the social benefits favour female education over male education. Education of females increases the level of health and nutrition thus increasing overall health and productivity. Income earned by females increase their bargaining power in households and a greater proportion of women's income on child goods compared to that of men. Economic theory suggests that education improves the level and quality of human capital, in turn increasing the productivity of individuals, but increasing the output generated per worker. Education facilitates long term growth and is often described as a tool to escape the poverty trap.

Female education also raises the labour force participation, which significantly raises the productivity and output of the economy.

Key issues

- A need for additional classrooms;
- A need for cottages/ accommodation for teachers;
- A need for the upgrading of school facilities;
- A need for basic infrastructure for schools, including fencing;
- Feeding schemes and
- A shortage of pre-school facilities.

7.9 Site of Archaeological, Cultural and Heritage Significance

Past surveys in the area have indicated no Stone Age or Iron Age sites. Historical sites that have been observed in surrounding areas include homesteads, and farming related structures. According to the National Heritage Resources Act No 25 of 1999, provisions are made to protect national heritage and this forms an integral part of the environmental assessment process. No structures are present on the site.

7.10 Noise

Currently, there are no noise sources on the site. Current ambient noise sources include the road only. Environmental limits for noise will be established to minimize noise impacts. The SANS limits for ambient noise in different types of districts is given in Table 10 below (SANS Code of Practice 10103:2003).

Table 10: Typical rating levels for ambient noise in districts (extracted from the sans cop 10103:2003)

Windows						
	Day-night	**Day-time**	**Night-time**	**Day-night**	**Day-time**	**Night-time**
Residential Districts Rural Districts	45	45	35	35	35	25
Suburban districts with little road traffic	50	50	40	40	40	30
Urban districts	50	55	45	45	45	35
Non Residential Districts Urban districts with some workshops, with business premises and with main roads	60	60	50	50	50	40
Central business districts	65	65	55	55	55	45
Industrial districts	70	70	60	60	60	50
Daytime – 06:00 to 22:00 Night-time – 22:00 to 06:00						

8. PROJECT ALTERNATIVES AND ASSOCIATED IMPACTS

8.1 Project Benefits

The major benefits of the project are as follows:

 will provide employment for 25 people over the 26-year operation period.

 the project will further create indirect employment through hiring of contractors and obtaining supplies. This will primarily be sought locally if available.

 The mine will result in continued implementation of social and local economic development plans through its S&LP.

 The proposed project will make a significant contribution to the inland aggregate market as well as the GDP.

Alternative 1 implies that no development will take place and that the environment will remain unchanged and unaltered by the proposed project. As much as the no-go option resulting in the protection of the environment *in situ* and the continued use of the land for stock farming, it will result in the sterilization of the aggregate resources should no other company mine the area. This would reduce construction material for road construction which is currently a major issue in Jozini, which currently has no viable construction resources. The no-go option would also result in no new employment opportunities. The proposed development footprint of the project will fall within an area comprising of a mixture of natural vegetation. The application area is dominated by shrubs and forest and therefore potential impacts on biodiversity should be considered. If the proposed project should not take place, no additional socio-economic benefits will be created by the mining activities within the area, the mineral resource will be lost, and the additional GDP from the local supply of industrial material will be compromised. Further implications of the No-Go alternative include the loss of economic input into the area and a loss of regional socio-economic benefit. However, the potential impacts on biodiversity and habitat will not occur.

8.2 Project site and activity alternatives

The project site is determined and delimited by the extent of the aggregate seam and no further site alternatives have been assessed. Currently the infrastructure location has not been finalized and is awaiting findings from the assessment studies which will be completed as part of the EIA/EMP process. Any alternatives which may come from these studies will be further assessed in the EIA/EMP report.

Project activity alternatives have not been further assessed. The aggregate/rhyolite seam of interest is shallow and can only be mined by opencast means. The limited extent of mining also makes truck-and-shovel mining the only realistic options.

8.3 Land use alternatives

Alternative land uses (No-Go, residential and stock subsistence farming) which were considered during land use alternative assessment and the impacts associated with these land uses, in comparison with that of mining.

Alternative 1 implies that no development will take place and that the environment will remain unchanged and unaltered by the proposed project. The proposed development foot print of the mining project will fall within an area comprising of natural vegetation and sock subsistence farming. The application area is dominated by natural vegetation, rhyolite stone cropping out throughout the area. If the proposed project should not take place, no additional socio-economic benefits will be created by the mining activities within the area, the mineral resource will be lost, and the additional GDP from the local supply of aggregate will be compromised. Further implications of the No-Go alternative include the loss of economic input into the area and a loss of regional socio-economic benefit. However, the potential impacts on biodiversity and habitat will not occur.

Alternative 2: Table 9 lists the three alternative land uses which were considered during land use alternative assessment and the impacts associated with these land uses, in comparison with that of mining. The comparative impact assessment indicates that opencast mining will have the greatest environmental impacts followed by residential development and stock agriculture. Stock subsistence farming will have the least impact to the environment as that is the predominant current land use. Mining and its associated activities will have the greatest impact on the environment and is the least sustainable but upon completion of mining and with proper rehabilitation other land uses can be considered for the area. Most of the mining impacts will also be for a very limited and occurred in a very small area (8ha). Residual impact extent and severity will still need to be assessed, but in general, responsible mining and rehabilitation from the start of the operation can mitigate a lot of the residual impacts associated with mining. Mining will also have a great positive economic impact, and should be considered a viable land use for the area, especially due to the fact that the surrounding area has no sensitive environmental features.

Table 9: Comparative impact assessment for alternative land uses

Aspect	Residential	Agriculture - Stock	Mining
Topography	Status: -ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: -ve Duration: Medium to short term Extent: Site specific Probability: Definite Severity: Slight to moderate

			Significance: Moderate to low
Soils	Status: -ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Slight to moderate Significance: Moderate to low	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Medium term Extent: Site specific Probability: Definite Severity: Moderate to high Significance: Moderate to high
Land Capability	Status: -ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Moderate Significance: Moderate	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Medium term Extent: Site specific Probability: Definite Severity: Moderate Significance: Moderate
Surface water	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: -ve Duration: Medium to short term Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high
Groundwater	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Moderate Significance: Moderate	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Long term Extent: Local Probability: Definite Severity: High Significance: High
Air quality	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Slight Significance: Low	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Medium to short term Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high
Noise	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Slight to moderate Significance: Moderate to low	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: -ve Duration: Short term Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high
Flora and Fauna	Status: -ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Slight to moderate Significance: Moderate	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Moderate to high Significance: Moderate to high
Archaeology and heritage	Status: -ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Moderate Significance: Moderate	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Long term Extent: Site specific Probability: Definite Severity: Moderate Significance: Moderate

Visual aspect	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Moderate Significance: Moderate	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Short term Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high
Traffic and safety	Status: -ve Duration: Permanent Extent: Local Probability: Definite Severity: Moderate to high Significance: Moderate to high	Status: Neutral Duration: - Extent: - Probability: - Severity: - Significance: -	Status: -ve Duration: Short term Extent: Local Probability: Definite Severity: Slight to moderate Significance: Moderate to low
Regional socio-economics	Status: +ve Duration: Permanent Extent: Site specific Probability: Definite Severity: Slight Significance: Low	Status: +ve Duration: Long term Extent: Local Probability: Definite Severity: Slight Significance: Low	Status: +ve Duration: Long term Extent: Local Probability: Definite Severity: Moderate Significance: Moderate to high
Cumulative assessment	The main cumulative effects of residential development will be around the permanent alteration of the area to residential. This means a permanent alteration of the soils, land capability, land use, floral and faunal biodiversity and a high risk of exotic species through gardening activities. The cumulative impacts are considered of moderate to high significance due to the permanent nature of the impacts.	The main impact is that of water use for livestock watering and the erosion and floral community alteration that may occur through overgrazing. These impacts are considered negligible as are cumulative contributions.	The operation of a mine will contribute most significantly to cumulative impacts. The detailed cumulative assessment is detailed later, but the operations will significantly contribute to drops in groundwater levels, reduced groundwater quality if poorly managed and elevated dust and particulate matter. From a socio-economic perspective it will significantly improve livelihood of the several employees.

9. ASSESSMENT AND EVALUATION OF POTENTIAL IMPACTS

Table below merely lists the proposed activities and a list of aspects of the environment which may be impacted upon by such activity. The table does not (and is not meant to) quantify or describe the nature of impact.

Activity
1. PRE- ESTABLISHMENT ACTIVITIES
1.1. Approvals (Pre-establishment)
1.2. Site Survey to place facilities
1.2.1. Land Capability

1.3. Demarcate Mining Right area & No-Go areas and danger
1.3.1. Land Capability
2. ESTABLISHMENT ACTIVITIES
2.1. Upgrade and extend selected access road
2.1.1. Topsoil
2.1.2. Visual
2.1.3. Land Capability
2.1.4. Animal Life
2.1.5. Noise
2.1.6. Air Quality
2.1.7. Hydrocarbons
2.2. Provide chemical toilets for site establishment staff
2.2.1. Surface Water
2.2.2. Groundwater
2.5. Remove topsoil to berms in Logistics and stockpiling Area
2.5.1. Topsoil
2.5.2. Land Capability
2.5.3. Vegetation
2.5.4. Animal Life
2.5.5. Noise
2.5.6. Air Quality
2.5.7. Archaeology
2.5.8. Hydrocarbons
2.6. Remove topsoil to berms
2.6.1. Topsoil
2.6.2. Land Capability

2.6.3. Vegetation
2.6.4. Animal Life
2.6.5. Noise
2.6.6. Air Quality
2.6.7. Archaeology
2.6.8. Hydrocarbons
2.7. Construct Primary Ramp
2.7.1. Topography
2.7.2. Visual
2.7.3. Noise
2.7.4. Dust
2.8. Construct haul road to excavation
2.8.1. Noise
2.8.2. Dust
2.8.3. Hydrocarbons
2.9. Construct / Place Container for office and store
2.10. Place personnel amenities container
2.11. Construct domestic and industrial waste collection point
2.11.1. Noise
2.11.2. Dust
2.11.3. Hydrocarbons
2.12 Cast concrete footings for crushing plant
2.12.1. Noise
2.12.2. Dust
2.12.3. Hydrocarbons
2.13 Erect crushing plant

2.13.1 Noise
2.13.2. Dust
2.13.3. Hydrocarbons
2.14 Construct weighbridge
2.14.1 Noise
2.14.2. Dust
2.14.3. Hydrocarbons
2.15 Establish storm water management system
2.15.1. Surface Water
2.15.2. Noise
2.15.3. Dust
2.15.4. Hydrocarbons
2.16. Initiate induction environmental training of staff
2.17. Install mist sprays on plant
2.18. Conduct post establishment Environmental Performance Assessment (EPA)
3. OPERATIONAL PHASE ACTIVITIES
3.1. Topsoil removal to perimeter stockpile ahead of face advance
Activity
3.1.1. Topsoil
3.1.2. Visual
3.1.3. Land Capability
3.1.4. Vegetation
3.1.5. Animal Life
3.1.6. Noise
3.1.7. Dust
3.1.8. Archaeology

3.1.9. Hydrocarbons
3.2. Drilling
3.2.1. Noise
3.2.2. Dust
3.2.3. Hydrocarbons
3.3. Blasting / Quarry advance
3.3.1. Geology
3.3.2. Topography
3.3.3. Visual
3.3.4. Land Capability
3.3.5. Surface Water
3.3.6. Groundwater: Quantity
3.3.7. Noise
3.3.8. Dust
3.3.9. Blast Vibration
3.3.10. Fly rock
3.4. Loading of shot rock
3.4.1. Noise
3.4.2. Dust
3.4.3. Hydrocarbons
3.5. Hauling of shot rock
3.5.1. Noise
3.5.2. Dust
3.5.3. Hydrocarbons
3.6. Crushing and screening of shot rock
3.6.1. Visual

3.6.2. Noise
3.6.3. Dust
3.6.4. Hydrocarbons
3.7. Use of mist sprays on plant
3.7.1. Water Use
3.7.2. Air Quality
3.8. Stockpiling of product
3.8.1. Noise
3.8.2. Dust
3.8.3. Hydrocarbons
3.9. Loading of product for delivery
3.9.1. Noise
3.9.2. Dust
3.9.3. Hydrocarbons
3.10 Use of access/delivery road to the site (and other un-surfaced roads)
3.10.1. Noise
3.10.2. Dust
3.10.3. Hydrocarbons
3.10.4. Traffic / Access
4. OPERATIONAL PHASE MONITORING AND REHABILITATION ACTIVITIES
4.1. Monitor fly rock during and after blasting
4.2. Record blast ground and air vibration
4.3. Monitor dust blowing in direction of surrounding residents/ communities
4.4. Conduct EPA (bi-annually)
4.5. Monitor and Maintain storm-water system
4.6. Monitor and Maintain dust control sprinklers on plant

4.7. Monitor and Maintain access/delivery road
4.8. Collection of waste bins
4.9. Enforce no-go area access
4.10. Operational Rehabilitation - upper perimeter face splitting (only after phase 4)
4.10.1. Topography
4.10.2. Topsoil
4.10.3. Visual
4.10.4. Land Capability
5. DECOMMISSIONING PHASE ACTIVITIES
Complete rehabilitation of the excavation through:
5.1. Complete upper bench splitting of hard face
5.1.1. Topography
5.1.2. Topsoil
5.1.3. Visual
5.1.4. Land Capability
5.2. Retain safety fence and berm around top of excavation rim
5.3. Allow excavation floor to flood as reedbed
5.4. Retain haul road access
Complete rehabilitation of the logistical facility, plant and stockpiling area through
5.5. Demolish all unrequired structures
5.5.1. Noise
5.5.2. Air Quality
5.5.3. Hydrocarbons
5.6. Remove all process plant and steel structures
5.6.1. Noise
5.6.2. Air Quality

5.6.3. Hydrocarbons
5.7. Remove all protruding foundations and footings
5.7.1. Noise
5.7.2. Air Quality
5.7.3. Hydrocarbons
5.8. Remove all pipelines and cables
5.9. Remove ramp to bottom of pit
5.9.1. Topography
5.9.2. Noise
5.9.3. Air Quality
5.9.4. Hydrocarbons
5.10. Remove weighbridge concrete structures
5.11. Rip / scarify all hardened areas
5.11.1. Noise
5.11.2. Air Quality
5.11.3. Hydrocarbons
5.12. Replace Topsoil ex berms in the logistics and stockpiling area and re-vegetate
5.12.1. Topsoil
5.12.2. Land Capability
5.12.3. Vegetation
5.12.4. Animal Life
5.12.5. Noise
5.12.6. Air Quality
5.12.7. Hydrocarbons
5.13. Replace Topsoil ex berms in Plant area and re-vegetate
5.13.1. Topsoil

5.13.2. Land Capability
5.13.3. Vegetation
5.13.4. Animal Life
5.13.5. Noise
5.13.6. Air Quality
5.13.7. Hydrocarbons
5.14. Retain storm-water management system
5.14.1. Land Capability
5.14.2. Surface Water
5.15. Retain access roads for future use
6. POST REHABILITATION AND MAINTENANCE PHASE
6.1. Maintain storm-water management system
6.1.1. Land Capability
6.1.2. Surface Water
6.2. Remove alien vegetation (if applicable)
6.3. Conduct supplementary seeding if necessary
6.4. Conduct final performance assessment
6.5. Lodge closure Application

9.1 Associated impact rating for each potential impact listed in paragraph above

The impact significance rating methodology, as provided by Beyond Green, is guided by the requirements of the NEMA EIA Regulations (2014). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

a) The significance level which is a summary of the impact importance taking into account the below considerations is based on the following criteria:

Significance		Criteria
Negative	Significant (S)	Recommended level always exceeded with associated widespread community action Disturbance to areas that are pristine, have conservation value, are important resource to humans and will be lost forever Complete loss of land capability Destruction of rare or endangered specimens May affect the viability of the project
	Moderate (M)	Moderate measurable deterioration and discomfort Recommended level occasionally violated – still widespread complaints Partial loss of land capability Complete change in species variety or prevalence May be managed Is insignificant if managed according to EMP provisions
	Minor/ (I) Insignificant	Minor deterioration. Change not measurable Recommended level will rarely if ever be violated

		Sporadic community complaints Minor deterioration in land capability Minor changes in species variety or prevalence
	Negligible	An impact will occur but it is barely discernible and not worthy of further investigation
Positive	Minor	Improvements in local socio-economics
	Significant	Major improvements in local socio-economics with some regional benefits

b) **The duration, the length of the period over which the impact occurs** is classified as:

Permanent (post-closure)

Life of Mine (LOM)

Temporary

c) **The probability, the chance that the impact will occur** is ranked as:

Definite/Certain

Possible

Unlikely

d) **Extent- the area of impact**

Site: impact limited to the mining area.

Local: impact limited to the mining area and immediate neighbours. < 500 m

Regional: impact extending beyond the immediate neighbours

d) **Significance –**Positive: discernible benefits

Very High: impact is of the highest order possible.

High: impact is substantial.

Moderate: impact is real but not substantial in relation to other impacts.

Low: impact is of a low order.

Very low: impact is negligible.

e) **Severity – the magnitude of the impact**

Low: the impact is of a small magnitude.

Medium: the impact is of a medium magnitude.

High: the impact is of a high magnitude

f) **Frequency – how often the impact occurs**

Continuous: the cause of the impact occurs all the time.

Often: impact cause is intermittent but occurs often

Regular: impact cause is intermittent but does not occur often.

Occasional: impact cause occurs every now and then.

Seldom impact cause occurs rarely - once or twice

h) **Mitigation measures –**

These are measures that can be implemented at the operation in order to reduce the significance of the impact. The detailed actions, which are required to ensure that mitigation is successful, are given in the EMP.

Table 10: Impact rating table

Activity	Nature of impact	Extent	Duration	Probability	Significance
1. PREESTABLISHMENT ACTIVITIES					
1.1. Approvals (Prestablishment)					
1.2. Site Survey to place					
1.2.1. Land Capability	Placing of facilities as	Mining Right area	Life of Mine	Definite	Positive (Insignificant)
1.3. Demarcate Mining Right area & No-Go areas and danger sign posting					
1.3.1. Land Capability	Placing of beacons to demarcate activity areas	Mining Right area	Life of Mine	Definite	Positive (Insignificant)
2. ESTABLISHMENT ACTIVITIES					
2.1 Upgrade selected access road	May require widening of sections of existing road				
2.1.1. Topsoil	Limited topsoil removal; will be required should road widening/ construction be required	Unknown but will be minor in currently cultivated lands	Life of Mine	Probable	Insignificant
2.1.2. Visual	Sections of access road may be visible from other public roads	Minor	Life of Mine	Possible	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
2.1.3. Land Capability	Sections of currently Cultivated areas will be Disturbed	No cultivated land will be disturbed	8ha	N/A	N/A
2.1.4. Animal Life	Disturbance of habitat (in grazing land)	Minor	On execution	Unlikely	Insignificant
2.1.5. Noise	Earthmoving Equipment	Local	On execution	Definite	Insignificant
2.1.6. Air Quality	Dust generated by earthmoving Equipment	Local	On execution	Definite	Insignificant
2.1.7. Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned	Possible	Insignificant
2.2. Provide chemical toilets for site establishment staff					
2.2.1. Surface Water	Possible leakage	Local	On execution until cleaned	Possible	Insignificant
2.2.2. Groundwater	Possible leakage	Local	On execution until cleaned	Unlikely	Insignificant
2.5 Remove topsoil to berms in Logistics and stockpiling area					

Activity	Nature of impact	Extent	Duration	Probability	Significance
2.5.1Topsoil	1.ha area topsoil to be removed to berms	1.ha @ 15cm deep = 2850m³	Life of Mine	Definite	Moderate
2.5.2. Land Capability	1.ha cultivated area lost to activities	1.ha	N/A	N/A	None
2.5.3. Vegetation	Natural vegetation will be disturbed/lost to activities	1ha	Life of Mine	Definite	Insignificant
2.5.4. Animal Life	Disturbance of habitat	Minor	On execution	unlikely	Insignificant
2.5.5 Noise	Earthmoving Equipment	Local	On execution	Definite	Insignificant
2.5.6. Air Quality	Dust generated by earthmoving Equipment	Local	On execution	Definite	Insignificant
2.5.7. Archaeology	Possible disturbance of Artefacts	Local	Permanent	Highly unlikely given type of terrain	Insignificant
2.5.8. Hydrocarbons	Possible oil/ fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.6. Remove topsoil to berms in Plant area					
2.6.1Topsoil	1.ha area topsoil to be removed to	1.ha @ 15cm deep =	Life of Mine	Definite	Moderate

	berms	1950m³			
2.6.2. Land Capability	1.ha cultivated area lost to activities	1.ha	N/A	N/A	None
2.6.3. Vegetation	natural vegetation will be disturbed/lost to activities	1ha	Life of Mine Definite	Definite	Insignificant
2.6.4. Animal Life	Disturbance of habitat	Minor	On execution	unlikely	Insignificant
2.6.5 Noise	Earthmoving Equipment	Local	On execution	Definite	Insignificant
2.6.6. Air Quality	Dust generated by Earthmoving Equipment	Local	On execution	Definite	Insignificant
2.6.7. Archaeology	Possible disturbance of Artefacts	1ha	Permanent	Highly unlikely given type of terrain and location	Insignificant
2.6.8. Hydrocarbons	Possible oil/ fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.7. Construct Primary ramp					
2.7.1. Topography	Typical ramps up to 5m[6] high with retaining wall to intake hopper	From surface to 5m high over an area of ±250m²	Will remain for life of mine	Definite	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
2.7.2 Visual	May be visible from the hunters and public situated on the mountain hill	From distance of 2km & more if at all	Life of mine	Possible	Negligent
2.7.3 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.7.4. Dust	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.8. Construct haul road to excavation					
2.8.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.8.2. Dust	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.8.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.9. Construct / Place Container for office and store					
2.10 Place personnel amenities container					
2.11 Construct domestic and industrial waste collection point					

Activity	Nature of impact	Extent	Duration	Probability	Significance
2.11.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.11.2. Dust	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.11.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.12 Cast concrete footings for crushing plant					
2.12.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.12.2. Dust	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.12.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.13. Erect Crushing plant					
2.13.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.13.2. Dust	Dust generated by	Local	During constructio	Definite	Insignificant

	earthmoving Equipment		n		
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
2.13.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.14. Construct weighbridge					
2.14.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.14.2. Dust	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.14.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.15 Establish storm-water management system					
2.15.1. Surface Water	Will prevent siltation of natural water resources	Local and Downstream	Life of mine	Definite	Insignificant to moderate (Positive)
2.15.2 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
2.15.3. Dust	Dust generated by earthmoving	Local	During constructio n	Definite	Insignificant

	Equipment				
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
2.15.4 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
2.16 Initiate induction environmental training of staff	Positive attenuation measure				
2.17 Install mist sprays on plant	Positive attenuation measure				
2.18 Conduct post establishment Environmental Performance Assessment	Positive attenuation measure				
3. OPERATIONAL PHASE ACTIVITIES					
3.1. Topsoil removal to perimeter stockpile ahead of face advance	Until end phase 4 after which topsoil can be replaced on upper benches				
3.1.1. Topsoil	Topsoil removed to average 15cm deep ahead of face of advance	In 40m strips ahead of mining	Until at least end Phase 4	Definite	Moderate

		advance			
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
3.1.2 Visuals	Landscape alteration	Local	Until end of Phase 4	Probable	Insignificant
3.1.3. Land Capability	Cleared area will not be available for livestock grazing	Eventually 8ha (at end Phase 4)	Permanent	Definite	Insignificant (small scale)
3.1.4. Vegetation	natural vegetation will be disturbed	8ha	Until end of Phase 4	Definite	Insignificant (small scale)
3.1.5. Animal Life	Disturbance of habitat	Minor	On execution	Unlikely	Insignificant
3.1.6 Noise	Earthmoving Equipment	Local	On execution	Definite	Insignificant
3.1.7. Air Quality	Dust generated by Earthmoving Equipment	Local	On execution	Definite	Insignificant
3.1.8 Archaeology	Possible disturbance of Artefacts	local	Permanent	Highly unlikely given type of terrain & location	Insignificant
3.1.9 Hydrocarbons	Possible oil/fuel; leak from earthmoving	Local	On execution until cleaned up	Possible	Insignificant
3.2 Drilling					

Activity	Nature of impact	Extent	Duration	Probability	Significance
3.2.1 Noise	Drilling noise	Local	On execution	Definite	Insignificant
3.2.2. Air Quality	Dust generated by Drilling	Local	On execution	Definite	Insignificant
3.2.3 Hydrocarbons	Possible oil/fuel; equipment	Local	On execution until cleaned up	Definite	Insignificant
3.3. Blasting / Quarry advance					
3.3.1. Geology	Removal of 1 30 0000 tons of rhyolite material	8ha	Permanent	Definite	Negligible
3.3.2. Topography	Excavation development in hard rock	8ha surface area to depth of btn 60m in east & 110m in SW	Permanent	Definite	Moderate to significant
3.3.3. Visual	Landscape alteration	Local	Until end of Phase 4	Probable	Insignificant
3.3.4. Land Capability	Natural area will not be available for livestock grazing	Eventually 8ha (at end Phase 4)	Permanent	Definite	Insignificant (small scale)
3.3.5 Surface Water	Loss of surface run-off contribution to the stream below mining area	8ha	Permanent	Definite	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
3.3.6. Groundwater	Possible exposure of groundwater. Could lead to drawdown	Over excavation surface area of 3ha (or even less)	Permanent	Possible	Insignificant
3.3.7 Noise	Blast noise	Mine area & beyond	At blasting time	Definite	insignificant (given houses Are 0.75 km away from blast area
3.3.8 Dust	Blast dust	Mine area & beyond	At blasting time	Definite	Insignificant given wind vectors
3.3.9 Blast vibration	Blast vibration as sub surface waves can cause damage to structures if excessive	Mine area & beyond	Damage at time of blasting	unlikely	insignificant (given houses Are 0.75 km away from blast area
3.3.10 Fly rock	Damage to structures and potential loss of life	Community to the surrounding & Structures nearby	Damage related to blasting	unlikely	insignificant (given houses 0.75km away from closest blast
3.4. Loading of shot rock					
3.4.1 Noise	Earthmoving Equipment	Local	During construction	Definite	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
3.4.2. Dust	Dust generated by earthmoving equipment	Local	During construction	Definite	Insignificant
3.4.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
3.5. Hauling of shot rock					
3.5.1 Noise	Earthmoving Equipment	Local	During construction	Definite	Insignificant
3.5.2. Dust	Dust generated by earthmoving equipment	Local	During construction	Definite	Insignificant
3.5.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
3.6 Crushing and screening of shot rock					
3.6.1 Visual	Dust also causes visual Impact	Local	Whilst crusher and screens operational under dry conditions	Probable	Insignificant
3.6.2 Noise	Earthmoving Equipment	Local	During construction	Definite	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
3.6.3. Dust	Dust generated by earthmoving equipment	Local	During construction	Definite	Insignificant
3.6.4 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant
3.7. Use of mist sprays on plant					
3.7.1. Water Use	Ground or surface water (quarry sump) use	Minor volumes	Whilst crusher and screens operational under dry conditions	Definite	Insignificant
3.7.2 Air quality	Reduction in dust levels	Local & reduction in visual outside of Mining Right area	Whilst crusher and screens operational under dry conditions	Definite	Insignificant
3.8. Stockpiling of product					
3.8.1 Noise	Earthmoving Equipment	Local	During construction	Definite	Insignificant
3.8.2. Dust	Dust generated by earthmoving	Local	During constructio	Definite	Insignificant

	equipment		n		
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
3.8.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
3.9 Loading of product for delivery					
3.9.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
3.9.2. Dust	Dust generated by earthmoving equipment	Local	During constructio n	Definite	Insignificant
3.9.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
3.10. Use of access/delivery road to the site (and other un-surfaced roads)					
3.10.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
3.10.2. Dust	Dust generated by earthmoving equipment	Local	During constructio n	Definite	Insignificant
3.10.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Local	On execution until cleaned up	Possible	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
3.10.4 Traffic / access	Increased heavy vehicle traffic	8 trucks per day[1]	Life of Mine During working hours	Most likely	Moderate
4. OPERATIONAL PHASE MONITORING AND REHABILITATION ACTIVITIES					
4.1 Monitor fly rock during and after blasting	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.2 Record blast ground and air vibration	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.3. Monitor dust blowing in direction of surrounding residents/ Communities	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.4 Conduct EPA (biannually)	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.5 Monitor and Maintain Storm-water system	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.6 Monitor and Maintain dust control sprinklers on plant	Monitoring is -an impact reduction measure. As such it has a positive impact.				
4.7 Monitor and Maintain access/delivery road	Monitoring is an impact reduction measure. As such it has a positive impact.				
4.8 Collection of waste bins	Is an impact reduction measure				
4.9 Enforce no-go area access	Is an impact reduction measure				
4.10 Operational Rehabilitation - upper perimeter face splitting (only after phase 4)					

[1] Assume 25ton trucks: 52 000tons per annum = 4 333tons/month / 22days = 197tons/day / 25ton trucks = 8 trucks per day in an area for quarry trucks

Activity	Nature of impact	Extent	Duration	Probability	Significance
4.10.1 Topography	Shaping of upper faces to maximize Re-vegetation potential and safety	Upper 10m bench	Permanent	Definitely	Insignificant (Positive)
4.10.2. Topsoil	Topsoil replaced over split benches	All benches	Permanent	Definitely	Insignificant
4.10.3 Visuals	Vegetation will grow on replaced topsoil hiding faces behind them	All benches	Permanent	Definitely	Moderate to Insignificant
4.10.4 Land capability	Allows for wilderness rating to be applied	Entire excavation (eventually)	Permanent	Definite	Insignificant
5. DECOMMISSIONING PHASE ACTIVITIES					
Complete rehabilitation of the excavation through:					
5.1 Complete upper bench splitting of hard face					
5.1.1 Topography	Shaping of upper faces to maximize Re-vegetation potential and safety	Upper 10m bench	Permanent	Definitely	Insignificant (Positive)

Activity	Nature of impact	Extent	Duration	Probability	Significance
5.1.2 Topsoil	Topsoil replaced over split benches	All benches	Permanent	Definite	Insignificant
5.1.3 Visuals	Vegetation will grow on replaced topsoil hiding faces behind them	All benches	Permanent	Definitely	Moderate to Insignificant
5.1.4 Land capability	Allows for wilderness rating to be applied	Entire excavation (eventually)	Permanent	Definite	Insignificant
5.2 Retain safety fence And berm around top of excavation rim					
5.3 Allow excavation floor to flood as reedbed					
5.4 Retain haul road access					
Complete rehabilitation of the logistical facility, plant and stockpiling area through:					
5.5 Demolish all unrequired Structures					
5.5.1 Noise	Earthmoving Equipment	Local	During construction	Definite	Insignificant
5.5.2. Dust	Dust generated by earthmoving Equipment	Local	During construction	Definite	Insignificant

Activity	Nature of impact	Extent	Duration	Probability	Significance
5.5.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
5.6 Remove all process plant and steel structures					
5.6.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.6.2. Air quality	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.6.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
5.7 Remove all protruding foundations and footings					
5.7.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.7.2. Air quality	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.7.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving	Local	On execution until	Possible	Insignificant

	Equipment		cleaned up		
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
5.8 REMOVE ALL PIPELINES AND CABLES					
5.9 REMOVE RAMP TO BOTTOM OF PIT					
5.9.1 Topography	Ramp removed	±250m²	Permanent	Definite	Insignificant
5.9.2 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.9.3. Air quality	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.9.4 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
5.10 Remove weighbridge concrete structures					
5.11 Rip / scarify all hardened areas					
5.11.1 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.11.2. Air quality	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.11.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving	Local	On execution until	Possible	Insignificant

	Equipment		cleaned up		
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
5.12 Replace Topsoil ex berms in the logistics and stockpiling area and revegetate					
5.12.1 Topsoil	1.ha area topsoil to be replaced to berms	1.ha @ 15cm deep = 2850m³	Permanent	Definite	Moderate
5.12.2. Land Capability	1.ha available as wilderness or for grazing	1.ha	Permanent	Definite	Insignificant
5.12.3. Vegetation	Will be seeded with vegetation	1ha	Permanent	Definite	Insignificant
5.12.4. Animal Life	Habitat returned	Minor	Permanent	Definite	Insignificant
5.12.5 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.12.6. Air quality	Dust generated by earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.12.7 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
5.13. Replace Topsoil ex berms in Plant area and re-vegetate					
5.13.1Topsoil	1.ha area topsoil to be removed to	1.ha @ 15cm deep =	Permanent	Definite	Moderate

	berms	1950m³			
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
5.13.2. Land Capability	1.ha available as wilderness or for grazing	1.ha	Permanent	Definite	Insignificant
5.13.3. Vegetation	Will be seeded with vegetation	1ha	Permanent	Definite	Insignificant
5.13.4. Animal Life	Habitat returned	Minor	Permanent	Definite	Insignificant
5.13.5 Noise	Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.13.6. Air Quality	Dust generated by Earthmoving Equipment	Local	During constructio n	Definite	Insignificant
5.13.7 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Local	On execution until cleaned up	Possible	Insignificant
5.14 Retain storm-water management system					
5.14.1 Land Capability	Enables more effective re-vegetation through prevention of erosion	Mining right area	Until Re-vegetated	Definite	Insignificant
5.14.2 Surface water	Elimination of potential siltation of	Mining right area	Until Re-vegetated	Definite	Insignificant

	stream below site				
Activity	**Nature of impact**	**Extent**	**Duration**	**Probability**	**Significance**
5.15 Retain access roads for future use					
6. AFTERCARE PERIOD					
6.1 Maintain stormwater management system					
6.1.1 Land Capability	Enables more effective re-vegetation through prevention of erosion	Mining right area	Until Re-vegetated	Definite	Insignificant
6.1.2 Surface water	Elimination of potential siltation of stream below site	Mining right area	Until Re-vegetated	Definite	Insignificant
6.2 Remove alien vegetation (if applicable)					
6.3 Conduct supplementary seeding if necessary					
6.4 Conduct final performance Assessment					
6.5 Lodge closure Application					

10. ENVIRONMENTAL MANAGEMENT PLAN

10.2 Mitigatory measures for each significant impact of the proposed mining operation

When assessing the criteria which describe the levels of impact in the table above

The largest impacts will be generated by:

- Impact on topography as a result of the excavation advance.

- Impact on topsoil through disturbance ahead of mining

- Possible dust impact on surrounding community and livestock farming

The mitigation measures to be introduced in each of these aspects is described in the table below

Table: 11 Mitigatory measures for each significant impact of the proposed mining operation.

Activity	**Nature of impact**	**Management option chosen**
1. PRE- ESTABLISHMENT ACTIVITIES		
1.1 Approvals (Pre-establishment)		
1.2 Site Survey to place Facilities		
1.2.1 Land Capability	Placing of facilities as per plan	Demarcation Plan
1.3 Demarcate Mining Right area & No-Go areas and danger sign posting		
1.3.1 Land Capability	Placing of beacons to demarcate activity areas	Demarcation Plan
2. ESTABLISHMENT ACTIVITIES		
2.1 Upgrade selected access road	May require widening of sections of existing road	
2.1.1Topsoil	Limited topsoil removal; will be required during road widening/ construction	Topsoil Handling Method
2.2.2. Land Capability	Sections of access road may be visible from other public roads	Vegetation Management Options
2.2.3. Vegetation	Sections of currently grazing/vegetated areas will be disturbed	Vegetation Management Options
2.2.4. Animal Life	Disturbance of habitat	Vegetation Management Options
2.2.5 Noise	Earthmoving equipment	Noise Reduction Measures
2.2.6. Air Quality	Dust generated by earthmoving	Dust Reduction Measures

	equipment	
2.2.7 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.2 Provide chemical toilets for site establishment staff		
2.2.1. Surface Water	Possible leakage	Monitoring programme
2.2.2. Groundwater	Possible leakage	Monitoring programme
2.5 Remove topsoil to berms in Logistics and stockpiling area		
2.5.1Topsoil	1.ha area topsoil to be removed to berms	Topsoil Handling Method
2.5.2. Land Capability	1.ha cultivated area lost to activities	Vegetation Management Options
2.5.3. Vegetation	natural vegetation will be disturbed/lost to activities	Vegetation Management Options
2.5.4. Animal Life	Disturbance of habitat	Vegetation Management Options
2.5.5 Noise	Earthmoving Equipment	Noise Reduction Measures
2.5.6. Air Quality	Dust generated by earthmoving equipment	Dust Reduction Measures
2.5.7. Archaeology	Possible disturbance of Artefacts	Archaeological occurrence procedure
2.5.8. Hydrocarbons	Possible oil/ fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.6. Remove topsoil to berms in Plant area		
2.6.1Topsoil	1.ha area topsoil to be removed to berms	Topsoil Handling Method
2.6.2. Land Capability	1.ha cultivated area lost to activities	Vegetation Management Options
2.6.3. Vegetation	natural vegetation will be disturbed/lost to activities	Vegetation Management Options
2.6.4. Animal Life	Disturbance of habitat	Vegetation Management Options
2.6.5 Noise	Earthmoving Equipment	Noise Reduction Measures

Activity	Nature of impact	Management option chosen
2.6.6. Air Quality	Dust generated by Earthmoving Equipment	Dust Reduction Measures
2.6.7. Archaeology	Possible disturbance of Artefacts	Archaeological occurrence procedure
2.6.8. Hydrocarbons	Possible oil/ fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.7. Construct Primary		
2.7.1. Topography	Typical ramps up to $5m^6$ high with retaining wall to intake hopper	None required
2.7.2 Visual	May be visible from Locals hunting	Grass seed exposed slope if relevant
2.7.3 Noise	Earthmoving Equipment	Noise Reduction Measures
2.7.4. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.8. Construct haul road to excavation		
2.8.1 Noise	Earthmoving Equipment	Noise Reduction Measures
2.8.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.8.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.9. Construct / Place		
2.10 Container for office and store		
2.11 Construct domestic and industrial waste collection point		
2.11.1 Noise	Earthmoving Equipment	Noise Reduction Measures
2.11.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.11.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.12 Cast concrete footings for		

crushing plant		
Activity	**Nature of impact**	**Management option chosen**
2.12.1 Noise	Earthmoving Equipment	Noise Reduction Measures
2.12.2. Dust	Dust generated by Earthmoving Equipment	Dust Reduction Measures
2.12.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.13. Erect Crushing plant		
2.13.1 Noise	Earthmoving Equipment	Noise Reduction Measures
2.13.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.13.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.14. Construct weighbridge		
2.14.1 Noise	Earthmoving Equipment	Noise Reduction Measures
2.14.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.14.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.15 Establish storm-water management system		
2.15.1. Surface Water	Will prevent siltation of natural water resources	Storm-water Management System
2.15.2 Noise	Earthmoving Equipment	Noise Reduction Measures
2.15.3. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
2.15.4 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
2.16 Initiate induction environmental training of staff	Positive attenuation Measure	
2.17 Install mist sprays on plant	Positive attenuation Measure	
Activity	**Nature of impact**	**Management option**

		chosen
2.18 Conduct post establishment Environmental Performance Assessment (EPA)	Positive attenuation Measure	
3. OPERATIONAL PHASE ACTIVITIES		
3.1. Topsoil removal to perimeter stockpile ahead of face advance	Until end phase 4 after which topsoil can be replaced on upper benches	
3.1.1. Topsoil	Topsoil removed to average 15cm deep ahead of face of advance	Topsoil Handling Method
3.1.2 Visuals	Landscape alteration	Initiate upper face trimming and re-vegetation of benches as soon as feasible
3.1.3. Land Capability	Cleared area will not be available for livestock grazing	Vegetation Management Options
3.1.4. Vegetation	natural vegetation will be disturbed	Vegetation Management Options
3.1.5. Animal Life	Disturbance of habitat	Vegetation Management Options
3.1.6 Noise	Earthmoving Equipment	Noise Reduction Measures
3.1.7. Air Quality	Dust generated by Earthmoving Equipment	Dust Reduction Measures
3.1.8 Archaeology	Possible disturbance of Artefacts	Archaeological occurrence Procedure
3.1.9 Hydrocarbons	Possible oil/fuel; leak from earthmoving	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.2 Drilling		
3.2.1 Noise	Drilling noise	Noise Reduction Measures
3.2.2. Air Quality	Dust generated by drilling	Dust Reduction Measures
3.2.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.3. Blasting / Quarry advance		
3.3.1. Geology	Removal of 1 30 0000 tons of rhyolite	None required

	material	
Activity	**Nature of impact**	**Management option chosen**
3.3.2. Topography	Excavation development in hard rock	Upper face shaping
3.3.3. Visual	Landscape alteration	Upper face shaping
3.3.4. Land Capability	Natural area will not be available for livestock grazing	Vegetation Management Options
3.3.5 Surface Water	Loss of surface run-off Contribution to the stream below mining area	None required
3.3.6. Groundwater	Possible exposure of groundwater. Could lead to drawdown	None required
3.3.7 Noise	Blast noise	Noise Reduction Measures
3.3.8 Dust	Blast dust	Dust Reduction Measures
3.3.9 Blast vibration	Blast vibration as sub-surface waves can cause damage to structures if excessive	Blasting considerations
3.3.10 Fly rock	Damage to structures and potential loss of life	Blasting considerations
3.4. Loading of shot rock		
3.4.1 Noise	Earthmoving Equipment	Noise Reduction Measures
3.4.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.4.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.5. Hauling of shot rock		
3.5.1 Noise	Earthmoving Equipment	Noise Reduction Measures
3.5.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.5.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.6 Crushing and screening of shot rock		
3.6.1 Visual	Dust also causes visual impact	Dust Reduction Measures

Activity	Nature of impact	Management option chosen
3.6.2 Noise	Earthmoving Equipment	Noise Reduction Measures
3.6.3. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.6.4 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.7. Use of mist sprays on plant		
3.7.1. Water Use	Ground or surface water (quarry sump) Use	None required
3.7.2 Air quality	Reduction in dust levels	Dust Reduction Measures
3.8. Stockpiling of product		
3.8.1 Noise	Earthmoving Equipment	Noise Reduction Measures
3.8.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.8.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.9 Loading of product for delivery		
3.9.1 Noise	Earthmoving Equipment	Noise Reduction Measures
3.9.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.9.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.12. Use of access/delivery road to the site (and other un-surfaced roads)		
3.9.1 Noise	Earthmoving Equipment	Noise Reduction Measures
3.9.2. Dust	Dust generated by earthmoving equipment	Dust Reduction Measures
3.9.3 Hydrocarbons	Possible oil/fuel; leak from earthmoving equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
3.9.4 Traffic / access	Increased heavy vehicle traffic	Fine road use offenders &

		Obey traffic regulations
Activity	**Nature of impact**	**Management option Chosen**
4. OPERATIONAL PHASE MONITORING AND REHABILITATION ACTIVITIES		
4.1 Monitor fly rock during and after Blasting		
4.2 Record blast ground and air vibration		
4.3. Monitor dust blowing in direction of surrounding residents/ Communities		
4.4 Conduct EPA (biannually)		
4.5 Monitor and Maintain Storm-water system		
4.6 Monitor and Maintain dust control sprinklers on plant		
4.7 Monitor and Maintain access/delivery road		
4.8 Collection of waste bins		
4.9 Enforce no-go area access		
4.10 Operational Rehabilitation – upper perimeter face splitting (only after phase 4)		
4.10.1 Topography	Shaping of upper faces to maximize re-vegetation potential and safety	Upper Face Shaping
4.10.2. Topsoil	Topsoil replaced over split benches	Topsoil Handling Method
4.10.3 Visuals	Vegetation will grow on replaced topsoil hiding faces behind them	Upper Face Shaping
4.10.4 Land capability	Allows for wilderness rating to be applied	Upper Face Shaping
5. Decommissioning phase activities		
Complete rehabilitation of the excavation through:		
5.1 Complete upper bench splitting of		

hard face		
Activity	Nature of impact	Management option Chosen
5.1.1 Topography	Shaping of upper faces to maximize re-vegetation potential and safety	Upper face shaping
5.1.2 Topsoil	Topsoil replaced over split benches	Topsoil Handling Method
5.1.3 Visuals	Vegetation will grow on replaced topsoil hiding faces behind them	Upper Face Shaping
5.1.4 Land capability	Allows for wilderness rating to be applied	Upper Face Shaping
5.2 Retain safety fence and berm around top of excavation rim		
5.3 Allow excavation Floor to flood as reedbed		
5.4 Retain haul road access		
Complete rehabilitation of the logistical facility, plant and stockpiling area through:		
5.5 Demolish all unrequired Structures		
5.5.1 Noise	Earthmoving Equipment	Noise Reduction Measures
5.5.2. Dust	Dust generated by Earthmoving equipment	Dust Reduction Measures
5.5.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.6 Remove all process plant and steel structures		
5.6.1 Noise	Earthmoving Equipment	Noise Reduction Measures
5.6.2. Air quality	Dust generated by Earthmoving equipment	Dust Reduction Measures
5.6.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.7 Remove all protruding foundations and footings		

Activity	Nature of impact	Management option Chosen
5.7.1 Noise	Earthmoving Equipment	Noise Reduction Measures
5.7.2. Air quality	Dust generated by earthmoving equipment	Dust Reduction Measures
5.7.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.8 Remove all pipelines and cables		
5.9 Remove ramp to bottom of pit		
5.9.1 Topography	Ramp removed	None required
5.9.2 Noise	Earthmoving Equipment	Noise Reduction Measures
5.9.3. Air quality	Dust generated by earthmoving equipment	Dust Reduction Measures
5.9.4 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.10 Remove weighbridge concrete structures		
5.11 Rip / scarify all hardened areas		
5.11.1 Noise	Earthmoving Equipment	Noise Reduction Measures
5.11.2. Air quality	Dust generated by earthmoving equipment	Dust Reduction Measures
5.11.3 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.12 Replace Topsoil ex berms in the logistics and stockpiling area and re-vegetate		
5.12.1 Topsoil	1.ha area topsoil to be replaced to berms	Topsoil Handling Method
5.12.2. Land Capability	1.ha available as wilderness or for grazing	Vegetation Management Options
5.12.3. Vegetation	Will be seeded with vegetation	Vegetation Management Options
5.12.4. Animal Life	Habitat returned	Vegetation Management

		Options
Activity	**Nature of impact**	**Management option Chosen**
5.12.5 Noise	Earthmoving Equipment	Noise Reduction Measures
5.12.6. Air quality	Dust generated by earthmoving equipment	Dust Reduction Measures
5.12.7 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Hydrocarbon Management Protocol & Industrial & Domestic Waste Control
5.13. Replace Topsoil ex berms in Plant area and re-vegetate		
5.13.1Topsoil	1.ha area topsoil to be removed to berms	Topsoil Handling Method
5.13.2. Land Capability	1.ha available as wilderness or for grazing	Vegetation Management Options
5.13.3. Vegetation	Will be seeded with vegetation	Vegetation Management Options
5.13.4. Animal Life	Habitat returned	Vegetation Management Options
5.13.5 Noise	Earthmoving Equipment	Noise Reduction Measures
5.13.6. Air Quality	Dust generated by Earthmoving Equipment	Dust Reduction Measures
5.13.7 Hydrocarbons	Possible oil/ fuel; leak from earthmoving Equipment	Management Protocol & Industrial & Domestic Waste Control
5.14 Retain storm-water management system		
5.14.1 Land Capability	Enables more effective Re-vegetation through prevention of erosion	Storm-water Management System
5.14.2 Surface water	Elimination of potential siltation of stream below site	Storm-water Management System
5.15 Retain access roads for future use		
6. AFTERCARE PERIOD		

Activity	Nature of impact	Management option Chosen
6.1 Maintain storm-water management system		
6.1.1 Land Capability	Enables more effective re-vegetation through prevention of erosion	Storm-water Management System
6.1.2 Surface water	Elimination of potential siltation of stream below site	Storm-water Management System
6.2 Remove alien vegetation (if applicable)		
6.3 Conduct supplementary seeding if necessary		
6.4 Conduct final performance Assessment		
6.5 Lodge closure Application		

10.3 Description of the mitigation measures

Demarcation Plan
The applicant is required to demarcate no go areas as follows:

- The mining right area must be demarcated by means of posts in each of the corner positions of the mining right area. In addition posts must be placed so that two side by side posts are always visible from any position for a person to easily determine whether they are inside of the mining right area

Topsoil Handling Procedure
The management of topsoil is of utmost importance. Without topsoil management, the disturbed area is subject to several other potential long term impacts such as lack of re-vegetation, dust generated off denuded areas and potential visual scarring. Given the locality of this operation within and area earmarked as Endangered in terms of the KZN

Conservation status mapping, it is of utmost importance that all topsoil is stripped for use in rehabilitation to maximize the eventual wilderness land use of all areas.

Vegetation Management
De-vegetation

All vegetation communities, identified during field that are present within the proposed area of development and will be impacted on. Of concern is the natural areas as the existing vegetation (Grassland, rocky ridges and riparian areas) will be removed to facilitate the construction of mine and related infrastructure. This will include the continuous and complete removal of vegetation on the footprint of the actual pit. This activity is considered to be short term and will occur during the construction phase. The impact will be regional in extent with impacts likely to occur on site. The presence of sensitive habitats does however mean that destruction will be a regional loss of the habitat type. The severity of the impact was determined to be moderate due to the fact that the area of disturbance will be very small considering that the area is dominated by hard rock outcropping on the site.

The destruction of the areas with undisturbed natural grassland will result in the permanent reduction of natural habitat of reptiles, birds, frogs, insects and mammals present within the areas. The destruction of the rocky ridges habitat type will be of special concern as these are sensitive habitats. The grassland, rocky areas and riparian vegetation found offers habitat to certain birds, reptiles, frogs, insects and mammals that could be present. The impact will be site specific in extent with impacts likely to occur on site. The severity of the impact was determined to be insignificant.

Noise reduction measures

It is not expected that noise of the plant or any other operational activity (besides blasting) result in any impact on surrounding land users given the topographical features, remote and predominant wind regime.

In addition, mining and crushing will be restricted to take place between hours of 07h00 to 19h00.

Blasting Considerations

- **Blast noise**

In case of blast noise, the following attenuation measures must be put in place should such impact arise / result in complaints. Chances of impacting the surrounding community are zero since the community is like 0.75km away from the proposed mining area. Nonetheless such impact must be monitored through:

1. Generate a database of surrounding land users with contact details and inform them timeously when blast is expected to take place

2. Always blast at same time of day

3. Avoid high wind conditions, low cloud cover and temperature inversions (afternoons are usually best)

Blast Vibration:

The following information is quoted directly from a report on Vibration measurement and control (Mohamed, 2010).

The ground vibration can be affected by certain blast design parameters:-

(i) The maximum instantaneous charge or MIC is the amount of explosives fired at the same moment in time.

(ii) The number and frequency of delays. The introduction of a delay sequence can reduce the size of the maximum wave produced.

(iii) The height of the working bench and therefore the length of borehole.

(iv) The number of "decks" or layers of explosives and detonators in each hole.

(v) The spacing, burden and number of holes, in the blast ratio.

(vi) The diameter of the shot hole, which will affect the amount of explosives used.

Flyrock:

Flyrock has the potential to result in significant impact including fatal accidents. Modern blasting practice however allows for blast design planning to accurately determine the charge per hole and delays required for a specific exclusion zone. This blast design description does not fall within the ambit of this documentation but must be conducted by the blasting professional and in the case where facilities / communities are located within 500m, then such blast design is presented to the DMR for their approval.

Dust Reduction Processes
Climate's role in dust generation

The Ngwavuma area has an average annual rainfall of over 700mm per annum (WB40) and evaporation rate of 1660mm per annum (WB28, A-Type Pan).

Dust impact is typically dependant on:

- Dust generation at source
- Rainfall
- Wind speed, direction and frequency (percentage blowing in a specific direction)
- Topographical controls (funnelling of wind and associated dust along valleys, and other topographical features)

Attenuation by retained surrounding trees lines. These trees reduce wind speed resulting in reduced dust generation off denuded surfaces and reduced dispersion.

Dust Dispersion and Expected Dust Levels Based on Other Monitored Sites

The following is a list of measures that must be implemented at the quarry to prevent any impact of dust on surrounding land uses or users.

Activity	***Attenuation Measure (Internal)***
Traffic along portions of access roads	Water cart wetting of the road must occur during dry and / or windy conditions. Use of unsurfaced roadways Water cart wetting of roads during dry and / or windy conditions

	□ Install permanent sprinkler system on long term routes such as haul roads
Topsoil removal	□ Pre-wet topsoil □ Avoid high wind conditions □ Schedule in the wet season
Drilling	□ Supply masks where applicable. □ Fit dust extraction equipment to drill rigs
Blasting (Excavation Advance)	□ Avoid blasting under extreme winds. □ Apply best available blasting practice
Hauling	□ Wet haul road with water cart but preferably permanent sprinkler system
Primary Tipping and Crushing	□ Semi-enclosure of hopper. □ Install mist spray system at primary intake hopper. □ Install dust extraction plant to bag filters on all crushers as a last option □ Supply masks where applicable for employee health protection
Screening	□ Supply masks where applicable for employee health protection □ Screens and crushers to be housed. □ Mist sprays at transfer points and on stockpile product walls. □ Dust extraction equipment to be fitted to plant as last option
Transfer points	□ Apply mist sprays at all belt transfers and screens. □ Enclose transfer points.
Stockpiling	□ Wall stockpiles where ever possible □ Provide sprinkler systems on walled or other stockpiles where wetting of product can take place
Loading and dispatch	□ Sprinkler wet stockpile to maintain moisture content □ Cover delivery trucks carrying dust generating loads
Monitoring of dust	Continuous monitoring of dust levels in the expected impact vector must take place.

Hydrocarbon and Domestic and Industrial Waste Management Protocol
Industrial and Domestic Waste handling

All domestic waste will be collected in bins located strategically around the site (i.e. at the office, the crushing plant and at the workshops). The domestic waste is to be collected on a daily basis and placed in the designated temporary storage area. Waste bins will be labelled according to waste hierarchy.

Archaeological Occurrence Procedure
In the unlikely event that a grave site or artefact of archaeological interest is uncovered then the following procedure must be adhered to:

1. Before any work is conducted on the site, all staff is to undergo induction training. Such induction training must include a section in respect of heritage issues. Staff must be trained what to look out for and what to do if they find such occurrence.

2. The important aspect is that work must cease at the site of the site of the finding and mine manager must be called in.

3. The mine manager must immediately inform the relevant heritage authority of Natal in the case of grave site, or in the case of archaeological artefact, take a GPS reading of the site and if reasonably possible work elsewhere and contact the heritage authority.

Storm-water Management System
The storm-water management system must be put into place to prevent silt laden water entering the natural surface water system. While the mist sprays on the plant and dust suppression sprinklers on the roadways and stockpiles do not generate free-flow from these areas, it is the periodic rainfall and associated storm-water run-off which occurs in the dust-laden areas which poses the risk of silt-load into the natural drainage system.

Excavation rehabilitation method: Shaping
In this case, the rehabilitation of the pit side slopes is relatively straightforward. The aim of such rehabilitation is to:

1. Ensure safety to humans and animals

2. Ensure that final rehabilitation of the site blends into surrounding natural vegetation and topography as much as possible.

It consists of upper trimming as per diagram below where the upper 15m is trimmed into smaller faces on benches. Each of these benches and slopes is top-soiled and re-vegetated.

10.4 Types of cumulative impacts

Additive impact: Impacts of the same nature from different operations (e.g. excessive groundwater abstraction from several operations in the same area result in a severe drawdown effect).

Interactive impact: where a cumulative impact is the result of a combination of different impacts to cause a new kind of impact. This kind of impact can be:

- Countervailing – the net adverse effect is less than the sum of the individual impacts (e.g. pumping clear water into a polluted water resource).
- Synergistic – when the impacts work together to develop a sum of different impacts results in an impact which is greater than the individual impacts.

10.5 Methodology to be used in assessing cumulative impact/s

Determine extent of cumulative impacts:

- Identify potentially significant cumulative impacts associated with the proposed activity
- Establish the geographic scope of the assessment
- Establish the timeframe of the analysis
- Identify other activities affecting the environmental resources of the area

Describe the affected environment:

- Characterize the resources identified above in terms of their response to change and ability to withstand stress

- Define a baseline condition that provides a measuring point for the environmental resources that will be acted upon

Assess the cumulative impacts:

- Determine the magnitude or significance of cumulative impacts

Recommend mitigation measures.

So, cumulative impacts arising from this operation will be fully assessed during the Draft EIR.

11. PUBLIC PARTICIPATION PROCESS (PPP)

The PPP for the proposed project has been undertaken in accordance with the requirements of the MPRDA, and NEMA in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&AP's are afforded an opportunity to comment on the project. A PPP has been implemented to engage with I&AP's and meet the requirements for Public Participation as stipulated by the relevant legislation. The PPP provides stakeholders with information about the proposed project, and several opportunities to comment throughout the EIA/EMP process. This will ensure public involvement at each key step in the process and allow for comments, concerns, suggestions, and objections to the proposed project to be included in each of the submissions to the relevant Government Authorities.

The first phase of an EIA is the Scoping Phase. In terms of the MPRDA and the NEMA, I&AP's must be given the opportunity to comment on the proposed project. The Scoping Report aims to describe the proposed project, the environment in which the project is located, and the potential impacts that may result if the project goes ahead. The Draft Scoping Report was made available for public comment from 07/12/2015 to 13/01/2016 (a period of 35 days). The comments received from I&AP's thus far have been captured in an Issues and Responses Report (IRR) accompanying this Scoping Report (Appendix D) and also recorded on Consultation document submitted at DMR. All comments received before the 13/01/2016, including during the Draft Scoping Report

comment period, is included in the Final Scoping Report for submission to the authorities.

A meeting was held on 22/04/2015 with the landowners, whose properties fall within the application area of the proposed project, to discuss the proposed project and allows for questions to be raised. The minutes of this focus group meeting can be found in Appendix D. A public open day was held on the 11 December 2015 to introduce I&AP's to the project and discuss the results of the scoping phase. An EIA Report, including an EMPR, will be compiled and presented for public comment as the next step of this EIA process during which time further stakeholder engagement will take place.

11.1 Scoping Phase

During the scoping phase for this particular project, the following steps were initiated and all relevant documents are attached in Appendix D.

11.2 Identifying Regulatory Authorities:

The authorities for this project were identified from similar projects in the past. The authorities contacted with regards to this project include:

- the Department of Mineral Resources (DMR);
- The Department of Water Affairs (DWA);
- Land Claims Commissioners Office;
- The South African Heritage Resources Agency (SAHRA);
- The Department of Roads and Transport;
- Jozini Local Municipality
- Mkhanyakude District Municipality (NDM).
- Department of Environmental Affairs

A process of engagement was followed in order to ensure that all I&APs were given the opportunity to raise concerns regarding the proposed activities. Consultation with I&APs took place by the following means: Background Information Document (BID)

Background Information Documents and Response forms notifying I&AP's of the application were compiled in English and were distributed to the I&APs via e-mail, post

and fax. Persons who did not have access to a computer, fax machine or postal service were notified via hand delivered documents

The purpose of the Background Information Document was to:

- Invite members of the public to register as I&AP's;
- Identify I&AP's;

Inform them of the current application;

- Initiate a process of public consultation to record perceptions and issues; and
- Invite I&AP's to attend the Public Meeting.

11.3 Notices

Further to this, A2 posters written in English and Zulu were erected and displayed on site (Reserve 16 of farm no 15836) as well as the Local Municipality, the Local Library and at a community to the proposed site. These posters informed the public of the proposed activities, invited (I&AP's) to attend the public meeting and requested people to register as I&AP's.

11.4 **Adverts**

An advertisement, informing people of the proposed activities, the public meeting and requesting readers to register as I&AP's, was placed in a local newspapers. An advertisement was placed in "Isolezwe", on the 22nd November 2015. ISolezwe was identified as the only newspaper within the area. It is unfortunate that the advert did not serve the intended results since no local newspaper could be used. The locals does not buy the newspaper since its most people are illiterate, newspaper reading is viewed as luxury.

11.5 **Introductory Public Meeting**

All I&AP's were invited through hail speaker to attend a public meeting that was held on the 27th November 2015 at Traditional leaders home. Minutes of the meeting and a copy of the presentation are attached in Appendix B.

11.6 Document Review

In addition, this NEMA Scoping Report was made available for public review and comment and all registered I&AP's were informed of its availability. I&AP's were given forty (30) days to submit their comments to the EAP. A copy of the report was made available at the Local Library in Jozini, as well as at the Ngwavuma primary schools

12. PLAN OF STUDY FOR THE EIA

The EIA process is being carried out in accordance with the NEMA 2014 EIA regulations. The main objectives of the Environmental Impact Assessment process, as set out in Appendix 3 to the EIA Regulations, will be to, through a consultative process -

a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment ;

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

(ii) Degree to which these impacts -

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

e) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

f) Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

g) Identify suitable measures to avoid, manage or mitigate identified impacts; and

h) Identify residual risks that need to be managed and monitored.

Included in this report is a detailed plan of study to be implemented during the EIA phase. Potential impacts identified during the Scoping and EIA will be assessed for each feasible development alternative and for each phase of the project. The EIA will provide input into the EMPR which will provide the necessary action plans and management measures to mitigate the identified impacts.

The EIA phase considers the impacts of the proposed project on the environment, and will consider the following project development phases in detail:

- Construction phase;
- Operation phase; and
- Normal, abnormal and emergency conditions and

Decommissioning phase

The EIA will utilize the public participation, an impact assessment methodology and management and mitigation measures to assess the significance of potential impacts on and risks to the environment.

12.1 Public Participation

A public participation program will be incorporated into the EIA phase will comprise of the following:

- Registered IAP updates and correspondence;
- Release of assessment studies for review;

- Issues and responses report; and
- Public Review of EIR.

At this stage no open day has been scheduled. This will be based on responses received. Preferably, issues will be discussed with IAPs regarding key issues and findings on a one-to-one basis or through impact focused forums.

Draft EIR report will be placed in the library or municipal offices for review by registered IAPs. Notification of review will be sent directly to register IAPs.

12.2 Focus Studies for the EIR

Areas where the scoping report has identified potential issues, a lack of information or where opportunities for improved environmental performance are identified, focus studies will be initiated.

12.3 Development of Management Plans

Management plans will be critical for the sustainable, efficient and responsible operating of the facility. A framework for the development and implementation of these plans will be developed:

- Phasing Plan
- Environmental Management Program (EMPr);
- Air Quality Management Plan (screening dust);
- Storm-water Management Plan;
- Environmental Awareness Plan
- Emergency and Incident Response Plan (EIRP)

12.4 EIA Methodology

The EIA process will be undertaken in line with the requirements of the promulgated EIA Regulations of the NEMA.

The outcomes of the plan of study for EIA include the following:

 Provide a description of the tasks that are undertaken as part of the EIA process, including any specialized processes, and the manner in which such tasks were undertaken;

 Provide an indication of the stages at which the competent authority will be consulted;

 Provide a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity;

 Overview of the stakeholder engagement that conducted during the EIA process; and

 Include any specific information required by the competent authority.

The purpose of the EIA and draft EMP is to provide/determine:

 An assessment of the environments likely to be affected by the proposed project;

 An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed project;

A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts;

 The appropriate mitigation measures for each significant impact of the proposed project;

 Details of the stakeholder engagement process followed during the course of the assessment and an indication of how the issues raised have been addressed;

 Identification of knowledge gaps and reporting on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information;

 A description of the arrangements for monitoring and management of environmental impacts; and

 Inclusion of technical and supporting information as appendices, if available.

The EIA process will see the following deliverables submitted for stakeholder review and approval by the responsible authority (DMR) will include the following:

- Specialist Investigations;
- Environmental Management Program;
- Emergency and Incident Response Plan;
- Monitoring Program;

Environmental Awareness Plan

- Environmental Impact Report; and

Environmental Management Plan

The EIR will contain the following information

- Details of the EAP who compiled the report and their expertise to carry out an EIA;
- Detailed description of the proposed activity;
- Description of the property on which the activity is to be undertaken and the location of the activity on the property;
- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity (pre-development description of the environment);

Details of the stakeholder engagement conducted during the scoping phase and the ongoing consultation during the EIA phase;

- Description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;

 An indication of the methodology used in determining the significance of potential environmental impacts;

 A description and comparative assessment of all alternatives identified during the EIA process;

 A summary of the findings and recommendations of any specialist report or report on a specialized process;

 A description of all environmental issues that were identified during the EIA process, and assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;

 An assessment of each identified potentially significant impact including cumulative impacts, the nature of the impact, the extent and duration of the impact, the probability of the impact occurring, the degree to which the impact can be reversed; the degree to which the impact may cause irreplaceable loss of resources, and the degree to which the impact can be mitigated; A description of assumptions, uncertainties and gaps in knowledge;

 An opinion as to whether the activity should or should not be authorized, and if the opinion is that it should be authorized, any conditions that should be made in respect of that authorisation;

 An environmental impact statement which contains a summary of the key findings of the environmental impact assessment and a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;

 A draft EMPr; and

During the compilation of the EIA, a draft EMPr will be compiled in accordance with the NEMA EIA Regulations. The draft EMPr will provide the actions for the management of identified environmental impacts emanating from the proposed project and a detailed outline of the implementation programme to minimize and/or eliminate the anticipated negative environmental impacts. The draft EMPr will provide strategies to be used to

address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring. The draft EMPr will be complied as part of the EIA.

The draft EMPr will include the following:

 Details of the person who prepared the draft EMPr and the expertise of the person to prepare and draft EMPr;

 Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in the EIA report, including environmental impacts or objectives in respect of planning and design, pre-construction and construction activities, operation or undertaking of the activities, rehabilitation of the environment and closure where relevant;

 A detailed description of the aspects of the activity that are covered by the draft EMPr;

 An identification of the people who will be responsible for the implementation of the measures;

 Where appropriate, time periods within which the measures contemplated in the draft EMPr must be implemented; and

 Proposed mechanisms for monitoring compliance with the draft EMPr and reporting thereon.

12.5 Impact Assessment Methodology

Impacts will be identified in terms of their nature, intensity, spatial scale, duration, probability and impact rating to provide significance. Once mitigation measures are identified, the efficacy of the mitigation measures will be assessed using the same methodology. The aspects that will be subject to further consideration and investigation in the EIA include:

- Surrounding Land Use
- Topography
- Visual Impact

- Soil
- Land Capability
- Natural Vegetation
- Animal Life
- Surface Water
- Ground Water
- Air Quality (Dust)
- Noise
- Vibration and Fly-rock
- Socio economic

Should it be deemed necessary that additional environmental aspects are investigated; the terms of reference will be drawn up and these will be included in the EIA report.

12.6 Other information required by the competent authority

None

13. Financial Provision

In terms of Section 24P of NEMA, an applicant for Environmental Authorisation relating to mining must, before the Minister of Mineral Resources issues the Environmental Authorisation, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.

FM Crushers would ensure appropriate financial cover is in place prior to any work being undertaken in the mining area. FM Crushers would discuss and conclude the nature and quantum of the financial provision required for the management and remediation of environmental damage with DMR prior to any mining activities being undertaken. The proposed nature and quantum of the financial provision will be presented in the Draft EIA report as per the requirements of section 24p of NEMA.

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

None.

14. UNDERTAKING

I, Hlengiwe Khumalo, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- ✓ The information provided herein is correct;
- ✓ the comments and inputs from stakeholders and I&APs has been correctly recorded;
- ✓ information and responses provided to stakeholders and I&APs by the EAP is correct; and
- ✓ the I&APs and stakeholders have reviewed and commented on the Plan of Study for EIA and the level of agreement therewith has been correctly documented.

_____ Date: **29 January 2016**

Signature of the EAP