

Application for a Mining permit and Associated Environmental Authorisation for the proposed mining of Aggregate Stone-dolerite, Clay and Sand on the Portion of Portion 1 of Farm Vooruitzicht 81 in the Sol Plaatje Local Municipality, Northern Cape Province

Final Basic Assessment Report

DMR Reference Number: NC10823 MP

Report Prepared for

Misabrite (Pty) Ltd



Report Prepared by



August 2020

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Report By *Ndi Geological Consulting Services (Pty) Ltd*



*38 Ophelia Street
Kimberley, 8301
Cell: 082 760 8420
Tel: 053 842 0687
Fax: 086 538 1069
atshidzaho@gmail.com
ndi@ndigeoservices.co.za*

Environmental Assessment Practitioner *Ndivhudzannyi Mofokeng*

Applicant *Misabrite (Pty) Ltd
48 Aviva Road
Hillcrest
Kimberley
8301
csehunelo@yahoo.com*



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

FINAL BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DMR Ref: NC10823 MP

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

NAME OF APPLICANT:	Misabrite (Pty) Ltd
TEL NO:	082 572 4274
FAX NO:	053 832 5018
POSTAL ADDRESS:	48 Aviva Road, Hillcrest, Kimberley, 8301
PHYSICAL ADDRESS:	48 Aviva Road, Hillcrest, Kimberley, 8301
FILE REFERENCE NUMBER SAMRAD:	NC 12569 PR

1 IMPORTANT NOTICE

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

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

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

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

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

2 Objective of the basic assessment process

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

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

General Project Overview

Misabrite (Pty) Ltd (Misabrite) appointed Ndi Geological Consulting Services-Sole Proprietary as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed Aggregate stone-dolerite, Clay and sand mining project located in the magisterial district of Francis Baard.

The proposed mining project will cover an area of 5 hectares and located approximately 5km west of the city of Kimberley.

Misabrite requires a mining permit in terms of the Mineral and Petroleum Resources Development Act (Act No. 22 of 2002) (MPRDA). Before the mining permit will be granted, Misabrite must undertake an environmental authorisation process in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). The competent authority for the environmental authorisation process is the Northern Cape Department of Mineral Resources (DMR).

The Department of Environmental Affairs (DEA) has identified the need for the alignment of environmental authorisations and has promulgated a single environmental management system under NEMA whereby the DMR has become the competent authority for the authorisation of mining-related projects under the NEMA Environmental Impact Assessment (EIA) Regulations. This will result in simultaneous decisions in terms of NEMA and other environmental management Acts.

Since the proposed mining project triggers Listing Notice 1 of activity 21 of GN R983 of the EIA which states that- Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the MPRDA, 2002 (Act 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 MPRDA, 2002 (Act 28 of 2002). Any activity including the operation of that activity associated with the primary processing of a mineral resource including crushing, screening and washing., a Basic EIA authorisation process in terms of NEMA Government Notice Regulation (GNR) 982 (as amended by GNR325 of 7 April 2017) will be required.

Misabrite submitted an application for an environmental authorisation to the DMR in respect of a mining permit application 4 March 2020.

Before an aggregate, clay and sand mining process can be planned and built, a number of tests and surveys must be conducted to ensure that the project is economically viable, technically feasible, and environmentally sound. Assessment of the geological information available has determined that the area in question may have good quality aggregate reserves. In order to ascertain the above and determine the nature, location and extent of the reserves within the proposed mining area, it will be necessary that mining activity be undertaken. The mining activity will also determine if there are any features that may have an impact on the economic extraction of the aggregate stone.

Most of the rehabilitation will be conducted while mining activities are undertaken. The final rehabilitation will be done once the mining activities have been completed at a site and before the mining team leaves the site.

The stakeholder engagement process, as part of the Environmental Authorisation process, is conducted in terms of NEMA (as amended) which provides clear guidelines for stakeholder engagement during an EIA. One of the general objectives of integrated environmental management set out in Section 23(2) of NEMA is to ensure the “adequate and appropriate opportunity for public participation in decisions that may affect the environment”.

The stakeholder engagement process is primarily aimed at affording Stakeholders and Interested and Affected Parties (I&APs) the opportunity to gain an understanding of the project. In addition, the purpose of consultation with the landowner, affected parties and communities is to provide them with

the necessary information about the proposed project so that they can make informed decisions as to whether and to which degree the project will affect them. In addition, the purpose of consultation with the Stakeholders and I&APs is to provide the competent authority with the necessary information in order for them to make informed decisions.

Before an EAP submits a final report, they must have given registered I&APs access to, and an opportunity to comment on the report prior to the submission of the final report to the competent authority for approval.

Stakeholders were therefore provided with an opportunity to participate in the public review period of the Draft BAR from 9 March 2020 – 10 April 2020 to ensure that the assessment of impacts and proposed management of impacts have addressed their concerns. Comments received during the 30-day comment period (from the Draft BAR review) have been incorporated into this Final BAR/EMPr and will be submitted to the DMR for decision making.

This EIA and EMPr has been compiled in terms of the provisions of Appendix 1 and Appendix 4 of December 2014 GNR 982 of the NEMA. These requirements are cross-referenced to the various sections in this report where these requirements are addressed (Table 2-1 and Table 2-2).

Table 2-1: Requirements of Appendix 1 of GNR 982 for a BAR

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
Appendix 1: 3 (1) (a)	Details of – the EAP who prepared the report; and the expertise of the EAP, including a curriculum vitae	Section 5.1
Appendix 1: 3 (1) (b)	The location of the activity, including – The 21-digit Surveyor General code of each cadastral land parcel; Where available, the physical address and farm name; Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties.	Section 6
Appendix 1: 3 (1) (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or On land where the property has not been defined, the coordinates within which the activity is to be undertaken; or.	Section 6 Figure 7-1
Appendix 1: 3 (1) (d)	A description of the scope of the proposed activity, including – All listed and specified activities triggered and being applied for; A description of the activities to be undertaken, including associated structures and infrastructure.	Section 7.5 Section 7
Appendix 1: 3 (1) (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	Section 8

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
	applicable to this activity and have been considered in the preparation of the report; and how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	
Appendix 1: 3 (1) (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.	Section 9
Appendix 1: 3 (1) (g)	A motivation for the preferred site, activity and technology alternative.	Section 10
Appendix 1: 3 (1) (h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	Section 11
	Details of all alternatives considered;	Section 11.1
	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 11.2
	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;	Section 11.5
	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 12
	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 the impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated.	Section 13
	The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 14
	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 geographic, physical, biological, social, economic, heritage and cultural aspects;	Section 15
	The possible mitigation measures that could be applied and level of residual risk;	Table 13-1, Table 13-2 and Table 13-3
	The outcome of the site selection matrix;	N/A
	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;	Section 17

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
	A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 18
Appendix 1: 3 (1) (i)	<p>a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including—</p> <p>a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p> <p>an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;</p>	<p>Section 18.1</p> <p>Section 13</p>
Appendix 1: 3 (1) (j)	<p>An assessment of each identified potentially significant impact and risk, including—</p> <p>cumulative impacts;</p> <p>the nature, significance and consequences of the impact and risk;</p> <p>the extent and duration of the impact and risk;</p> <p>the probability of the impact and risk occurring;</p> <p>the degree to which the impact and risk can be reversed;</p> <p>the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>the degree to which the impact and risk can be avoided, managed or mitigated;</p>	Section 13
Appendix 1: 3 (1) (k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	N/A
Appendix 1: 3 (1) (l)	<p>an environmental impact statement which contains—</p> <p>a summary of the key findings of the environmental impact assessment;</p> <p>a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and</p> <p>a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p>	<p>Section 21</p> <p>Figure 21-1</p>
Appendix 1: 3 (1) (m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed [impact management objectives and the impact management outcomes for the development for inclusion in the EMPr;	Table 13-1, Table 13-2 and Table 13-3

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
Appendix 1: 3 (1) (n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 23
Appendix 1: 3 (1) (o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 24
Appendix 1: 3 (1) (p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 25
Appendix 1: 3 (1) (q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Section 26
Appendix 1: 3 (1) (r)	An undertaking under oath or affirmation by the EAP in relation to- The correctness of the information provided in the report; The inclusion of the comments and inputs from stakeholders and interested and affected parties; The inclusion of inputs and recommendations from the specialist reports where relevant; and Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	Section 27
Appendix 1: 3 (1) (s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Section 28
Appendix 1: 3 (1) (t)	Any specific information required by the competent authority.	Section 29
Appendix 1: 3 (1) (u)	Any other matter in terms of Section 24(4)(a) and (b) of the NEMA	Section 29.3

Table 2-2: Requirements of Appendix 4 of GNR 982 for a an EMPr

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EMPr	Section where addressed in the EMPr
Appendix 4 (a)	details of i. the EAP who prepared the EMPr; and ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 5
Appendix 4 (b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 7
Appendix 4 (c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers	Figure 7-2

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EMPr	Section addressed where in the EMPr
Appendix 4 (d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- <ul style="list-style-type: none"> i. planning and design; ii. pre-construction activities; iii. construction activities; iv. rehabilitation of the environment after construction and where applicable post closure; and v. where relevant, operation activities; 	Section 31
Appendix 4 (e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 31
Appendix 4 (f)	a description of proposed impact management actions, identifying the way the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to: <ul style="list-style-type: none"> i. avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; ii. comply with any prescribed environmental management standards or practices; iii. comply with any applicable provisions of the Act regarding closure, where applicable; and iv. Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable. 	Section 36
Appendix 4 (g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 36
Appendix 4 (h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 38.2
Appendix 4 (i)	an indication of the persons who will be responsible for the implementation of the impact management actions	Section 38.3
Appendix 4 (j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 38.4
Appendix 4 (k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 38.5
Appendix 4 (l)	a program for reporting on compliance, considering the requirements as prescribed by the Regulations;	Section 38.5
Appendix 4 (m)	an environmental awareness plan describing the manner in which- <ul style="list-style-type: none"> i. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and 	Section 40

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EMPr	Section where addressed in the EMPr
	ii. risks must be dealt with to avoid pollution or the degradation of the Environment.	
Appendix 4 (n)	Any specific information that may be required by the competent authority.	None

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List of abbreviations

BAR:	Basic Assessment Report
C Plan:	Conservation Plan
CBAs:	Critical Biodiversity Areas
CPR:	Competent Person's Report
CRR:	Comments and Responses Report
CV:	Curriculum Vitae
DEA:	Department of Environmental Affairs
DM:	District Municipality
DMR:	Department of Mineral Resources
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
EAP:	Economic Active Population
EAP:	Environmental Assessment Practitioner
ECO:	Environmental Control Officer
EHS:	Environmental Health and Safety
EIA:	Environmental Impact Assessment
EMF:	Environmental Management Framework
EMPr:	Environmental Management Programme
ESA:	Ecological Support Area
GA:	Generally Authorised
GIS:	Geographic Information Systems
GNR:	Government Notice Regulation
GNR:	Government Notice Regulation
GSSA:	Geological Society Of South Africa
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plans
LM:	Local Municipality
LUDS:	Land Use Development System
MPRDA:	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
NEM:BA:	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
NEM:WA:	National Environmental Management Waste Act (Act No. 59 of 2008)
NEMA:	National Environmental Management Act (Act No. 107 of 1998)
NFEPA:	National Freshwater Ecosystem Priority Areas

NGA:	National Groundwater Archive
NHRA:	National Heritage Resources Act, 1999 (Act 25 of 1999)
NWA:	National Water Act, 1998 (Act 36 of 1998)
PM:	Particulate Matter
RDP:	Reconstruction and Development Programme
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
SANBI:	South African National Biodiversity Institute
SANS:	South African National Standards
SAPD:	South African Police Department
SCC:	Species of Conservation Concern
SDF:	Spatial Development Framework
SDF:	Spatial Development Framework
WMA:	Water Management Area
WUL:	Water Use Licence

3 Project background

Misabrite (Pty) Ltd (Misabrite) appointed Ndi Geological Consulting Services-Sole Proprietary as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed aggregate stone (dolerite) project located in the magisterial district of Kimberly.

The proposed mining project will cover an area of 5 hectares and located approximately 5km west of the city of Kimberley.

Misabrite requires a mining permit in terms of the Mineral and Petroleum Resources Development Act (Act No. 22 of 2002) (MPRDA). Before the mining permit will be granted, Misabrite must undertake an environmental authorisation process in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). The competent authority for the environmental authorisation process is the Northern Cape Department of Mineral Resources (DMR).

The Department of Environmental Affairs (DEA) has identified the need for the alignment of environmental authorisations and has promulgated a single environmental management system under NEMA whereby the DMR has become the competent authority for the authorisation of mining-related projects under the NEMA Environmental Impact Assessment (EIA) Regulations. This will result in simultaneous decisions in terms of NEMA and other environmental management Acts.

Since the proposed mining project triggers Listing Notice 1 of activity 21 of GN R983 of the EIA which states that- Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the MPRDA, 2002 (Act 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 MPRDA, 2002 (Act 28 of 2002). Any activity including the operation of that activity associated with the primary processing of a mineral resource including crushing, screening and washing., a Basic EIA authorisation process in terms of NEMA Government Notice Regulation (GNR) 982 (as amended by GNR325 of 7 April 2017) will be required.

Misabrite submitted an application for an environmental authorisation to the DMR in respect of a mining permit application 4 March 2020.

The mining process of a crusher operation will consist of loading, hauling and crushing. To get to the fresh dolomite, sand, clay and weathered dolomite need to be stripped. With these materials gravels, being G4,5,6 and 7 is manufactured. The different denominations have got to do with the sizes of the weathered dolomite which has been crushed and mixed in the right portions. Gravels are used for back filling on mining area 3 known as the dump's sites. on intersecting the fresh dolomite the process of drill and blast then follows. This material is then transported to a jaw crusher, from the jaw crusher it will go to a cone crusher, then into a 4 deck screen, to produce crusher dust (-5mm), ballast, -70mm + 32mm. The -32mm goes into a VSI, and from there to the screens to produce -26mm, -21mm, -15mm, and -5mm. Equipment to be used are 2 excavators between 26 and 36 ton each, 2 Front end loaders, with 5 cube bucket, 2 ADT's, between 30 and 40 tons each and screens.

Most of the rehabilitation will be conducted while mining activities are undertaken. The final rehabilitation will be done once the mining activities have been completed at a site and before the mining team leaves the site.

The total duration of the mining and evaluation activities is planned for two (2) years.

The stakeholder engagement process, as part of the Environmental Authorisation process, is conducted in terms of NEMA (as amended) which provides clear guidelines for stakeholder engagement during an EIA. One of the general objectives of integrated environmental management

set out in Section 23(2) of NEMA is to ensure the “*adequate and appropriate opportunity for public participation in decisions that may affect the environment*”.

The stakeholder engagement process is primarily aimed at affording Stakeholders and Interested and Affected Parties (I&APs) the opportunity to gain an understanding of the project. In addition, the purpose of consultation with the landowner, affected parties and communities is to provide them with the necessary information about the proposed project so that they can make informed decisions as to whether and to which degree the project will affect them. In addition, the purpose of consultation with the Stakeholders and I&APs is to provide the competent authority with the necessary information in order for them to make informed decisions.

Before an EAP submits a final report, they must have given registered I&APs access to, and an opportunity to comment on the report prior to the submission of the final report to the competent authority for approval.

Stakeholders were therefore invited to participate in the public review period of the Draft Basic Assessment Report (Draft BAR) from 9 March 2020 to 10 April 2020 to ensure that the assessment of impacts and proposed management of impacts had addressed their concerns. Comments from the public review and comment period have been incorporated into this Final BAR.

The DMR will now consider the findings in consultation with various authorities and make a decision whether an environmental authorisation should be granted for the proposed mining project.

4 Purpose and context of this document

The project triggers activities listed in terms of Listing Notices 1 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) (as amended) and will require an Environmental Authorisation (EA) from the Department of Mineral Resources (DMR), Northern Cape Province.

This document serves as the final Basic Assessment Report (final BAR) and includes the following objectives as a minimum:

- To comply with the requirements of NEMA and associated Regulations;
- Identify and assess the environmental (biophysical, socio-economic, and cultural) impacts of activities associated with decommissioning and closure of the cement-ash mixing plant. The cumulative impacts of the proposed development will also be identified and evaluated;
- Identify and evaluate potential management and mitigation measures that will reduce the possible negative impacts of the proposed development and enhance the positive impacts;
- Compile monitoring, management, mitigation and training needs in the EMPr; and
- Provide the decision-making authorities with sufficient and accurate information in order to make a sound decision on the proposed development and set conditions that must be adhered to.

All activities that trigger activities listed in GNR 983 require that a Basic Assessment (BA) process be followed. The BA process entailed:

- Compilation of an Initial Draft BAR and draft EMPr for the public to comment on before the submission of the application to DMR.
- Submission of the EA Application to the DMR.
- Finalisation of the Draft BAR and EMPr for the official public participation comment period of 30 days.
- Incorporation of stakeholder comments into the final BAR and EMPr.
- Public Participation Process (PPP).

The BA process followed the procedure as prescribed in Regulations 19 to 20 as summarised in Figure 4-1.

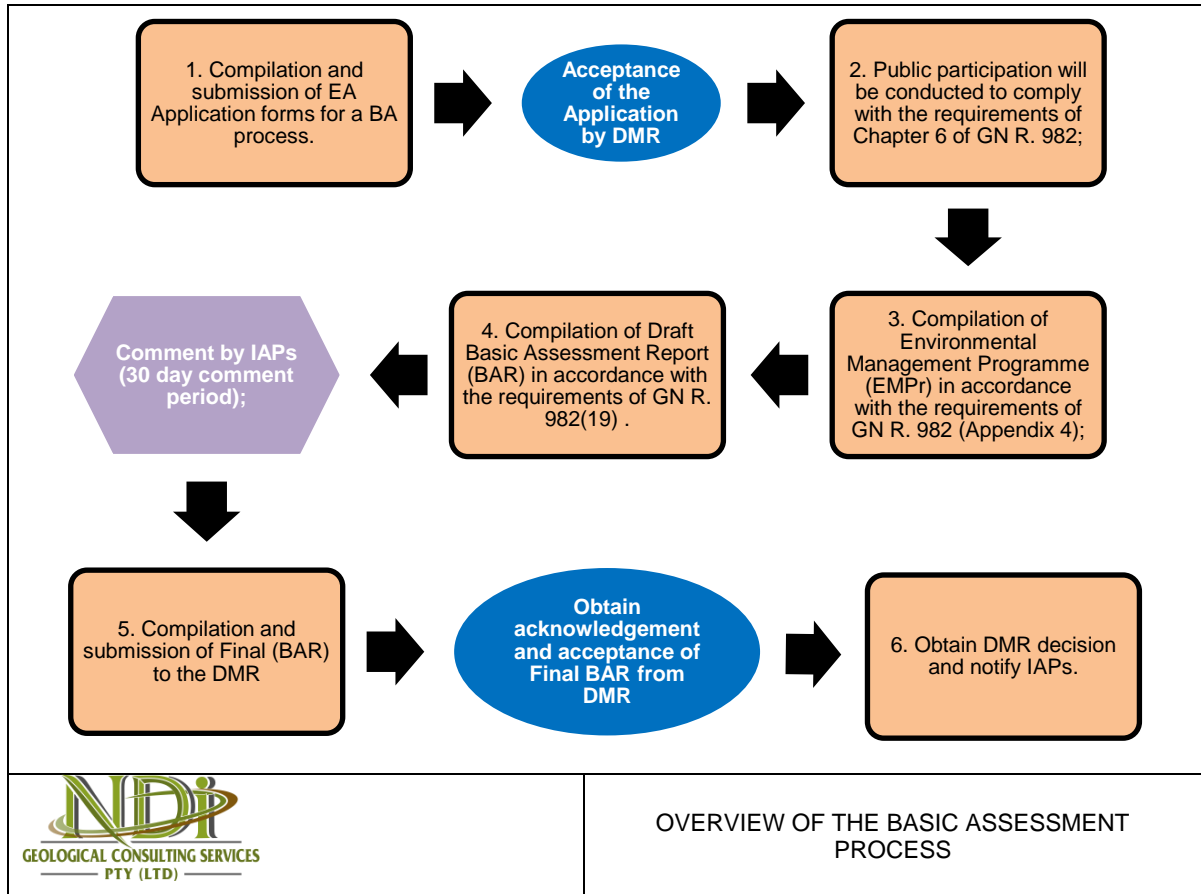


Figure 4-1: Overview the Basic Assessment Process

5 Contact Person and Correspondence Address

5.1 Details of EAP who prepared the report

The EAP involved in the compilation of this BAR and her contact details are provided in Table 5-1 below:

Table 5-1: EAP Contact Details

EAP Name	Contact Number	Fax Number	Email Address
Ndivhudzannyi Mofokeng	053 842 0687	086 538 1069	atshidzaho@gmail.com

5.2 Expertise of the EAP

5.2.1 Qualifications of the EAP

The qualifications of the EAP are provided for in Table 5-2 below, and copies of the qualifications are provided in Appendix 1.

Table 5-2: EAP Qualifications

EAP Name	Qualifications	Professional registration	Years' Experience
Ndivhudzannyi Mofokeng	BSc (Hons) Earth Sciences in Mining and Environmental Geology	GSSA Prof Reg	10

5.2.2 Summary of EAPs past experience

Ndivhudzannyi holds BSc (Hons) Earth Sciences in Mining and Environmental Geology. She has 10 years' experience in the exploration and open cast work in the mining industry and a member of the GSSA. She has proven leadership skills from supervising exploration rigs and in field exploration, mapping, borehole logging, borehole sampling, sample preparation for laboratory analysis, handling of GPS, supervisory duties within the field, geological report and Environmental Reports. She has been involved in environmental management projects including environmental assessments where she has been involved in identification and assessment of potential environmental consequences of projects as well as developing mitigation measures to avoid/and or minimise the significance of the identified impacts. In her early years as a Geologist, her job entailed conducting geological assessments for mining, to ensure sustainable mining of resources. Ndivhudzannyi experience with environmental management has been at project design phase where EIAs are the main environmental management tool used for the assessment of potential environmental consequences. In addition, environmental monitoring and auditing of projects to ensure that a developer complies with the EMPr, ensuring that adverse environmental impacts are being avoided and/or rehabilitation is being undertaken.

A detailed Curriculum Vitae (CV) of the EAP is provided for Appendix 2.

6 Project Location

6.1 Property Description

The description of the affected property is provided in Table 6-1 and map showing the affected property is provided in Figure 6-1.

Table 6-1: Description of Properties affected by the Vooruitzicht Project

Farm Name:	Portion of Portion 1 of Farm Vooruitzicht 81
Application area (Ha)	5 ha
Magisterial district:	Kimberly District Municipality
Distance and direction from nearest town	Approximately 5km west of West end right outside of the City Centre.
21-digit Surveyor General Code for each farm portion	C0370000000008100000

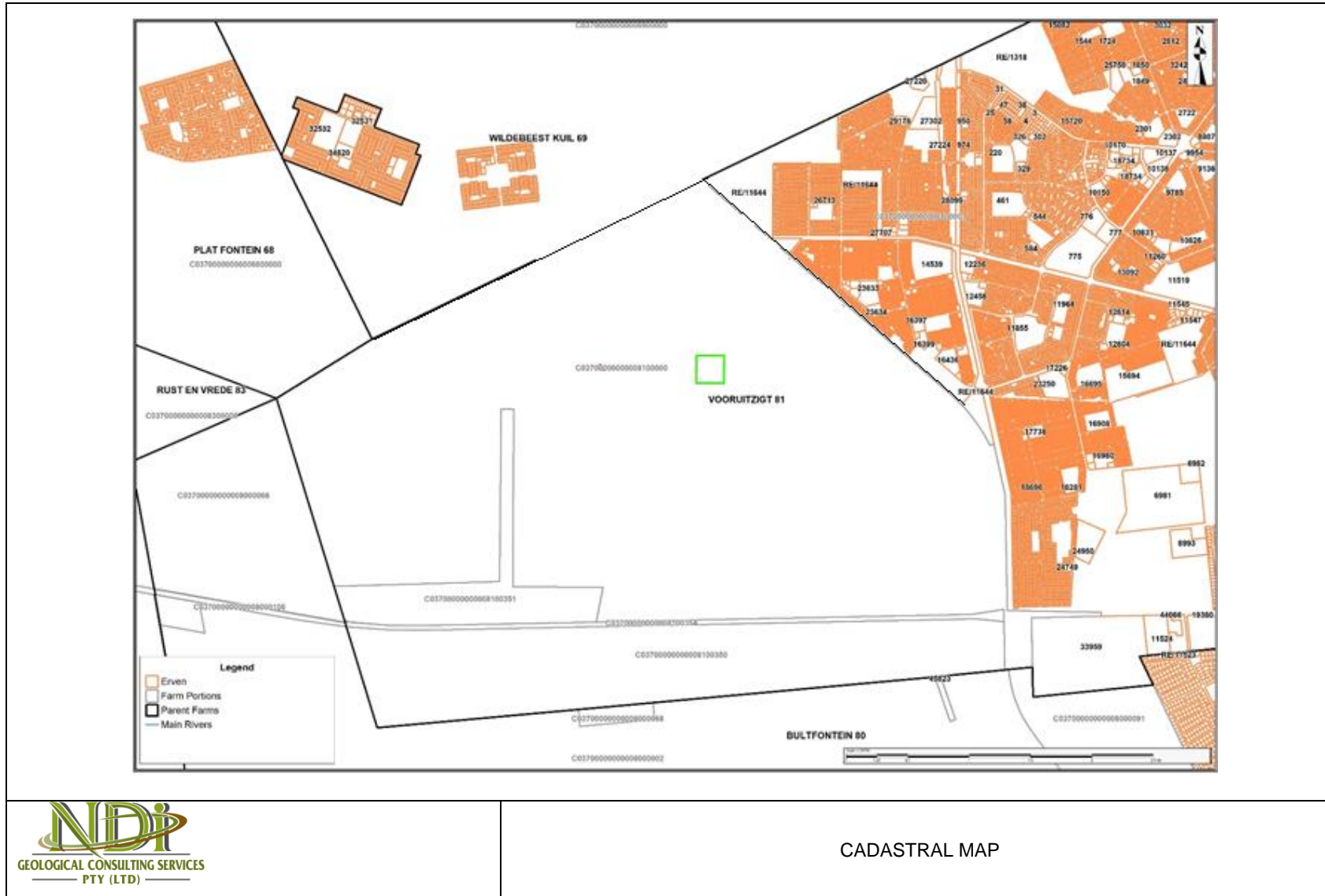


Figure 6-1: Cadastral Map

6.2 Locality map

The proposed Vooruitzicht project is located in the Northern Cape Province of South Africa, approximately 5 kilometres (km) outside the Kimberly City Centre.

A copy of the locality map is provided in Appendix 3.

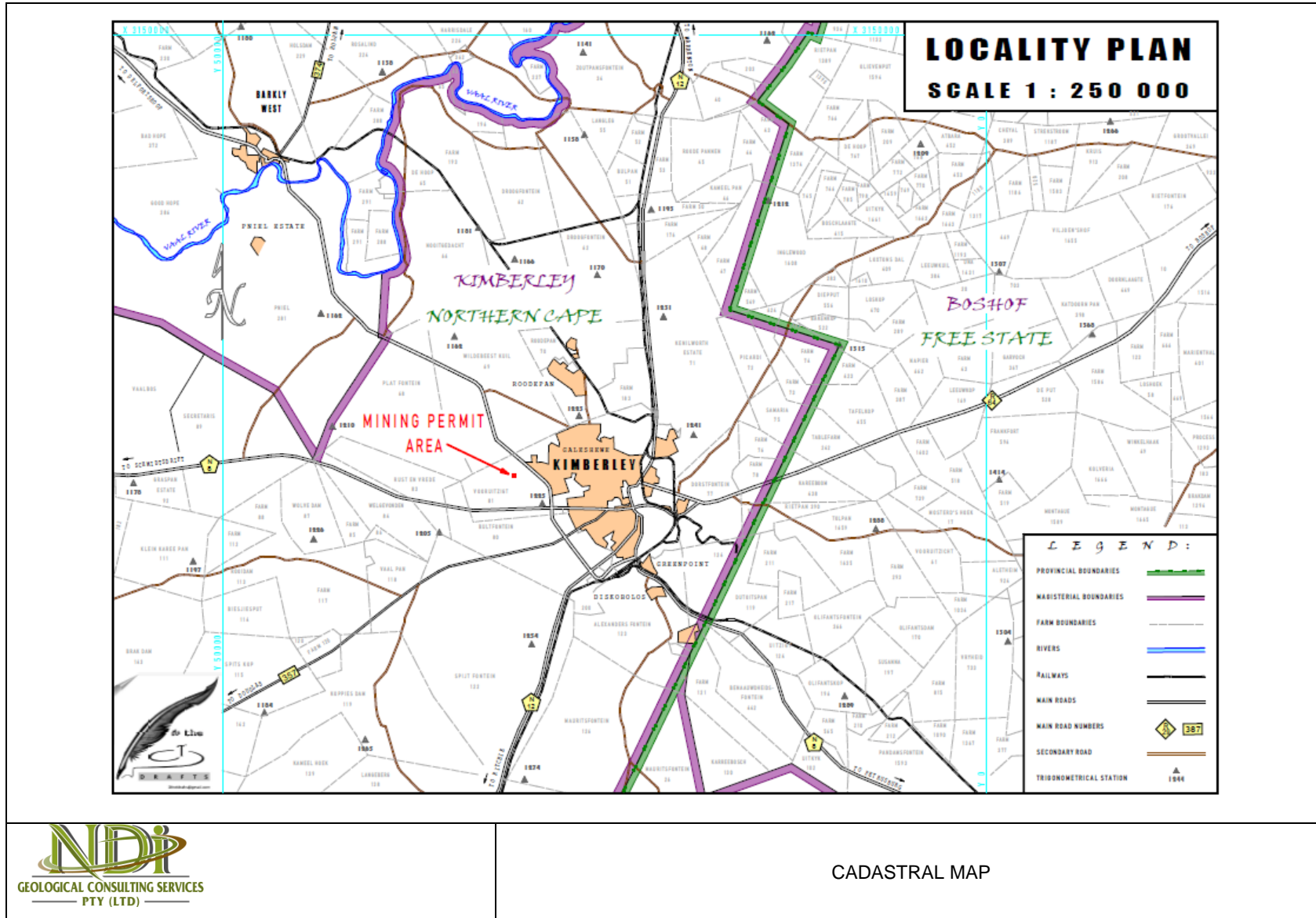


Figure 6-2: Locality Map

7 Description of the Scope of the Proposed Overall Activity

7.1 Overview

Miserbrite t/a Kimberley Rehabilitation and Development wishes to develop various infrastructure, mining (mining permit application) and industrial developments to change the face of Kimberley City, Sol Plaatje Municipality, Northern Cape Province (Figure 2,3).

The project will contribute to the city and the province in terms of infrastructure and socio-economic development, especially due to the estimated 1 500 direct and indirect job opportunities. KRD has done extensive calculations, investigations and consultations in the compilation of the project plan and its various components and its integration into a single integrated business model. The information and calculations all indicated the feasibility of the project, if implemented as an integrated model. This project cannot succeed if the various individual activities do not contribute to the execution of the project plan.

Figure 7-1: summarizes the scope of the project entitled “Changing the Face of a City” which KRD is packaging for implementation:

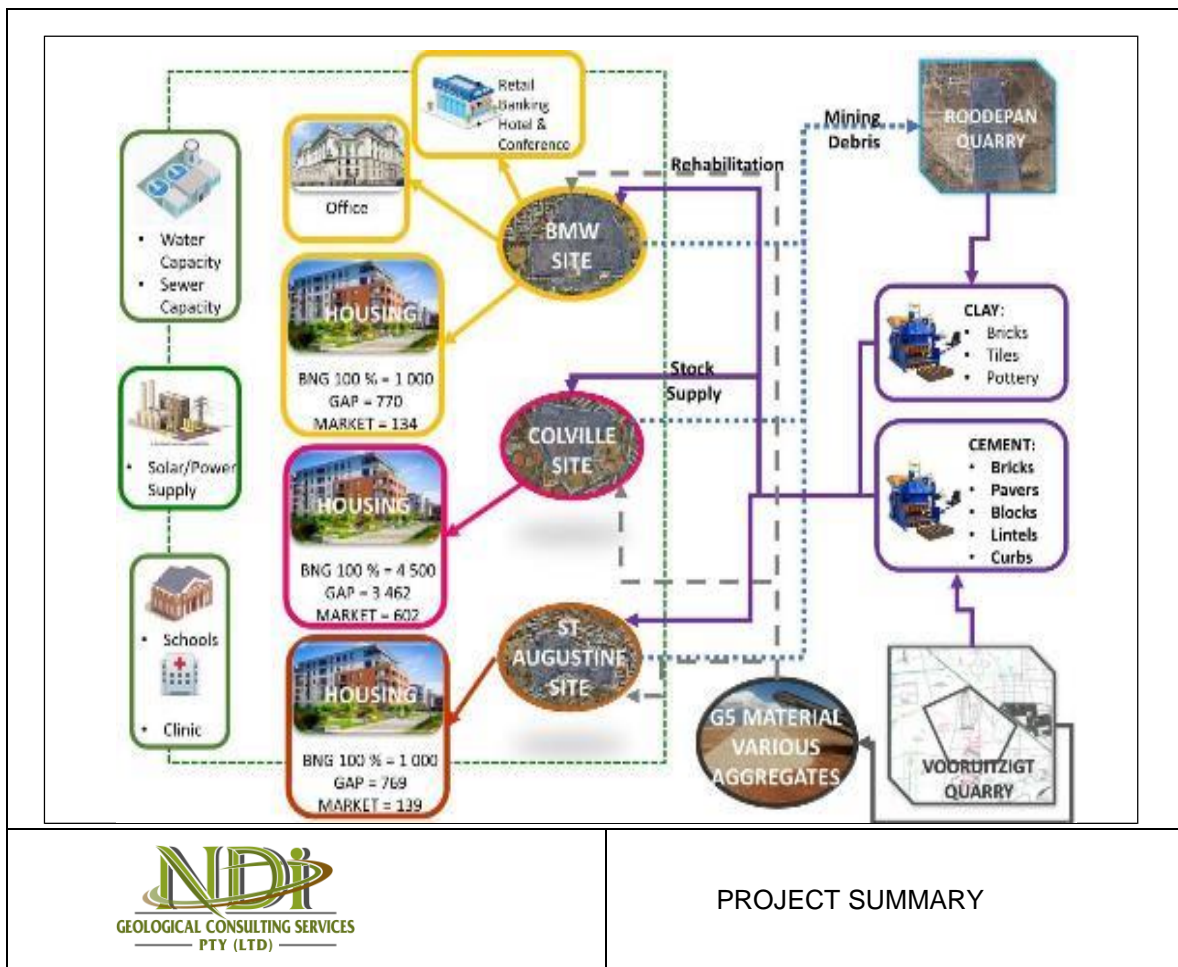


Figure 7-2: Changing the face of the City Project Summary

It is understood that the mining debris will be removed from three sites (BMW, St. Augustine and Colville) to the Roodepan Quarry, which is vacant and has been unattended for the last ± 80 years. At the quarry the debris will be reworked to extract the clay content, which will be used for the

manufacturing of clay bricks. The cement bricks manufactured at the Vooruitzicht Quarry will be used for the development of the three development sites (BMW, St. Augustine and Colville). The unused material will be used to fill the quarry in accordance with an approved Environmental Management Plan (EMP).

7.2 Processing

The mining process of a crusher operation will consist of loading, hauling and crushing. To get to the fresh dolorite, sand, clay and weathered dolorite need to be stripped. With these materials gravels, being G4,5,6 and 7 is manufactured. The different denominations have got to do with the sizes of the weathered dolorite which has been crushed and mixed in the right portions. Gravels are used for back filling on mining area 3 known as the dump's sites. on intersecting the fresh dolorite the process of drill and blast then follows. This material is then transported to a jaw crusher, from the jaw crusher it will go to a cone crusher, then into a 4-deck screen, to produce crusher dust (-5mm), ballast, -70mm + 32mm. The -32mm goes into a VSI, and from there to the screens to produce -26mm, -21mm, -15mm, and -5mm. Equipment to be used are 2 excavators between 26 and 36 ton each, 2 Front end loaders, with 5 cube bucket, 2 ADT's, between 30 and 40 tons each and screens.

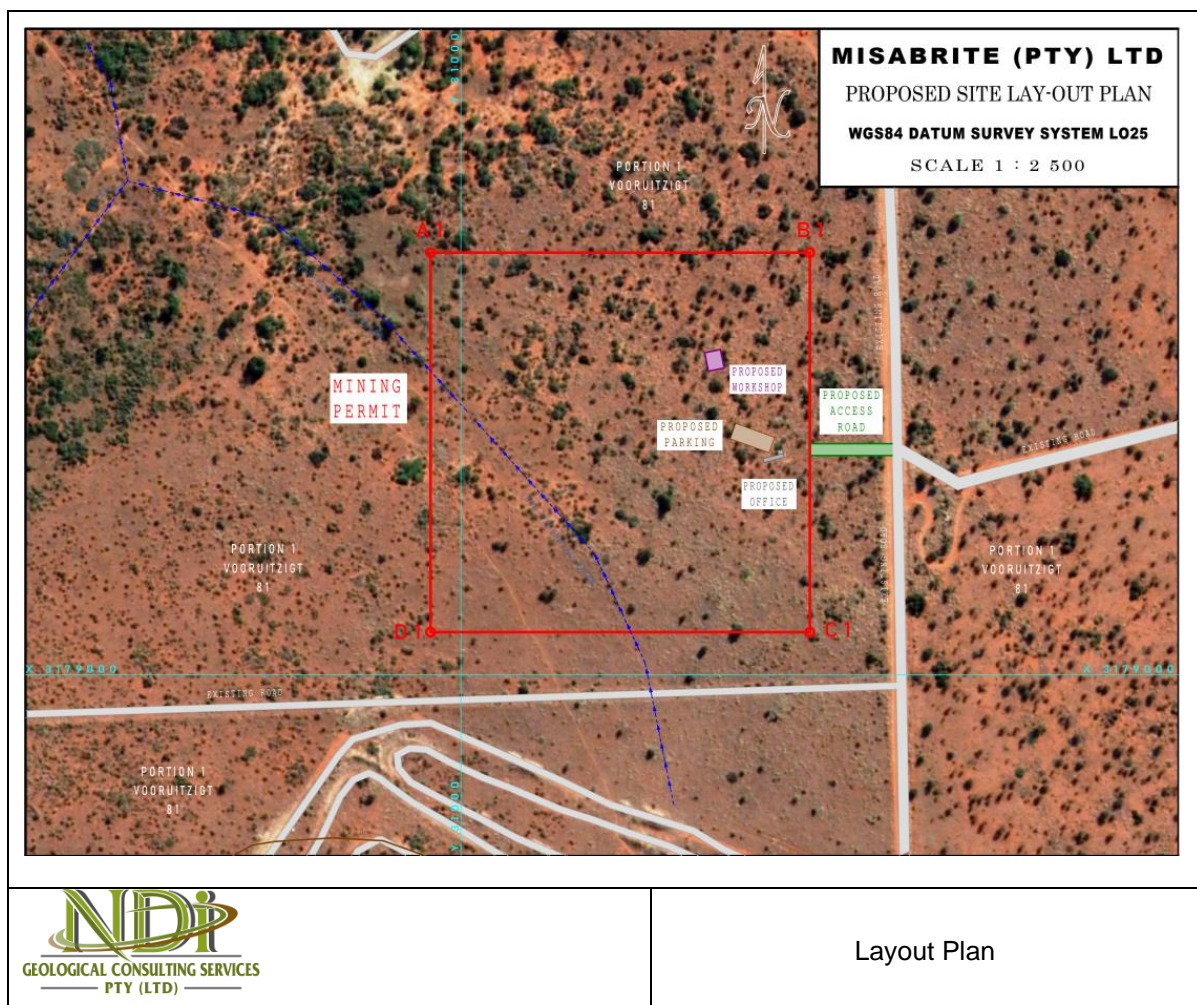


Figure 7-3: Layout Plan showing the location and area of the Mining permit Area

7.3 Listed and specified activities

Section 16 of the MPRDA requires, upon request by the Minister that an Environmental Management Programme (EMPr) be submitted and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that listed activities, which may potentially affect the environment negatively, must obtain an environmental authorisation from a relevant authority before the activities may commence.

Such activities are listed under the EIA Regulations (2014 which has been amended in 2017) and consist of:

- EIA Process (Government Notice Regulation (GNR) 982);
- Listing Notice 1 GNR 983 – Basic Assessment process,
- Listing Notice 2 GNR 984 – Scoping and EIA process;
- Listing Notice 3 GNR 985 – Activities in specific identified geographical areas only.

GNR 982, 983, 984 and 985 have been amended in 2017 through GNR 324, 325, 326 and 327, respectively.

The purpose of these regulations is to avoid negative impacts on the environment, and where these cannot be avoided, ensure the mitigation and management of the impacts to acceptable levels, while optimising positive environmental impacts.

The proposed project triggers Listing Notice 1 of activity 21 of GN R983 of the EIA which states that- Any activity including the operation of that activity which requires a Mining Permit in terms of section 27 of the MPRDA, 2002 (Act 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 MPRDA, 2002 (Act 28 of 2002). Any activity including the operation of that activity associated with the primary processing of a mineral resource including crushing, screening and washing. It is noted that no activities will be undertaken within 32 metres of a watercourse.

Table 7- provides a summary of the identified NEMA listed activities that will be triggered by the mining project.

Table 7-2: Applicable Activities

<p>NAME OF ACTIVITY</p> <p>(E.g. For mining - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining, - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>Aerial extent of the Activity Ha or m²</p>	<p>LISTED ACTIVITY (Mark with an X where applicable or affected).</p>	<p>APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)</p>
<p>Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including —</p> <p>(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource [,] ; or [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)]</p> <p>(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;</p> <p>Processing Plant (crushers)</p>	<p>5ha</p>	<p>x</p>	<p>GNR 983 as mended by GNR 327, Listing 21</p>
<p>The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>Site Clearance and removal of vegetation Drilling of blasting boreholes when necessary Stockpiling material from site clearance Discarding material from pits/trenches site Rehabilitation of pits/trenches of trenches Construction of temp/mobile site infrastructure and access routes Stormwater management Storage of diesel and vehicle/machinery maintenance equipment. Water extraction from borehole and/or tank. Waste generation and management. Demolition and/or removal of temporary infrastructure/equipment Rehabilitation and restoration of disturbed areas Topsoil storage</p>	<p>1 ha</p>	<p>x</p>	<p>GNR 983 as amended by GNR 327, Listing 27</p>
<p>Mobile Office</p>	<p>0.0025 ha</p>	<p>x</p>	<p>GNR 983</p>
<p>Stockpiles</p>	<p>0.2ha</p>	<p>x</p>	<p>GN R 983 Activity 27, GNR 985 Activity 12</p>
<p>Ablution Facility</p>	<p>0.0025 ha</p>	<p>x</p>	<p>GNR 983</p>
<p>Road (Loading Hauling & Transport)</p>	<p>1000m²</p>	<p>x</p>	<p>GNR983</p>

7.4 Activities to be undertaken

7.4.1 Mining

Please refer to Sections 7.1 to 7.3 for a detailed description of the mining activities to be undertaken.

7.4.2 Establishment of Temporary Access Roads

There are various main and minor roads passing over the proposed project area. Some of these roads will be used to access the proposed mining project area. Where sites cannot be accessed via existing roads, a temporary access roads (tracks) will be established.

7.4.3 Power

Diesel powered vehicles and machinery will be used for the proposed project.

7.4.4 Processing Plant

The project will also include a crushing processing plant with a capacity of approximately 500m³.

7.4.5 Water Supply

It is anticipated that water will be brought onto site and trucked to the identified sites. Water bowsers will be deployed to the sites as and when required.

Additional water requirements relate to the potable water supply for mining personnel. A temporary vertical water storage tank for drinking water and general use by persons will be provided.

7.4.6 Ablution Facilities

Sewage waste will be generated from Excavation/pit and Excavation. Portable chemical toilets will be used for the management of sewage waste generated on site.

7.4.7 Temporary Site Office Area

A temporary site office area will be erected at the Excavation/pit site.

7.4.8 Accommodation

No accommodation for staff and workers will be provided on-site and all persons will be accommodated in nearby Kimberly town. Workers will be transported to and from the mining site on a daily basis.

Night security staff will be employed once equipment has been established on-site.

7.4.9 Blasting

The proposed mining will include blasting activities.

7.4.10 Waste Management

Hazardous Waste

Hazardous waste to be generated includes mineral residue, hydrocarbon wastes (oil and liquid fuel wastes) and sewage waste. Hydrocarbon waste will be collected in drums for storage. The removal of the drums or any other appropriate receptacle will be undertaken by a registered waste disposal

company, for disposal at a registered licensed waste disposal site. The drums will be placed on protected ground.

Oil waste and liquid fuel waste include used oils from mine machinery and vehicles and diesel/petrol waste.

General Waste

General waste to be generated from the proposed project area will include domestic waste which includes old food, polystyrene, old stationary, discarded Personal Protective Equipment (PPE) and old clothing generated from the drilling and campsites. General waste will be collected in drums and disposed of at a registered domestic waste disposal site (Kimberley).

Storage of Dangerous Goods (Hydrocarbons)

During the blasting drill holes and Excavation/pit activities, limited quantities of diesel fuel, oil and lubricants will be stored on site. The only dangerous good that will be stored in any significant amount will be the diesel fuel. No more than 30 m³ will be stored above ground in diesel storage tanks.

8 Policy and legislative context

Table 8-1 provides a summary of the applicable legislation, policies and guidelines identified as relevant to the proposed project. In addition, a description of how the proposed activity complies with and responds to the legislation and policy context, is provided. This list is not exhaustive but rather represents an indication of the most applicable pieces of legislation relevant to the project.

Table 8-1: Applicable legislation, policies and guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) (As amended)	Application for Mining permit in terms of Section 27.	A mining permit application was submitted to the DMR by the applicant on 4 March 2020.
National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA)	The project may trigger the requirements under Section 38 of the NHRA. However, the requirements for the permits have not yet been established.	<p>The Environmental Management Programme (EMPr) will regulate the applicant to apply for tree removal permits from the South African Heritage Resources Agency (SAHRA) prior to removal or relocation of any heritage resources.</p> <p>The BAR and EMPr was also submitted to the SAHRA through the South African Heritage Resources Information System (SAHRIS) to determine whether or not any permits will be required.</p>
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	This Basic Assessment Report (BAR) and Environmental Management Plan (EMP)	An application for an Environmental Authorisation was submitted to the DMR on 4 March 2020. The BAR and EMPr will be submitted to the DMR once finalised and have been subjected to a public participation process as required by Chapter 6 of the NEMA.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA)	The possibility of the presence of protected flora	The EMPr will regulate the applicant to apply for tree removal permits prior to removal of any sensitive and/or protected species.
National Water Act, 1998 (Act 36 of 1998) (NWA)	Soil Sampling and excavation/pit site establishment within 32 m of a watercourse or 500m of a wetland	<p>The South African National Biodiversity Institute (SANBI) National Wetlands database shows that there are a number of wetlands in the mining area. There are also watercourses and drainage lines that may be affected by the project. In terms of the NWA, any activities undertaken within 500 m of a wetland or within 32 m of a watercourse require a Section 21 (c) and (i) Water Use Licence (WUL). Should the impacts of the activities be of low significance, the activities may also be Generally Authorised (GA).</p> <p>Clarification is required from the DWS on whether or not a WUL or GA will be required.</p>
Municipal Integrated Development Plans (IDPs)	Land Claims	One of the key issues identified by the IDPs is to facilitate the land claims.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Francis Baard Spatial Development Framework (SDF)	Alternatives	The Francis Baard DM Spatial Development Framework shows that the area is not earmarked for any development by the Francis Baard DM.

9 Need and Desirability

The mining industry is of great importance to the South African economy. According to the DMR, sand, clay and aggregate mining opens up more opportunities to small scale miners since it requires less capital for operation. There is not much capital that goes into buying expensive underground machinery. Demand for aggregate and sand in South Africa is driven by the construction industry, which is comprised of residential building, non-residential building and civil construction.

The DMR lists 881 quarrying operations located throughout South Africa. 92.2 million tonnes of mined aggregate, clay, natural sand, dimension stone and limestone to the value of R9.4bn was sold locally during 2016 while the value of exports of quarry products reached US\$61.5m. Although the majority of quarries are individually owned by small operators, a number of large companies are also involved in the sector. These include cement producers like Lafarge, PPC, AfriSam and Dangote Cement that own limestone quarries, construction companies such as Raubex that own sand and aggregate operations, and brick manufacturers like Corobrik that own clay quarries.

The definition of mining in terms of the MPRDA states: “*intentionally searching for any minerals by means of any method which disturbs the surface or sub-surface of the earth, including any portion of the earth that is under the sea or under other water...*”. Mining is the physical search for minerals, fossils, precious metals or mineral specimens, which allows a company to survey or investigate an area of land for the purpose of identifying an actual or probable mineral deposit, before investments are made into the mining activities.

Assessment of the geological information available has determined that the area in question may have good quality aggregate reserves. In order to ascertain the above and determine the nature, location and extent of the reserves within the proposed mining area, it will be necessary that mining be undertaken. The mining will also determine if there are any features that may have an impact on the economic extraction of the aggregate stone.

The information that will be obtained from the mining to be undertaken will be necessary to determine, should aggregate stone be found, how and where the aggregate stone will be extracted and how much economically viable reserves are available within the proposed mining area.

Should good quality aggregate be found in the project area, Misabrite will be able to mine the available reserves. This will result in job creation and boost to local businesses is continued.

Misabrite expects that substantial benefits from the project will accrue to the immediate project area, the sub-region and the province of the Northern Cape. This mining activities has a potential to decrease unemployment rates in proposed areas and surroundings. This mining activities will also bring revenue into the city and the province which will in turn boost the economy of the country and contribute in the supply of aggregate stone, clay and sand required by the construction industry in South Africa.

These benefits must be offset against the costs of the project, including the impacts to landowners. Further to the above, it has been determined that the mining project activities will not have a conflict with the spatial development plans for the Sol Plaatje LM and Francis Baard DM, the Integrated Development Plans and the Environmental Management Framework (EMF) for the affected municipalities.

A process that ensures consultation with Interested and Affected Parties (I&APs) for the project is being undertaken. The stakeholder engagement process was conducted is a way to provide all interested and affected parties with an opportunity to comment on the project, with several platforms that allow public commenting opportunities to be offered to the I&APs. All issues raised by the interested and affected parties have been recorded and addressed in the BAR and EMPr.

10 Motivation

10.1 Preferred Site

The proposed project site is preferred due to its location where dolerite occurs widely spread as dykes, sills and funnel shaped bodies. These dolerites (Jd) can also be seen at the bottom or south of the mining permit. The rest of the farm is covered by sand (Qs)

10.1.1 Regional Geology

The farm is underlain by Archaean age rocks which also include a variety of Senozoic sediments and intrusive rocks. The gneiss, pegmetite, granite and amphibolite are some of the Archaean age rocks which outcrop in the area of study. The regional geology is characterised by:

- The Archaean age rocks which are found in the area are the Ventersdorp Supergroup, the Grinqualand West Sequence and the Karoo Sequence.
- The Ventersdorp Supergroup: The rocks in this group are quartz' porphyry and quartz-feldspar pophyry of Makwassie Formation at the base, andesitic lava, volcanic breccia, tuff and chert of the Rietat Formation which forms the top of the squence. The rocks in this group are mainly volcanic.
- The Grinqualand West Sequence: The Grinqualand West sequence unconformably follows the Ventersdorp Supergroup It comprises a concordant sequence which grades from the coarse to fine grained clastic rocks of the Vryburg Formation at the base through alternating stromatolitic dolomite, limestone, sandstone and shale of the Schimtdsdrift Formation to limestone and dolomite of the Ghaaplato Formation.
- Karoo Sequence: The Karoo Sequence stratigraphically lies above the older formations unconformably. At the base the Dwyka Formation comprises glacial and fluvioglacial rocks which include tillite, varved shale, mudstone with pebbles and conglomerate. The Eccca Group, which follows concordantly on the Dwyka, consists almost exclusively of deep-water, fine grained clastic sediments and the lithological monotony of this sequence is only interrupted by the characteristic black, carbonaceous shale of the Whitehill Formation which is underlain and overlain respectively by dark-grey mudstone and shale of the Prins Albert and Tierberg Formation.

10.1.2 Local Geology

In this area the dolerite occurs widely spread as dykes, sills and funnel shaped bodies. Early Jurassic age igneous intrusions are abundant in the area. The intrusions are generally referred to loosely as dolerite, but the actual rock type varies. They occur in the form of dykes and sills and are composed primarily of plagioclase feldspar and pyroxene. The rocks are highly durable, and this are often seen capping the sandstone and mudstone hills. These dolerites (Jd) can also be seen at the bottom or south of the mining permit. The rest of the farm is covered by sand (Qs). The geology of the application area is shown in Figure 10-1.

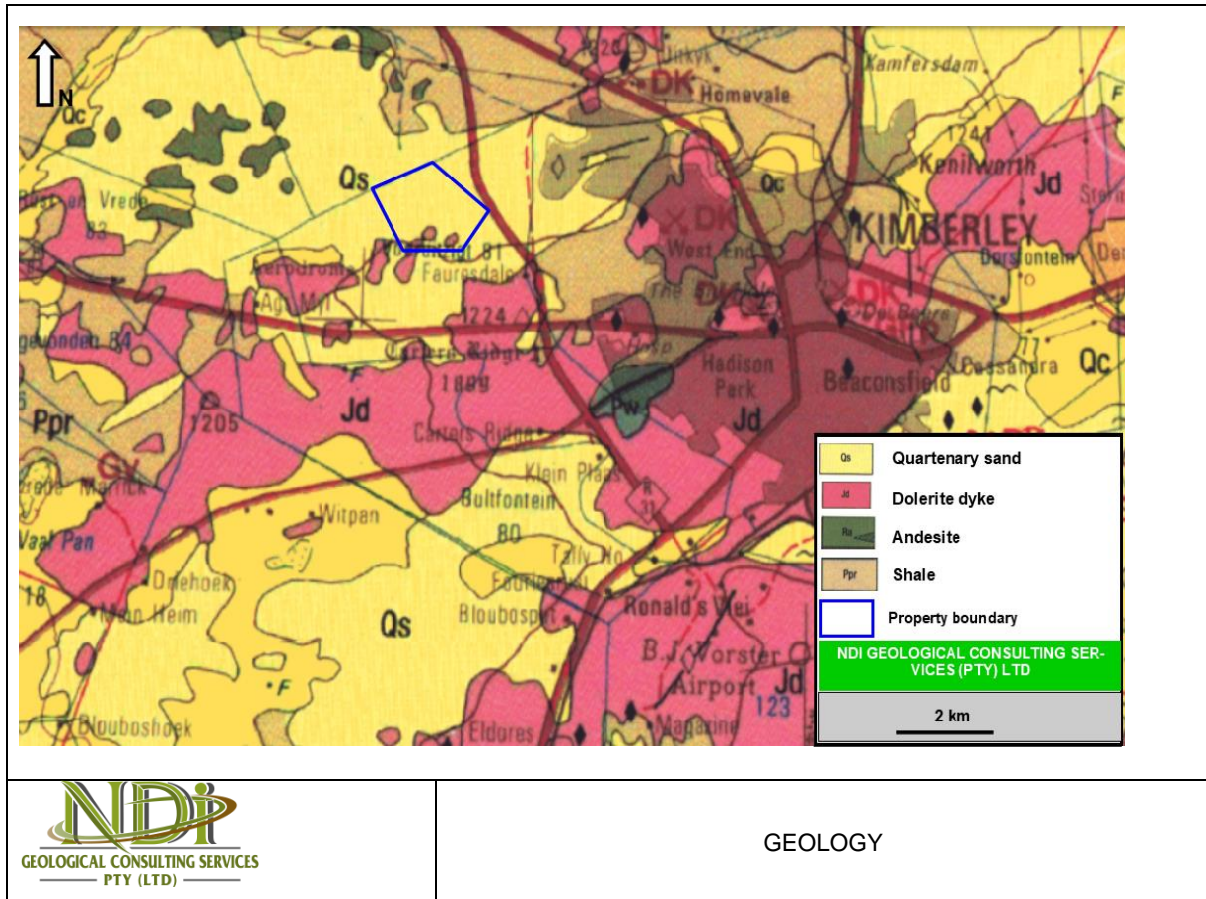


Figure 10-1: Geology of the Mining Area

10.2 Technologies

Due to the nature of the proposed mining activities, future land use alternatives will not be compromised. Once the viable reserve has been confirmed, a comprehensive social and environmental impact assessment will be required (according to legislation), during which alternative land use to mining of the aggregate stone will be investigated.

In terms of the proposed technologies, these have been chosen based on long term proven success in mining. All infrastructure will be temporary and/or mobile. Figure 7-3. All infrastructure will be temporary and/or mobile.

10.3 Design/Layout

Since no complicated surface infrastructure will be required for this project design and layout alternatives for the proposed project were determined.

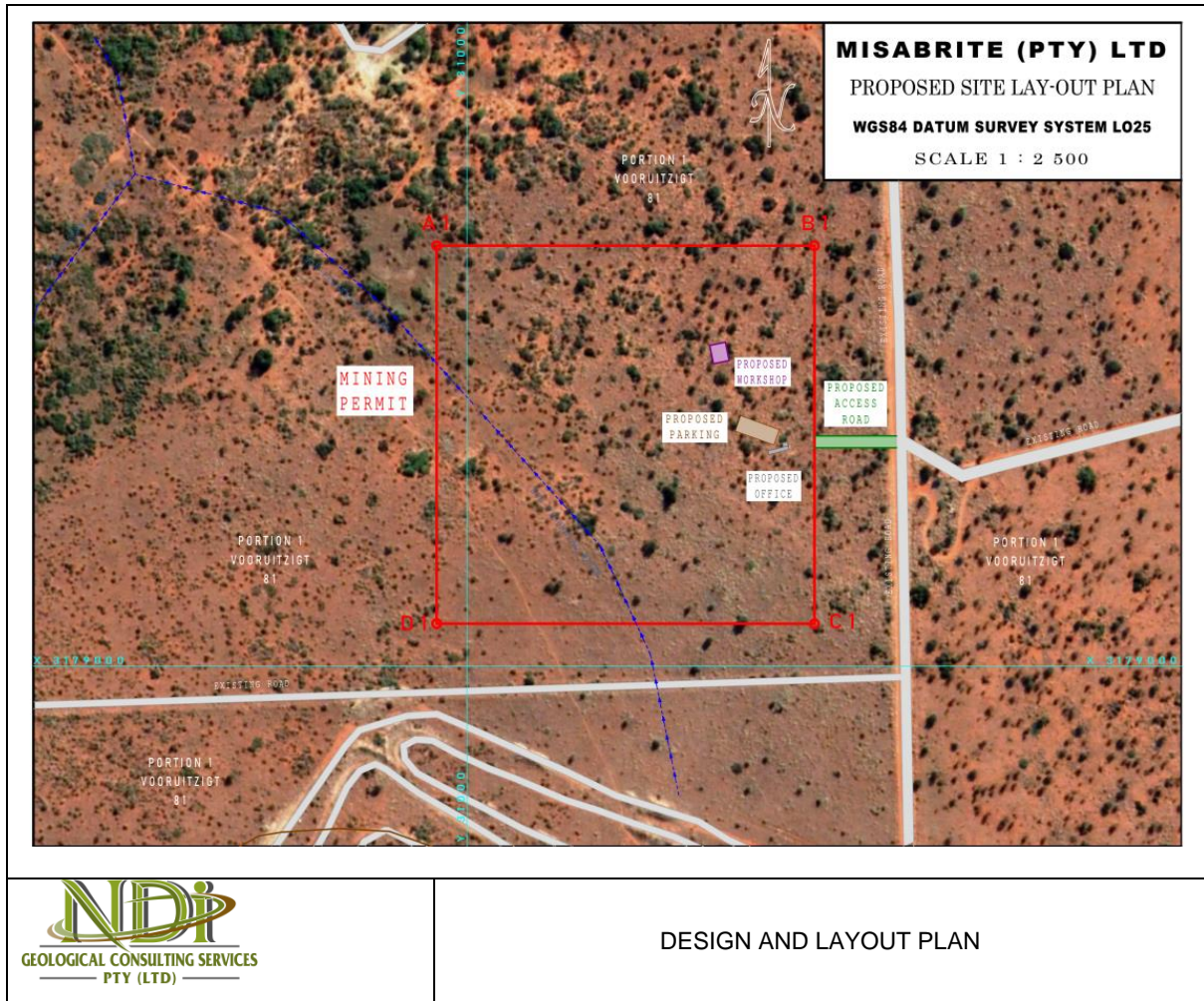


Figure 10-2: Design and layout of the Mining Area

11 Full description of the process followed to reach the proposed preferred alternatives within the site.

The invasive mining phase will be dependent of the results of the preceding phase. The location and extent of the pits/trenches, soil sampling cannot be determined at this stage, therefore comprehensive mapping of the specific mining activity site could not be undertaken at this stage. For the purposes of this report, the overall mining site is presented in **Error! Reference source not found.** and location of the trenches presented in Figure 7-3.

The stakeholder consultation process has not been finalised at this stage, and therefore the comments raised by the I&APs have not been incorporated in this section. This will be updated as part of the final report.

11.1 Details of the Development Footprint Alternative Considered

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

The proposed mining area is located in an area where dolerite occurs widely spread as dykes, sills and funnel shaped bodies. Early Jurassic age igneous intrusions are abundant in the area. The intrusions are generally referred to loosely as dolerite, but the actual rock type varies. They occur in the form of dykes and sills and are composed primarily of plagioclase feldspar and pyroxene. The rocks are highly durable, and this are often seen capping the sandstone and mudstone hills. These dolerites (Jd) can also be seen at the bottom or south of the mining permit. The rest of the farm is covered by sand (Qs). The site is therefore regarded as the preferred site and alternatives are not considered.

11.1.2 The type of activity to be undertaken

The application is for mining permit and no alternatives were considered. The mining process of a crusher operation will consist of loading, hauling and crushing. To get to the fresh dolerite, sand, clay and weathered dolerite need to be stripped. With these materials gravels, being G4,5,6 and 7 is manufactured. The different denominations have got to do with the sizes of the weathered dolerite which has been crushed and mixed in the right portions. Gravels are used for back filling on mining area 3 known as the dump's sites. on intersecting the fresh dolerite the process of drill and blast then follows. This material is then transported to a jaw crusher, from the jaw crusher it will go to a cone crusher, then into a 4-deck screen, to produce crusher dust (-5mm), ballast, -70mm + 32mm. The -32mm goes into a VSI, and from there to the screens to produce -26mm, -21mm, -15mm, and -5mm. Equipment to be used are 2 excavators between 26 and 36 ton each, 2 Front end loaders, with 5 cube bucket, 2 ADT's, between 30 and 40 tons each and screens. The design or layout of the activity

All infrastructure will be temporary and/or mobile (Refer to Section 7.6 of this report).

11.1.3 The design or layout of the activity

The location of the infrastructure will be determined based on the location of the mining activities, refer to **Error! Reference source not found.**, as well as the presence of sensitive environmental attributes such as wetlands, watercourses, protected flora and graves. All infrastructure will be temporary and/or mobile (Refer to Section 7.6 of this report).

11.1.4 The technology to be used in the activity

The proposed technologies have been chosen based on long term proven success in mining .

11.1.5 The operational aspects of the activity

No permanent services in terms of water supply, electricity, and or sewage facilities will be required. Temporary access roads will however be constructed in areas where there are no existing access routes. After the desktop studies, geological mapping will be undertaken.

The option of not implementing the activity will result in a loss of valuable information regarding the mineral status of the aggregate stone present on the affected properties. In addition to this, should economical reserves be present, and the applicant does not have the opportunity to mine, the opportunity to utilise the reserves will be lost.

11.1.6 The option of not implementing the activity

The option of not implementing the activity will result in a loss of valuable information regarding the mineral status of the aggregate stone present on the affected properties. In addition to this, should economical reserves be present, and the applicant does not have the opportunity to prospect, the opportunity to utilise the reserves will be lost.

11.2 Details of the Public Participation Process Followed

The Public Participation Process (PPP) was conducted in terms of Chapter 6 of the National Environmental Management Act, 1998 (Act 107 of 1998).

The stakeholder engagement process forms an important part of the impact assessment process. The stakeholder engagement process is primarily aimed at affording I&AP's the opportunity to gain an understanding of the proposed project. In addition, the purpose of consultation with the landowners, key stakeholders, and I&AP's is to provide them with the necessary information about the proposed project so that they can make informed decisions as to whether the project will affect them, and provide the EIA team with local knowledge of the area and raise concerns relating to the biophysical, socio-economic and cultural impacts that may arise.

The stakeholder engagement process is conducted in terms of NEMA, which provides clear guidelines for stakeholder engagement during an EIA. Chapter 1 of the NEMA outlines the principles of environmental management, several pertaining to public consultation (e.g. Chapter 1, subsections (2), (3), (4) (f), (g), (h), (k), (q) and (r). Chapter 6, Regulations 39 – 44 of the amended EIA Regulations GNR) 982, promulgated on 8 December 2014, specify the minimum requirements for stakeholder engagement in an EIA process conducted under the NEMA. In 2017, the Minister of Environmental Affairs published, in terms of Section 24J of the NEMA, Public Participation Guidelines which guide the Public Participation Process (PPP) in order to give effect to Section (2)(4)(f), (o) and 24 (1A) (C) of the NEMA.

Figure 11-1 provides a summary of the stakeholder engagement process followed for the proposed project.

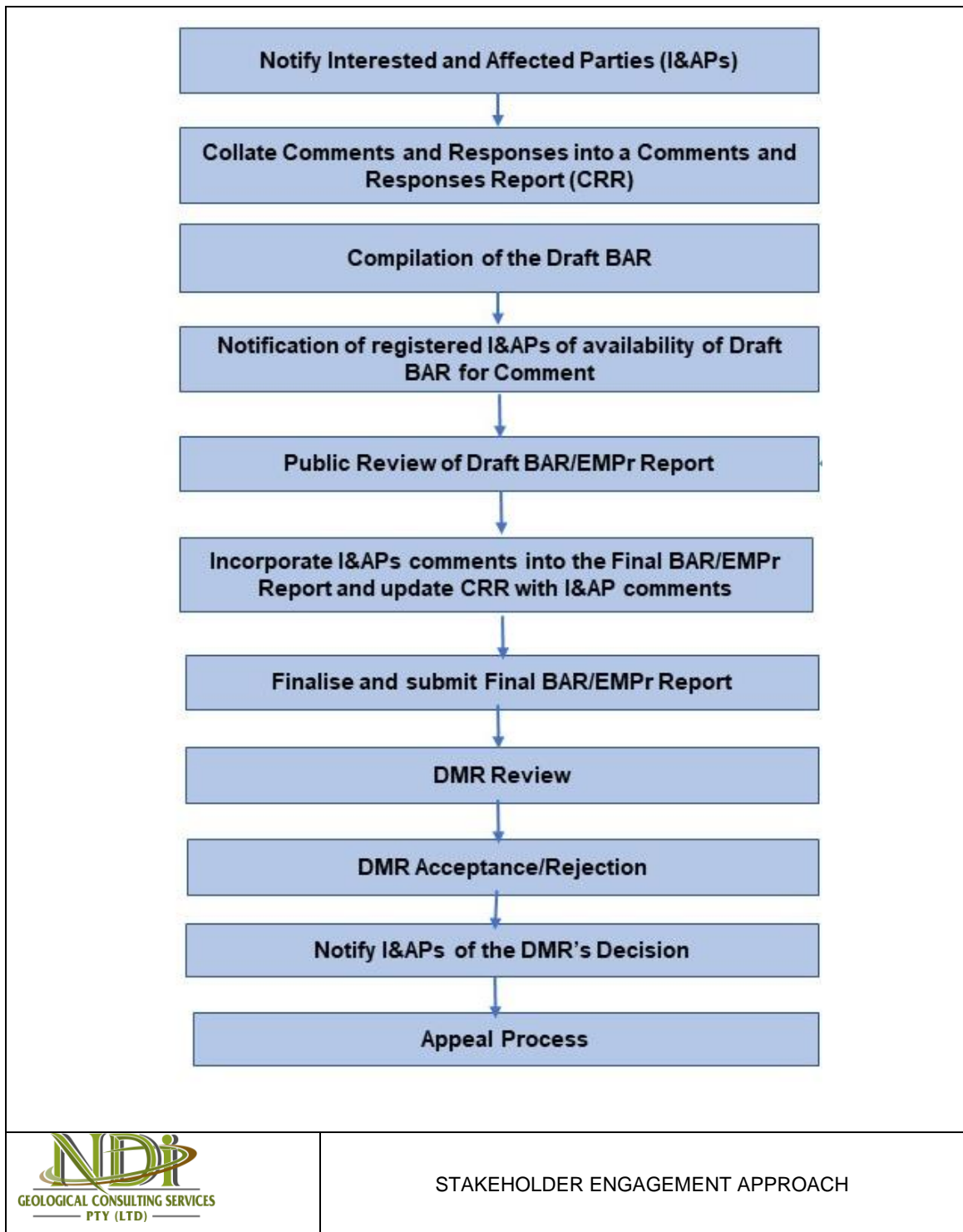


Figure 11-1: Summary of the Stakeholder Engagement Process followed

All the above guidelines have been incorporated into this stakeholder engagement process. This application will be submitted to the DMR for authorisation as the competent authority. Identified commenting authorities on this application include:

- DWS – Regional Office;
- SAHRA – Provincial;
- Sol Plaatjie Local Municipality;
- Francis Baard District Municipality; and

- Northern Cape Department of Nature Conservation (DENC)).

All stakeholder engagement documents have been included in Appendix 4.

11.2.1 Stakeholder Identification Interested and Affected Parties

An I&APs register was developed using information from the surveyor general's office and from stakeholders that responded to the project announcement that was conducted through placement of newspaper advertisements, on-site notices and notification letters sent to the adjacent and affected landowners.

The I&APs register was maintained for the duration of the study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs was conducted as an on-going activity.

The affected properties are provided in Table 11-1.

Table 11-1: List of Affected Farm and Farm Portions

Farm	Portions	21 Digit Survey General Code
Vooruitzicht 81	A portion of portion 1	C03700000000008100000

A map of the affected and adjacent farm portions and farm portions of the site are illustrated in Figure 11-2.

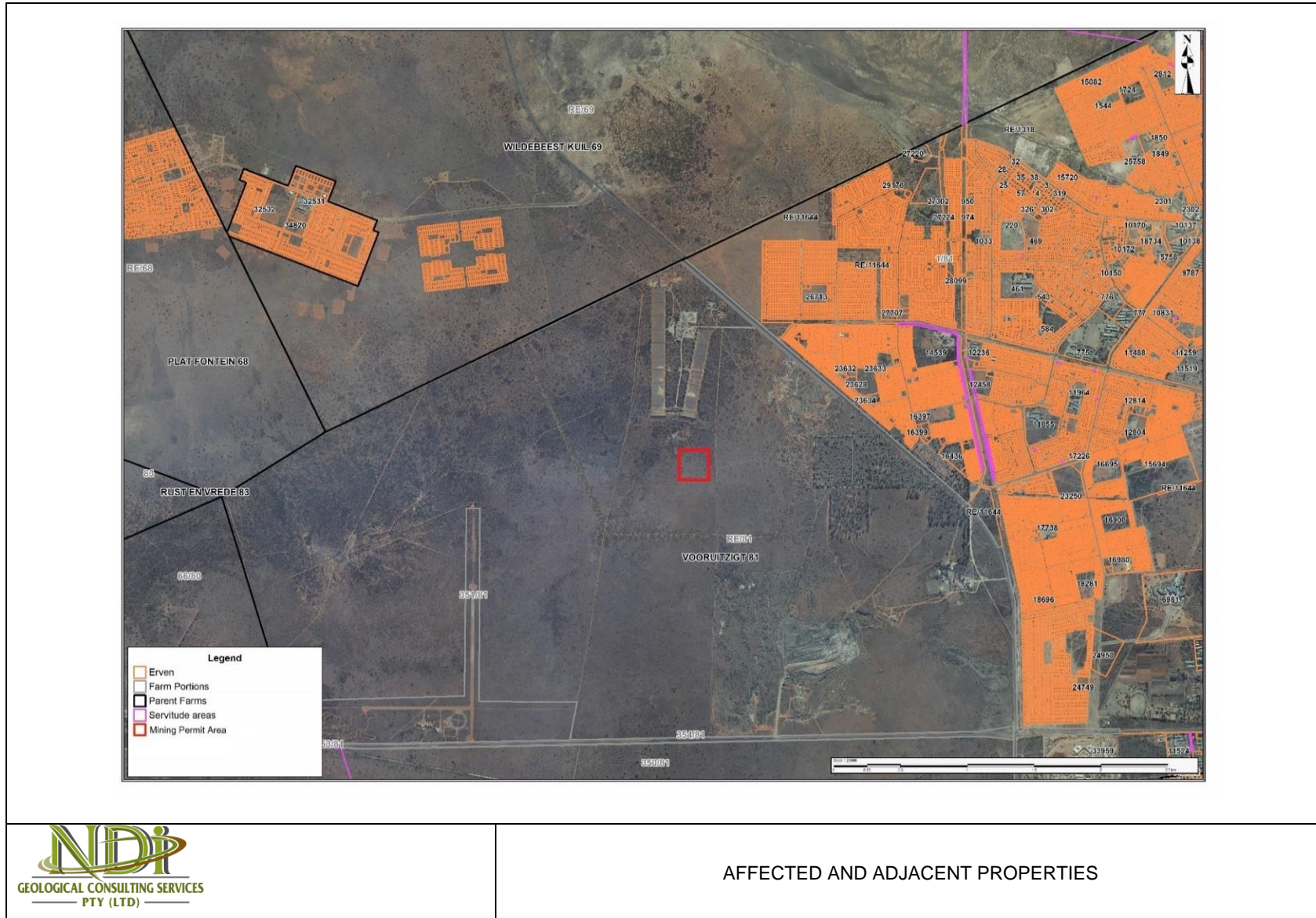


Figure 11-2: Affected and Adjacent Properties

11.2.2 Project Announcement

Stakeholders were informed of the proposed mining project as well as Misabrite' s intention to undertake the required and environmental processes and EA application through various methods. Stakeholders were provided with the opportunity to participate and register as I&AP's during the announcement phase of the project.

- Distribution of Notification Letters: Notification letters were sent to identified I&AP's on 10 March 2020, informing them of the proposed project.
- Site Notice Placements: Sites notice boards (Size A2: 600 mm X 420 mm) notifying stakeholders and I&AP's of the proposed mining were placed at conspicuous places in the project area. Newspaper Advertisements: Newspaper advertisements notifying stakeholders about the proposed project and the opportunity to participate in the EIA process were placed in the newspapers.

All stakeholder consultation documents are included in Appendix 4.

11.3 Public Review of the Draft Basic Assessment Report

The Draft BAR was compiled in terms of the requirements of GNR 326. All comments received during the announcement phase of the stakeholder engagement process were incorporated into Draft BAR and collated into a Comments and Responses Report (CRR) which formed an appendix to the draft BAR.

The availability of the Draft BAR was announced by means of SMSes, letters and emails to registered I&APs. Copies of the draft BAR were made available at the venues listed in Table 11-2.

Table 11-2: List of places the Draft BAR was placed for public review

Public Place	Locality	Telephone
Ndi Geological Services Website	http://www.ndigeoservices.co.za/	053 842 0687

The draft BAR was also made available to the competent and commenting authorities during the 30-day review and comment period.

11.4 Stakeholder Consultation Meeting

A stakeholder consultation meeting was held at Promised Land Stop Sign on 19 March 2020. The purpose of the meeting was to discuss the proposed mining project as well as the findings from the impact assessment process. Stakeholders were provided with an opportunity to raise queries and/or objections to the proposed project.

The minutes of the meeting, presentation and attendance register are included in Appendix 4.

11.5 Summary of Issues Raised by I&APs

Table 11-3 provides a summary of the comments received to date following the newspaper adverts, site notices, written notification of the project and the Draft BAR review period.

Table 11-3: Summary of issues raised by Interested and Affected Parties

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
<u>AFFECTED PARTIES</u>				
Sol Plaatjie (Landowner)		The landowner provided the applicant with the consent letter to mine by means of resolution.	The landowner provided the applicant with the consent letter to mine by means of resolution.	See attached resolution.
<u>AFFECTED PARTIES</u>				
Adjacent Landowner/s				
Kim Crush		<p>With reference to your mining permit application that came to our attention we wish to register as an affected party as we are holding the right next to your proposed application. We therefor need to instruct you to do the following studies on top of the ones we did as there would be a cumulative impact, as our operations will be next door to each other, we would also like to see the studies:</p> <ul style="list-style-type: none"> • Noise and dust • Ecological • Heritage and palaeontological • Geohydrological 	<p>It is the considered opinion of the EAP that due to the small and localised footprint of the proposed mining, no specialist studies will be required. This is supported by findings from the Department of Environmental Affairs (DEA) screening tool, which found that all environmental attributes in the area are of low sensitivity. The DEA screening report is attached as Appendix 8.</p> <p>Although during the draft BAR phase, the EAP was of the opinion that heritage resources specialist must be appointed to locate and identified all heritage resources that may be affected where the mining will occur, the applicant appointed a Hydrologist specialist, wetland specialist, noise specialist, vibration and blasting specialist, and HIA specialist to undertake the assessment. Findings from the specialists have been summarised in</p>	<p>Section 12 Section 13 Appendix 8 Appendix 9</p>

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.					
				Section of this report and the Reports are attached in Appendix 9. The impact assessment for the mining permit Application included an assessment of potential groundwater, biodiversity, noise and dust impacts during all phases of the project. The assessment also includes potential cumulative impacts that may occur due to the proposed project. A geohydrology assessment was conducted as part of the application for a Water Use Authorisation (WUA).	
Municipal councillor	X		Permission granted.	Permission granted.	See attached resolution.
Municipality					
Permission granted.					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
Communities					

<p>Interested and Affected Parties</p> <p>List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.</p>	<p>Date Comments Received</p>	<p>Issues raised</p>	<p>EAPs response to issues as mandated by the applicant</p>	<p>Section and paragraph reference in this report where the issues and or response were incorporated.</p>
	X	<p>When will the operations start?</p>	<p>Depending on the success of the applications and the granting of the rights. The expected timeline is approximately 3 to 4 months.</p>	<p>N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.</p>
		<p>How many job opportunities will be created?</p>	<p>It is not as yet finalised but in total in excess of 1 500 opportunities will be created by the development project of which the quarry is a part.</p>	<p>N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.</p>
		<p>Will the local population be given preference for the job opportunities?</p>	<p>The company will give preference to qualified local community members.</p>	<p>N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.</p>
		<p>How is BEE addressed by the company?</p>	<p>The company complies with any BEE legislation and requirements.</p>	<p>N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.</p>
		<p>Will the company look after the community better than the current crusher, also located nearby?</p>	<p>We cannot comment on the activities of other businesses but assure the community that we shall fulfil our obligations as required by legislation.</p>	<p>N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.</p>

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
		Where will the quarry be located?	The meeting was referred to the locality maps that were attached to the information document and explained the location of the area by referencing known landmarks.	N/A. The comment had no bearing on the application process and/or findings from the impact assessment process and did not contribute to the revision of the BAR.
Dept. Land Affairs				
No land claim received to date.				
Traditional Leaders				
No comments received to date.				
Dept. Environmental Affairs				
No comments received to date.				
Other Competent Authorities affected				
No comments received to date.				
OTHER AFFECTED PARTIES				

12 Environmental Attributes Associated with the Alternatives

12.1 Baseline Environment

12.1.1 Geographical

The proposed project area is situated in the Sol Plaatjie Local Municipality's area of jurisdiction, within the Francis Baard District Municipality, Northern Cape Province. The wards affected by the project include Ward 16 and 27. The affected property is located approximately 5km outside Kimberley town.

12.1.2 Topography

Kimberley is set in a relatively flat landscape with no prominent topographic features within the urban limits. The only "hills" are debris dumps generated by more than a century of diamond mining. From the 1990s these were being recycled and poured back into De Beers Mine (by 2010 it was filled to within a few tens of metres of the surface). Certain of the mine dumps, in the vicinity of the Big Hole, have been proclaimed as heritage features and are to be preserved as part of the historic industrial landscape of Kimberley.

The surrounding rural landscape, not more than a few minutes' drive from any part of the city, consists of relatively flat plains dotted with hills, mainly outcropping basement rock (andesite) to the north and north west, or Karoo age dolerite to the south and east. Shallow pans formed in the plains.

12.1.3 Climate

Average Monthly Temperatures

The average monthly temperatures (Minimum and Maximum) as received from Kimberley are indicated in Figure 12-1.

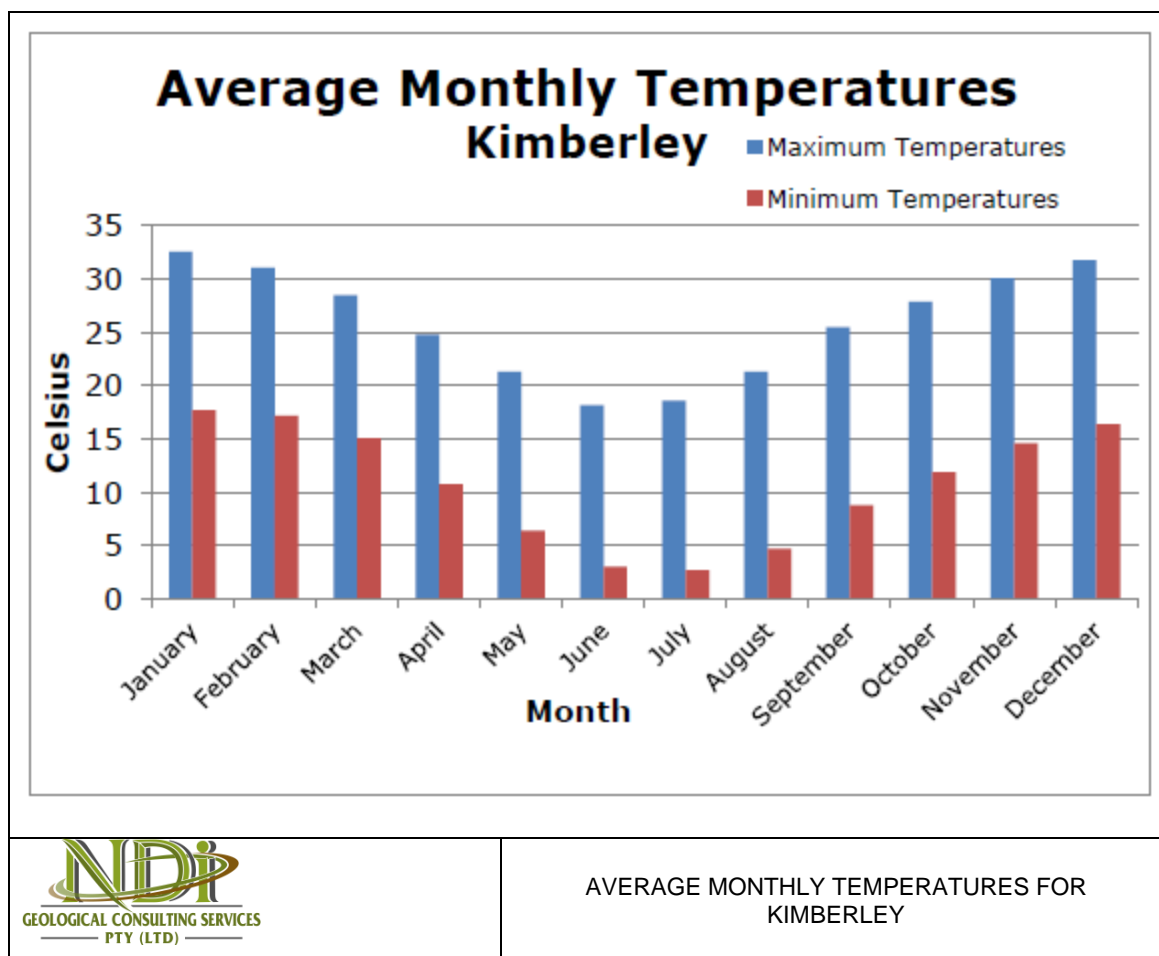
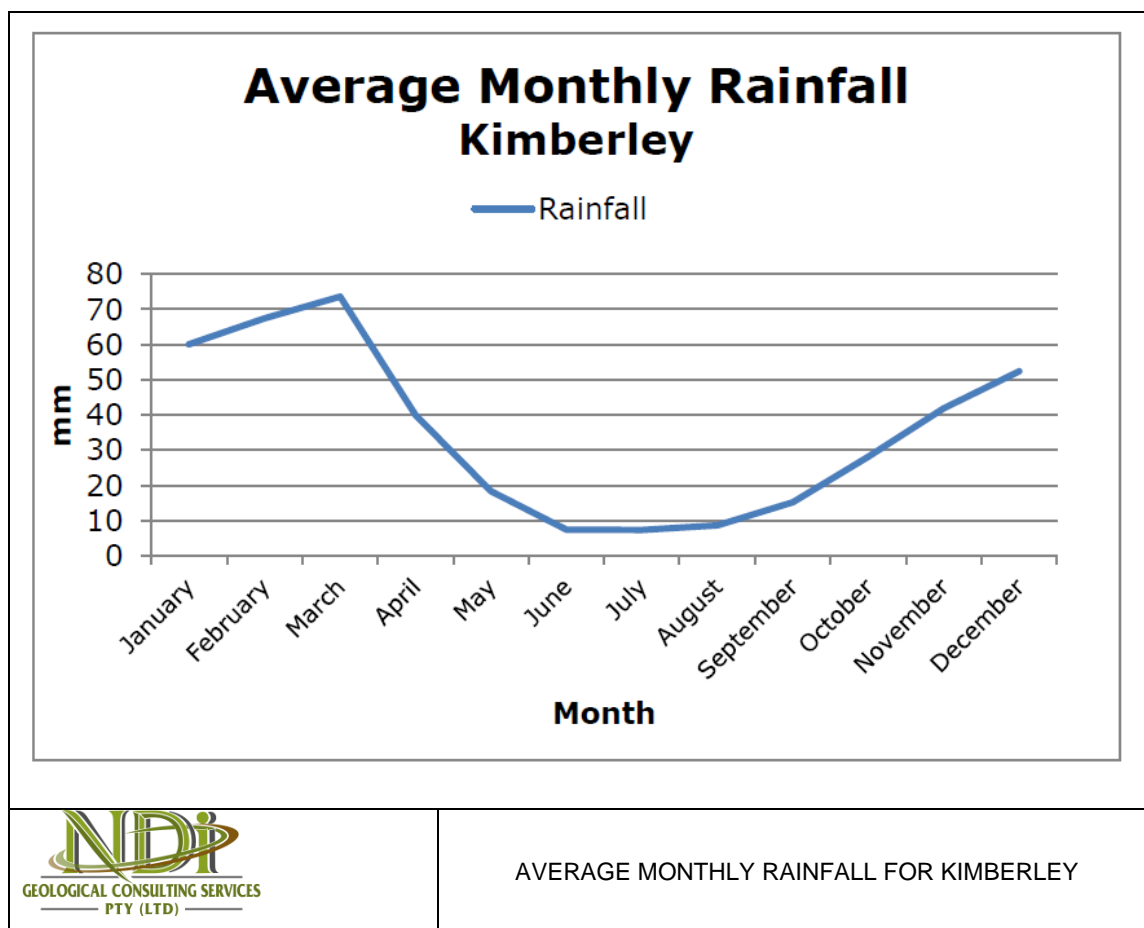


Figure 12-1: Average Monthly Temperatures for Kimberley (Source: Weather SA.)

The figure indicates that:

- The highest maximum temperature is experienced during November, January and February.
- The average maximum goes beyond 33 °C.
- The coldest months of the year are June and July, where the average temperature drops well below 20 °C.

Figure 12-2 indicates the average monthly rainfall for the region.



AVERAGE MONTHLY RAINFALL FOR KIMBERLEY

Figure 12-2: Average Monthly Rainfall for Kimberley (Source: Weather SA.)

The average monthly rainfall data indicates that:

- The highest rainfall months are February to March with an average of ±75mm;
- November/December has a higher peak with just over 50mm;
- While the dry months are June and July with an average of below 10mm.

Average monthly Precipitation

The information available indicates the average monthly precipitation and indicates the following:

- The highest precipitation is in March (70mm) while;
- The lowest is in June to September with an average under 10mm.

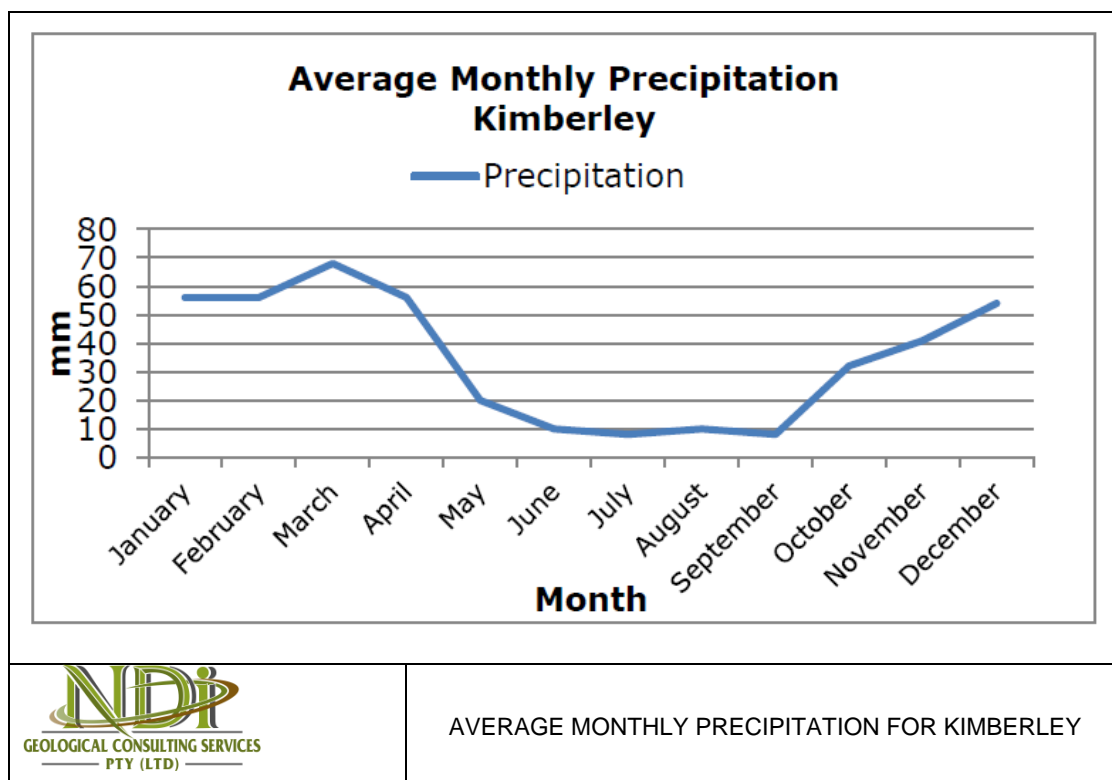


Figure 12-3: Average Monthly Precipitation for Kimberley. (Source: Weather SA)

12.1.4 Geology

The farm is underlain by Archaean age rocks which also include a variety of Senozoic sediments and intrusive rocks. The gneiss, pegmatite, granite and amphibolite are some of the Archaean age rocks which outcrop in the area of study. The regional geology is characterised by:

- The Archaean age rocks which are found in the area are the Ventersdorp Supergroup, the Grinqualand West Sequence and the Karoo Sequence.
- The Ventersdorp Supergroup: The rocks in this group are quartz porphyry and quartz-feldspar porphyry of Makwassie Formation at the base, andesitic lava, volcanic breccia, tuff and chert of the Rietat Formation which forms the top of the sequence. The rocks in this group are mainly volcanic.
- The Grinqualand West Sequence: The Grinqualand West sequence unconformably follows the Ventersdorp Supergroup. It comprises a concordant sequence which grades from the coarse to fine grained clastic rocks of the Vryburg Formation at the base through alternating stromatolitic dolomite, limestone, sandstone and shale of the Schimtdsdrift Formation to limestone and dolomite of the Ghaaplato Formation.
- Karoo Sequence: The Karoo Sequence stratigraphically lies above the older formations unconformably. At the base the Dwyka Formation comprises glacial and fluvioglacial rocks which include tillite, varved shale, mudstone with pebbles and conglomerate. The Ecca Group, which follows concordantly on the Dwyka, consists almost exclusively of deep-water, fine grained clastic sediments and the lithological monotony of this sequence is only interrupted by the characteristic black, carbonaceous shale of the Whitehill Formation which is underlain and overlain respectively by dark-grey.

12.1.5 Water Resources

The project is located within quaternary catchments, which include C91E (located within the Lower Vaal Water Management Area(WMA)) (Figure 12-5).

There is a drainage line that traverses the project area (Figure 12-4).

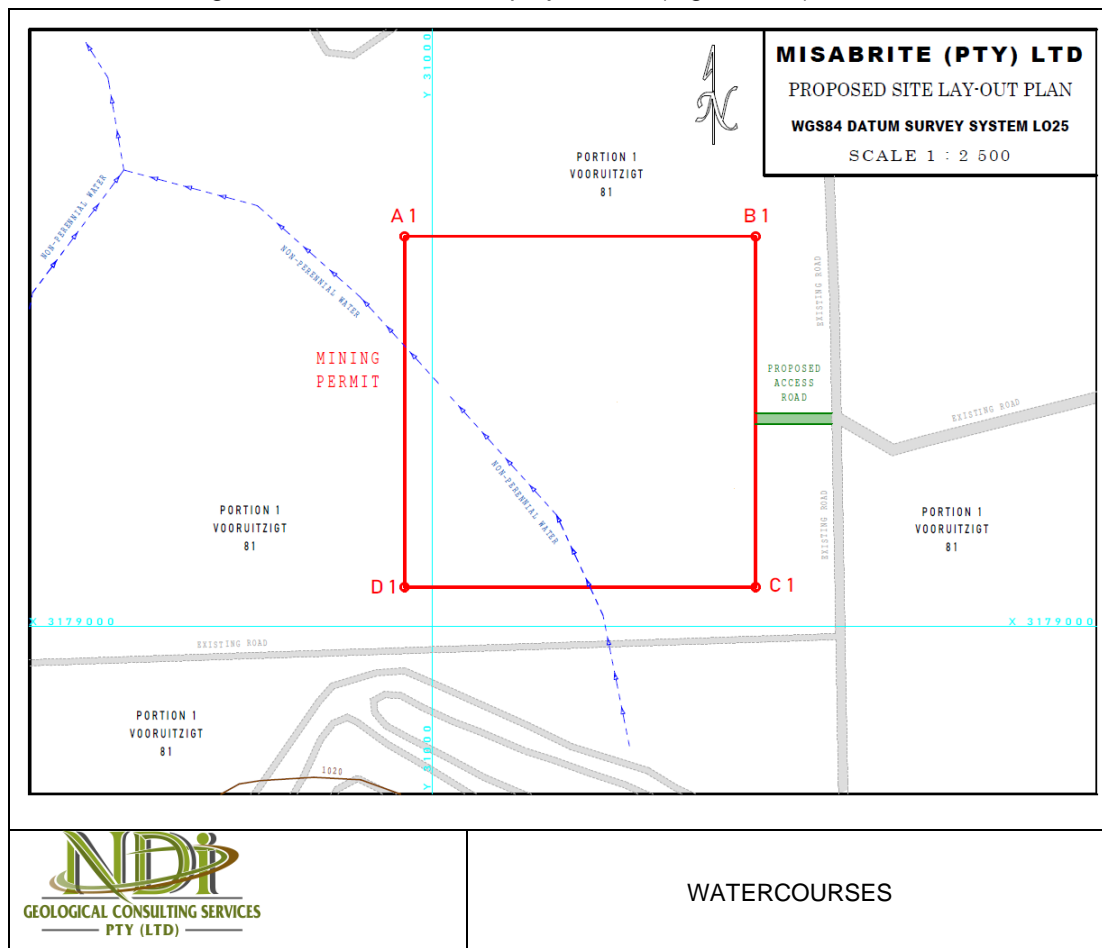
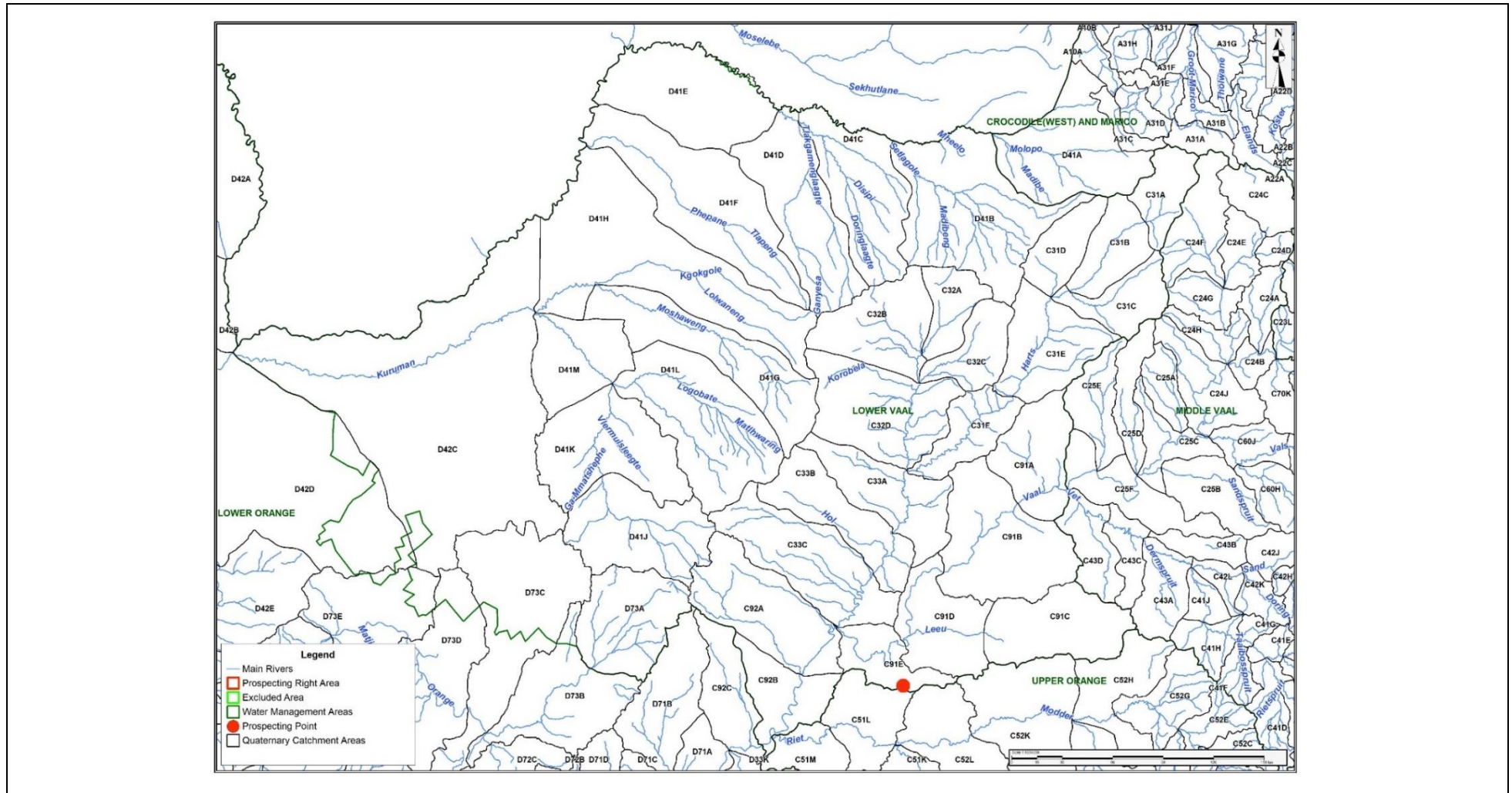


Figure 12-4: Rivers, Streams and Drainage Lines

According to the SANBI Wetland Inventory (2006) National Freshwater Ecosystem Priority Areas (NFEPA) (2011), the affected quaternary catchment areas are not regarded as important in terms of fish sanctuaries, rehabilitation or corridors.

In addition, the project area is not considered important in terms of translocation and relocation zones for fish.



WATER MANAGEMENT AREA AND CATCHMENT AREAS

Figure 12-5: Water Management Areas and Quaternary Catchment Areas

12.1.6 Wetlands

The SANBI data shows that there are no wetlands occurring on the study area.

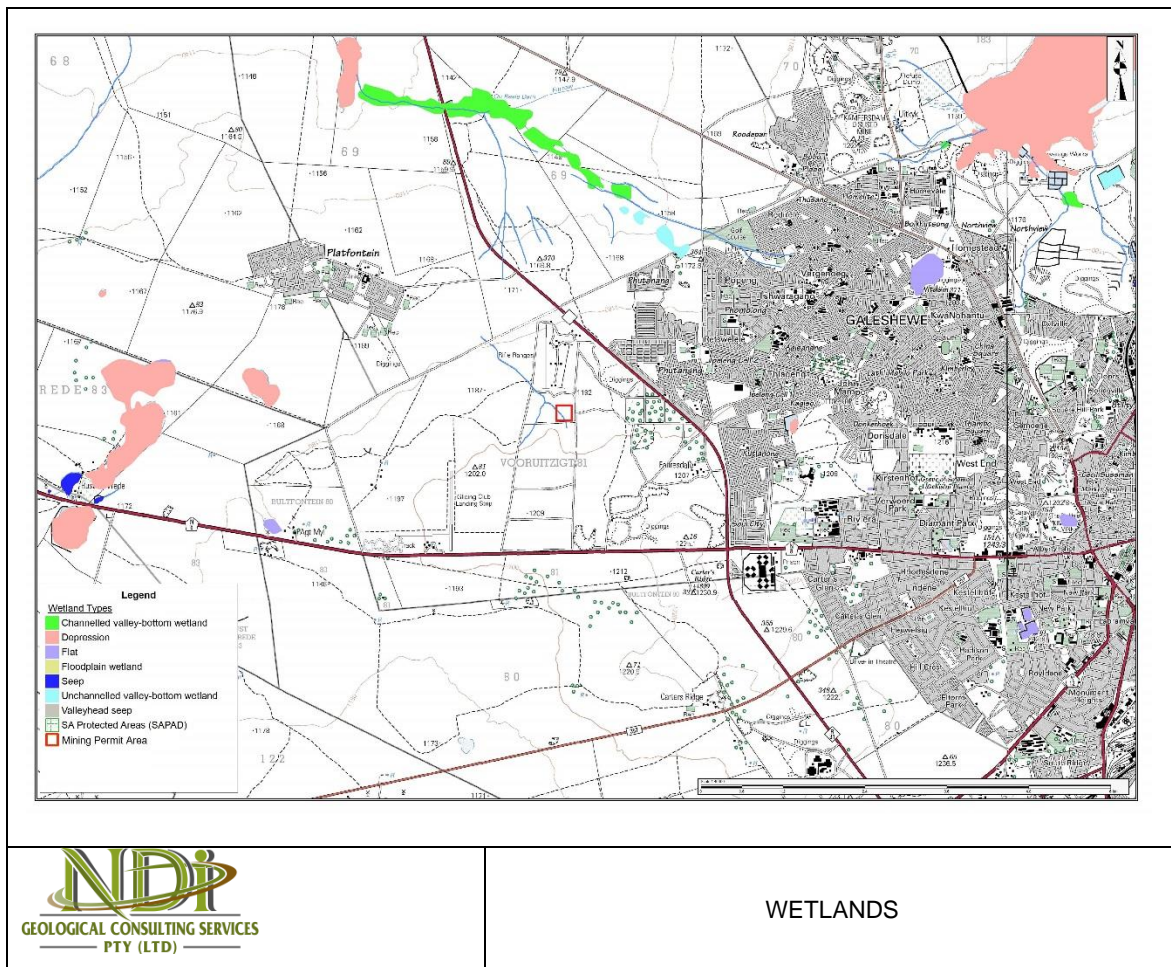


Figure 12-6: Wetland Types

12.1.7 Groundwater

Aquifer Characterisation

The DWS launched the Reconstruction and Development Programme (RDP) in South Africa, which highlighted the importance of groundwater resources in the country as well as the role they will play in satisfying the targets of the RDP. According to the DWS aquifer classification the following applies for the mining area:

- The aquifer is classified as a Minor aquifer region (which is a moderately-yielding aquifer system of variable water quality), except for areas around Koppies where the aquifer is classified as a poor aquifer region which is a low to negligible yielding aquifer system of moderate to poor water quality;
- Aquifer Vulnerability is classified as moderate (vulnerable to some pollutants, but only when continuously discharged or leached); and
- Aquifer Susceptibility is classified as Medium 4 (minor aquifer region, with moderate vulnerability)

The Groundwater Harvest Potential Map of South Africa published by the Department of Water Affairs (Baron et al, 1998) classifies the area around Kimberley has having a harvest potential of 6 000 to 10

000 m³/km²/annum, defined as the maximum volume of groundwater that may annually be abstracted per square kilometre per annum without depleting the aquifers.

Local Geohydrology

The local hydrogeology within the study area is hosted by the Karoo dolerite rock and basement rocks. The surrounding lithological units are classified as intergranular and fractured with the estimated yield of 0.5 – 2 l/s as indicated in Figure 12-7.

Groundwater aquifers within the study area are potentially recharged through regional and local recharge system due to the limited rainfall in the area. Groundwater harvest potential as indicated by Baron et al, (1998) is approximately 6 000 to 10 000 m³/km²/annum, which is the maximum groundwater which can be sustainably abstracted per square kilometre.

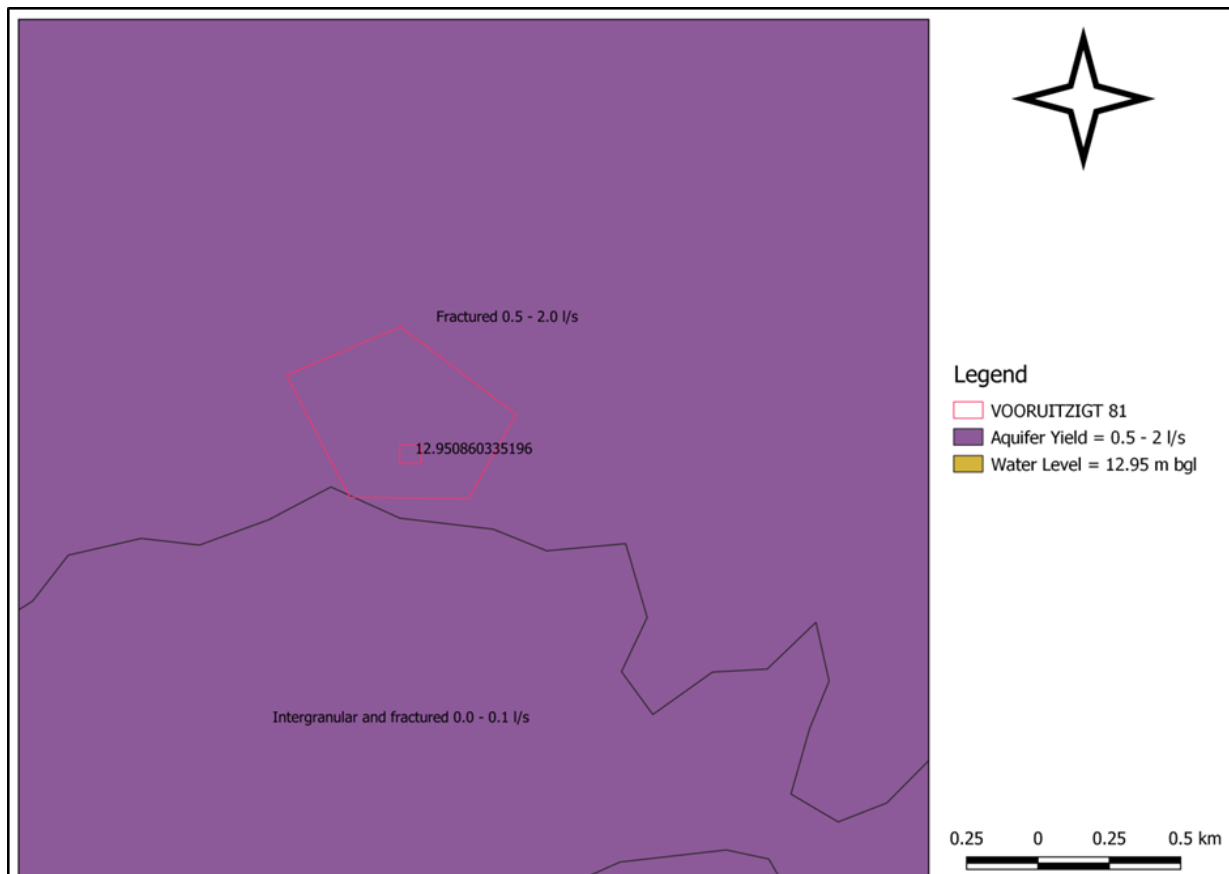


Figure 12-7: Localised groundwater yield

Hydro-census and Land Use

Hydro-census was conducted within a limited distance of 1 km radius of the study area to establish groundwater use information such as the registered and unregistered boreholes, borehole depth to water level, groundwater use, springs etc. The study area comprises of flat topography with no river which flows within the 1 km radius.

No registered boreholes were identified during the desktop study and also on the site visit. However, 2 monitoring boreholes were noted and visited at the site. However, these boreholes were locked and therefore water level could not be measured. The first borehole was within 1 km radius of the mining area on the south eastern part very close to the land fill site as indicated on Figure 12-8.

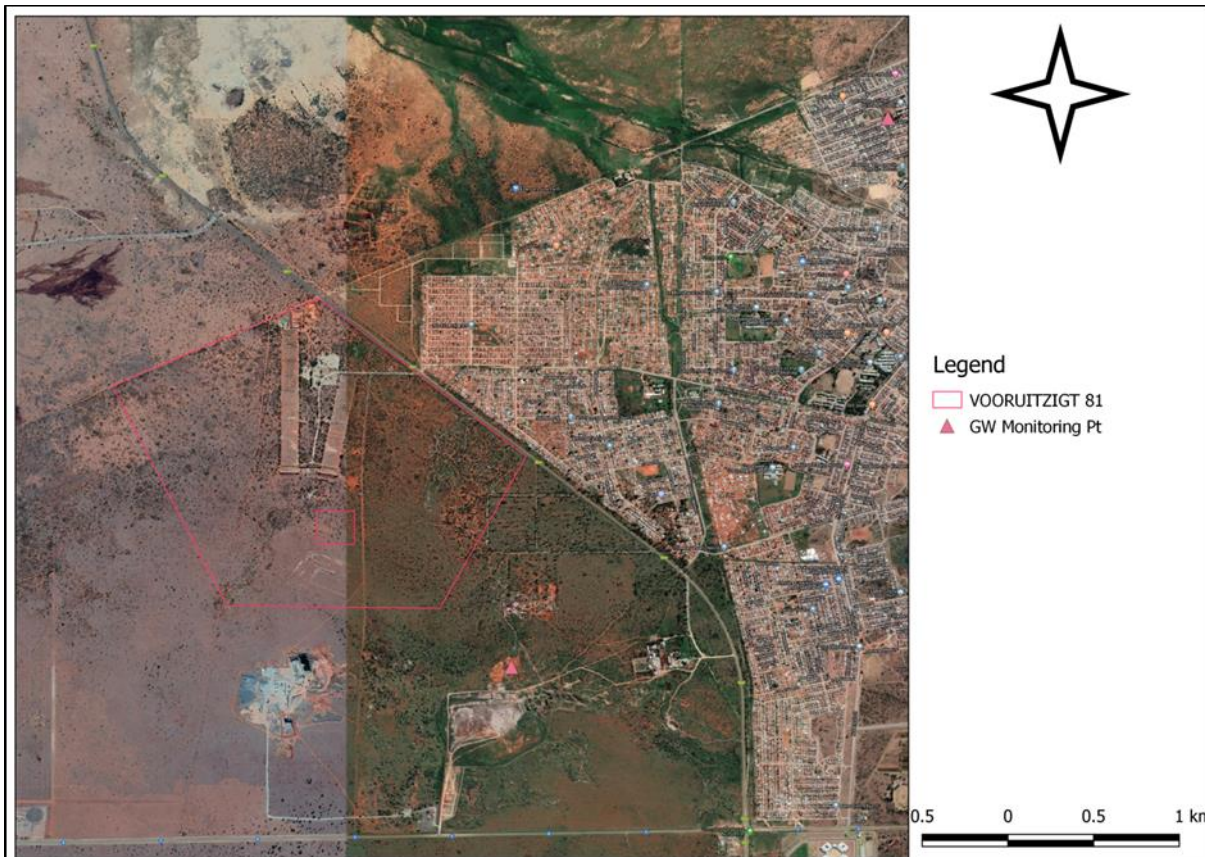


Figure 12-8: Groundwater Monitoring Points

Land use activities around the proposed mining site was aggregate stone-dolerite mining on the southern side, the land fill on the south eastern side and human settlement on the northern side.

Both the mining and the land fill site do have potential to contaminate groundwater which potentially flows towards the proposed mining permit area. It is recommended that another monitoring borehole be constructed on the southern boundary of the proposed mining in order to monitor groundwater quality before the mining permit site.

Groundwater Resource Assessment

The quaternary catchment is within the Vegter Region 30 referred to as North-eastern Pan Belt as indicated in Figure 12-9. Two basic types of aquifer storage are assumed to exist in this region, namely the “Weathered /Jointed” (WZ) and Fractured” Zone (FZ).

In fractured rock (FZ) aquifers the number of water-bearing fractures generally decreases with depth (Vegter, 1995) and this often results in a similar decline in aquifer storativity with depth. While saturated zone (WZ) is normally a relatively thin zone (i.e. 5 to 40m thick) with its upper surface formed by the water table, therefore making this portion of the aquifer semi-unconfined to unconfined. This zone is characterised by a large number of relatively low-yielding water-strikes.

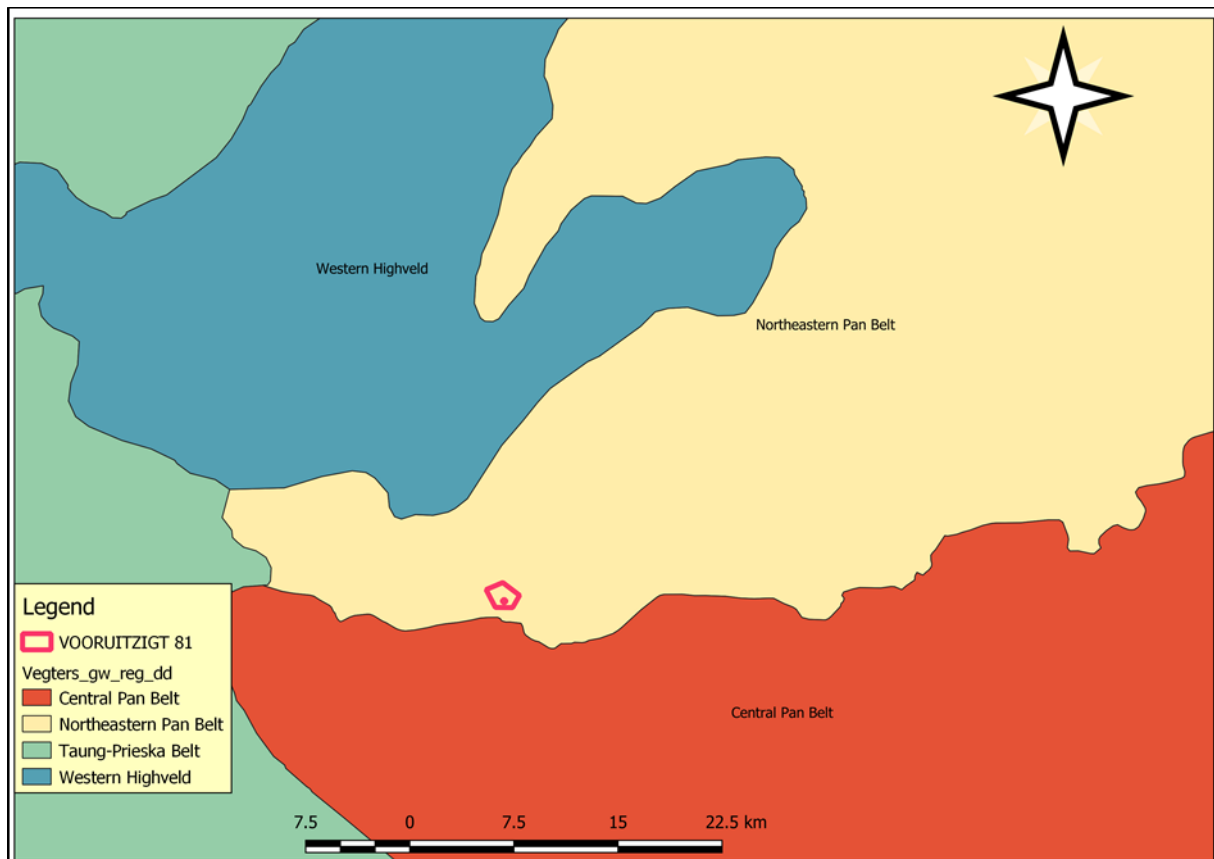


Figure 12-9: Vegter Regions

Table 12-1 indicates the estimated groundwater quantity for quaternary catchment C91E of which the proposed mining project is located. The total volume of water stored in both the weathered and fractured aquifer is also indicated.

Groundwater use within the quaternary catchment is very limited as indicated on the hydro census, this was further validated by the absence of registered groundwater users on the DWS Water Resource Management Services Database. The proposed project will also not use groundwater but surface water will be delivered by bowsers to the project area.

Table 12-1: Groundwater Quantification

Quaternary Catchment	Area km ²	Saturated Thickness (m)			Specific Yield Of WZ	Storage Coefficient Of FZ	Volume of Water Stored in Aquifer X 10 ³ m ³ /km ²		
		Weathered Zone (WZ)	Fractured Zone (FZ)	Aquifer			Weathered Zone	Fractured Zone	Aquifer
C91E	1507	12	149	161	2.08E-03	7.05E-05	33 827	16 630	50 457

Source: Groundwater Resource Assessment: Task 1D

Water Quality Sampling and Monitoring

Water quality sampling was not conducted due to the unavailability of boreholes in the proposed mining area. However, it recommended that some of the mining boreholes around the mining permit area

(NC12569PR) be used to monitoring groundwater quality mainly on the southern, eastern, western and the northern side of the proposed mining permit area.

Pump Testing

The proposed mining area had no existing borehole and therefore pump testing was not conducted. However, it is recommended that some of the exploration boreholes within the prospecting area next door be pump tested in order to determine groundwater aquifer parameters which will add to the knowledge of the site groundwater resource system.

AQUIFER RISK AND VULNERABILITY ASSESSMENT

The risk assessment was carried out in terms of 3 stages: evaluation of aquifer’s strategic value, identification of possible contamination risk and evaluation of aquifer’s vulnerability to identified contamination risk.

Aquifer classification/strategic value

Aquifer classification was conducted in terms of the “**South African Aquifer System Management Classification, December 1995**” manual. The following definitions of aquifer management classification were used. The aquifer has **low** strategic value as it does not provide water supply for households as the area is supplied by the municipality. No irrigation activities take place within 2 km radius of the proposed mining permit project. The aquifer is therefore classified as a **sole/minor** aquifer (Parsons, 1995) due to less dependence.

Aquifer Risk Level Assessment

There are many activities associated with mining such as clearing of vegetation, access roads, borehole drilling, ablution etc. These activities may have impact on the receiving environment and the groundwater system in particular. It is therefore important to assess what level of risk is, so that necessary steps can be taken to prevent and mitigate the risk. Table 12-2 has been adopted from the “Best Practice Guideline A1.1: Small Scale Mining Practices August 2006”.

Table 12-2: Assessing the significance of impacts

	Low impact	Medium impact	High impact	Severe impact
Frequency	Single event, unlikely to be repeated e.g. spillage	Not regular, but does happen more than once	Regular, but intermittent e.g. soakaways; drains	Continuous e.g. leaks; infiltration
Extent	Limited to only in the mining area	Local water resources. Limited to a 5 km radius of mining area.	Catchment area. Limited to a 50 km radius of mining area.	Wider (regional/national) Can spread to other provinces or regions
Duration	<u>Short term</u> - 0-6 month. Events that will not happen more than once in 6 months	<u>Medium term</u> Up to 1 year	<u>Long term</u> - 5 years	<u>Permanent</u> - No mitigation will shorten impact duration
Intensity	<u>Negligible/Very low</u> Minor disturbances to aquatic ecosystems or local water resources; impact temporary	<u>Low</u> Important but easily controlled by routine management actions	<u>Medium</u> Impacts experienced as temporary or continual loss of amenity or deterioration in water quality and can extend over both small and large areas.	<u>High</u> Impacts serious and requires frequent management attention and remedial action. Large scale effects on water resources; aquatic ecosystems and other water users
Probability	<u>Improbable</u> Low probability.	<u>Probable</u> Distinct probability.	<u>Highly probable</u> Most likely.	<u>Definite</u> Will occur regardless of prevention or mitigatory methods.

Table 12-3: Potential Risk Significance and Mitigation

Activity of concern	Risk	Risk Level	Recommended Mitigation
Access and mine road	Compaction of footprint area. Reduction in groundwater levels.	Medium Impact	Implement acceptable protection zones around drainage lines, riparian zones. Implement access control. Plan and regulate vehicle movement. Impellent erosion protection.
Storage of chemical and fuels	Potential spillage of fuels, oils and lubricant contaminating groundwater	Low Impact	Train contractors and own staffon re-spills and disposal, procedure for storage, use and disposal of oils and grease. Activities monitored daily.
Ablution and waste collection	Faecal coliform and leachate from waste contaminating groundwater resource	Medium Impact	Disposable latrines should be used and emptied in the municipal sewage. Containers should be used to store waste and should be emptied and cleaned weakly depending on the rate of waste generation.

Aquifer Vulnerability

The aquifer is characterised as intergranular and fractured with medium to high transmissivity and porosity. The water table is estimated to be around at 30 m below ground. High transmissivity, porosity and depth to water table makes the aquifer’s vulnerability to contamination to be high as indicated in Figure 12-10. This therefore implies that aquifer contamination risk and mitigation measures should be implemented and complied with as the aquifer is already vulnerable due to its natural composition.

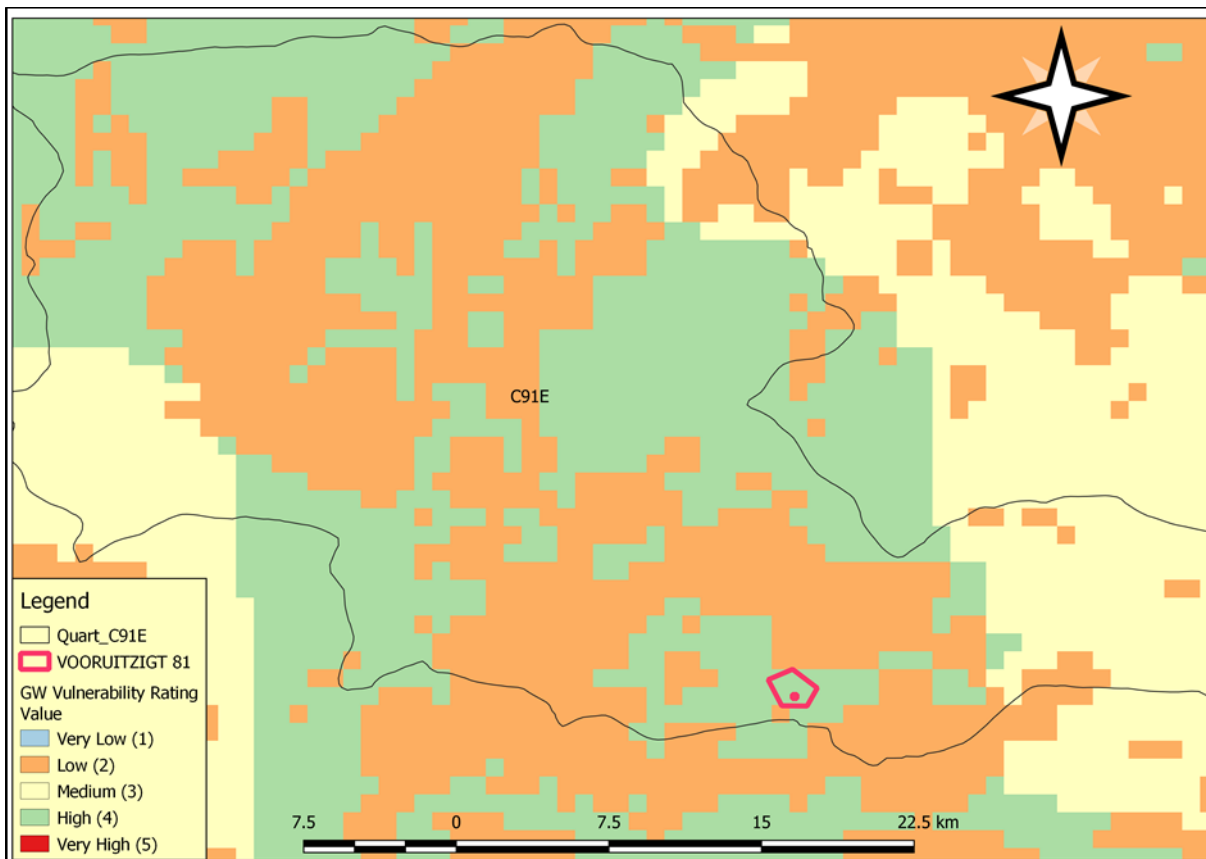


Figure 12-10: Aquifer Vulnerability

12.1.8 Biodiversity

Biomes

The proposed mining area is located in the Savanna Biome (Figure 12-11). The Savanna Biome is the largest Biome in southern Africa, occupying 46% of its area, and over one-third the area of South Africa. It is well developed over the lowveld and Kalahari region of South Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground the vegetation may be referred to as Shrubveld, where it is dense as Woodland, and the intermediate stages are locally known as Bushveld.

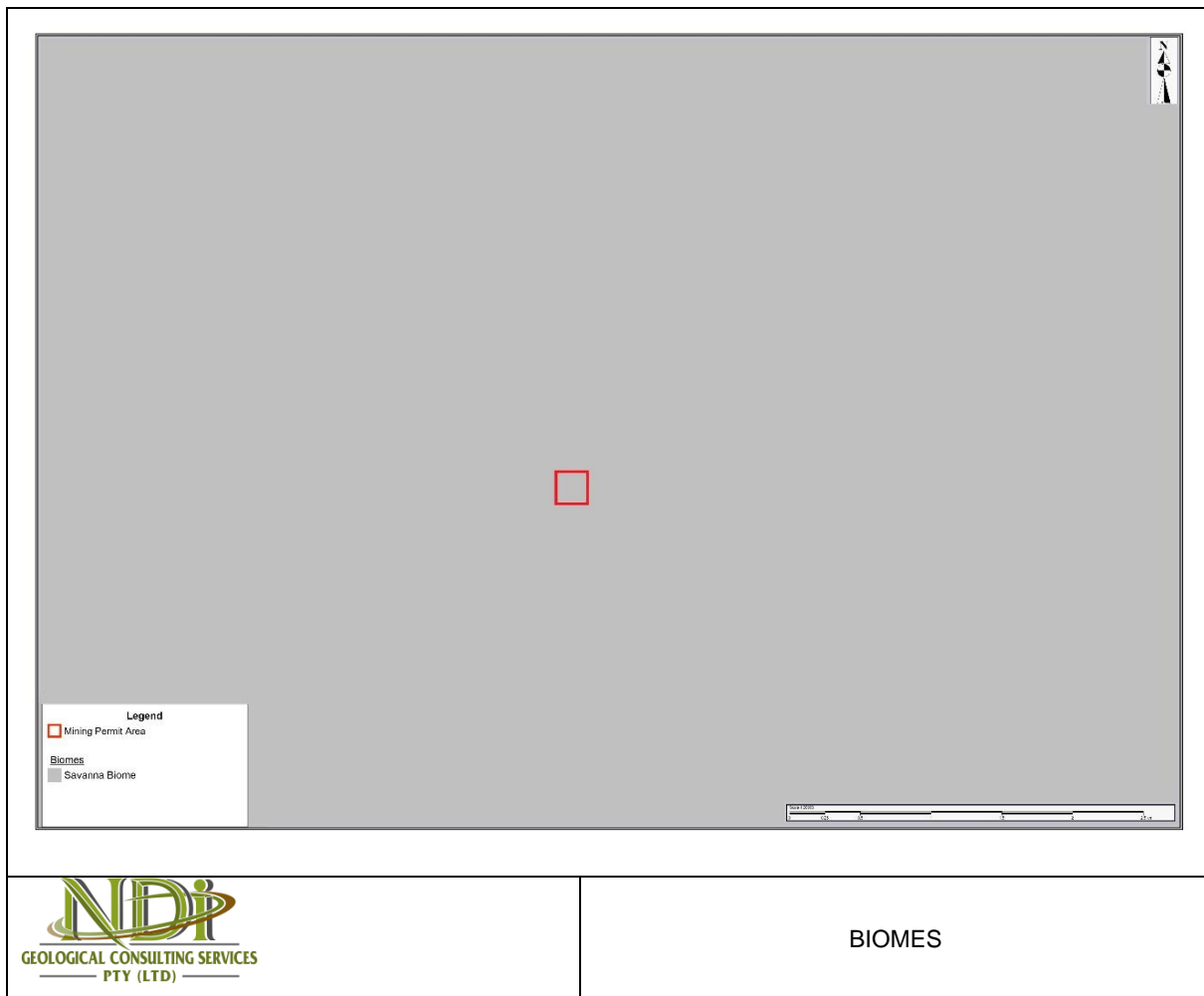


Figure 12-11: Biomes

Most of the savanna vegetation types are used for grazing, mainly by cattle or game. In the southernmost savanna types, goats are the major stock. In some types crops and subtropical fruit are cultivated. These mainly include the Clay Thorn Bushveld, parts of Mixed Bushveld, and Sweet Lowveld Bushveld.

Bioregions

The proposed mining area is located in the Eastern Kalahari Bushveld Bioregion as shown in Figure 12-12. The Eastern Kalahari Bushveld Bioregion is the largest savanna bioregion and is on average at the highest altitude. It is roughly bounded by Mafikeng, Bloemhof, Kimberley, Groblershoop and Van Zylsrus.

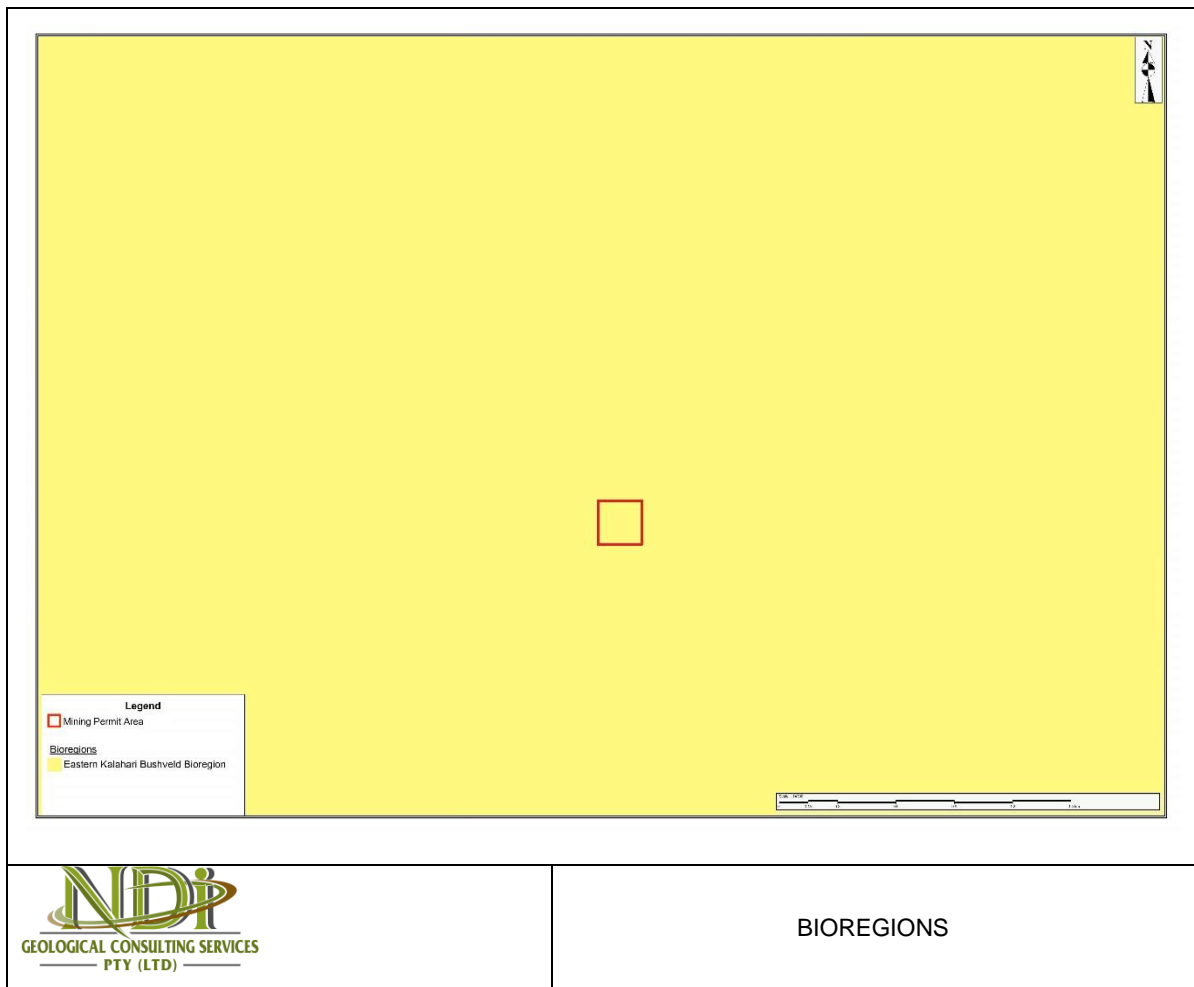


Figure 12-12: Bioregions

Vegetation Types

According to the SANBI remaining vegetation types database, there is no remaining natural vegetation on the affected area.

The proposed site is associated with ecosystems that are considered to be threatened (Figure 12-13). The threatened ecosystem associated with the site is the Kimberley Thornveld. According to SANBI, the ecosystem is classified at Least Threatened (Figure 12-14).

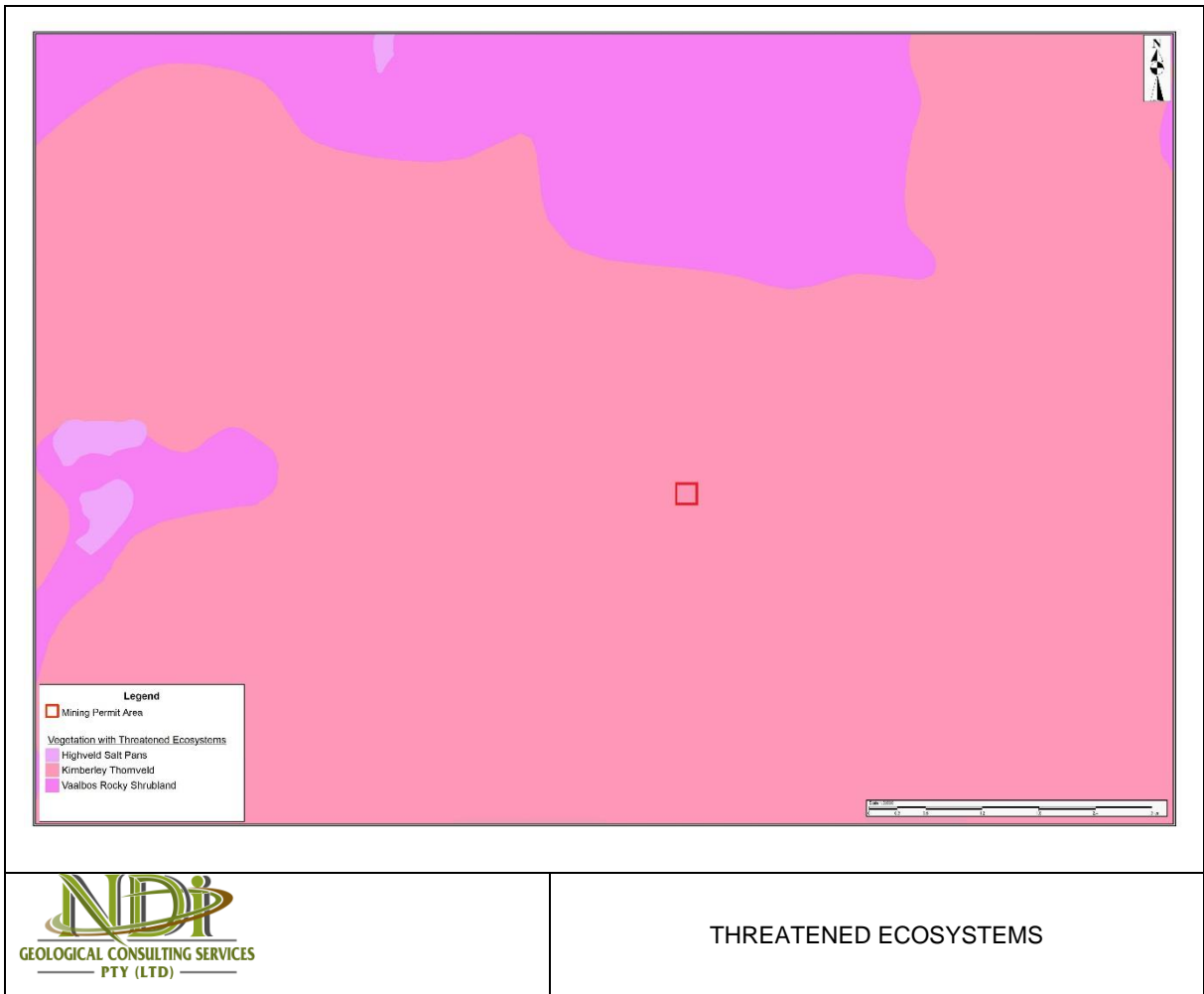


Figure 12-13: Vegetation with Threatened Ecosystems



THREATENED ECOSYSTEMS STATUS

Figure 12-14: Status of Vegetation with Threatened Ecosystems

12.1.9 Conservation Plan

According to the Northern Cape Provincial Biodiversity Conservation Plan (C Plan), a portion of the affected property is classified as an Ecological Support Area (ESA). Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas (CBAs) and/or in delivering ecosystem services.

Figure 12-15 provides a map showing areas of conservation importance that may be affected by the mining activities.



Figure 12-15: Areas of Conservation Importance

12.1.10 Heritage Resources

Heritage resources may be tangible, such as buildings and archaeological artefacts or intangible such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical scientific, social, spiritual, linguistic economic or technological values; their representation of a particular period; their rarity and their sphere of influence. There are a number of heritage and cultural resources in the Northern Cape Province. However, there are no major heritage resources sites that are associated with the affected properties. Although the specialist found no graves on site, it is still possible that there may be graves missed during the survey that may be affected by the proposed mining activities.

A HIA conducted by the specialist found a very low density ‘background scatter’ of cf. Fauresmith artefacts was noted in areas where Hutton Sands are removed, both on the mining site and in an immediately adjacent property (Morris 2012). No colonial era or other cultural resources were in evidence. Archaeological significance of the area is reckoned to be low. There is potential for subsurface material across the entire area, but indications are that densities would be low. Steps for reporting in the event of archaeological material being found are indicated.

Should there be any heritage sites (graves) within the mining area, they will be identified and fenced before any mining activities take place.

12.1.11 Blasting and Vibrations at Vooruitzigt

A desktop assessment of impacts on blasting operations at the Vooruitzigt Quarry was conducted. Various installations were identified within 1500 m from the proposed quarry area (Figure 12-16). Possible impacts at these points of interest associated with the planned operation was identified and considered. Three areas within a range of 0 to 1500 m from the pit boundaries were identified and

indicated at different levels of possible influence. The possible influences and level of influence will be investigated and if required, mitigation measures will be recommended during the impact assessment phase.

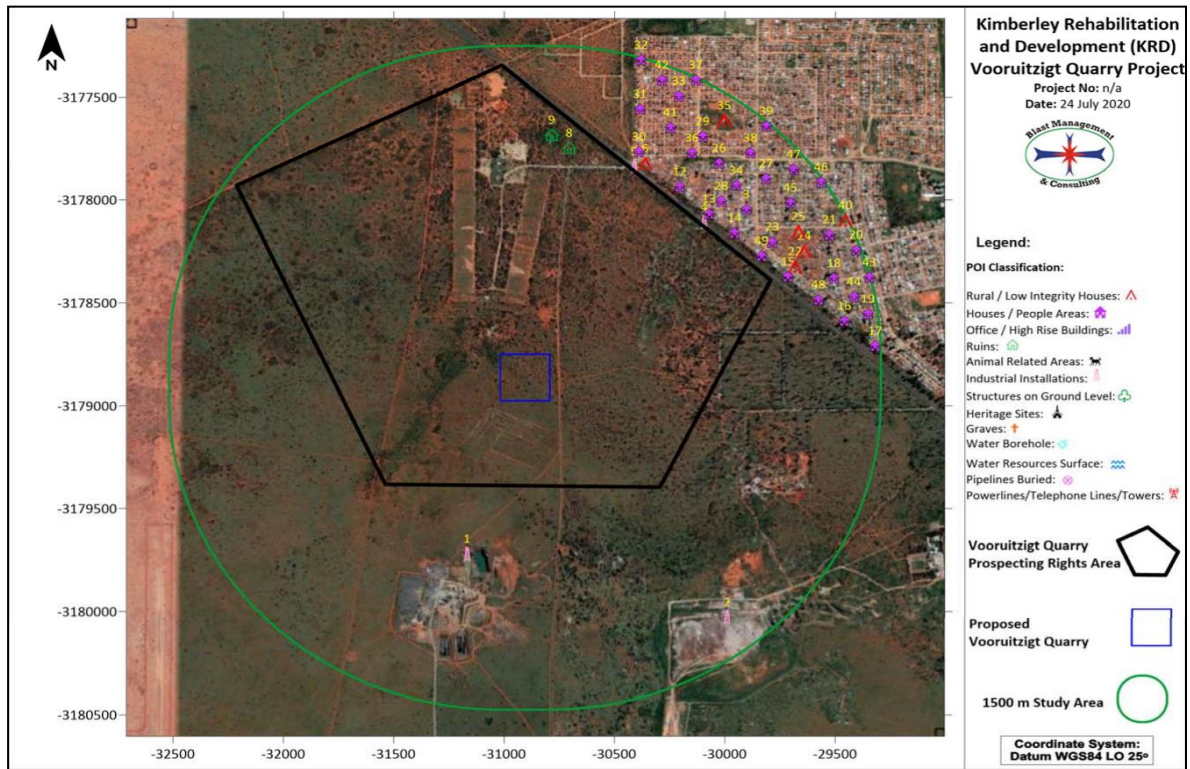


Figure 12-16: Point of Interest Classification

The sensitivity assessment found that most of the infrastructure is located within the low sensitivity zone (Figure 12-17) except for the quarry activity. Review of the area clearly shows that various infrastructure is found around the proposed open pit area in range order of 950 m and further. The infrastructure is considered private property and not mine owned. This will require careful planning regarding drilling and blasting operations. There are various legal requirements that will need to be considered in the process going forward.

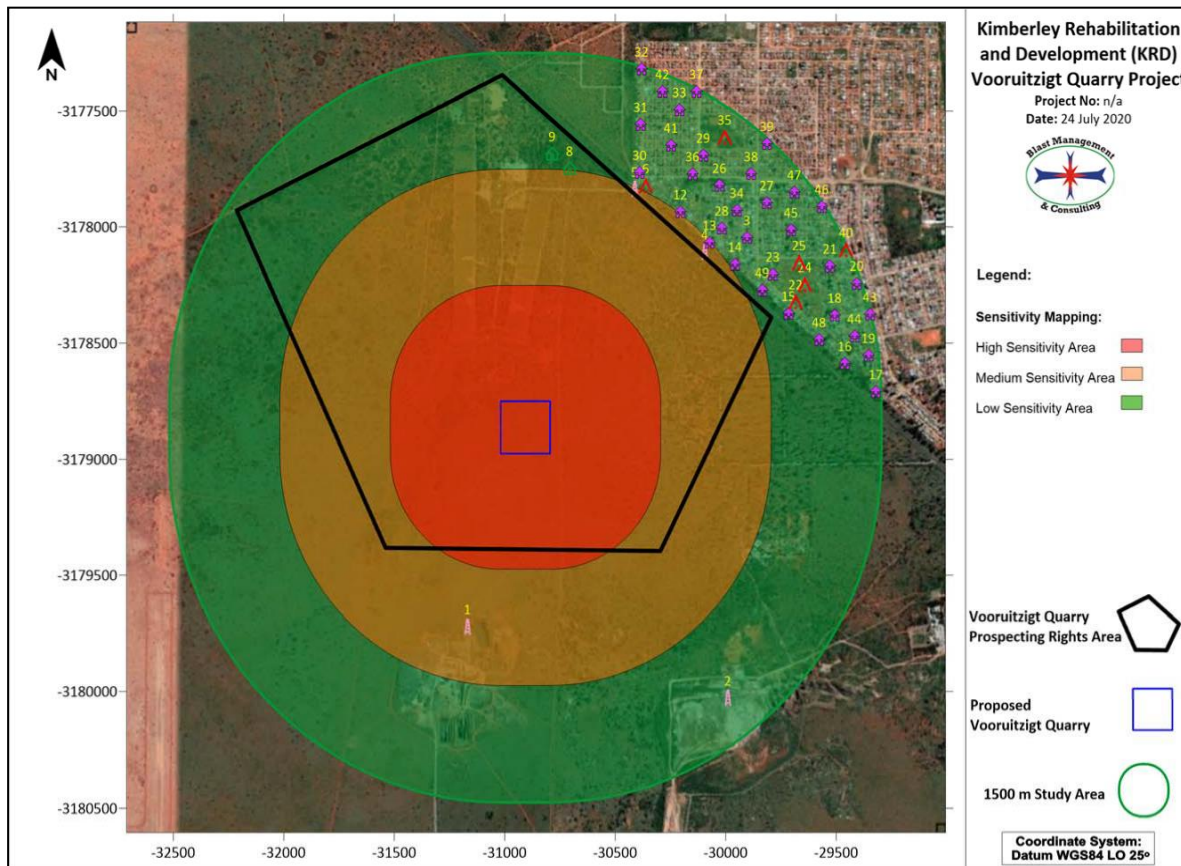


Figure 12-17: Point of Interest Sensitivity Assessment

Review of probable ground vibration and air blast levels and method applied, certain areas may experience limited negative influence. The expectation is that ground vibration levels will be low but perceptible. Air blast is expected to be below the limits at the distances observed. This is specific towards the Galeshewe Township with the Phutanang suburb being closest to the quarry operations.

12.1.12 Socio-Economic

The proposed mining project will be located within the Sol Plaatje Local Municipality which is situated in the Francis Baard District Municipality.

Population: The municipality has experienced negative growth (-0.3%) in the population from 1996 to 2001 and an upswing to 2% from 2001 to 2011. With almost 260 000 people, the Sol Plaatje Local Municipality housed 0.5% of South Africa's total population in 2015. Between 2005 and 2015 the population growth averaged 2.22% per annum which is slightly higher than the growth rate of South Africa as a whole (1.51%). Compared to Frances Baard's average annual growth rate (1.78%), the growth rate in Sol Plaatje's population at 2.22% was slightly higher than that of the district municipality. The population projection of Sol Plaatje Local Municipality shows an estimated average annual growth rate of 1.9% between 2015 and 2020. The average annual growth rate in the population over the projection period for Frances Baard District Municipality, Northern Cape Province and South Africa is 1.7%, 1.5% and 1.4% respectively and is lower than that the average annual growth in Sol Plaatje Local Municipality.

The population pyramid reflects a projected change in the structure of the population from 2015 and 2020. The differences can be explained as follows:

- In 2015, there is a significantly larger share of young working age people between 20 and 34 (27.4%), compared to what is estimated in 2020 (25.4%). This age category of young working age population will decrease over time.

- The fertility rate in 2020 is estimated to be slightly higher compared to that experienced in 2015.
- The share of children between the ages of 0 to 14 years is projected to be slightly smaller (27.4%) in 2020 when compared to 2015 (27.6%).
- In 2015, the female population for the 20 to 34 years age group amounts to 14.3% of the total female population while the male population group for the same age amounts to 13.2% of the total male population. In 2020, the male working age population at 12.1% does not exceed that of the female population working age population at 13.3%, although both are at a lower level compared to 2015.

Level of Education: Of the population over 20 years, 30% have matric and higher education, while 10% indicate no schooling. The remaining 60% have some primary schooling and some secondary schooling. This will pose a serious problem for the future economic trajectory as skills will have to be built to suit the economic path and in the short-term skills will have to be brought in from skilled areas. Within Sol Plaatje Local Municipality, the number of people without any schooling decreased from 2005 to 2015 with an average annual rate of -3.43%, while the number of people within the 'matric only' category, increased from 32 100 to 49 200. The number of people with 'matric and a certificate/diploma' increased with an average annual rate of 3.65%, with the number of people with a 'matric and a Bachelor's' degree increasing with an average annual rate of 7.82%. Overall improvement in the level of education is visible with an increase in the number of people with 'matric' or higher education.

Employment Levels: In 2005, 39.7% of the total population in Sol Plaatje Local Municipality were classified as economically active which decreased to 39.6% in 2015. Compared to the other regions in Frances Baard District Municipality, Sol Plaatje local municipality had the highest Economic Active Population (EAP) as a percentage of the total population within its own region relative to the other regions. On the other hand, Magareng local municipality had the lowest EAP with 28.0% people classified as economically active population in 2015. Of the economically active people in the municipality, 31.9% are unemployed (narrow definition of unemployment). 41.7% of the economically active youth (15 – 34 years) in the area are unemployed. This figure is compelling enough to direct a special focus on youth employment. In 2015 the labour force participation rate for Sol Plaatje was at 60.0% which is very similar when compared to the 59.2% in 2005. The unemployment rate is an efficient indicator that measures the success rate of the labour force relative to employment. In 2005, the unemployment rate for Sol Plaatje was 36.6% and decreased overtime to 36.0% in 2015. The gap between the labour force participation rate and the unemployment rate decreased which indicates a negative outlook for the employment within Sol Plaatje Local Municipality.

Economic Statistics: the tertiary sector employs relatively little unskilled labour compared to the primary and secondary sectors. Therefore, growth in the tertiary sector does not normally have a significant impact on unemployment as the majority of unemployed people are not highly skilled. compared to the national economy of South Africa, Sol Plaatje Local municipality has a comparative advantage on community services and almost the same advantage on the transport industry. A slight advantage is also noted on financial services. However, when it comes to specifically manufacturing, Sol Plaatje has a significant comparative disadvantage relative to the country as a whole. In terms of trade the quotient of Sol Plaatje is relatively similar to that of South Africa. Generally speaking, Sol Plaatje has a very narrow economy.

12.2 Description of the current land uses.

The majority of the affected area is currently being used for agriculture and mining.

12.3 Description of specific environmental features and infrastructure on the site.

Please refer to Section 12.1.

12.4 Environmental and current land use map.

An environmental and current land use map has been attached as Figure 12-18 and is also included in Appendix 6.

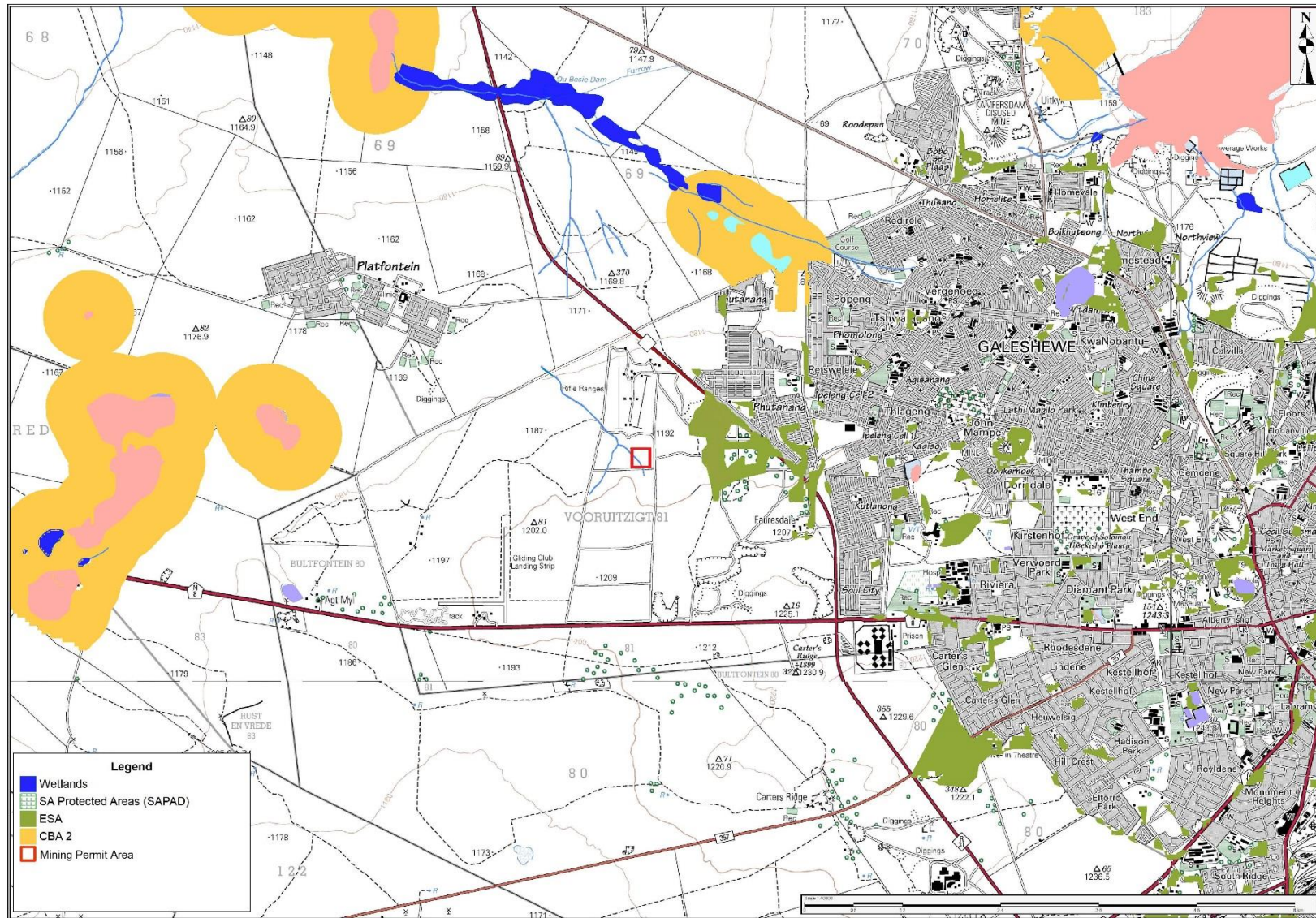


Figure 12-18: Current Environmental Attributes and Landuse Map

13 Impacts and Risks Identified

Table 13-1 provide a high-level assessment of the potential impacts and associated mitigation measures which could result from the proposed mine during construction, operation and decommissioning/closure. These impacts will be further refined and assessed according to the impact assessment methodology in Section 14.

Table 13-1: Summary of Potential Environmental Impacts Associated with the Proposed Development

Element of Environment	Potential Impact Descriptions
Socio-Economic	Possible job opportunities during the construction and operation.
Hydrogeology	Possible groundwater contamination.
Surface water	Possible surface water contamination.
Air Quality	Possible impact on Air Quality in the area.
Climate Change	Possible contribution to climate change through emission of Green House Gases
Blasting and Vibrations	Possible impacts on private properties and fauna due to blasting and vibrations
Noise	Possible generation of noise during construction and operation.
Soils/Land Use/Land Capability	Loss of soil resource and change in land capability and land use.
Biodiversity	Disturbance and loss of biodiversity, especially SCC.
Aquatic ecology	Possible loss, sedimentation and contamination of aquatic resources
Heritage	Highly unlikely, but possible impact on heritage and cultural resources (including graves) in the area.
Traffic	Potential safety issues due to the increased traffic.
Cumulative Impacts	Cumulative Impacts

13.1 Construction

The construction phase of the project will entail the site establishment for the access roads, the camp site as well as surveying and pegging sites. Environmental impacts on the biophysical and socio-economic environment which are anticipated to occur throughout the construction were identified as follows:

13.1.1 Socio-Economic

The main positive impacts of the mining activities will be the temporary creation of jobs during the construction phase of the project. The project may also result in a temporary boost in small local businesses in the area.

The final site layout will take into account all the sensitive environment in the area. Movement of construction vehicles on the roads (R31 and other farm roads) may increase the risks accidents on the roads. Other health and safety risks may be as a result on construction workers lighting fires on site, littering and lack of housekeeping. Potential increase in social pathologies and negative health impacts due to potential squatting of job seekers and increase in nuisance dust may also occur.

13.1.2 Groundwater

The use of earth moving machinery and construction vehicles on site poses the risk of chemical spillages including fuel and oils, which may leach into the groundwater. The removal of vegetation could furthermore lower the evapotranspiration rates, thereby allowing a greater volume of potentially contaminated water to percolate to the underlying aquifer in the event of an accidental spill from the machinery. It must however be noted that the removal of vegetation will be limited to the required footprints for the access roads. The impact on evapotranspiration is therefore expected to be negligible.

Site clearing and grubbing is unlikely to materially affect the groundwater within the project area. However, care should be taken during the utilisation and storage of hydrocarbons and chemicals, which may have an impact on groundwater quality as a result of spillages and uncontrolled release.

13.1.3 Surface water

The potential impacts on surface water during the construction phase of the proposed project are as follows:

- Accidental spillages of hazardous substances from construction vehicles used during construction of the crossings, as well as from hazardous storage areas;
- Contamination of runoff by poor materials/waste handling practices;
- Debris from poor handling of materials and/or waste blocking watercourses;
- Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality;
- Increase in turbidity of the local water streams as a result of runoff of cleared areas; and
- Increase of surface runoff and potentially contaminated water that needs to be controlled in the areas where site clearing occurred.

Some level of sedimentation is expected to occur in the drainage line that traverse the project area as runoff is naturally anticipated to pick up environmental debris as it crosses natural areas. Increased turbidity is reversible and surface water should return to pre-impact turbidity levels once sediment levels entering the watercourse are reduced. Settled sediments should naturally move downstream during periods of high flow flowing storm events.

13.1.4 Aquatic Ecosystems

The removal of vegetation from the construction area is also expected to have an impact on the provision of ecological and sociocultural services by aquatic ecosystems. In addition, construction waste dumping and oil leakages from construction vehicles will alter biodiversity maintenance of the aquatic ecosystems, which endangers the survival of aquatic ecosystem and riparian species inhabiting the area. Impacts on the aquatic ecosystems and will include:

- Loss of habitat and aquatic ecosystem and riparian ecological structure as a result of site clearance activities and uncontrolled aquatic ecosystem and riparian habitat degradation;
- Impact on the aquatic ecosystem and riparian systems as a result of changes to the sociocultural service provisions through site clearance, waste management and riparian disturbance;
- Potential poor planning, resulting in the placement of the access roads across aquatic ecosystem and riparian habitats, leading to altered habitat;
- Impact on the hydrological functioning of the aquatic ecosystem and riparian systems;

- Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of riparian habitat; and
- Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of riparian resources.

13.1.5 Heritage and Archaeological Resources

The following impacts are envisaged on heritage resources as a result of the construction phase of the proposed project. Although the specialist found no graves on site, it is still possible that there may be graves missed during the survey that may be affected by the proposed mining activities.

The siting of the pit/excavation and infrastructure will be in such a way as to avoid sensitive environments as far as is practicable.

13.1.6 Palaeontology Impacts

Earth moving activities may result in the destruction of fossils (if any).

13.1.7 Flora

The project may result in the following impacts on the floral environment during the construction phase:

- Destruction of potential floral habitats for species of conservational concern as a result of site clearing, alien species, waste management and soil compaction;
- Vegetation clearance may lead to floral habitat loss of potential species of conservational concern;
- Impact on floral diversity as a result of site clearance, anthropogenic activity, and possible uncontrolled fires;
- Potential spreading of alien invasive species as a result of floral disturbance;
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase;
- Generation of waste and incorrect disposal from construction material leading to disturbance of natural vegetation; and
- Habitat fragmentation as a result of construction activities of the access roads leading to loss of floral diversity.

13.1.8 Fauna

The project may result in the following impacts on the faunal environment during the construction phase:

- Loss of faunal habitat and ecological structure as a result of site clearing, alien invasive species, erosion, and general construction activities;
- Loss of faunal species due to collisions with construction vehicles and machinery;
- Loss of faunal diversity and ecological integrity as a result of construction activities, erosion, poaching and faunal specie trapping;
- Impact on faunal species of conservational concern due to habitat loss and collision with construction vehicles;
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts on faunal habitat during the operation phase.

The loss of biodiversity is expected to be insignificant as it will be limited to the footprints of the required infrastructure. However, mitigation and management of species of conservational concern, if any, needs to be adhered to. The infrastructure that will have the significant impact on biodiversity is expected to be the access roads.

13.1.9 Air Quality

The movement of construction vehicles and earth moving machinery as well as the stripping of vegetation will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery. It is expected that the implementation of dust suppressing mitigation measures will result in the reduction in nuisance dust.

13.1.10 Visual

The following impacts on the visual character as a result of the proposed project are envisaged during the construction phase:

- Scaring of the landscape as a result of the clearance of vegetation;
- Visual intrusion as a result of the movement of machinery and the erection of contractor camps; and
- Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.

13.1.11 Ambient Noise

The use of vehicles and machinery may result in an increase in ambient noise in the immediate vicinity of the project.

13.1.12 Soil Landuse and Land Capability

During the construction phase, all infrastructure and activities required for the operational phase will be established. The main envisaged activities include the following:

- Movement of construction vehicles, machinery and workers in unprotected areas (bare) may result in compacting of the soil of the existing roads. Fuel and oil spills from vehicles may result in soil chemical pollution;
- Clearing of vegetation will result in the soils being particularly more vulnerable to soil erosion. The impact can persist long after cessation of mining activities depending on mitigation and rehabilitation strategies. Strategic stormwater management should be put in place to minimise soil losses.
- Soil contamination as a result of construction activities can be as a result of a number of activities (i.e. incorrect hazardous substance storage, incidental hydrocarbon leakages from construction vehicles);
- Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint. Although soils will be stripped and stockpiled, loss of seed reserve and organic matter depletion through decomposition during stockpiling will severely reduce soil quality and its ecological function if not managed appropriately. Re-vegetation should be imposed as far as is possible to maintain soil fertility through natural nutrient cycling during soil storage prior to rehabilitation phase;

- Other activities in this phase that will impact on soil are the handling and storage of building materials and different kinds of waste. This will have the potential to result in soil pollution when not managed properly; and
- In areas of permanent changes such as the borehole and sump area, access roads (tracks), the erection of infrastructure and stockpiles, the current land capability and land use will be lost permanently. This will however be localised to the footprint of the infrastructure.

13.1.13 Traffic

The movement of construction vehicles in the project area will result in an increase in traffic on the roads.

13.1.14 Climate Change

The movement of vehicles and earth moving machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.

The above-mentioned impacts were assessed based on the quantitative impact assessment methodology described in Section 14 of this Report. For each impact assessed, mitigation measures have been proposed to reduce or avoid negative impacts and enhance positive impacts. These mitigations were also incorporated in the EMPr to ensure that they are implemented during the various phases of the proposed project.

The summary of the impact assessment during the construction phase is provided in Table 13-2.

Table 13-2: Impact Assessment Table for the Construction Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation								
		Consequence			Probability		Frequency: Impact	Significance		Significance Rating	Consequence			Probability		Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Severity	Spatial			
Site Establishment: Establishment of the access (tracks) to the mining site, Establishment of Excavation/pit, site physical surveying and pegging of Excavation																		
Social	Influx of job seekers will have a negative social impact on the landowners and land occupiers.	2	2	3	2	2	28	Medium Low	Random and regular alcohol and drug testing shall be conducted on all personnel responsible for operating machinery and driving construction vehicles to ensure the safety of the public; Security and safety should be emphasised; Recruitment will not be undertaken on site; Recruitment practises will favour locals, but farm labourers will not be employed unless agreed to with the farm owners; Liaise with the SAPD and existing forums in order to implement effective crime prevention strategies; and No construction workers shall be allowed to access private properties without the owner's knowledge and consent.	1	1	1	1	2	9	Low		
	Unauthorised access to private property outside of the demarcated areas will result in conflict with landowners.	2	2	3	2	2	28	Medium Low		1	1	1	1	2	9	Low		
	Increased traffic in the area will increase the likelihood of accidents on the roads, posing a health and safety issue for the landowners and land occupiers.	2	2	3	2	2	28	Medium Low		1	1	1	1	2	9	Low		
	The influx of job seekers in the area may result in an increase in petty crimes.	2	2	3	2	2	28	Medium Low		1	1	1	1	2	9	Low		
	Ineffective communication channels leading to community unrest.	2	2	3	2	2	28	Medium Low		1	1	1	1	2	9	Low		
	Negative impact as a result of the dissection of land by clearing and excavations for construction of infrastructure, constraints to access to cultivated land to farmers, impacting on day to day farm activity.	3	1	3	2	2	28	Medium Low		1	1	1	1	2	9	Low		
	Possible boost in short term local small business opportunities.	3	1	3	2	2	28	Medium Low positive		3	1	3	2	2	28	Medium Low positive		
Groundwater	Localised spillages of oils from machinery leaching to groundwater contamination.	3	2	2	2	2	28	Medium Low	No washing of vehicles shall be allowed outside demarcated areas. The bays will be clearly demarcated and will not be allowed to contaminate any surface runoff; Sufficient areas shall be provided for the maintenance and washing of vehicles; Refuelling of vehicles will only be allowed in designated areas; All construction equipment shall be parked in a demarcated area Drip trays shall be used when equipment is not used for some time; On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the material; Bund areas shall contain 110% of the stored volume; Bund areas must be impermeable; Bund areas must have a facility such as a valve/sump to drain or remove clean stormwater; Contaminated water shall be pumped into a container for removal by an approved service provider; Regular inspections shall be carried out to ensure the integrity of the bundwalls; All preventative servicing of earth moving equipment and construction vehicles shall be undertaken off site; Runoff from this area shall be contained;	2	1	1	2	2	16	Low		
	Existing boreholes within the mining area may create conduits of flow to the groundwater unless sealed.	3	2	2	2	2	28	Medium Low		2	1	1	2	2	16	Low		

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation								
		Consequence			Probability		Frequency: Impact	Significance		Significance Rating	Consequence			Probability		Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Severity	Spatial			
									Management and Mitigation Measures									
									Spill kits shall be made available and all personnel shall be trained on how to use the kits and training records shall be made available on request.									
Surface Water	Increase in silt load in runoff due to site clearing, grubbing and the removal of topsoil from the footprint area associated with the Excavation/pit site and associated infrastructure.	2	3	2	2	2	28	Medium Low	Ensure that topsoil is properly stored, away from the streams and drainage areas; No construction activities will be undertaken within 32 metres of the nearby streams and 500 meters from riparian areas without consent from the DWS; Vehicle and personnel movement within watercourses and riparian areas shall be strictly prohibited; Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses from dirty water.	1	1	1	2	2	12	Low		
	Potential deterioration in water quality due to the potential accidental spillages of hazardous substances.	2	3	2	2	2	28	Medium Low		1	1	1	2	2	12	Low		
	Debris from poor handling of materials and/or waste blocking watercourses, resulting in flow impediment and pollution.	2	2	2	2	2	24	Low		1	1	1	2	2	12	Low		
	Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality.	2	3	2	2	2	28	Medium Low		1	1	1	2	2	12	Low		
	Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing occurred.	3	2	2	2	2	28	Medium Low		1	1	1	2	2	12	Low		
Aquatic Ecosystems	Localised changes to the riparian areas as a result of vegetation clearing.	2	2	2	2	3	30	Medium Low	Adequate stormwater management must be incorporated into the design of the project in order to prevent erosion and the associated sedimentation of the aquatic system; No construction activities shall be allowed within 500 m of riparian zones without consent from the DWS; No vehicles may be allowed to indiscriminately drive through the riparian areas or within the active stream channels; All disturbed areas shall be re-vegetated with indigenous species; All construction materials shall be kept out of the riparian areas; and All vehicles shall be regularly inspected for leaks. Re-fuelling must take place outside the project area, on a sealed surface area to prevent ingress of hydrocarbons into topsoil and aquatic ecosystems	1	1	1	1	1	6	Low		
	Loss of habitat and aquatic ecological structure as a result of site clearance activities and uncontrolled aquatic ecosystem degradation.	3	2	2	2	2	28	Medium Low		1	1	1	1	1	6	Low		
	Impact on the aquatic ecological systems as a result of changes to the sociocultural service provisions.	3	2	2	2	2	28	Medium Low		1	1	1	1	1	6	Low		
	Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of riparian resources.	3	2	2	2	2	28	Medium Low		1	1	1	1	1	6	Low		
	Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of riparian habitat.	3	2	2	2	2	28	Medium Low		1	1	1	1	1	6	Low		
	Impact on the hydrological functioning of the aquatic ecosystems.	3	2	2	2	2	28	Medium Low		1	1	1	1	1	6	Low		
Heritage Resources	The proposed project has the potential to impact on local graves within the area if any.	2	1	2	2	2	20	Low	In the event that sites or features (e.g. high density of artefacts, a burial, or ostrich eggshell cache) being found during the mining project, SAHRA should be informed immediately to determine steps (e.g. have an archaeologist assess the find/s and recommend mitigation, if necessary); No construction activities may be undertaken within 50 m of the heritage and/or cultural sites; If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.	1	1	1	1	1	6	Low		
	The proposed project has the potential to impact on sites of archaeological importance.	2	1	2	2	2	20	Low		1	1	1	1	1	6	Low		

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation								
		Consequence			Probability		Frequency: Impact	Significance		Significance Rating	Consequence			Probability		Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance			
Palaeontological Resources	Drilling of blasting boreholes and pit activities has potential to impact on palaeontological resources	2	1	2	2	1	20	Low	Should fossils be exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.	1	1	1	1	1	6	Low		
Flora	Loss of localised biodiversity habitats within sensitive areas due to site clearance and establishment of Excavation/pit site.	2	1	2	2	2	20	Low	The Contractor shall be on the lookout for SCC and any floral SCC encountered within the development footprint are to be relocated to areas with suitable habitat, outside the disturbance footprint;	1	1	1	1	2	9	Low		
	Loss of localised floral species diversity including RDL and medicinal protected species due to site clearance and establishment of Excavation/pit site.	2	1	2	2	2	20	Low	Floral species of conservation concern, if encountered within the development footprint, are to be handled with care and the relocation of sensitive plant species to suitable similar habitat is to be overseen by a botanist;	1	1	1	1	2	9	Low		
	Potential spreading of alien invasive species as indigenous vegetation is removed, and pioneer alien species are provided with a chance to flourish.	2	1	2	2	2	20	Low	The proposed development footprint shall be kept to the minimum; All disturbed areas must be concurrently rehabilitated during construction; Prohibit the collection of any plant material for firewood or medicinal purposes; The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the construction areas; Edge effect control shall be implemented to avoid further habitat degradation outside of the proposed footprint area; All sensitive open space areas will be demarcated and access into these areas shall be prohibited; Protected floral species occurring within the vicinity of the study area, but outside the disturbance footprint shall be fenced for the duration of the construction activities; Monitoring of relocation success will be conducted during the operational phase; Construction related activities shall be kept strictly within the development footprint; Construction vehicles shall only be allowed on designated roadways to limit the ecological footprint of the project. Alien Invasive Plant Species Management plan to be implemented; Edge effects of activities including erosion and alien/ weed control will be strictly managed in the riparian area; All sites disturbed by construction activities shall be monitored for colonisation by exotic or invasive plants; Exotic or invasive plants shall be controlled as they emerge; An alien vegetation control program must be developed and implemented within all disturbed areas. After removal of alien vegetation, the affected areas must be re-assessed to determine the success of the program and any follow up measures that may be required; The eradicated plant material must be disposed of at an approved solid waste disposal site; During post-construction, an alien vegetation removal and monitoring plan must be compiled for those areas which were not effectively rehabilitated;	1	1	1	1	2	9	Low		

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		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance			
									Management and Mitigation Measures									
									The extent of invasion must be established through investigation to identify priority areas; Priority species shall be identified to control and develop protocols for the removal of all alien species e.g. mechanical removal, herbicidal treatment etc. Mechanical methods must be favoured for the removal of alien invasive species. Chemical removal shall only be undertaken by a suitably qualified and approved person; and As much vegetation growth as possible must be promoted in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro seeding, rehabilitation planting (where applicable) are to be implemented.									
Fauna	Vegetation clearance may result in loss of faunal habitat ecological structure, species diversity and loss of species of conservation concern.	2	1	2	2	2	20	Low	The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas; No trapping or hunting of fauna shall be permitted; Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed; Should any SCC be encountered within the study area, these species will be relocated to similar habitat within or in the vicinity of the study area with the assistance of a suitably qualified specialist; No informal fires in the vicinity of construction areas shall be permitted; An alien vegetation control plan must be developed and implemented in order to manage alien plant species occurring within the study area, and to prevent further faunal habitat loss.	1	1	1	1	2	9	Low		
	Habitat fragmentation as a result of construction activities of the access roads leading to loss of floral diversity.	2	1	2	2	2	20	Low		1	1	1	1	2	9	Low		
	Loss of faunal diversity and ecological integrity as a result of construction activities, erosion, poaching and faunal specie trapping.	2	2	2	2	2	24	Low		1	1	1	1	2	9	Low		
	Movement of construction vehicles and machinery may result in collision with fauna, resulting in loss of fauna.	2	2	2	2	2	24	Low		1	1	1	1	1	6	Low		
Air Quality	Possible increase in dust generation, PM ₁₀ and PM _{2.5} as a result of bulk earthworks, operation of heavy machinery, and material movement.	2	2	2	2	2	24	Low	Dust suppression measures shall be implemented on dry weather days and periods of high wind velocities; Appropriate dust suppression measures may include spraying with water; Where practical rehabilitation should be undertaken in tandem with the construction activities; A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved road; All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution; Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; Where practical rehabilitation should be undertaken progressively; Materials transported on public roads must be covered; Odours:	1	2	1	1	2	12	Low		
	Increase in carbon emissions and ambient air pollutants (NO ₂ and SO ₂) as a result of movement of vehicles and operation of machinery/equipment.	2	2	2	2	2	24	Low		1	2	1	1	2	12	Low		

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		Consequence			Probability		Frequency: Impact	Significance		Significance Rating	Consequence			Probability		Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance			
									Management and Mitigation Measures									
									Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; and Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.									
Visual	Scaring of the landscape as a result of the clearance of vegetation.	2	1	2	2	2	20	Low	The number of construction vehicles and machinery to be used shall be kept to a minimum; Movement of vehicles shall be kept to outside busy hours to minimise the visual impacts on the residents; Materials transported on public roads must be covered; and Where possible, rehabilitation of the work areas shall be undertaken in tandem with construction to ensure that areas stripped of vegetation are kept to a minimum.	1	1	1	1	2	9	Low		
	Visual intrusion as a result of the movement of machinery and the establishment of the required infrastructure.	2	1	2	2	2	20	Low		1	1	1	1	2	9	Low		
	Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.	2	1	2	2	2	20	Low		1	1	1	1	2	9	Low		
Noise	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity.	2	2	2	2	2	24	Low	Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e.gw. noise) in advance; Surrounding communities must be notified in advance of noisy construction activities; All equipment should be provided with standard mufflers; Muffling units on vehicles and equipment must be kept in good working order. Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment; Where possible, operation of several equipment and machinery simultaneously must be avoided; All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping fan-belts, worn bearings and other sources of noise; Equipment must be operated within specifications and capacity (e.g. no overloading of machines); Regular maintenance of equipment must be undertaken, particularly with regard to lubrication; Equipment shall be switched off when not in operation; Appropriate directional and intensity settings must be maintained on all hooters and sirens; The Contractor must ensure that the employees conduct themselves in an appropriate manner while on site; and Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 18H00 and Saturday 07H00 -14H00).	1	1	1	2	1	9	Low		
	Localised chemical pollution of soils as a result of vehicle hydrocarbon spillages and compaction.	2	1	2	2	2	20	Low	Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEMWA, or can	1	1	1	2	1	9	Low		

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		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Severity	Spatial			
Soil, Land use and Land Capability	Localised clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	2	1	2	2	2	20	Low	be removed by a service provider that is qualified to clean the soil; The time in which soils are exposed during construction activities should remain as short as possible; Erosion control measures shall be implemented where deemed necessary; In general, all steep slopes steeper than 1:3 or where the soils are more prone to erosion must be stabilised; If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion; Runoff from stockpiles shall be detained in order to support growth of vegetation; Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.	1	1	1	1	2	9	Low		
	Localised loss of resource and its utilisation potential due to compaction over unprotected ground/soil.	2	1	2	2	2	20	Low		1	1	1	1	2	9	Low		
	Localised loss of soil and land capability due to reduction in nutrient status - de-nitrification and leaching due to stripping and stockpiling footprint areas.	2	1	2	2	2	20	Low		1	1	1	1	2	9	Low		
Traffic	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion along the R31 as well as the farm roads around the mining area.	2	3	2	2	2	28	Medium Low	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; The number of construction vehicles and trips shall be kept to a minimum; and Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	2	2	2	1	2	18	Low		
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low	All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	2	1	1	1	8	Low		
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices.	2	3	2	2	2	28	Medium Low	Separation of waste: All waste shall be separated into general waste and hazardous waste; Hazardous waste shall not be mixed with general waste and in doing so increase the quantities of hazardous waste to be managed; General waste can further be separated into waste that can be recycled and or reused;	2	2	2	1	2	18	Low		

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation						Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation					
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		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance		Significance Rating	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact
								<p>No littering shall be allowed in and around the site, a sufficient number of bins shall be provided for the disposal of waste;</p> <p>Where necessary dedicate a storage area on site for collection of construction waste.</p> <p>Storage of waste:</p> <p>No stockpiling of debris shall be permitted within 32 m of any water courses and drainage lines, or within 500 m of riparian areas;</p> <p>General waste will be collected in an adequate number of litter bins located throughout the construction site;</p> <p>Bins must have lids in order to keep rainwater out;</p> <p>Bins shall be emptied regularly to prevent them from overflowing;</p> <p>All work areas shall be kept clean and tidy at all times;</p> <p>All waste management facilities will be maintained in good working order;</p> <p>Waste shall be stored in demarcated areas according to type of waste;</p> <p>Runoff from any area demarcated for waste will be contained, treated and reused;</p> <p>Flammable substances must be kept away from sources of ignition and from oxidizing agents;</p> <p>No construction rubble shall be disposed of to the riparian area;</p> <p>If construction rubble is not removed immediately it shall be stockpiled outside the 1:100-year floodline and outside the sensitive riparian areas;</p> <p>Demolition waste and surplus concrete shall be disposed of responsibly;</p> <p>Waste shall not be buried or burned on site; and</p> <p>The maximum retention time for temporary storage of waste generated shall not exceed 30 days, provided the waste does not present a health hazard or risk of odour.</p> <p>Disposal of hazardous waste:</p> <p>No dumping shall be allowed in or near the construction site;</p> <p>Hazardous containers shall be disposed of at an appropriate licensed site;</p> <p>Hazardous waste will be removed and managed by an approved service provider;</p> <p>A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste; and</p> <p>The safe disposal certificate shall be stored and provided on request.</p> <p>Disposal of general waste:</p> <p>No dumping shall take place in or near the construction site;</p> <p>All general waste shall be disposed of to the nearest licensed landfill site;</p>						

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation						Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation							
		Consequence			Probability				Consequence			Probability				
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance		Significance Rating	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
								Demolition waste and builder's rubble shall be disposed of to an appropriate licensed landfill site; and The necessary permissions must be obtained to dispose of builders' rubble to the landfill site.								

13.2 Operational Phase

The operation phase of the project will include excavation/pit, blasting and crushing of the G5 material.

13.2.1 Social-Economic

It is expected that during the operation phase the project will not result in the creation of employment as mining requires highly specialised personnel. The applicant will make use of qualified contractors for the drilling and sampling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. The socio-impacts expected during the operation phase include:

- Impact on the day to day operation by landowners in the area, which may have an impact on their livelihoods;
- Negative impacts on health and safety of the local communities as a result of additional vehicles on the roads;
- Negative impact on, local community health and safety due to influx of employees, the presence of job seekers, which may lead to prostitution and conflict with the local communities. Illegal informal settlement of job seekers in the area may exacerbate the situation; and
- Potential damage to adjacent landowners'/occupiers' infrastructure as a result of blasting drill holes and Excavation/pit activities.

13.2.2 Groundwater

The use of vehicles during the drilling of blasting holes and Excavation/pit activities may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater.

The mining operations will require the drilling of blasting holes and Excavation/pit activities, which may result in the drawdown, which may affect the yield to the surrounding groundwater users.

Material used for backfilling the pit may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.

13.2.3 Surface water

Drilling for blasting may result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The runoff containing sediments will have negative impacts on the water quality due to increase turbidity and sedimentation of water courses. This will also have an impact on aquatic habitats.

13.2.4 Aquatic Ecology

In addition to the impacts on aquatic habitats as explained above, the operation phase of the project is expected to have the following impacts on aquatic ecosystems:

- Loss of habitat and aquatic ecological structure as a result of continual disturbance and uncontrolled degradation;
- Impact on the aquatic ecological systems as a result of changes to the sociocultural service provisions through continued uncontrolled vegetation clearance, waste management and disturbance; and

- Impact on the hydrological functioning of the aquatic ecological and riparian systems as a result of reduced aquatic ecosystem and riparian footprints and uncontrolled disturbance.

13.2.5 Flora

The project may result in the following impacts on the floral environment during the operation phase:

- Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion and sedimentation;
- Impact on floral diversity as a result of possible uncontrolled fires;
- Potential spreading of alien invasive species as a result of floral disturbance; and
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.

13.2.6 Fauna

The project may result in the following impacts on the faunal environment during the operation phase:

- Migration of fauna from the mining area due to noise as a result of blasting drill holes and Excavation/pit activities;
- Loss of faunal species due to collisions with vehicles and machinery;
- Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping;
- Failure to initiate a rehabilitation plan and alien control plan during the operation phase may lead to further impacts during the operation phase.

13.2.7 Soils, Land Use and Land Capability

The use of vehicles during the drilling of blasting holes and Excavation/pit activities may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.

13.2.8 Air Quality

The movement of vehicles and drilling machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery. It is expected that the implementation of dust suppressing mitigation measures will result in the reduction in nuisance dust.

13.2.9 Visual

The drill rigs and towers used during the drilling for blasting phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the mining area.

13.2.10 Heritage, Archaeological Resources

The drilling for blasting may result in the destruction of graves and other heritage resources. Although the specialist found no graves on site, it is still possible that there may be graves missed during the survey that may be affected by the proposed mining activities.

13.2.11 Palaeontology Impacts

Earth moving activities may result in the destruction of fossils (if any).

13.2.12 Ambient Noise

The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The blasting drill holes, and Excavation/pit activities will also result in an increase in noise in the vicinity of the project.

13.2.13 Traffic

The movement of vehicles in the project area will result in an increase in traffic on the roads.

13.2.14 Climate

The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.

13.2.15 Blasting and Vibrations

The following impacts are envisaged as a result of blasting activities:

- Impact of ground vibration on houses, boreholes and roads, resulting in possible damage to infrastructure;
- Air blast impact on houses, boreholes and roads, resulting in possible damage to infrastructure;
- Fly rock impact on houses, boreholes and roads, resulting in possible damage to infrastructure; and
- Impact of fumes on nearby land occupiers, boreholes and road users.

The summary of the impact assessment during the operation phase is provided in Table 13-3.

Table 13-3: Impact Assessment Table for the Operation Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Socio-Economic	Operation may affect the day to day operation of the land owners hence result in direct impact on their livelihood.	2	1	2	2	3	25	Low	Random and regular alcohol and drug testing shall be conducted on all personnel responsible for operating machinery and driving construction vehicles to ensure the safety of the public; Excavation/pit site shall be kept to a minimum; Landowners shall be informed of the exact location of the Excavation/pit site and shall be privy to the drilling programme, indicating the days on which each site will be drilled; and The time spent at each drill site shall be kept to a minimum.	1	1	2	1	1	8	Low
	Uncontrolled access of private property during operation may result in conflict with affected landowners and occupiers.	2	1	1	2	2	16	Low	Security and safety should be emphasized; No construction workers shall be allowed to access private properties without the owner's knowledge and consent; Access to private property and areas outside the designated operation areas shall be strictly prohibited.	1	1	1	1	1	6	Low
	Negative impact as a result of additional trucks on the roads, impacting on local communities' health and safety.	3	3	2	1	2	24	Low	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; Where possible the transportation of materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents; The number of vehicles on the roads shall be kept to a minimum; Materials transported on public roads must be covered.	1	2	1	1	1	8	Low
	Negative impact on, local community health and safety due to potential influx of employees, the presence of job seekers, which may lead to prostitution and conflict with the local communities. Illegal informal settlement of job seekers in the area may exacerbate the situation.	3	3	2	1	2	24	Low	Liaise with the SAPD and existing forums in order to implement effective crime prevention strategies; and The applicant will ensure that as far as possible locals will be used during the operation of the mining project. Recruitment will not be undertaken on site.	1	2	1	1	1	8	Low
	As a result of blasting drill holes and Excavation/pit activities during operation, potential damage to adjacent landowner's/occupiers' infrastructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Excavation/pit site shall be located as far from private property as is possible to minimise damage to infrastructure; Should private property be damaged due to operation activities, property owners shall be appropriately compensated.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	As a result of blasting drill holes and Excavation/pit activities, there is potential for the occurrence of subsidence, impacting on the safety surface land dwellers and users.	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Groundwater	The use of vehicles during the drilling of blasting holes and Excavation/pit activities may result in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination of the vegetation cover and soils. The material removed from the drilling exercises will contain carbonaceous material, which has a potential for pollution should it be allowed stay for a prolonged period at the drilling site.	3	2	2	2	2	28	Medium Low	Ensure that the drilling of blasting holes and Excavation/pit activities is conducted in such a manner that the environment is protected from probable spillages and contamination. All boreholes and sumps will be rehabilitated to pre-drilling conditions. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility.	2	1	2	1	2	15
Storage of hydrocarbons and chemicals, which may impact on groundwater as a result of spillages and uncontrolled release.		3	2	2	2	2	28	Medium Low	All waste generated from the drilling and Excavation/pit will be collected in proper receptacles and removed to a registered disposal facility e.g., sewage treatment plant, solid waste disposal site or hydrocarbon recycling or treatment facilities.	2	1	2	1	2	15	Low

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		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Severity	Spatial			
	The mining operations will require the drilling of blasting holes and Excavation/pit activities. The boreholes may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling may leach pollutants that will result in the pollution of the surrounding groundwater regime. This may even spread beyond the backfilling site via plume migration.	2	2	2	2	2	24	Low	Ensure that the landowners' borehole yields are monitored during the drilling for blasting. Should it be proven that the operation is indeed affecting the quantity and quality of groundwater available to users and surrounding water resources, the affected parties must be compensated.	2	1	2	1	2	15	Low		
Surface Water	The drilling for blasting may result in the generation of surface water runoff contaminated with drilling muds and cuttings should spillages occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the surrounding clean water environment. These will cause an increase in the turbidity and will decrease acidity of the water in the streams, which will affect the aquatic habitat, hence important habitats may be lost.	2	2	2	2	2	24	Low	No mining operations will be undertaken within 32 metres from the nearby streams and 500 meters from riparian areas without consent from the DWS; Sumps will be excavated for the collection mud and excess water from the Excavation; The sumps will be sized such that they will be able to contain the water and mud that will be generated during the mining operation; Storm water generated around the drilling site will be diverted away to the clean water environment; No concrete mixing and vehicle maintenance will be allowed on site. All hydrocarbons will be stored on protected storage areas away from the streams.	2	1	2	1	2	15	Low		
Biodiversity	Continued destruction of potential floral habitats for species of conservational concern as a result continual disturbance of soils leading to altered floral habitats, erosion and sedimentation.	2	1	3	2	2	24	Low	All disturbed areas must be rehabilitated in tandem with construction activities. The collection of any plant material for firewood or medicinal purposes shall be strictly prohibited.	2	1	1	1	1	8	Low		
	Impact on floral species of conservational concern as a result of an increased in alien species proliferation and ineffective rehabilitation of exposed areas	2	1	3	2	2	24	Low	The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the demarcated Excavation/pit site.	2	1	1	1	1	8	Low		
	Loss of faunal habitat and ecological structure as a result of increased fires during operation and introduction of alien species, leading to transformation of the natural habitat	2	1	3	2	2	24	Low	The rehabilitation of the disturbed areas must be conducted such that the rehabilitated areas will encourage the migration of animals back into the rehabilitated areas. The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas. No trapping or hunting of fauna shall be permitted. Edge effects of all operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat shall be strictly managed. No informal fires in the vicinity of Excavation/pit site shall be permitted. An alien vegetation control plan must be implemented in order to manage alien plant species occurring within the study area, and to prevent further faunal habitat loss. Poaching of wild animals and livestock will be prohibited.	1	1	1	1	1	6	Low		
Soils Land use and Land Capability	Topsoil removal, storage and replacement during the excavation of the sumps will result. This will result in the disruption of the soils profile.	2	1	2	2	2	20	Low	Ensure that topsoil is properly stored, away from the streams and drainage areas.	1	1	1	1	1	6	Low		

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
	Soil contamination as a result of operational activities can be as a result of a number of activities (i.e. hazardous substance storage, incidental hydrocarbon leakages from construction vehicles).	3	1	2	2	2	24	Low	The soils must be used for the backfilling and rehabilitation of the sumps. The rehabilitated sump must be seeded with recommended seed mix consisting of indigenous species. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs. Soil disturbance within the Excavation/pit site shall be kept to a minimum.	2	1	1	1	1	8	Low
Air Quality	The mining operation will require vehicular movement which may result in Possible increase in dust generation, PM10 and PM2.5 as a result of stockpiling material, use of heavy machinery, and material movement.	2	3	2	2	2	28	Medium Low	Dust suppression must be conducted during the operational phase of the project. Correct speed will be maintained at the proposed project site. Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes.	1	1	1	1	1	6	Low
	Increase in carbon emissions and ambient air pollutants (NO2 and SO2) as a result of movement of vehicles and operation of machinery/equipment.	2	3	2	2	2	28	Medium Low	Where practical possibly rehabilitation should be undertaken progressively. A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved roads. All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution. Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; Materials transported on public roads must be covered; and Where practical rehabilitation should be undertaken progressively. <i>Odours</i> Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; and Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.	1	1	1	1	1	6	Low
Visual	The drill rigs and towers and the crushers used during the drilling of blasting holes and processing operations will be visible from the nearby residents and properties.	2	2	3	2	3	35	Medium Low	Ensure that the time period used for the drill rigs is optimised to ensure that the drill rigs are moved from one site to another over short periods Materials transported on public roads must be covered.	1	1	1	1	1	6	Low
Heritage Resources	The drilling for blasting and processing may result in the destruction of graves and any other heritage sites during operational phase of the project.	3	2	2	1	2	21	Low	Locate excavation/pit or drill holes more than 50 m from the identified heritage sites. In the event that sites or features (eg high density of artefacts, a burial, or ostrich eggshell cache) being found during the mining project, SAHRA should be informed immediately to determine steps (e.g. have an archaeologist assess the find/s and recommend mitigation, if necessary	1	1	1	1	1	6	Low
Noise	The use of crushing machinery, vehicles and machinery during the operations phase may generate noise in the immediate vicinity	2	2	2	2	2	24	Low	Ensure that proper management measures as well as technical changes are undertaken to reduce the impacts on surrounding residents and employees. This include ensuring that less noisy equipment is used, that equipment is kept in good working order and that the equipment must be fitted with correct and appropriate noise abatement measures and where possible use	1	1	1	1	1	6	Low
	Increase in ambient noise levels as a result of the blasting drill holes and Excavation/pit activities.	2	2	2	2	2	24	Low		1	1	1	1	1	6	Low

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									Management and Mitigation Measures							
									white-noise generators instead of tonal reverse alarms on heavy vehicles operating on roads. Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e.gw. noise) in advance. Surrounding communities must be notified in advance of noisy construction activities. All equipment should be provided with standard mufflers. Muffling units on vehicles and equipment must be kept in good working order. Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment. Where possible, operation of several equipment and machinery must be avoided; All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping fan-belts, worn bearings and other sources of noise; Equipment must be operated within specifications and capacity (e.g. no overloading of machines); Regular maintenance of equipment must be undertaken, particularly with regard to lubrication; Equipment shall be switched off when not in operation; Appropriate directional and intensity settings must be maintained on all hooters and sirens; The Contractor must ensure that the employees conduct themselves in an appropriate manner while on site; Adjacent landowners shall be notified in writing if work needs to be carried out after hours or if any blasting will be required; and Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 18H00 and Saturday 07H00 -14H00).							
Traffic	Increase in traffic volumes as a result of operational activities which may lead to an increase in traffic congestion along the R31 as well as the farm roads around the mining area.	2	3	1	2	2	24	Low	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; and Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	1	2	1	1	1	8	Low
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low	The number of construction vehicles and trips shall be kept to a minimum All the vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	1	1	1	1	6	Low
Pit/trench site, blasting and Vibrations	Impact of drilling ground vibration on houses, boreholes and roads, resulting in possible damage to infrastructure	2	1	1	2	2	16	Low	Excavation/pit site shall be located as far from private property as is possible. Affected property owners shall be notified of any blasting drill holes and Excavation/pit activities before commencement of the activities.	1	1	1	1	1	6	Low
	Fly rock impact on houses, boreholes and roads, resulting in possible damage to infrastructure;	2	1	1	2	2	16	Low	Should there be damage to private property as a result of blasting drill holes and Excavation/pit activities, property owners shall be appropriately compensated. Reduce Charge Mass/Delay over decreasing distance towards POI's of concern; Relocate POI's of concern at least 600 m;	1	1	1	1	1	6	Low

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation							
		Consequence			Probability					Consequence			Probability				
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	
									Management and Mitigation Measures								
									Re-drill boreholes further away which will be impacted on by the blasting activities, should these boreholes be utilised at a later stage.; Reroute affected roads; Notify all affected parties in advance prior to any blasting activity; Prior to blasting a 500 m radius must be cleared of people and animals; Immediate action will take place should thresholds exceed legal requirements for air blast (134 dB) and ground vibration (12.5 mm/s).								
	Air blast impact on houses, boreholes and roads, resulting in possible damage to infrastructure	2	1	1	2	2	16	Low	Reduce Charge Mass/Delay over decreasing distance towards POI's of concern; Relocate POI's of concern at least 600 m	1	1	1	1	1	6	Low	
	Impact of fumes on nearby land occupiers, boreholes and road users.	2	1	1	2	2	16	Low	Use correct products; Control product quality; Prevent sleep time for charged blast holes; Same day charge and blast.	1	1	1	1	1	6	Low	
Waste Management	Inadequate control, management and disposal of waste on site during operation activities	2	1	1	2	2	16	Low	<i>Storage of waste</i> General waste will be collected in an adequate number of litter bins located throughout the construction site; Bins must have lids in order to keep rainwater out; Bins shall be emptied regularly to prevent the bins from overflowing; All work areas shall be kept clean and tidy at all times; All waste management facilities will be maintained in good working order; Waste shall be stored in demarcated areas according to type of waste; Runoff from Excavation/pit site will be contained, treated and reused; Flammable substances must be kept away from sources of ignition and from oxidizing agents; No storage of waste shall be permitted within 32 m of the water courses or within 500 m of riparian areas; Demolition waste and surplus concrete shall be disposed of responsibly; Waste shall not be buried or burned on site; and The maximum retention time for temporary storage of waste generated shall not exceed 30 days, provided the waste does not present a health hazard or risk of odour. <i>Disposal of hazardous waste</i> No dumping shall be allowed in or near the construction site; Hazardous containers shall be disposed of at an appropriate licensed site; Hazardous waste will be removed and managed by an approved service provider; A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste; and	1	1	1	1	1	6	Low	

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation								
		Consequence			Probability		Frequency: Impact	Significance		Significance Rating	Consequence			Probability		Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity	Severity					Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance			
									Management and Mitigation Measures The safe disposal certificate shall be stored and provided on request. <i>Disposal of general waste</i> No dumping shall take place in or near the Excavation/pit site; and All general waste shall be disposed of to the nearest licensed landfill site.									

13.3 Decommissioning and Closure

It is expected that the impacts for the decommissioning and closure phases will be similar to the impacts during the construction phase and have not been assessed in detail (please refer to the construction phase assessment). The most significant impacts will be:

13.3.1 Soils and Land Capability

The removal of Excavation/pit equipment and the rehabilitation of the Excavation and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed. However, should the rehabilitation of affected sites not be conducted properly, it may result in loss of usable soils and agricultural land, resulting in reduced land capability.

13.3.2 Land Use

Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by Excavation/pit, processing plant and Excavation.

13.3.3 Soils and Vegetation

The use of vehicles/machinery during the rehabilitation of the mining site may result in the compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover, soils and groundwater.

13.3.4 Surface Water and Aquatic Ecosystems

During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water courses.

13.3.5 Air Quality

Rehabilitation and removal of the mining sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generate diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.

13.3.6 Noise

Noise will be generated during the removal of equipment and rehabilitation of the sites. The noise is not expected to exceed occupational noise limits and will be short lived.

The summary of the impact assessment during the decommissioning and closure phase is provided in Table 13-4.

Table 13-4: Impact Assessment Table for the Decommissioning and Closure Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Likelihood (Probability)					Consequence			Likelihood (Probability)			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Soils, Land Capability and Land Use	The removal of Excavation/pit equipment and the rehabilitation of the Excavation and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	N/A	N/A	N/A	N/A	N/A	0	N/A	Ensure that contamination of the rehabilitate area by hydrocarbon liquids is prevented. Ensure that the rehabilitation work is done in such a manner that the environment is protected from probable spillages. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility. All waste generated from the rehabilitation sites will be collected in proper receptacles and removed to registered disposal facilities e.g., sewage treatment plant, solid waste disposal site or hydrocarbon recycling or treatment facilities.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Land Use	Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by Excavation/pit and Excavation.	N/A	N/A	N/A	N/A	N/A	0	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Soils and Vegetation	The use of vehicles/machinery during the rehabilitation of the mining site may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	2	1	2	2	2	20	Low		1	1	2	1	2	12	Low
Surface Water	During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation, surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	2	3	2	2	2	28	Medium Low	Ensure that water leaving the site does not have elevated silt load. Adequate stormwater management shall be conducted on site to ensure that dirty water is kept separate from clean water. Ensure that the rehabilitated areas are free draining and that water from these areas is clean.	2	1	2	2	2	20	Low
Air Quality	Rehabilitation and removal of the mining sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generated diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	1	3	2	2	2	24	Low	Dust suppression must be conducted during the decommissioning phase of the project whenever excessive dust is generated. Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes.	1	1	1	1	2	9	Low
Noise	Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	2	1	2	2	2	20	Low	Where necessary, provide employees with ear plugs and employees must be instructed to use the ear plugs. Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.	1	1	1	1	2	9	Low

14 Impact Assessment Methodology

All the identified potential impacts were assessed according to the following Impact Assessment Methodology as described below. This methodology has been utilised for the assessment of environmental impacts where the consequence (severity of impact, spatial scope of impact and duration of impact) and likelihood (frequency of activity and frequency of impact) have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact.

The first stage of any impact assessment is the identification of potential environmental activities¹, aspects² and impacts which may occur during the commencement and implementation of a project. This is supported by the identification of receptors³ and resources⁴, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. Environmental impacts⁵ (social and biophysical) are then identified based on the potential interaction between the aspects and the receptors/resources.

The significance of the impact is then assessed by rating each variable numerically according to defined criteria as outlined in Table 9. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity⁶, spatial scope⁷ and duration⁸ of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity⁹ and the frequency of the impact¹⁰ together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix table as shown in Table 14-1. This matrix thus provides a rating on a scale of 1 to 150 (low, medium low, medium high or high) based on the consequence and likelihood of an environmental impact occurring.

Natural and existing mitigation measures, including built-in engineering designs, are included in the pre-mitigation assessment of significance. Measures such as demolishing of infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

Table 14-1: Criteria for Assessing Significance of Impacts

¹An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.

²An **environmental aspect** is an 'element of an organisations activities, products and services which can interact with the environment'. The interaction of an aspect with the environment may result in an impact.

³**Receptors** comprise, but are not limited to people or man-made structures.

⁴**Resources** include components of the biophysical environment.

⁵**Environmental impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and palaeontology. In the case where the impact is on human health or well-being, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.

⁶**Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

⁷**Spatial scope** refers to the geographical scale of the impact.

⁸**Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

⁹**Frequency of activity** refers to how often the proposed activity will take place.

¹⁰**Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5

SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
Project area specific	2
Local area (within 5 km of the mine boundary)	3
Regional (Municipal area)	4
National	5

DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

CONSEQUENCE

FREQUENCY OF ACTIVITY / DURATION OF ASPECT	RATING
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5

LIKELIHOOD

FREQUENCY OF IMPACT	RATING
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

		Consequence														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Likelihood	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

	High	76 to 150	Improve current management
	Medium High	40 to 75	Maintain current management
	Medium Low	26 to 39	
	Low	1 to 25	No management required

SIGNIFICANCE = CONSEQUENCE x LIKELIHOOD

15 Positive and Negative Impacts

The impacts of the proposed site layout will be the same as those of the alternative sites that may be identified during the mining exercise. The alternative sites will be identified based on the location of sensitive environments such as aquatic ecosystems, riparian zones, and areas with Red Data Species. Changes in the layout plan will be discussed and agreed on with the affected landowners.

The positive impacts of the activities are the creation of employment, which is required in the region. Should adequate aggregate stone-dolerite, Clay and sand be found in the project area, Misabrite will be able to mine the available reserves. This will result in job creation and support to local businesses is continued. Misabrite expects that substantial benefits from the project (should adequate reserves be found and confirmed) will accrue to the immediate project area, the sub-region and the province of the Northern Cape.

Aggregate stone, clay and sand mining in South Africa is of important economic value, especially for the construction industry. This mining activities has a potential to decrease level of unemployment rate in proposed areas and surroundings. This mining activities will bring revenue into the city and the province which will in turn boost the economy of the country.

The proposed activities have medium to low significance impacts, which will be short term activities in nature. The probability of occurrence of an impact was determined and most of the activities can be controlled and impacts can be reduced or avoided. The probability was also determined based on other mining activities of similar nature. It was found that generally mining activities have low impact on the environment.

Please refer to Section 13 for a comprehensive impact assessment.

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

Please refer to Section 13 for the management and mitigation measures.

17 Motivation where no alternative sites were considered.

As discussed previously, the site is located in an area where there is dolerite, clay and sand of good quality. The site is therefore regarded as the preferred site and alternative sites are not considered. The alternative Excavation/pit site will be identified based on the location of sensitive environments such as aquatic ecosystems, riparian zones, and areas with Red Data Species. Changes in the layout plan will be discussed and agreed on with the affected landowners.

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

The location and extent of the mining activities is based on the information derived from the desktop surveys as well as the specialist studies. Where practicable, the Excavation and location of infrastructure will be selected to avoid sensitive environments such as aquatic ecosystems, riparian areas, watercourses, biodiversity of conservation importance and heritage features.

18.1 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site

In order to identify the potential impacts associated with the proposed mining activities, the following steps were undertaken:

- The stakeholder consultation process was undertaken in a manner to be interactive, providing the landowners and identified stakeholders with an opportunity to provide input into the project. This is considered a key focus as the local residents have capabilities of providing site-specific information, which may not be available in desktop research material. Stakeholders were requested, as part of the notification letter, to provide their views on the project, and to state any potential concerns they may have. All comments and responses provide have been collated into the Comments and Responses Register, which is included in this final BAR, and where necessary, incorporated into the final impact assessment.
- A detailed desktop study was undertaken to determine the environmental setting in which the project is located. Based on the desktop investigations, various resources were used to determine the significance and sensitivity of the various environmental considerations. The desktop investigation involved the use of:
 - The South African National Biodiversity Institute (SANBI) Biodiversity Geographic Database LUDS System;
 - Department of Water and Sanitation information documents such as the Internal Strategic Perspective (ISP) for the Vaal River and Groundwater Vulnerability Reports;
 - The Municipal Integrated Development Plan for Sol Plaatje Local Municipality; and
 - The Spatial Development Framework for the Francis Baard District Municipality.

In addition, Heritage resources, hydrogeological and blasting and vibrations specialist studies have been conducted where the specialists identified potential impacts and assessed their significance.

The rating of the identified impacts was undertaken in a quantitative manner as provided in Section 13 (impact rating). The ratings were undertaken in a manner to calculate the significance of each of the impacts. The identification of management and mitigation measures was done based on the significance of the impacts and measures included are considered sufficient, appropriate and practical to protect the environment.

19 Assessment of each identified potentially significant impact and risk

Table 19-1: Assessment of each identified potentially significant impact and risk

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Data Collection and Assessment	Desktop Study	None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Geological Mapping		None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Planning for Pits/trenches		None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of pits/trenches	Loss of soils, erosion of the soils and impacts on landowners' livelihood.	Soils, Land capability and Land use	Construction	Low	Rehabilitation of areas cleared of vegetation and dust control	Low
Pits/trenches site		Contamination of groundwater from hydrocarbon spillages	Groundwater	Construction	Medium Low	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Low
Temporary Soil Storage Area		Contamination of surface water due to erosion of soils which will lead to increased turbidity as well as contamination from hydrocarbon spillages	Surface water	Construction	Medium Low	Monitoring through rehabilitation and management of spoil sites	Low
Fence		Aquatic Ecosystem contamination, destruction and loss of habitat	Aquatic ecosystems	Construction	Medium Low	Control of access to aquatic ecosystems and riparian habitat areas and within the regulated 500 m buffer.	Low
Hydrocarbon storage area		Destruction of graves and cultural heritage sites	Heritage and archaeological resources	Construction	Low	Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites	Low
Mobile office		Destruction of fossils	Palaeontological resources	Construction	Low	Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified	Low
Ablution Facility		Loss of natural vegetation in the affected areas	Flora	Construction	Low	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Low
		Migration of fauna due to disturbance caused by the proposed project	Fauna	Construction	Low	Relocation of affected species of conservation importance	Low
		Air pollution through nuisance dust, PM 10 and PM2.5 as well as emissions from construction vehicles and machinery.	Air Quality	Construction	Low	Dust control measures	Low
		Increase in ambient noise due to movement of construction vehicles and machinery	Noise	Construction	Low	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers Control through the limiting of the activities to the daytime and the implementation of an open and transparent channel of communication	Low
	Visual impacts as a result of vegetation clearance	Visual	Construction	Low	Rehabilitation of areas cleared of vegetation	Low	

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
		Increased traffic on the roads due to additional construction vehicles	Traffic, Socio-economic	Construction	Medium Low	Speed control and limitation of the times when construction vehicles may be on the roads	Low
		Impact of carbon dioxide (GHG) produced by construction vehicles on the local climate	Climate Change	Construction	Low	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Low
Trenching	Excavation and blasting	It is expected that during the operation phase the project will not result in the creation of employment as mining requires highly specialised personnel. The applicant will make use of qualified contractors for the blast hole drilling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day to day operations by affected landowners	Socio-Economic	Operation	Low	Control of times during which operation activities will take place	Low
		The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The mining operations will require the blast hole Drilling, which may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Groundwater	Operation	Medium Low	Rehabilitation of affected areas and control using bunds	Low
		Blast hole Drilling may result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation will have negative impacts on the water quality due to increase turbidity in the watercourses. This will have an impact on aquatic habitats.	Surface Water	Operation	Low	Control through management and monitoring of surface runoff	Low
		The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The material from the excavated area may result in the contamination of soils, which may render the land not usable after backfilling operation.	Soils Land use and Land Capability	Operation	Low	Rehabilitation of affected areas	Low
		The movement of vehicles and earthmoving machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery. It in the reduction in nuisance dust.	Air Quality	Operation	Medium Low	Dust control measures	Low
		The drill rigs and towers used during the drilling for blasting phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the mining area.	Visual	Operation	Medium Low	Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable	Low
		The Blast hole Drilling may result in the destruction of graves and other heritage resources.	Heritage Resources	Operation	Low	Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites	Low

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
		Earth moving activities may result in the destruction of fossils (if any).	Palaeontological Resources	Operation	Low	Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified	Low
		The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The blasting holes drilling activities will also result in an increase in noise in the vicinity of the project.	Noise	Operation	Low	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers	Low
		The movement of vehicles in the project area will result in an increase in traffic on the roads.	Traffic	Operation	Low	Speed control and limitation of the times when construction vehicles may be on the roads	Low
		The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.	Climate	Operation	Low	Control and keep to a minimal the number of vehicles used for operations. Vehicles must be maintained to ensure efficient use of fuel.	Low
		Drilling ground vibrations may result in possible damage to infrastructure.	Drilling and Vibrations	Operation	Low	Pits/trenches site must be located as far from infrastructure as is possible to avoid damage to infrastructure	Low
Data Analysis	Feasibility Studies	None	N/A	Operation	N/A	N/A	N/A
Feasibility Studies Report		None	N/A	Operation	N/A	N/A	N/A
Removal of equipment and infrastructure	Closure and Rehabilitation of pits/trenches and infrastructure sites	The removal of Excavation/pit equipment and the rehabilitation of the pits/trenches and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Soils, Land Capability and Land Use	Decommissioning and Closure	N/A	N/A	N/A
		Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by Excavation/pit and pits/trenches.	Land Use	Decommissioning and Closure	N/A	N/A	N/A
		The use of vehicles/machinery during the rehabilitation may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	Soils and Vegetation	Decommissioning and Closure	Low	Control and prohibit access of vehicles and machinery to areas outside of established access tracks Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of a soil management programme in terms of the correct tops oil removal, stockpiling and rehabilitation practices as discussed in the EMPr.	Low
		During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Surface Water	Decommissioning and Closure	Medium Low	Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of the NWA GN 704 water management principles.	Low

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
		Rehabilitation and removal of the mining sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generate diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Air Quality	Decommissioning and Closure	Low	Dust control measures and rehabilitation of areas stripped of vegetation	Low
		Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Noise	Decommissioning and Closure	Low	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Low

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

Please refer to Appendix 5.

20 Summary of specialist reports

The DEA Screening tool classified the environmental attributes in the project area as of *low* sensitivity therefore desktop information was mostly used to compile the report and to conduct the impact assessment. Heritage Impact Assessment, Hydrogeology and Blasting Vibrations assessment have been conducted for the application.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Heritage Resources Assessment	<p>A very low density 'background scatter' of cf. Fauresmith artefacts was noted in areas where Hutton Sands are removed, both on the mining site and in an immediately adjacent property (Morris 2012). No colonial era or other cultural resources were in evidence. Archaeological significance of the area is reckoned to be LOW. There is potential for subsurface material across the entire area, but indications are that densities would be low. Steps for reporting in the event of archaeological material being found are indicated.</p> <p>In summary, the proposed mining is not expected to have a negative impact on the heritage resources of the area. Archaeologists should be granted access to the mining operation at any time to inspect sections and exposed areas at the base of the Hutton Sands.</p>	<p>In the event that sites or features (eg high density of artefacts, a burial, or ostrich eggshell cache) being found during the mining project, SAHRA should be informed immediately to determine steps (e.g. have an archaeologist assess the find/s and recommend mitigation, if necessary). All archaeological traces are protected by legislation, as indicated above.</p>	Section 13
Hydrogeology	<p>Possible sources for groundwater contamination are fuels leakage and spillage from machinery and on site latrines and waste as indicated on Table 3. DWS overarching water quality management principles are; (1) protection of human health and (2) protection of the environment.</p> <p>Based on these principle's objectives and the significance of this aquifer classification, if any potential risk exist, measures must be put in place to limit the risk to the environment, which in this case is the protection of the Primary Underlying Aquifer.</p> <p>Due to low likelihood of pollution as a result of the nature of the proposed activity, it recommended</p>	<p>Measures must be put in place to limit the risk to the environment, which in this case is the protection of the Primary Underlying Aquifer.</p> <p>It is recommended that some of the exploration boreholes from the prospecting area next door be pump tested in order to determine groundwater aquifer parameters which will add to the knowledge of the site groundwater resource system. The prospecting boreholes must also be used for groundwater quality monitoring.</p>	Section 13

	<p>that some of the mining boreholes around the mining permit area (NC12569PR) be used to monitoring groundwater quality mainly on the southern, eastern, western and the northern side of the proposed mining permit area.it is therefore recommended 4 of the 20 planned mining boreholes be used for water quality monitoring and groundwater level monitoring. These boreholes should be on the southern boundary of the farm Vooruitzicht 81 to monitor possible impacts from the existing mine south of the farm, south east boundary to monitor possible impact from the land fill and both north east and west of the farm boundary.</p>		
Blasting and Vibrations	<p>The Vooruitzicht Quarry Project was reviewed on scoping level phase. Points of interest were identified for possible influence. Various installations were identified within the 1500 m radius from the proposed new quarry area. Three areas ranging from 0 to 1500 m was identified with different levels of possible influence indicated.</p> <p>Review of probable ground vibration and air blast levels and method applied, certain areas may experience limited negative influence. The expectation is that ground vibration levels will be low but perceptible. Air blast is expected to be below the limits at the distances observed. This is specific towards the Galeshewe Township with the Phutanang suburb being closest to the quarry operations.</p>	<p>Mitigation measures must be implemented to minimise impacts on POIs within the high sensitivity zone (500m radius).</p>	Section 13
Wetland and Ecology	<p>Detailed ecological (fauna habitat & flora) surveys were conducted during July 2020 to verify the ecological sensitivity, floristic components and vegetation of the site at ground level. A sensitivity analyses was conducted for the vegetation units to identify the most suitable site for the development.</p>	<p>Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. Furthermore, the proposed layout plan of the development should be consistent with the sensitivity map and recommendations stipulated in this report, and the impact on the sensitive habitats on site should be kept to a minimum.</p>	Section 13
Noise	<p>The environmental noise impact assessment will be done by means of approved scientific methods and the expertise of the specialist will ensure that the impact assessment will be done with utmost sensitivity towards the receptors, expansion</p>	<p>Environmental noise surveys to be carried out monthly during the construction phase for the first year after it may be changed to a bi-annual basis.</p>	Section 13

	<p>project establishment and associated infra-structure.</p> <p>Acoustic screening measures such as screens, earth-berms and good maintenance of the machinery and/or vehicles will have to be in place;</p> <p>Compliance to the Building Regulations in terms of servitudes along the boundaries of the buildings;</p> <p>Restriction of working hours in sensitive areas (residential areas) to daytime periods only;</p> <p>Speed limit of hauling vehicles to comply with the speed limits per area;</p>		
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Attach copies of Specialist Reports as Appendix 9

21 Environmental impact statement

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

During the proposed mining operation impacts may occur on soils, natural vegetation, surface water, groundwater, sensitive landscapes, air quality, noise, visual aspects, and sites of archaeological and cultural importance should the EMPr not be adhered to.

Misabrite will undertake measures to ensure that the identified impacts are minimised. Assessment of the impacts with the proposed mitigation measures has shown the significance of the impacts on all affected environmental aspects to be reduced from medium and low to low and negligible significance.

Land use will not change. Landowners and land occupiers within the proposed project area may be affected although on a temporary basis due to the need to access the sites and the establishment and use of Excavation/pit. Measures such as safety along the roads and dust suppression will be undertaken to ensure that the impacts on the landowners and land occupiers are minimised.

Storm water runoff from the dirty water areas of the Excavation, its associated surface infrastructure (campsite) may have a detrimental impact on the surrounding water environment should this water be released to the environment. In order to prevent the occurrence of the above-mentioned impacts, dirty water collection will be used to collect all dirty water from the site.

The employees will undergo training and will be given strict instruction not to undertake activities that will affect the environment and that may have an impact on the landowners. Waste generated from the site will be collected in proper receptacles and disposed of in registered waste disposal sites.

Key findings of the environmental impact assessment include:

- All the identified impacts will be localised, short term and will have a medium and low significance. The significance of potential environmental impacts can be reduced to low and very low significance with implementation of mitigation measures and monitoring.
- Cumulative noise, visual and air quality (dust) impacts are deemed to not be significant (low) when proper mitigation measures are implemented.
- Vegetation loss is unavoidable during the construction phase of the project. This will however be limited to the footprint of the infrastructure (access road, camp, boreholes). Care must be taken to manage any species of special concern as well as the proliferation of alien invasive plant species.

21.2 Final Site Map

Please refer to Appendix 6 for the preliminary site map which includes the environmental sensitive areas.

The final map showing the layout of the proposed project will be submitted to the DMR on granting of the mining permit. The map will be developed to superimpose the proposed mining project and associated infrastructure together with the environmentally sensitive areas such as heritage sites, wetland and riparian areas, water courses and Red Data Listed floral species within the proposed project site.

21.3 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives

The proposed activities have medium and low significance and will be short term activities. The probability of occurrence of an impact was determined and most of these activities can be controlled and impacts can be reduced or avoided. Generally mining activities have low impact on the environment. The planned activities negative impacts can be controlled and avoided or minimised. Mitigation measures will be used to manage and control any potential impact. The main impacts will include:

- Increased ambient noise levels resulting from blasting drill holes and Excavation/pit activities and increased traffic movement;
- Potential water and soil pollution resulting from hydrocarbon spills and soil erosion which may impact on the water resources utilised by the communities and landowners;
- Potential water and soil pollution resulting from hydrocarbon spills and soil erosion which may impact on ecosystem functioning;
- Increased vehicle activity within the area resulting in potential destruction and disturbance of flora and fauna;
- Poor access control to farms may impact on cattle movement, breeding and grazing practices;
- Influx of job seekers to site may result in increased opportunistic crimes;
- Potential visual impacts by blasting drill holes and Excavation/pit activities as well as vegetation clearance;
- Mining will be undertaken by special sub-contractors and it is not anticipated that employment opportunities for local and/or regional communities will result from mining activities; and
- Short term boost for local businesses.

22 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

The objectives of the EMPr will be to:

- Provide sufficient information to strategically plan the mining activities as to avoid unnecessary social and environmental impacts;
- Provide sufficient information and guidance to plan the mining activities in a mane that will reduce impacts (social, physical and biological) as far as is practically possible;
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance; and
- Provide a management plan that is effective and practical for implementation.

Through the implementation of the identified proposed mitigation measures, it is anticipated that the identified impacts can be managed and mitigated effectively. All the impacts were assessed to have significance ranging between medium and low without the implementation of mitigation measures. All the identified impacts will have a reduced significance of low when the mitigation measures have been implemented.

23 Aspects for inclusion as conditions of Authorisation

The following conditions should be included in the Environmental Authorisation:

- A minimum distance of 100 m from any dwellings or infrastructure must be kept;
- Landowners as well as land occupiers must be re-consulted at least 30 days prior to any mining activities undertaken on their properties;
- A map detailing the excavation/pit locations should be submitted to the relevant landowners, the DWS and DMR prior to the commencement of the mining activities;
- No activities may be undertaken within 500 m of riparian areas/wetland areas and/or within 32 m of watercourses without approval from the DWS;
- No relocation or destruction of heritage resources may be undertaken without the approval of SAHRA; and
- Mitigation measures contained in the HIA report must implemented during all project phases.

24 Description of any assumptions, uncertainties and gaps in knowledge

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

- Details on the Water Use Licence requirements are not available;
- For the Heritage Impact Assessment, during the site investigation, it was noted that parts of the area are already disturbed by informal sand quarrying, as well as informal waste dumping. The entire area is veneered by Hutton Sands which would obscure from view some of the types of archaeological traces expected in the area (MSA/Fauresmith lithics typically rest on calcrete/decomposing dolerite which occurs between 1 and 1.5 m below the present surface (Fernando Garcao pers comm). Representative parts of the proposed mining area, and particularly areas where Hutton Sands have been depleted by quarrying, were inspected on foot to assess findings relative to expectations;
- The groundwater specialist was not able to conduct water level assessment of the boreholes in the area as the boreholes were locked;
- No wetland/riparian area delineation was undertaken; and
- No detailed site layout is currently available due to the nature of the mining activities. The impact assessment was undertaken as a holistic assessment for the overall site.

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

25.1 Reasons why the activity should be authorized or not.

It is the considered opinion of the EAP that the activity may be authorised. The proposed mining area that Misabrite identified is located in an area where dolerite occurs widely spread as dykes, sills and funnel shaped bodies. Early Jurassic age igneous intrusions are abundant in the area. The intrusions are generally referred to loosely as dolerite, but the actual rock type varies. They occur in the form of dykes and sills and are composed primarily of plagioclase feldspar and pyroxene. The rocks are highly durable, and this are often seen capping the sandstone and mudstone hills. These dolerites (Jd) can also be seen at the bottom or south of the mining permit. The rest of the farm is covered by sand (Qs). The site is therefore regarded as the preferred site and alternatives are not considered.

The option of not approving the activities will result in a significant loss of valuable information regarding the mineral status (in terms of Aggregate stone-dolerite, Clay and sand), present on the identified properties. In addition, should economical reserves be present and the applicant does not have the opportunity to prospect the opportunity to utilize these reserves for future phases will be lost.

According to the impact assessment undertaken for the proposed project, the impacts of the project are considered to be of medium and low significance. The significance of the impacts can be reduced to low and very low when the mitigation measures are implemented.

The project will also have positive impacts due to the employment to be created although for a short term, as well as a short boost to local businesses.

The stakeholders were also requested for their comments. All comments to be received during Public Participation Process have been included in this BAR and EMPr. The comments received have been addressed the as far as possible to the satisfaction of the interested and affected parties.

The management of the impacts identified in the impact assessment for all phases of the proposed project will be undertaken through a range of programmes and plans contained in the EMPr. In consideration of the layout plan and the management and mitigation measures contained within the EMPr compiled for the project, which are expected to be effectively implemented, there will be significant reduction in the significance of potential impacts.

25.2 Conditions that must be included in the authorisation

See Section 23 of the BAR.

26 Period for which the Environmental Authorisation is required.

The mining permit has been applied for a period of two (2) years. The Environmental Authorisation should therefore allow for 2 year of mining .

27 Undertaking

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

An undertaking by the EAP and the client is provided in Section 41 of the EMPr.

28 Financial Provision

The amount required to cover the rehabilitation is anticipated to be R 299 745.00 as shown in Table 28-1.

Table 28-1: Cost Estimate Expenditure

Applicant: **Miserbrite**

DMR Ref No:

NC10823 MP

Evaluators: **Ndi Geological Consulting Service (Pty) Ltd**

Date:

2020/08/11

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	500	15.94	1	1	7970
2 (A)	Demolition of steel buildings and structures	m2	0	221.99	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	20	327.14	1	1	6542.8
3	Rehabilitation of access roads	m2	1000	39.72	1	1	39720
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	385.55	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	210.3	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	443.97	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	0.5	225957.57	0.52	1	58748.9682
7	Sealing of shafts adits and inclines	m3	0	119.17	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0.2	155155.97	1	1	31031.194
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	193243.96	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	561272.05	1	1	0
9	Rehabilitation of subsided areas	ha	0	129919.76	1	1	0
10	General surface rehabilitation	ha	0.5	122909.7	1	1	61454.85
11	River diversions	ha	0	122909.7	1	1	0
12	Fencing	m	0	140.2	1	1	0

13	Water management	ha	0	46733.73	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	0.5	16356.8	1	1	8178.4
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
Sub Total 1							213646.2122

1	Preliminary and General	25637.54546	weighting factor 2		
			1	25637.54546	
2	Contingencies	21364.62122			21364.62122
Subtotal 2				260648.38	

VAT (15%)	39097.26
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Grand Total	299746
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28.1 Explain how the aforesaid amount was derived.

The financial provision for the environmental rehabilitation and closure of any mine/mining and its associated operations forms an integral part of the MPRDA. Sections 41 (1) and, 41 (2), 41 (3) and 45 of the MPRDA deal with the financial provision for rehabilitation and closure. During 2012, the DMR made updated rate available for the calculation of the closure costs, where contractor's costs are not available, these apply.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the DMR in January 2005 in order to empower the personnel at Regional DMR offices to review the quantum determination for the rehabilitation and closure of mining sites.

With the determination of the quantum for closure, it must be assumed that the infrastructure had no salvage value (clean closure). The closure cost estimate (clean closure) was determined in accordance with the DMR guidelines.

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

The amount required to cover the rehabilitation is anticipated to be R 299 745.00. Misabrite will fund the operation.

29 Specific Information required by the competent Authority

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

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

No specific report was generated for the purposes of the socio-economic conditions. Current land uses inside the mining area, such as mining, farming and grazing, may be temporarily impacted through the presence of the fenced areas that drill rigs will operate within. These will, however, be small areas. These areas will be rehabilitated post blasting drill holes and Excavation/pit activities and the areas will once again become available for grazing. Other potential socio-economic impacts will include:

- Nuisance noise due to on site activities and drilling for blasting;
- Poor access control resulting in impacts on cattle movement, breeding and grazing practises;
- Influx of jobseekers to site, which may result in an increase in opportunistic crime;
- Uncontrolled access to private property outside of the demarcated boundaries; and
- Visual impact as a result of the vegetation clearance.

Mining will be undertaken by specialist sub-contractors and it is not anticipated that employment opportunities for local and/or regional communities will result from the mining activities during the excavation/pit phases.

Management and mitigation measures must be implemented to prevent environmental pollution which may impact on environmental resources utilised by communities, landowners and other stakeholders. Measures to manage the potential impacts on communities, individuals or competing land uses in close proximity include;

Noise due to construction activities and drilling for blasting:

- Directly affected and adjacent landowners and land occupiers must be informed of the planned dates of the blasting drill holes and Excavation/pit activities and a grievance lodging mechanism must be made available to the stakeholders.
- Site activities shall be concluded during daytime hours (0700 to 1730), to avoid night-time noise disturbances and night-time collisions with fauna.

Poor access control resulting in impacts on cattle movement, breeding and grazing practices:

- Access control procedures must be agreed on with the farm owners and all on site personnel shall be trained on these procedures.

Influx of job seekers to the site which may result in increased opportunistic crime:

- Casual labour shall not be recruited at the site. This will eliminate the incentive for people to travel to site seeking employment. Where necessary, a recruitment centre may be established in the major town areas;
- The landowners shall be notified on unauthorised persons encountered on site; and
- Where necessary, the South African Police Service (SAPS) will be notified of unauthorised persons encountered on site.

Visual Impact:

- Wet dust suppression will be undertaken to manage nuisance dust from construction vehicle movements and other construction activities as and when necessary;
- The portable ablution facilities and any other infrastructure will be acquired with a consideration for colour. Natural earth, green and mat black options which blend with the surrounding must be favoured;
- A waste management system will be implemented, and sufficient waste bins will be provided for on site. A fine system must be implemented to further prohibit littering and poor housekeeping practices; and
- Vegetation cover shall be used where drill rigs will be located to minimise visual impacts.

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

As outlined in Section 5 of this report, mining will be undertaken in phases. The first phase will be a desktop study, which will be followed by ground surveys and soil sampling.

The HIA found a very low density 'background scatter' of cf. Fauresmith artefacts was noted in areas where Hutton Sands are removed, both on the mining site and in an immediately adjacent property (Morris 2012). No colonial era or other cultural resources were in evidence. Archaeological significance of the area is reckoned to be LOW. There is potential for subsurface material across the entire area, but indications are that densities would be low. Steps for reporting in the event of archaeological material being found are indicated.

In summary, the proposed mining is not expected to have a negative impact on the heritage resources of the area. Archaeologists should be granted access to the mining operation at any time to inspect sections and exposed areas at the base of the Hutton Sands.

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

The proposed mining area is located in an area where dolerite occurs widely spread as dykes, sills and funnel shaped bodies. Early Jurassic age igneous intrusions are abundant in the area. The intrusions are generally referred to loosely as dolerite, but the actual rock type varies. They occur in the form of dykes and sills and are composed primarily of plagioclase feldspar and pyroxene. The rocks are highly durable, and this are often seen capping the sandstone and mudstone hills. These dolerites (Jd) can also be seen at the bottom or south of the mining permit. The rest of the farm is covered by sand (Qs). The site is therefore regarded as the preferred site and alternatives are not considered.

All infrastructure will be temporary and/or mobile (Refer to Section 5.6 of this report).

In addition, the proposed technologies have been chosen based on long term proven success in mining.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

30 Final environmental management programme

30.1 Details of the EAP

Details of the EAP are included in Part A Section 3

30.2 Description of the Aspects of the Activity

The EAP hereby confirms that the requirement to describe the aspects of the activity that are covered by the draft Environmental Management Programme is already included in Part A, Section 11 of this report as required.

30.3 Composite Map

Please refer to Appendix 7 for the composite map. No specific heritage sites have been identified and therefore have not been included in the preliminary composite map. The composite map will be updated once all the sensitive environmental sites have been identified. The current composite map includes red flag areas which include the following:

- Water Course and 32m buffer area as determined by a specialist;
- Wetlands and regulated 500m areas;
- CBAs and ESAs; and
- Protected Areas.

31 Description of Impact management objectives including management statements

31.1 Determination of closure objectives.

As previously mentioned, each phase of the mining activities is dependent on the success of the preceding phase. Depending on the findings from Phase 1, Phase 2 will be initiated. The location and extent of the Excavation/pit site can therefore not be determined at this stage of the process.

The rehabilitation plan was developed on the basis that the rehabilitated areas will be made safe, stable, non-polluting and will be able to support self-sustaining ecosystems, similar to surrounding natural ecosystems.

To ensure that the rehabilitation plan is aligned with the closure objective, high-level risk assessment of the mining components was undertaken to establish the potential risks associated with therewith.

The closure objectives are to:

- Remove and/or rehabilitate all pollution and pollution sources such as waste materials and spills;
- To establish rehabilitated areas to a state which with no susceptible to soil erosion which may result in loss of soil, pollution of water resources;
- Restore disturbed areas and re-vegetate these areas with plant species naturally occurring in the area to restore the ecological function of the affected areas as far as practicable; and
- Eliminate all alien invasive plant species from the disturbed areas.

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

The rates and volumes of water to be used are not available at this stage.

33 Has a water use licence has been applied for?

It is anticipated that discussions will be held with the DWS to determine whether or not abstraction of water will be required. Based on the outcomes of the discussions with the DWS, any potential abstraction of water due to blasting drill holes and Excavation/pit activities will be clarified. At this stage it is not anticipated that abstraction will be required.

Furthermore, depending on the DWS opinion of the sampling, potentially in the riverbeds, Section 21 (c) and (i) WUL may be required. This will also be clarified with the DWS. Should it be deemed necessary, on instruction by the DWS, the applicant will submit a water use licence application.

34 Impacts to be mitigated in their respective phases

Table 34-1: Environmental Management Programme for the proposed Misabrite Mining project

NAME OF ACTIVITY		PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Data Collection and Assessment	Desktop Study	Planning	N/A	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Throughout the planning phase
Geological Mapping			N/A	N/A		
Planning for Pits/trenches			N/A	N/A		
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of pits/trenches	Construction	1000 m ²	<u>Loss of soils, erosion of the soils and impacts on landowner's livelihood:</u> No soil stripping will be allowed during site establishment;	Implementation of mitigation measures will ensure that the activities in the development of the mining sites and associated infrastructure do not have detrimental impacts on the soils, land use and land capability.	During the construction phase
Pits/trenches site			pits/trenches with a total footprint of 0.5ha	Should it be necessary to conduct geophysical surveys and geological mapping, ensure minimal disturbance of soil; Any activity that may result into the disturbance of the soils must be rehabilitated immediately on discovery;		
Temporary Soil Storage Area			0.001ha	Machinery to be used for the operation will be of good working conditions; Any hydrocarbon spill from the site establishment will be remediated as soon as possible;		
Fence			<0.2ha	Use sites that are unused and that are in the degraded state for the proposed development. This must be done in agreement with the landowner. The siting of the boreholes must be conducted such that rocky ridges, sensitive grass lands, indigenous trees and shrubs, sites of geological importance and farmlands actively used for crop farming are avoided;		
Hydrocarbon storage area			Less than 30 m ³	Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEMWA, or can be removed by a service provider that is qualified to clean the soil;		
Mobile office			0.002 ha	The time in which soils are exposed during construction activities should remain as short as possible;		
Ablution Facility			0.0025 ha	Erosion control measures shall be implemented where deemed necessary; In general, all steep slopes steeper than 1:3 or where the soils are more prone to erosion must be stabilised; Institute adequate sedimentation control measures where necessary when rehabilitation of pits/trenches or disturbance of the riverbanks takes place; The time in which soils are exposed during construction activities; If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion and resulting in the increase in turbidity; Runoff from stockpiles shall be detained in order to support growth of vegetation; Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; <u>Loss of natural vegetation in the affected areas:</u> Use sites with most disturbed vegetation cover for the development; No strip of topsoil and vegetation will be allowed during site establishment; Ensure minimal disturbance of vegetation when conducting geophysical surveys and geological mapping; Use existing track and roads in all instances as far as is practicable;		
				The implementation of mitigation measures will ensure that the establishment of the mining site and associated infrastructure/equipment do not have detrimental impact on the area's flora, in particular		

			<p>Storm water upslope of the campsite and pits/trenches site should be diverted around these sites;</p> <p>Proper waste management facilities will be put in place at the campsite and excavated area. Any hydrocarbon spill from the site establishment will be remediated as soon as possible;</p> <p>No washing of vehicles shall be allowed outside demarcated areas. Washing bays for vehicles and other equipment shall be provided with appropriate soakaways, will be clearly demarcated and will not be allowed to contaminate any surface runoff;</p> <p>Sufficient areas shall be provided for the maintenance and washing of vehicles;</p> <p>Refuelling of vehicles will only be allowed in designated areas;</p> <p>All construction equipment shall be parked in a demarcated area Drip trays shall be used when equipment is used for some time;</p> <p>On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the material;</p> <p>Bunded areas shall contain 110% of the stored volume;</p> <p>Bund areas must be impermeable;</p> <p>Bund area must have a facility such as a valve/sump to drain or remove clean stormwater, Contaminated water shall be pumped into a container for removal by an approved service provider;</p> <p>Regular inspections shall be carried out to ensure the integrity of the bundwalls;</p> <p>All preventative servicing of earth moving equipment and construction vehicles shall conducted off site;</p> <p>Runoff from this area shall be contained;</p> <p>Spill kits shall be made available and all personnel shall be trained and training records shall be made available on request;</p> <p>Ensure that topsoil is properly stored, away from the streams and drainage areas;</p> <p>Vehicle and personnel movement within watercourses and riparian areas shall be strictly prohibited;</p> <p>Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses from dirty water;</p> <p><u>Water abstraction:</u> Any abstraction of water for construction purposes must be approved by DWS'</p> <p><u>Riparian and Aquatic Ecosystem Ecology destruction and loss of habitat:</u> Construction activities will be limited to be more than 500 m from the edge of the riparian areas without consent from the DWS;</p> <p>Adequate stormwater management must be incorporated into the design of the project in order to prevent erosion and the associated sedimentation of the aquatic system;</p> <p>No vehicles may be allowed to indiscriminately drive through the riparian areas or within the active stream channels;</p> <p>All disturbed areas shall be re-vegetated with indigenous species;</p> <p>All construction materials shall be kept out of the riparian areas;</p> <p>All vehicles shall be regularly inspected for leaks. Re-fuelling must take place outside the project area, on a sealed surface area to prevent ingress of hydrocarbons into topsoil and aquatic ecosystem;</p> <p><u>Air pollution through air pollutants' emissions, from the construction site:</u> Wet suppression using will be conducted at areas with excessive dust emissions;</p> <p>Dust suppression measures shall be implemented on dry weather days and periods of high wind velocities;</p> <p>Rehabilitation of disturbed areas shall be undertaken in tandem with construction activities;</p>	<p>Water abstraction will not be permitted unless authorisation is granted by DWS. Obtain all necessary authorisations in terms of Section 21 of the National Water Act (No.36 of 1998).</p> <p>Implementation of mitigation measures will assist with maintaining the current state of the sensitive landscapes within the project area and will enable the project to comply with the requirements of the NWA</p> <p>With the implementation of the mitigation measures, the construction will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.</p>	
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Trenching	Excavation and blasting	Operation	two trenches/pits	<p><u>Soil profile disruption, contamination of soils, destruction of natural vegetation and loss of land use:</u></p> <p>Rehabilitation of pits/trenches period will be undertaken in such a manner that the environment is protected from probable spillages and contamination by carbonaceous material.</p> <p>Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs.</p> <p>All oil spills will be remedied using approved methodologies.</p> <p>The contaminated soils will be removed and disposed of at a licensed waste disposal facility.</p> <p>All waste generated from the pits/trenches and the campsite will be collected in proper receptacles and removed to registered disposal facilities e.g., sewage treatment plant, solid waste disposal site or hydrocarbon recycling or treatment facilities.</p> <p>No topsoil shall be stored within 100 m of water courses and drainage lines or within 500 m of riparian areas.</p> <p>The soils must be used for the backfilling and rehabilitation of the sumps.</p> <p>The rehabilitated sump must be seeded with recommended seed mix.</p> <p><u>Migration of animal life due to disturbance caused proposed project:</u></p> <p>Where possible pits/trenches site shall be located within degraded environments.</p> <p>Poaching will be prohibited at the mining sites.</p>	<p>The implementation of the mitigation measures will ensure that the land use and capability of the sites where the operations will be undertaken will continue after the proposed project.</p> <p>Maintenance of the current status on animal life within the project area.</p>	<p>Upon cessation of the individual activity</p> <p>Throughout the operation phase</p>

<p>Soil Sampling</p>			<p><u>The drilling operation for blasting and use of campsite may result in the generation of surface water runoff contaminated with silt (sedimentation) and possibly hydrocarbon fluids should spillages occur:</u></p> <p>No mining operations will be undertaken within 32 metres from the nearby streams and 500 meters from the riparian areas.</p> <p>Sumps will be excavated for the collection mud and excess water from the pits/trenches. The sump will be sized such that it will be able to contain the water and mud that will be generated during the mining operation.</p> <p>Storm water generated around the excavated area will be diverted away to the clean water environment.</p> <p>No vehicle maintenance will be allowed on site. All hydrocarbons will be stored on protected storage areas away from the streams.</p> <p>Rehabilitation of pits/trenches period will be undertaken done in such a manner that the environment is protected from probable spillages and contamination by carbonaceous material.</p> <p>Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility.</p> <p>The landowners' borehole water quality and yield will be closely monitored during the drilling operation for blasting.</p> <p>Should it be proven that the operation is affecting the quantity and quality of groundwater available to users and surrounding water resources, the affected parties must be compensated.</p> <p>.</p> <p>All waste generated from blast hole and the campsite will be collected in proper receptacles and removed to a registered disposal facility e.g., sewage treatment plant, solid waste disposal site or hydrocarbon recycling or treatment facilities.</p> <p>The contaminated soils will be removed and disposed of at a licensed waste disposal facility.</p> <p>All waste generated from the blast hole and the campsite will be collected in proper receptacles and removed to registered disposal facilities e.g., sewage treatment plant, solid waste disposal site or hydrocarbon recycling or treatment facilities.</p> <p><u>Generation of dust and fuel fumes by vehicular movement:</u></p>	<p>The mitigation measures will ensure that the drilling operation for blasting does not have detrimental impacts on the surface and ground water environment, and that the activities will comply with the provisions of the NWA.</p>	
			<p>Dust suppression must be conducted during the operational phase of the project.</p> <p>Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes.</p> <p>Maintain a speed limit of 20km/hr during the dry season and or when the wind velocity is likely to result in an increased nuisance dust.</p> <p>Materials transported on public roads must be covered.</p> <p><u>Increased noise levels:</u></p> <p>Limit the maximum speed to 40 km/h or less, subject to risk assessment.</p> <p>Less noisy equipment will be used, the equipment will be kept in good working order and the equipment will be fitted with correct and appropriate noise abatement measures.</p> <p>Ensure that the employees are issued with earplugs and that they are instructed to use them.</p> <p>Educate employees on the dangers of hearing loss due to mine machinery noise.</p> <p>Pits/trenches site shall be located as far from private property as is possible to minimise noise impacts</p> <p><u>Visual impacts on the surrounding communities and road users from the construction:</u></p> <p>The landowners will be informed on the type of machinery and equipment to be used at the mining sites.</p> <p>Lighting will be conducted in manner that will reduce the impacts on visual aspects at night times.</p> <p>Materials transported on public roads must be covered.</p> <p>The number of construction vehicles and machinery to be used shall be kept to a minimum.</p>	<p>The air quality in the vicinity of the pits/trenches and sites' access routes will be maintained to stay within the national air quality standards.</p> <p>The mitigation measures will ensure that the noise levels from the sites will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 guidelines.</p> <p>Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives.</p>	

			<p>Movement of vehicles shall be kept to outside busy hours to minimise the visual impacts on the residents.</p> <p>All lighting shall be kept to a minimum within the requirements of safety and efficiency. Where such lighting is deemed necessary, low-level lighting, which is shielded to reduce light spillage and pollution, shall be used.</p> <p>No naked light sources shall be directly visible from a distance. Only reflected light shall be visible from outside the site.</p> <p>External lighting shall use down-lighters shielded in such a way as to minimise light spillage and pollution beyond the extent of the area that needs to be lit.</p> <p>Security and perimeter lighting shall be shielded so that no light falls outside the area needing to be lit</p> <p>Drill rigs shall be located in areas with adequate tree and bush cover to minimise the visual impact on residents.</p> <p>Where no adequate vegetation cover is available for the drill rigs, shade cloths can be used to screen off the drill rigs.</p> <p>Where possible, rehabilitation of the work areas shall be undertaken in tandem with construction to ensure that areas stripped of vegetation are kept to a minimum</p> <p><u>Damage or destruction of sites with archaeological and cultural significance:</u></p> <p>The pits/trenches will be situated away from any identified grave site or heritage sites. A 50 m buffer will be created between the sites and the proposed camp and pits/trenches.</p> <p><u>Safety, intrusion livelihood impacts on the landowners and occupiers:</u></p> <p>Residents shall be informed of any road closures and other disruptions and maintain roads used for the operation in good order. Clear signage shall be installed around the project area indicating the type of disruption and the time during which the disruptions will occur.</p> <p>Communication with landowners and land occupiers shall be kept open during the operational phase of the project. A record of such communication shall be kept on site.</p> <p>Ensure that negotiations on compensation are undertaken before the blasting programme can commence. This will include any other conditions that the landowners may deem necessary for the mining operation. The outcomes of the negotiations shall be recorded and kept in a file on site.</p> <p>Ensure that safety measures are implemented to prevent impacts on landowners and occupiers.</p> <p>Access to private property, outside of the demarcated pits/trenches site, without landowner consent shall be strictly prohibited.</p> <p><u>Traffic:</u></p> <p>Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads;</p> <p>Where possible the transportation of materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents;</p> <p>The number of construction vehicles and trips shall be kept to a minimum</p> <p>All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.</p> <p><u>Flora:</u></p> <p>All disturbed areas must be concurrently rehabilitated.</p> <p>Prohibit the collection of any plant material for firewood or medicinal purposes.</p> <p>The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the construction areas</p> <p>Edge effect control shall be implemented to avoid further habitat degradation outside of the proposed footprint area.</p>	<p>With the implementation of the mitigation measures, the Blast hole Drilling will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist.</p> <p>The mine will ensure that all safety standards are met and that access to landowners and occupiers are not detrimentally affected</p> <p>The objective is to warn the general public of construction traffic, and to manage traffic on site and implementing the mitigation measures will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles</p> <p>The implementation of mitigation measures will ensure that the blast hole drilling activities do not have detrimental impact on the area's flora.</p>	
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Data Analysis	Feasibility Studies		N/A	N/A	N/A	N/A
Feasibility Studies Report			N/A	N/A	N/A	N/A
trenching	Closure and Rehabilitation of pits/trenches and infrastructure sites	Decommissioning and Closure	All the affected sites	<p><u>Compaction and contamination of soils within the rehabilitation site:</u></p> <p>All vehicles and machinery used at the rehabilitation site will be kept in good working order.</p> <p>No repairs of vehicles or machinery will be conducted at the rehabilitation site unless it is emergency repairs, which will be conducted on protected ground.</p> <p>Movement of mine vehicles and machinery will be limited to demarcated routes, which will be rehabilitated when no longer in use.</p> <p><u>Re-instatement of soil productivity, land capability and land use:</u></p> <p>All infrastructure will be removed from the site in accordance to the rehabilitation plan.</p> <p>Contaminated soils shall be cleaned or disposed of at a registered landfill site in terms of the requirements of the NEM: WA.</p> <p><u>Pollution of surface water environment:</u></p> <p>The site area will be rehabilitated to be free draining.</p> <p>Erosion protection measures such as the use of contour berms and repair of gullies will be undertaken until such time that the rehabilitated surfaces can be shown to be sustainable.</p> <p>Existing roads should be used where possible and new disturbed areas should be minimised.</p> <p><u>Air pollution from rehabilitation site:</u></p> <p>Where necessary, wet suppression will be conducted at areas with excessive dust emissions.</p> <p>Vehicles and machinery will be well maintained.</p> <p>The traffic volumes and speed within the rehabilitation site will be controlled.</p>	Rehabilitated areas will be maintained to comply with the closure objectives.	Upon cessation of the aggregate stone-dolerite, Clay and sand mining
Removal of equipment and infrastructure				<p><u>Nuisance Noise:</u></p> <p>Smaller or less noisy equipment should where possible be used when working near receptors.</p> <p>Equipment will be well maintained and fitted with the correct and appropriate noise abatement measures.</p>	Rehabilitated areas will be maintained to comply with the closure objectives.	

				<p><u>Damage or destruction of sites with Archaeological and cultural significance:</u> A 50m buffer will be maintained between any site and the archaeological site.</p>	<p>Should heritage sites be identified, rehabilitation in close proximity to the sites will not be damaged or destroyed by the rehabilitation activities</p>	
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35 Impact Management Outcomes

Table 35-1: Impact Management

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
Data Collection and Assessment	Desktop Study	None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Geological Mapping		None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Planning for Pits/trenches		None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of pits/trenches	Loss of soils, erosion of the soils and impacts on landowners' livelihood.	Soils, Land capability and Land use	Construction	Rehabilitation of areas cleared of vegetation and dust control	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas
Pits/trenches site		Contamination of groundwater from hydrocarbon spillages	Groundwater	Construction	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Comply with the EMPr. Retain topsoil integrity for the reuse in rehabilitation. Where required, disposal of contaminated soils shall be undertaken in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA)
Temporary Soil Storage Area		Contamination of surface water due to erosion of soils which will lead to increased turbidity as well as contamination from hydrocarbon spillages	Surface water	Construction	Monitoring through rehabilitation and management of spoil sites	Retain topsoil integrity for the reuse in rehabilitation Comply with the requirements of the NWA: no construction activities within 100 m of water courses and 500m of riparian zones without consent from the DWS.
Fence		Riparian area contamination, destruction and loss of habitat	Aquatic ecosystems	Construction	Control of access to riparian areas and within the regulated 500 m buffer.	National Water Act, 1998 (Act 36 of 1998) No construction activities may be conducted within 500 m of riparian zones without approval from the DWS.
Hydrocarbon storage area		Destruction of graves and cultural heritage sites	Heritage and archaeological resources	Construction	Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites	No destruction/loss of heritage resources
Mobile office		Destruction of fossils	Palaeontological resources	Construction	Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified	No destruction/loss of fossils
Ablution Facility		Loss of natural vegetation in the affected areas	Flora	Construction	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) and Alien and Invasive Species Regulations, 2014. No vegetation clearance outside of demarcated areas
		Migration of fauna due to disturbance caused by the proposed project	Fauna	Construction	Relocation of affected species of conservation importance	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		Air pollution through nuisance dust, PM 10 and PM2.5 as well as emissions from construction vehicles and machinery.	Air Quality	Construction	Dust control measures	Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural communities. Comply with the requirements of the Minimum Emission Standards
		Increase in ambient noise due to movement of construction vehicles and machinery	Noise	Construction	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers Control through the limiting of the activities to the day time and the implementation of an open and transparent channel of communication	Remain within the Noise Regulation Standards for Rural Areas.
		Visual impacts as a result of vegetation clearance	Visual	Construction	Rehabilitation of areas cleared of vegetation	Vegetation clearance must be limited to demarcated areas only
		Increased traffic on the roads due to additional construction vehicles	Traffic, Socio-economic	Construction	Speed control and limitation of the times when construction vehicles may be on the roads	Minimise the number of vehicles used during construction Movement of construction vehicles shall be limited to outside of busy hours
		Impact of carbon dioxide (GHG) produced by construction vehicles on the local climate	Climate Change	Construction	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Comply with the EMPr Minimise the number of vehicles used during construction Regular maintenance of vehicles and machinery to improve fuel efficiency Comply with requirements of the National Environmental Management: Air Quality Act, 2004
Trenching	Excavation and blasting	It is expected that during the operation phase the project will not result in the creation of employment as mining requires highly specialised personnel. The applicant will make use of qualified contractors for the blast hole drilling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day to day operations by affected landowners	Socio-Economic	Operation	Control of times during which operation activities will take place	Maintain a 100% crime free area within the control of the mining No complaints from landowners due to mining activities. Should there be conflicts, these must be resolved
		The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The mining operations will require the blast hole Drilling, which may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Groundwater	Operation	Rehabilitation of affected areas and control using bunds	No soil contamination as a result of hydrocarbon spillages Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
Soil Sampling		Blast hole Drilling may result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the water quality due to increase turbidity and an increase in acidity of the water in the streams. This will have an impact on aquatic habitats.	Surface Water	Operation	Control through management and monitoring of surface runoff	Retain topsoil integrity for the reuse in rehabilitation. No dirty runoff/stormwater entering water courses. The NWA: No activities within 100 m of watercourses and drainage without consent from the DWS. No soil contamination as a result of hydrocarbon spillages

NAME OF ACTIVITY	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved	
						Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
		Uncontrolled movement within riparian zones may have an impact on the aquatic ecological habitat, ecological functioning and structure.	Aquatic Ecosystems	Operation	Avoidance of riparian areas	NWA: No activities shall be permitted within 500 m of riparian areas without prior approval from the DWS Comply with requirements of the NWA
		The project may result in the following impacts on the floral environment during the operation phase: Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion and sedimentation; Impact on floral diversity as a result of possible uncontrolled fires; Potential spreading of alien invasive species as a result of floral disturbance; and Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase	Flora	Operation	Rehabilitation of affected areas Monitoring of rehabilitated areas to ensure success.	No invasive plant species in rehabilitated areas No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation and/or removal of contaminated soils
		The project may result in the following impacts on the faunal environment during the operation phase: Migration of fauna from the mining area due to noise as a resulting of blasting activities; Loss of faunal due to collisions with vehicles and machinery; Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping; Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.	Fauna	Operation	Rehabilitation of affected areas	No removal of vegetation outside of demarcated areas.
		The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The materials removed from the pits/trenches will contain carbonaceous material, which has potential for contamination should it not be managed properly. The material from the excavated area may result in the contamination of soils, which may render the land not usable after backfilling operation.	Soils Land use and Land Capability	Operation	Rehabilitation of affected areas	Retain topsoil integrity for the reuse in rehabilitation.
		The movement of vehicles and earthmoving machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery.	Air Quality	Operation	Dust control measures	Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural as well as Minimum Air Emissions Standards
		The drill rig and towers used during the blasting phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the mining area.	Visual	Operation	Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable	No removal of vegetation outside de of demarcated area to ensure as much vegetation cover for the rigs, as possible Make use of rigs that have earthy cover to minimise the visual impact

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		The Blast hole Drilling may result in the destruction of graves and other heritage resources.	Heritage Resources	Operation	Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites	No destruction/loss of heritage resources Comply with requirements of the SAHRA
		Earth moving activities may result in the destruction of fossils (if any).	Palaeontological Resources	Operation	Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified	No destruction/loss of fossils Comply with requirements of the SAHRA
		The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The blast drilling activities will also result in an increase in noise in the vicinity of the project.	Noise	Operation	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers	Remain within the Noise Regulation Standards for Rural Areas. National Noise Control Regulations, SANS10103:2008 guidelines.
		The movement of vehicles in the project area will result in an increase in traffic on the roads.	Traffic	Operation	Speed control and limitation of the times when construction vehicles may be on the roads	Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times
		The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.	Climate	Operation	Control and keep to a minimal the number of vehicles used for operations. Vehicles must be maintained to ensure efficient use of fuel.	Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural as well as Minimum Air Emissions Standards Minimise the number of vehicles
		Drilling ground vibrations may result in possible damage to infrastructure.	Drilling and Vibrations	Operation	Pits/trenches site must be located as far from infrastructure as is possible to avoid damage to infrastructure	No private infrastructure shall be damaged/lost due to blasting vibrations
Data Analysis	Feasibility Studies	None	N/A	Operation	N/A	N/A
Feasibility Studies Report		None	N/A	Operation	N/A	N/A
Removal of equipment and infrastructure	Closure and Rehabilitation of pits/trenches and infrastructure sites	The removal of the campsite equipment and the rehabilitation of the pits/trenches and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Soils, Land Capability and Land Use	Decommissioning and Closure	N/A	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before mining activities
		Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by the campsite and pits/trenches.	Land Use	Decommissioning and Closure	N/A	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before mining activities
		The use of vehicles/machinery during the rehabilitation may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	Soils and Vegetation	Decommissioning and Closure	Control and prohibit access of vehicles and machinery to areas outside of established access tracks Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of a soil management programme in terms of the correct tops oil removal, stockpiling and rehabilitation practices as discussed in the EMPr.	Vehicle movement shall be limited to areas demarcated as access tracks Comply with the requirements of the EMPr

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Surface Water	Decommissioning and Closure	Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of the NWA GN 704 water management principles.	Maintain the water quality of water course in the project area Ensure that dirty stormwater and runoff is diverted from the water courses and riparian areas Comply with the requirements of GN704
		Rehabilitation and removal of the mining sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generated diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Air Quality	Decommissioning and Closure	Dust control measures and rehabilitation of areas stripped of vegetation	Comply with the requirements of the National Environmental Management Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
		Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Noise	Decommissioning and Closure	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers	Comply with the Noise Regulation Standards for Rural Areas.

36 Impact Management Actions

Table 36-1: Impact management actions

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	MITIGATION TYPE	Time Period for Implementation	Compliance with standards
Data Collection and Assessment	Desktop Study	None	Control potential deviations from the approved Mining Works Programme through the effective implementation of the data acquisition and desktop study.	Planning	Remain within the ambits of the EMPr and Environmental Authorisation.
Geological Mapping		None	Control potential deviations from the approved Mining Works Programme through the effective implementation of the data acquisition and desktop study.	Planning	Remain within the ambits of the EMPr and Environmental Authorisation.
Planning for Pits/trenches		None	Control potential deviations from the approved Mining Works Programme through the effective implementation of the data acquisition and desktop study.	Planning	Remain within the ambits of the EMPr and Environmental Authorisation.
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of pits/trenches	Loss of soils, erosion of the soils and impacts on landowners' livelihood.	Rehabilitation of areas cleared of vegetation and dust control	Construction	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas
Pits/trenches site		Contamination of groundwater from hydrocarbon spillages	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Construction	Comply with the EMPr. Retain topsoil integrity for the reuse in rehabilitation. Where required, disposal of contaminated soils shall be undertaken in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA)
Temporary Soil Storage Area		Contamination of surface water due to erosion of soils which will lead to increased turbidity as well as contamination from hydrocarbon spillages	Monitoring through rehabilitation and management of spoil sites	Construction	Retain topsoil integrity for the reuse in rehabilitation Comply with the requirements of the NWA: no construction activities within 100 m of water courses and 500m of riparian zones without consent from the DWS.
Fence		Riparian Zone contamination, destruction and loss of habitat	Control of access to riparian areas and within the regulated 500 m buffer.	Construction	National Water Act, 1998 (Act 36 of 1998) No construction activities may be conducted within 500 m of riparian zones without approval from the DWS.
Hydrocarbon storage area		Destruction of graves and cultural heritage sites	Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites	Construction	No destruction/loss of heritage resources
Mobile office		Destruction of fossils	Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified	Construction	No destruction/loss of fossils
Ablution Facility		Loss of natural vegetation in the affected areas	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Construction	Comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) and Alien and Invasive Species Regulations, 2014. No vegetation clearance outside of demarcated areas
		Migration of fauna due to disturbance caused by the proposed project	Relocation of affected species of conservation importance	Construction	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation
		Air pollution through nuisance dust, PM 10 and PM 2.5 as well as emissions from construction vehicles and machinery.	Dust control measures	Construction	Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural communities. Comply with the requirements of the Minimum Emission Standards

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	MITIGATION TYPE	Time Period for Implementation	Compliance with standards
		Increase in ambient noise due to movement of construction vehicles and machinery	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers Control through the limiting of the activities to the day time and the implementation of an open and transparent channel of communication	Construction	Remain within the Noise Regulation Standards for Rural Areas.
		Visual impacts as a result of vegetation clearance	Rehabilitation of areas cleared of vegetation	Construction	Vegetation clearance must be limited to demarcated areas only
		Increased traffic on the roads due to additional construction vehicles	Speed control and limitation of the times when construction vehicles may be on the roads	Construction	Minimise the number of vehicles used during construction Movement of construction vehicles shall be limited to outside of busy hours
		Impact of carbon dioxide (GHG) produced by construction vehicles on the local climate	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Construction	Comply with the EMPr Minimise the number of vehicles used during construction Regular maintenance of vehicles and machinery to improve fuel efficiency Comply with requirements of the National Environmental Management: Air Quality Act, 2004
Trenching	Excavation and blasting	It is expected that during the operation phase the project will not result in the creation of employment as mining requires highly specialised personnel. The applicant will make use of qualified contractors for the blast hole drilling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day to day operations by affected landowners	Control of times during which operation activities will take place	Operation	Maintain a 100% crime free area within the control of the mining No complaints fro landowners due to mining activities. Should there be conflicts, these must be resolved
		The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The mining operations will require the blast hole Drilling, which may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Rehabilitation of affected areas and control using bunds	Operation	No soil contamination as a result of hydrocarbon spillages Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
Soil Sampling		Blast hole Drilling may result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the water quality due to increase turbidity and an increase in acidity of the water in the streams. This will have an impact on aquatic habitats.	Control through management and monitoring of surface runoff	Operation	Retain topsoil integrity for the reuse in rehabilitation. No dirty runoff/stormwater entering water courses. The NWA: No activities within 100 m of watercourses and drainage without consent from the DWS. No soil contamination as a result of hydrocarbon spillages Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
		The project may result in the following impacts on the floral environment during the operation phase: Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion and sedimentation; Impact on floral diversity as a result of possible uncontrolled fires;	Avoidance of riparian areas	Operation	NWA: No activities shall be permitted within 500 m of riparian areas without prior approval from the DWS Comply with requirements of the NWA

NAME OF ACTIVITY	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	MITIGATION TYPE	Time Period for Implementation	Compliance with standards
	<p>Potential spreading of alien invasive species as a result of floral disturbance; and</p> <p>Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase</p>			
	<p>The project may result in the following impacts on the faunal environment during the operation phase:</p> <p>Migration of fauna from the mining area due to noise as a resulting of blast drilling activities;</p> <p>Loss of faunal due to collisions with vehicles and machinery;</p> <p>Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping;</p> <p>Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.</p>	<p>Rehabilitation of affected areas</p> <p>Monitoring of rehabilitated areas to ensure success.</p>	<p>Operation</p>	<p>No invasive plant species in rehabilitated areas</p> <p>No removal of vegetation outside of demarcated areas.</p> <p>Ensure successful rehabilitation and/or removal of contaminated soils</p>
	<p>The use of vehicles during rehabilitation of pits/trenches period may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The materials removed from the pits/trenches will contain carbonaceous material, which has potential for contamination should it not be managed properly. The material from the excavated area may result in the contamination of soils, which may render the land not usable after backfilling operation.</p>	<p>Rehabilitation of affected areas</p>	<p>Operation</p>	<p>Retain topsoil integrity for the reuse in rehabilitation.</p>
	<p>The movement of vehicles and earthmoving machinery will likely result in an increase in nuisance dust, PM10 and PM2.5.</p> <p>There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery.</p>	<p>Dust control measures</p>	<p>Operation</p>	<p>Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural as well as Minimum Air Emissions Standards</p>
	<p>The drill rigs and towers used during the blasting operation phase will be visible from nearby locations, and will have visual impact on the local communities in close proximity to the mining area.</p>	<p>Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable</p>	<p>Operation</p>	<p>No removal of vegetation outside de of demarcated area to ensure as much vegetation cover for the rigs, as possible</p> <p>Make use of rigs that have earthy cover to minimise the visual impact</p>
	<p>The Blast hole Drilling may result in the destruction of graves and other heritage resources.</p>	<p>Control through clear demarcation of mining areas to ensure avoidance of graves and other heritage sites</p>	<p>Operation</p>	<p>No destruction/loss of heritage resources</p> <p>Comply with requirements of the SAHRA</p>
	<p>Earth moving activities may result in the destruction of fossils (if any).</p>	<p>Management of pits/trenches site. Should any fossils be discovered, operations must cease and SAHRA must be notified</p>	<p>Operation</p>	<p>No destruction/loss of fossils</p> <p>Comply with requirements of the SAHRA</p>
	<p>The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The blasting activities will also result in an increase in noise in the vicinity of the project.</p>	<p>Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies eg noise mufflers</p>	<p>Operation</p>	<p>Remain within the Noise Regulation Standards for Rural Areas.</p> <p>National Noise Control Regulations, SANS10103:2008 guidelines.</p>
	<p>The movement of vehicles in the project area will result in an increase in traffic on the roads.</p>	<p>Speed control and limitation of the times when construction vehicles may be on the roads</p>	<p>Operation</p>	<p>Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times</p>
	<p>The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.</p>	<p>Control and keep to a minimal the number of vehicles used for operations. Vehicles must be maintained to ensure efficient use of fuel.</p>	<p>Operation</p>	<p>Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural as well as Minimum Air Emissions Standards</p>

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	MITIGATION TYPE	Time Period for Implementation	Compliance with standards
					Minimise the number of vehicles
		Blasting may result in possible damage to infrastructure.	Pits/trenches site must be located as far from infrastructure as is possible to avoid damage to infrastructure	Operation	No private infrastructure shall be damaged/lost due to blasting vibrations
		None	N/A	Operation	N/A
Data Analysis	Feasibility Studies	None	N/A	Operation	N/A
Feasibility Studies Report		The removal of the campsite equipment and the rehabilitation of the pits/trenches and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	N/A	Decommissioning and Closure	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before mining activities
	Closure and Rehabilitation of pits/trenches and infrastructure sites	Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by the campsite and pits/trenches.	N/A	Decommissioning and Closure	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before mining activities
Removal of equipment and infrastructure		The use of vehicles/machinery during the rehabilitation may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	Control and prohibit access of vehicles and machinery to areas outside of established access tracks Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of a soil management programme in terms of the correct tops oil removal, stockpiling and rehabilitation practices as discussed in the EMPr.	Decommissioning and Closure	Vehicle movement shall be limited to areas demarcated as access tracks Comply with the requirements of the EMPr
		During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Control through the clear delineation of the mining area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of the NWA GN 704 water management principles.	Decommissioning and Closure	Maintain the water quality of water course in the project area Ensure that dirty stormwater and runoff is diverted from the water courses riparian areas Comply with the requirements of GN704
		Rehabilitation and removal of the mining sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generated diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Dust control measures and rehabilitation of areas stripped of vegetation	Decommissioning and Closure	Comply with the requirements of the National Environmental Management Air Quality Act, 2004 Dust Regulation guidelines for rural communities.
		Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Decommissioning and Closure	Comply with the Noise Regulation Standards for Rural Areas.

37 Financial Provision

37.1 Determination of the amount of Financial Provision.

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

The rehabilitation plan was developed on the basis that the rehabilitated areas will be left safe, stable, non-polluting and able to support a self-sustaining ecosystem similar to the surrounding natural environment. To ensure that the rehabilitation plan is aligned with the closure objective, a high-level risk assessment of the mining components was undertaken to establish the potential risks associated therewith.

The closure objectives are to:

- Remove and/or rehabilitate all pollution and pollution sources such as waste materials and spills;
- To establish a rehabilitated area that is not susceptible to soil erosion which may result in the loss of soil, degradation of water resources and aquatic environments;
- Restore disturbed areas and re-vegetate these areas with plant species naturally occurring the area to restore the ecological function of such areas, as far as is practicable; and
- To eradicate all alien invasive plant species that may colonise the areas that have been cleared of vegetation.

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

The draft BAR and EMPr was made available to all registered I&APs for a 30-day review and comment period. All comments received and responses provided to the stakeholders have been incorporated into the final BAR and EMPr.

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

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

The only rehabilitation that will specifically be required is backfilling of the pit and revegetation:

- Re-vegetation: A suitably qualified ecologist will be appointed to determine the appropriate species that may be used for re-vegetating the area.
- Re-vegetation efforts will be monitored every second month for a period of 6 months after the initial seeding. An effective vegetation cover of 45% must be achieved. Re-seeding will be undertaken if the vegetation cover has not been achieved after 6 months.

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

Due to the nature of the activities, the impacts will be very limited and of short duration. The management plan is in such a manner as to ensure concurrent rehabilitation. The impacts of the blasting drill holes and Excavation/pit activities will be temporary in nature and a detailed management plan has been provided to address potential impacts.

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

The financial provision for the environmental rehabilitation and closure of any mine/mining and its associated operations forms an integral part of the MPRDA. Sections 41 (1) and, 41 (2), 41 (3) and 45 of the MPRDA deal with the financial provision for rehabilitation and closure. During 2012, the DMR made updated rate available for the calculation of the closure costs, where contractor's costs are not available, these apply.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the DMR in January 2005 in order to empower the personnel at Regional DMR offices to review the quantum determination for the rehabilitation and closure for mining sites.

With the determination of the quantum for closure, it must be assumed that the infrastructure had no salvage value (clean closure). The closure cost estimate (clean closure) was determined in accordance with the DMR guidelines.

The amount required to cover the rehabilitation is anticipated to be R 299 745.00 at this stage as shown in Table 37-1.

Table 37-1: Cost Estimate Expenditure

CALCULATION OF THE QUANTUM

Applicant: **Miserbrite**

DMR Ref No:

NC10823 MP

Evaluators: **Ndi Geological Consulting Service (Pty) Ltd**

Date:

2020/08/11

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	500	15.94	1	1	7970
2 (A)	Demolition of steel buildings and structures	m2	0	221.99	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	20	327.14	1	1	6542.8
3	Rehabilitation of access roads	m2	1000	39.72	1	1	39720
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	385.55	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	210.3	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	443.97	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	0.5	225957.57	0.52	1	58748.9682
7	Sealing of shafts adits and inclines	m3	0	119.17	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0.2	155155.97	1	1	31031.194
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	193243.96	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	561272.05	1	1	0
9	Rehabilitation of subsided areas	ha	0	129919.76	1	1	0
10	General surface rehabilitation	ha	0.5	122909.7	1	1	61454.85
11	River diversions	ha	0	122909.7	1	1	0
12	Fencing	m	0	140.2	1	1	0
13	Water management	ha	0	46733.73	1	1	0

14	2 to 3 years of maintenance and aftercare	ha	0.5	16356.8	1	1	8178.4
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
Sub Total 1							213646.2122

1	Preliminary and General	25637.54546	weighting factor 2		25637.54546
			1		
2	Contingencies	21364.62122			21364.62122
Subtotal 2					260648.38

VAT (15%)	39097.26
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Grand Total	299746
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37.1.6 Confirm that the financial provision will be provided as determined.

The amount required to cover the rehabilitation is estimated to be R 299 745.00 at this stage as provided in Table 37-1.

Misabrite will fund the operation and hereby undertakes to fund the operations and to manage the operations. The applicant (Misabrite) hereby confirms that the financial provision will be provided as determined in Table 37-1.

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

38.1 Monitoring of Impact Management Actions

Please refer to Table 38-1.

38.2 Monitoring and Reporting Frequency

Please refer to Table 38-1.

38.3 Responsible Persons (Roles and Responsibilities)

Generic roles that require to be defines for the project include:

- Project Developer;
- Environmental Control Officer;
- Environmental Health and Safety (EHS) Manager; and
- Site Manager.

The typical requirements of each of the roles are provided in the following sections.

38.3.1 Project Developer

The Project Developer (Misabrite) is the 'owner' of the project and as such is responsible for ensuring that the conditions of the Environmental Authorisation issued in terms of NEMA (should the project receive such authorisation) are fully complied with, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that Misabrite will appoint the Environmental Control Officer, EHS Manager and Site Manager.

38.3.2 Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed to monitor the compliance of the proposed project with the conditions of Environmental Authorisation (should such authorisation be granted by DMR) during the construction phase (and possibly the operational phase, depending on the requirements of DMR). The ECO must also monitor compliance of the proposed project with environmental legislation and conditions of the EMPr. The roles and responsibilities of the ECO should include the following:

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances. It is recommended that weekly or bi-weekly environmental audits be undertaken by the ECO during the construction phase.
- Environmental compliance reports must be submitted by the ECO to the DMR on an annual basis or as stipulated by the DMR.
- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by DMR) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.

- Prior to the commencement of construction, the ECO must meet on site with the Site Manager to confirm the construction procedure and designated construction areas.

38.3.3 Environmental Health and Safety (EHS) Manager

The EHS Manager will be appointed to fulfil the roles of the Environmental Officer during the construction phase and the Environmental Manager during the operational phase. The responsibility of the EHS Manager include overseeing the implementation of the EMPr during the construction and operational phases, monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessary. The EHS Manager is also responsible for monitoring compliance with the conditions of the Environmental Authorisation that may be issued to Misabrite

The lead contractor and sub-contractors may have their own Environmental Officers or designate Environmental Officer functions to certain personnel.

During construction, the EHS Manager will be responsible for the following:

- Meeting on site with the Site Manager prior to the commencement of construction activities to confirm the construction procedure and sites allocated for the Excavation/pit site and infrastructure required for the project.
- Daily or weekly monitoring of site activities during construction to ensure adherence to the specifications contained in the EMPr and Environmental Authorisation (should such authorisation be granted by DMR), using a monitoring checklist that is to be prepared at the start of the construction phase.

38.3.4 Site Manager

The site manager will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the facility.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and ensuring that all employees and contractors and sub-contractors are aware of the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employ an Environmental Officer (or have a designated Environmental Officer function) to monitor and report on the daily activities on-site during the construction period.
- Ensuring that safe, environmentally acceptable working methods and practices are implemented, and that sufficient plant and equipment is made available, is properly operated and maintained in order to facilitate proper access and enable any operation to be carried out safely.
- Meeting on site with the EHS Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the programme.
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the EHS Manager.

38.4 Time Period for Implementing Impact Management Actions

Please refer to Table 38-1.

38.5 Mechanism for Monitoring Compliance

Please refer to Table 38-1.

Table 38-1: Mechanisms for Monitoring

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Site Clearance and removal of vegetation Drilling of blasting boreholes when necessary Stockpiling material from site clearance Discarding material from pits/trenches site Rehabilitation of pits/trenches Construction of temp/mobile site infrastructure and access routes Stormwater management Storage of diesel and vehicle/machinery maintenance equipment. Water extraction from municipality and/or tank. Waste generation and management. Demolition and/or removal of temporary infrastructure/equipment Rehabilitation and restoration of disturbed areas	Soil Erosion	Management and monitoring of soil stockpiles. Soils must be stored properly and revegetated to prevent erosion and to enable re-use during rehabilitation. Stockpiles must be visually inspected daily to ensure that no erosion is taking place	ECO, Site Manager	Daily Monitoring and Monthly Reporting
	Loss of Indigenous plant Species	A suitably ecologist or horticulturist will be required to make recommendations regarding the collection, propagation/storage and translocation of plants is advised.	ECO, Site Manager	Monthly monitoring and reporting. Monitoring will be required at all the construction and operational activities until such time that rehabilitation is completed, and sustainability of vegetation cover is achieved.
	Faunal Habitat Loss	Adhere to law and best practice guidelines regarding the displacement and relocation of CI fauna Where required fauna shall be relocated to an area with a similar habitat as the project area Time construction activities to minimise faunal mortality Poaching of fauna shall be prohibited Uncontrolled fires shall not be permitted on site and persecution or hunting of fauna	ECO, Site Manager	Monthly monitoring and reporting. Monitoring will be required at all the construction and operational activities until such time that rehabilitation is completed, and sustainability of vegetation cover is achieved.
	Proliferation of alien invasive species	Declared weeds and alien invasive species must be eradicated. Management of alien invasive plant shall be undertaken throughout the	ECO, Site Manager	Monthly monitoring and reporting. Monitoring will be required at all the construction and operational activities until such time that rehabilitation is completed and sustainable.
	Nuisance dust and air emissions generation	During dry seasons, ensure that cleared (excavated) areas and unpaved surfaces are sprayed with water obtained from an approved source to minimise dust generation. Set up PM 2.5 and PM10 Monitoring sites in the area to monitor dust fall.	ECO, Site Manager	Monthly monitoring and reporting
	Loss of arable land/land for grazing	Ensure proper rehabilitation measures are adhered to in order to return the soil quality to its natural state.	ECO, Site Manager	Monitor monthly and report on an annual basis. Monitoring will be required until such time that rehabilitation is completed.
	Soil and groundwater contamination	Manage through the EMPr and develop a groundwater management programme. Collection of baseline hydrochemistry samples for analysis.	ECO, Site Manager	Monthly monitoring and reporting
	Groundwater extractions	Ensure that no groundwater extraction is undertaken without approval from the DWS Monitoring water levels of the boreholes found in close proximity to the proposed mining site, through a flow meter and water level data logger.	ECO, Site Manager	Monthly monitoring and reporting
	Visual Intrusion and loss of sense of place	Ensure that infrastructure is kept to its most "natural" state and keep a tidy visually ordered site. Rubble/litter/waste removal and disposal to be monitored throughout construction. Complaints about night lights should be investigated and documented in a register	ECO, Site Manager	Monthly monitoring and reporting
	Increased pressure on the road network	Speed control and limitation of the times when construction vehicles may be on the roads	ECO, Site Manager	Monthly monitoring and reporting
Soil disturbance resulting in the spread of alien	Alien invasive vegetation monitoring and control through Alien Invasive Management Plan	ECO, Site Manager	Monthly monitoring and reporting	

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
	Surface water contamination	Monitor surface water quality upstream and downstream of the mining area to ensure that the mining activities are not contamination to water resources	ECO, Site Manager	Monthly monitoring and reporting
	Riparian Area and Aquatic Ecosystem Loss	Ensure that there are construction activities that will be located within any riparian and aquatic ecosystem areas.	ECO, Site Manager	Monthly monitoring and reporting
	Destruction of graves and cultural resources	No pits/trenches shall impact graves and sites of heritage or cultural importance	ECO, Site Manager	Monthly monitoring and reporting
	Water Use	No water may be sources from rivers and streams without approval from the DWS. No clean water shall be used for dust suppression		
	Nuisance Noise	Measure noise levels routinely to ensure the noise levels are being kept within the acceptable ISO standards.	ECO, Site Manager	Monthly monitoring and reporting
	Health and safety of personnel	Routine safety checks, safety training and Inspections to be carried out during the construction and operation phase to enforce the use of Personnel Protective Equipment (PPE). This must also be included in the safety requirements of the Contract.	ECO, Site Manager	Routine inspection and Quarterly reporting
	Waste Management	Maintain a waste manifest book to record volumes of waste leaving the site, including recyclables. Keep safe disposal certificates on file on site for Hazardous waste. Way Bridge slips must be obtained for all other waste streams and kept on file on site	ECO, Site Manager	Monthly daily and report on a monthly basis
	Stormwater Management	Visual monitoring based on sediment Clean water must be kept separate from contaminated water emanating from the project sites	ECO, Site Manager	Monthly daily and report on a monthly basis
	Rehabilitation	Monitoring of the following: <ul style="list-style-type: none"> • Basal Cover • Arial Cover • Species diversity 	ECO, Site Manager	Rehabilitation will be undertaken throughout all the project phases. The final rehabilitation will be undertaken when the mining activities have been finalised. The ECO shall inspect the affected areas 6 months after finalisation of rehabilitation to assess the success of the rehabilitation.

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

Annual environmental audits must be undertaken to ensure compliance with the EMPr and EA. The environmental audit reports must also include the financial provision. The reports must be submitted to the DMR.

40 Environmental Awareness Plan

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

An Environmental Awareness and Risk Assessment Schedule has been developed and is outlined in Table 40-1. The purpose of this schedule is to ensure that onsite employees are not only trained, but that the principles are continuously re-enforced.

Table 40-1: Environmental Training and Awareness Schedule

Frequency	Time allocation	Objective
Induction (all staff and workers)	1-hour training on environmental awareness training as part of site induction	Develop an understanding of what is meant by the natural environmental and social environment and establish a common language as it relates to environmental, health, safety and community aspects. Establish a basic knowledge of the environmental legal framework and consequences of non-compliance. Clarify the content and required actions for the implementation of the Environmental Management Plan. Confirm the spatial extent of areas regarded as sensitive and clarify restrictions. Provide a detailed understanding of the definition, the method for identification and required response to emergency incidents.
Monthly Awareness Talks (all staff and workers)	30 minutes awareness talks	Based on actual identified risks and incidents (if occurred) reinforce legal requirements, appropriate responses and measures for the adaptation of mitigation and/or management practices.
Risk Assessments (supervisor and workers involved in task)	Daily task-based risk assessment	Establish an understanding of the risks associated with a specific task and the required mitigation and management measures on a daily basis as part of daily toolbox talks.

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

As prescribed in Table 40-1, Task/Issue based Risk Assessments must be undertaken with all workers involved in the specific tasks in order to establish an understanding of the risks associated with a specific task and the required mitigation and management measures contained in this report.

Environmental Awareness Training Content- Induction Training: The following environmental awareness training will be provided to all staff and workers who will be involved in mining activities :

- Description of the approved mining activities and content of the mining permit;
- An overview of the applicable legislation and regulations as they relate to environmental, health, safety and community;

Content and implementation of the approved EMPr specifically:

- Allocated roles and responsibilities;
- Management and mitigation measures; and
- Identification of risks and requirements adaptation.

Sensitive environments and features:

- Description of environmentally sensitive areas and features; and
- Prohibitions as it relates to activities in or in proximity to such areas.

Emergency Situations and Remediation:

- Methodology for the identification of areas where accidents and emergencies may occur, communities and individuals that may be affected;
- An overview of the response procedure;
- Equipment and resources;
- Designate of responsibilities;
- Communication, including communication with the potentially affected communities and responsible authorities; and
- Training schedule to ensure effective response.

Development of procedures and checklists: The following procedures will be developed, and all staff and workers will be adequately trained on the content and implementation thereof:

Emergency Preparedness and Response: The procedure will be developed to specifically include risk identification, preparedness, response measures and reporting. The procedure will specifically include spill and fire risk, preparedness and response measures. The appropriate emergency control centres (fire department, hospitals etc.) will be identified and the contact numbers obtained and made available on site. The procedure must be developed in consultation with potentially affected landowners.

In the event that risks are identified, which may affect adjacent landowners (or other persons), the procedure will include appropriate communication strategy to inform such persons and provide response measures to minimize the impact.

Incident Reporting Procedure: Incident reporting will be undertaken in accordance with an established incident reporting procedure to:

- Provide details of the responsible person, including any person who
- Is responsible for the incident;
- Owns any hazardous substance involved in the incident;
- Was in control when the incident occurred.
- Provide details of the incident (time, date, location);
- The details of the cause of incident;
- Identify aspects of the environment affected;
- The details of corrective action taken; and
- The identification of any potential residual or secondary risks that must be monitored and corrected or managed.

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

40.3 Specific information required by the Competent Authority

No specific information was required by the Competent Authority.

41 UNDERTAKING

The EAP herewith confirms

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



Signature of the environmental assessment practitioner:

Ndi Geological

Name of company:

11 August 2020

Date:

-END-

Appendices

Appendix 1: The Qualifications of the Environmental Assessment Practitioner

Appendix 2: Curriculum Vitae of the EAP

Appendix 3: Locality and Layout Maps

Appendix 4: Stakeholder Engagement Documents

Appendix 5: Supporting Impact Assessment

Appendix 6: Preliminary Layout Plan, including Environmental Attributes

Appendix 7: Composite Map

Appendix 8: DEA Screening Tool Report

Appendix 9: Specialist Studies Reports

