Application for a Mining Permit and Associated Environmental Authorization for the Proposed Mining of Diamonds on a Portion of Portion 4 of Farm Colga 132 JO, located in the Ngaka Modiri Molema District Municipality, North West Province.

Draft Basic Assessment Report

DMPR Reference Number: NW30/5/1/3/2/12219MP

Report Prepared for

G and E Global Mining (Pty) Ltd



Report Prepared by

GEOLOGICAL CONSULTING SERVICES PTY (LTD)

August 2026

Title:	*Application For a Mining Permit and Associated Environmental Authorisation for The Proposed Mining of Diamonds with associated minerals that may include Limestone, Manganese, Aggregate, Sand, lead and Gold on a Portion of Portion 4 of Farm Colga 132 JO, Located in the Ngaka Modiri Molema District Municipality, North West Province*
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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DMPR Ref: NC12219MP

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: G and E Global Mining (Pty) Ltd
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FILE REFERENCE NUMBER SAMRAD: NC12219MP

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 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 considered 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

G and E Global Mining (G and E Global) has appointed Ndi Geological Consulting Services (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed diamond ming project located in the Ngaka Modiri District Municipality.

The proposed mining project will cover an area of about 5 hectares and is located approximately 14 km southwest of Mahikeng, North West Province of South Africa.

G and E Global requires a ming permit in terms of the Mineral and Petroleum Resources Development Act (Act No. 22 of 2002) (MPRDA). Before the mining permit will be granted, G and E Global 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 North West Department of Mineral Resources (DMRE).

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 DMRE 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 activities listed in Listing Notices 1 and 3 of the NEMA, a Basic EIA authorisation process in terms of NEMA Government Notice Regulation (GNR) 326 of 7 April 2017 will be required.

The total duration of the mining activities is planned for five (5) years. However, under mining permit applications the applicant can only apply for a period of two (2) years, with potential to renew the MP. The MP will be renewed three (3) times to make up for the 5 years required. Where possible, rehabilitation will be conducted in tandem with the mining activities, with the final rehabilitation being undertaken once the mining activities have been completed at a site and before the mining team leaves the site.

The Interested and Affected Parties (I&APs) engagement process, as part of the EA process, is conducted in terms of NEMA (as amended) which provides clear guidelines for I&APs 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 I&AP engagement process is primarily aimed at affording 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 I&APs is to provide the competent authority with the necessary information 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. I&APs were therefore invited to participate in the public review period of the Basic Assessment Report (Draft BAR) from 14 August 2026 to 13 September 2026 to ensure that the assessment of impacts and proposed management of impacts have addressed their concerns. After the public review period, the report will be updated with comments received from I&APs on the Final BAR.

The updated Final BAR will be submitted to the competent authority (DMPR) and other commenting authorities for review once the comments from the I&APs are incorporated into the Draft BAR. The DMPR will consider the findings in consultation with various authorities and decide whether environmental authorisation should be granted for the proposed mining project.

This EIA and EMPr has been compiled in terms of the provisions of Appendix 1 and Appendix 4 GNR 325 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 326 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 6-1
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 7.6 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 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;	Section 8
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

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
	A summary of the issues raised by interested and affected parties, and an indication of the way 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
	A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 18
Appendix 1: 3 (1) (i)	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— a description of all environmental issues and risks that were identified during the environmental impact assessment process; and 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;	 Section 18.1 Section 13

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
Appendix 1: 3 (1) (j)	An assessment of each identified potentially significant impact and risk, including— cumulative impacts; the nature, significance and consequences of the impact and risk; the extent and duration of the impact and risk; the probability of the impact and risk occurring; the degree to which the impact and risk can be reversed; the degree to which the impact and risk may cause irreplaceable loss of resources; and the degree to which the impact and risk can be avoided, managed or mitigated;	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)	an environmental impact statement which contains— a summary of the key findings of the environmental impact assessment; 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 a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 21 Figure 21-1
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
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

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
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 I&APs 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 326 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 12-17
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- 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

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EMPr	Section where addressed in the EMPr
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: 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- i. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and ii. risks must be dealt with to avoid pollution or the degradation of the Environment.	Section 40
Appendix 4 (n)	Any specific information that may be required by the competent authority.	None

YOUR COMMENT ON THE BASIC ASSESSMENT REPORT

The Basic Assessment Report (Draft BAR) will be available for comment for a period of 30 days from 14 August 2026 to 13 September 2026. Copies of the Draft BAR were made available at the following public places for review:

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

I&APs are requested to provide comments and information on the following aspects of the proposed project:

1. Information on how I&APs consider that the proposed activities will impact on them or their socio-economic conditions;
2. Written responses stating their suggestions to mitigate the anticipated impacts of each activity;
3. Information on current land uses and their location within the area under consideration;
4. Information on the location of environmental features on site to make proposals as to how and to what standard the impacts on site can be remedied; and
5. How to mitigate the potential impacts on their socio-economic conditions and to make proposals as to how the potential impacts on their infrastructure can be managed avoided or remedied.

DUE DATE FOR COMMENT

13 SEPTEMBER 2026

Please submit comments to the EAP:

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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
DFFE:	Department of Forestry, Fisheries and the Environment
DM:	District Municipality
DMPR:	Department of Mineral and Petroleum Resources
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
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
GSSA:	Geological Society of South Africa
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plans
IWULA:	Integrated Water Use License Application
LM:	Local Municipality
MLM:	Mahikeng Local Municipality
LUDS:	Land Use Development System
MPA:	Mining Permit Area
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

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
WMA:	Water Management Area
WUA:	Water Use Authorisation
WUL:	Water Use License

3 Project background

G and E Global Mining (G and E Global) has appointed Ndi Geological Consulting Services (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed diamond mining project located in the Ngaka Modiri District Municipality.

The proposed mining project will cover an area of about 5 hectares and is located approximately 14 km southwest of Mahikeng, North West Province of South Africa.

G and E Global 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, G and E Global 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 North West Department of Mineral Resources (DMRE).

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 DMRE 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 activities listed in Listing Notices 1 and 3 of the NEMA, a Basic EIA authorisation process in terms of NEMA Government Notice Regulation (GNR) 326 of 7 April 2017 will be required.

The total duration of the mining activities is planned for five (5) years. However, under mining permit applications the applicant can only apply for a period of two (2) years, with potential to renew the MP. The MP will be renewed three (3) times to make up for the 5 years required. Where possible, rehabilitation will be conducted in tandem with the mining activities, with the final rehabilitation being undertaken once the mining activities have been completed at a site and before the mining team leaves the site.

The Interested and Affected Parties (I&APs) engagement process, as part of the EA process, is conducted in terms of NEMA (as amended) which provides clear guidelines for I&APs 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 I&AP engagement process is primarily aimed at affording 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 I&APs is to provide the competent authority with the necessary information 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. I&APs were therefore invited to participate in the public review period of the Basic Assessment Report (Draft BAR) from 14 August 2026 to 13 September 2026 to ensure that the assessment of impacts and proposed management of impacts has addressed their concerns. After the public review period, the report will be updated with comments received from I&APs on the Draft BAR.

The updated Final BAR will be submitted to the competent authority (DMPR) and other commenting authorities for review once the comments from the I&APs will be incorporated into the Final BAR. The DMPR will consider the findings in consultation with various authorities and decide whether an EA 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 and 3 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) (as amended) and will require an EA from the DMPR.

This document serves as the Basic Assessment Report (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 the proposed mining of diamonds with associated minerals that may include limestone, manganese, aggregate, sand, lead and gold on a portion of Portion 4 of Colga 132 JO. 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 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 327 and 324 (Listing Notice 1 and 3) require that a Basic Assessment (BA) process be followed. The BA process will entail:

- Submission of the EA Application to the DMPR. The application was submitted to the DMPR and formally accepted.
- Compilation of a Draft Basic Assessment Report (BAR) and draft Environmental Management Programme (EMPr) for the public to comment on during the official public participation comment period of 30 days.
- Incorporation of I&AP comments into the final BAR and EMPr.
- Public Participation Process (PPP).

The BA process will follow the procedure as prescribed in Regulations 19 to 20 and is summarised in Figure 4-1.

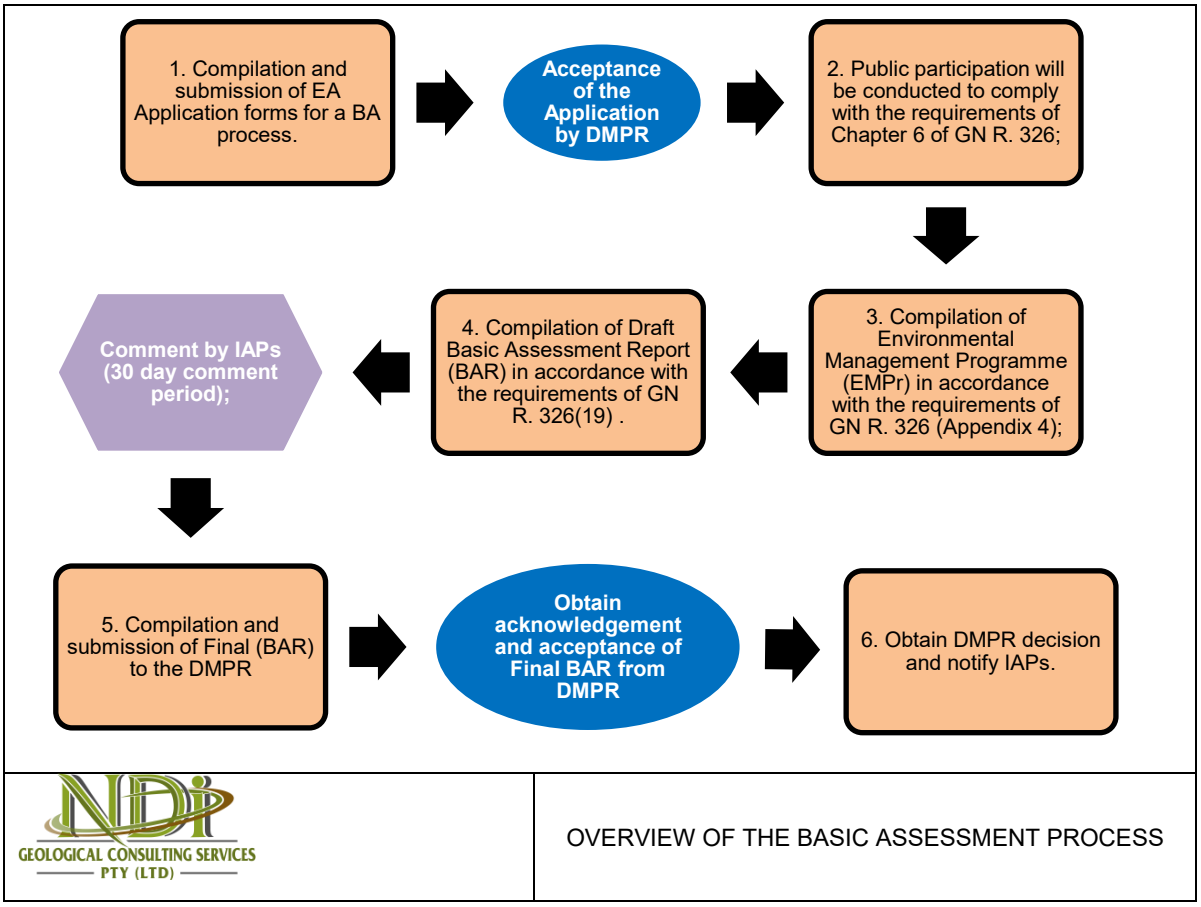


Figure 4-1: Overview the Basic Assessment Process

5 Contact Person and Correspondence Address

Ndi Geological Consulting Services (Pty) Ltd has been appointed by G and E Global Mining as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary EA process and associated I&AP engagement process to meet the requirements of NEMA.

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	EAPASA Reg Number 2020/1554 GSSA Prof Reg	11

5.2.2 Summary of EAPs experience

The EAP, Mrs Mofokeng is a registered EAP (EAPASA Reg Number 2020/1554) with a BSc (Hons) Earth Sciences, majoring in Mining and Environmental Geology. She is a self-motivated and hardworking Geologist with 13 years of experience in environmental, mining exploration, open cast work and consulting in the mining industry. She has proven leadership skills from supervising exploration rigs (Reverse Circulation and Percussion Drilling). Proven field experience in exploration, i.e. mapping, borehole logging, borehole sampling, sample preparation for laboratory analysis, supervisory duties in the field. Her responsibilities involve but are not limited to managing all Environmental matters: Environmental Impact Assessment and Environmental Management Programme, Environmental Authorizations, Environmental Auditing & Risk Assessment, Mine Closure & Rehabilitation, and conducting & reviewing Environmental specialists' studies. Ndivhudza also has experience in writing geological reports, including Prospecting Work Programmes and Mining Work Programmes Environmental Management Plans, handling Department of Mineral and Petroleum Resources documents in general like the submission of Mining & Prospecting Right Applications and Renewals.

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.

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

Farm Name:	Portion 4 of Colga 132 JO		
Application area (Ha)	5 ha		
Magisterial district:	Mahikeng District		
Distance and direction from nearest town	Approximately 14 km to the southwest of Mahikeng Town.		
21-digit Surveyor General Code for each farm portion	**Farm**	**Portion**	**SG Code**
	Colga 132 JO	Portion 4	T0JO00000000013200004

6.2 Locality map

The proposed G and E project is in the North West Province of South Africa, approximately 14 km southwest of the town of Mahikeng (Figure 6-2).

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

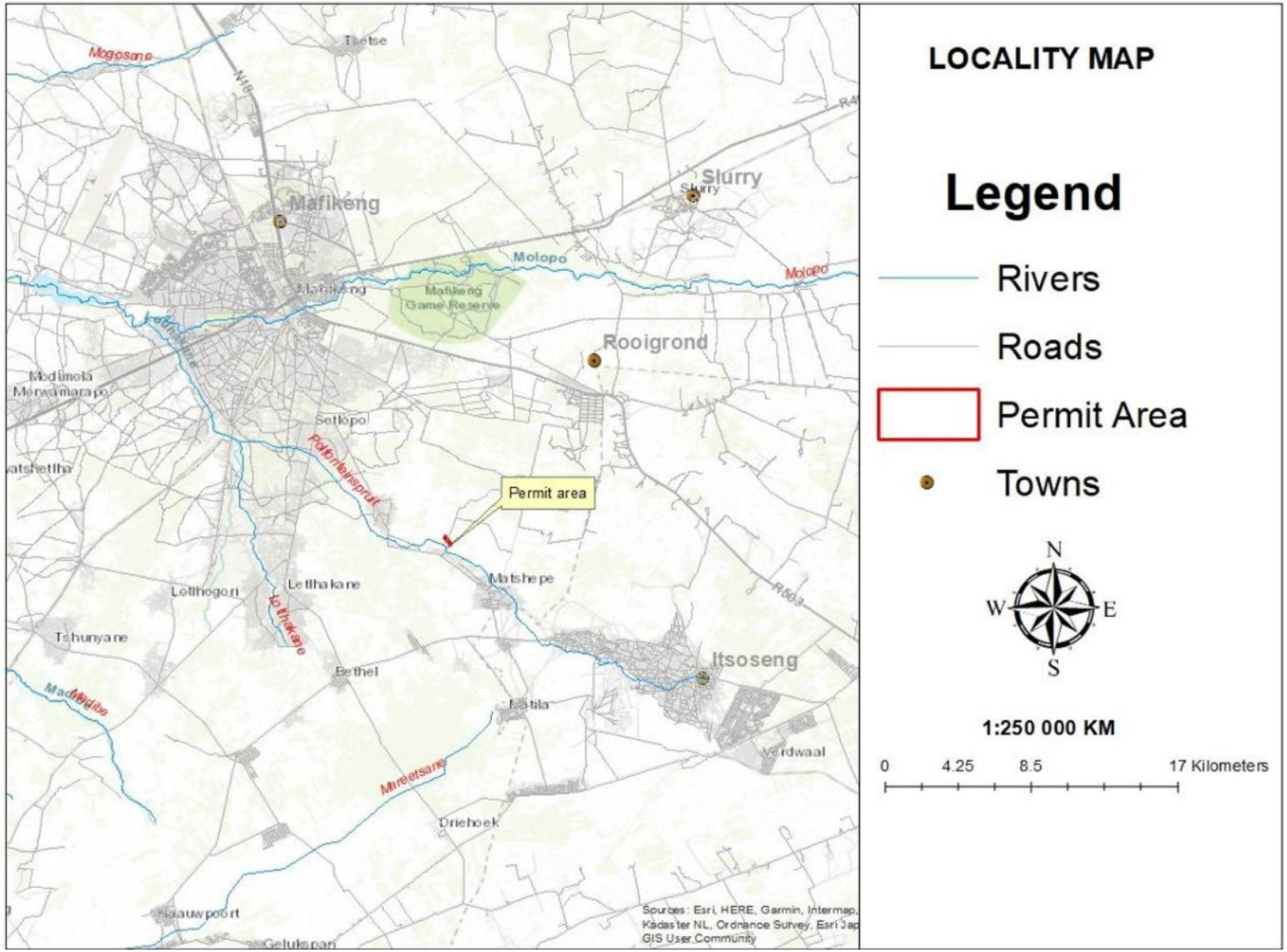


Figure 6-1: Locality Map

7 Description of the Scope of the Proposed Overall Activity

7.1 Overview of the Mining Activities

Description of mining activities

The proposed project is an open cast of mining operation primarily focused on the extraction of diamonds as the main mineral resource. In addition to diamonds, other associated and supporting minerals may be present and considered, depending on their occurrence and economic viability. These may include diamondiferous kimberlite, limestone, manganese, aggregate, sand, lead, and gold.

Mineral processing flow

- Sizing:

Raw gravel will be fed into a vibrating grizzly. Material greater than 40 mm, regarded as waste material, will be discarded immediately to optimise fuel efficiency.

- Liberation:

Material smaller than 40 mm will be fed into a rotary scrubber. This process is critical to clean and liberate diamonds by removing calcium and clay coatings that may hinder recovery.

- Pan Separation Process:

The washed gravel will be fed into a 14-foot diamond pan. A central shaft rotates triangular tines through a slurry of water and fine sand. Lighter waste material, such as quartz and sand is discharged via a central weir while heavier minerals, including diamonds and garnet indicators, migrate to the outer wall.

- Tailings Management:

Tailings and waste material will be dewatered using dewatering screens before being backfilled into mined-out areas to facilitate concurrent rehabilitation.

7.1.1 Pre-Construction Phase

The primary activities associated with the pre-construction (pre-mining) of diamonds will include the following:

- Detailed geotechnical investigations to be completed.
- Contractor to confirm the mining process and to develop a method statement for the excavation and operation of the pits.
- Development of the mine plan including the layout of mining activities and infrastructure locations.
- Determine pre-existing drainage patterns and concentration of flow on the mining site.
- Construction of access and haul roads.
- Site preparation, including clearing, grubbing, and fencing of the mining area.
- Removal and safe storage (temporary stockpiles) of topsoil and overburden material for rehabilitation.

7.1.2 Construction And Operation Phases

The construction and operation phases will include:

- Stormwater management e.g., diverting up-slope water around the mining area).
- Manage the mining area, including side slopes and floor of the excavated areas.

- Manage impacts related to pollution sources (noise, air and water).
- Excavation of required material:
    - The material will be excavated from the pits using an excavator to remove required volumes of construction material.
- Blasting activities (where necessary):
    - Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.
    - Survey potentially affected structures prior to and after blasting.
    - Should blasting be required, adjacent landowners and businesses must be notified well in advance and appropriate precautionary measures must be taken.
- Processing of material (screener):
    - Excavated material will be placed in a screener (if necessary), where the processed material will be stockpiled.

7.1.3 Closure Phase

The following activities will occur during the Closure Phase of the pits:

- All fences, infrastructure (site office/store), mining equipment (screener, haul vehicles), and waste/rubble on site will be removed;
- Overburden stockpiles from the construction and operation phase will be used for the filling of the pits excavated; and
- Site stabilisation where the pits will be graded, re-vegetated and grassed with indigenous grasses to blend with surrounding environment.
- Closure of mining area where a Closure Plan will also be required for the proposed mining area, which will ensure that the mining area is rehabilitated, and that after closure of the area, vegetation establishes effectively. Measures for rehabilitation of the mining area during closure will be provided in the EMPr.

7.1.4 Rehabilitation

Rehabilitation measures to be implemented will include:

- The Contractor shall take all reasonable measures to minimise disturbance to the natural environment at the site thereby reducing the degree of rehabilitation required.
- The contractor must re-establish any grass and vegetation within the road reserve and mining area that was disturbed during construction.
- Upon completion of all construction activities, all structures, equipment, materials, waste, rubble, notice boards along the entire length of the mining pit area must be removed from site.
- The decommissioning of the site camp must be done in such a manner to cause the least environmental impact.
- All waste generated by the decommissioning of the site must be disposed of at an appropriate waste disposal site.
- All rehabilitation and reinstatement efforts shall be implemented immediately after completion of construction activities.
- Re-vegetation shall take place at the start of the rainy season to maximise water availability and minimise the need for watering.
- All topsoil including mulched vegetation material removed during vegetation clearing, but excluding invasive species), removed and stockpiled must be spread evenly all scared areas.
- Acceptable reinstatement and rehabilitation of disturbed areas to prevent erosion.
- Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasives.

- Re-vegetation of disturbed areas must be undertaken with site indigenous species.
- All areas affected by construction should be rehabilitated upon completion of the construction phase of the development to its pre-construction state, or better where possible, in agreement with the ECO.
- A formal rehabilitation plan for wetlands affected by the project activities must be developed.
- All wetland areas affected by construction should be rehabilitated upon completion of the construction phase of the development to its pre-construction state, or better where possible, in agreement with the ECO.

7.2 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 activities listed in NEMA Listing Notices 1 and 3 as provided in Table 7-1.

Table 7-1: Applicable Activities

NAME OF ACTIVITY (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.)	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985)*	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)

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, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, is required to exercise the mining permit. e.g. the primary processing of a mineral resource- crushing and screening. Processing plant Earthmoving machines and infrastructures.	5 ha	X	GNR 983 (21) Listing Notice 1: Basic Assessment (Activities requiring an Environmental authorization subject to a Basic Assessment) – as amended 7 April 2017 &11 June 2021	[redacted]
drill holes for blasting, if necessary	0.5ha	X		
The clearance of an area of 1 ha or more, but less than 20ha of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of linear activity; or (i) maintenance purposes undertaken in accordance with a maintenance management plan	<1ha .	X	GNR 983 (27) GNR 985 (10h), (12h), (18h), (22h) as amended 7 April 2017 & 11 June 2021 iv. Critical biodiversity areas as identified in systematic	
			biodiversity plans adopted by the competent authority; v. sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	
Ablution facility	0.02 ha	X	GNR 983 (25) GNR 985 (12 h)	

Topsoil Stockpile	<0.01 ha	X	GNR 983 (27) GNR 985 (12 h)	[redacted]
Access roads The development of a road - (i) for which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010 or. (ii) with a reserve wider than 13.5 meters or where no reserve exists where the road is wider than 8 meters, but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; or	<0.3 ha	X	GNR 983 (24, 27) GNR 985 (4 h) GNR 985 (12 h) as amended 7 April 2017 & 11 June 2021	
(b) where the entire road falls within an urban area; or which is 1 kilometre or shorter				
Vehicle parking area	<0.02ha	X	GNR 983 (27) GNR 985 (12 h)	
The development of a road wider than 4 metres with a reserve of less than 13.5 metres. -	<0.5ha	X	GNR 985 (4 h)	
The expansion and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage facilities or infrastructure will be expanded by 30 cubic metres or more but no more than 80 cubic metres.	0.02 ha	X	GNR 985 (22h)	

7.3 Activities to be undertaken

7.3.1 Mining

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

7.3.2 Establishment of Temporary Access Roads

Access roads will be established for use during the mining activities.

7.3.3 Diesel storage

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.

7.3.4 Fences

Fences will be erected around the mining area.

7.3.5 Slimes dam

A slimes dam will be erected on site, and its design will be based on the use of bedrock and strapping to ensure filtration of water for recycling.

7.3.6 Contractors' Camp

A contractors' camp will be established on site and will be located outside any sensitive environments.

7.3.7 Power

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

7.3.8 Plant Site

The processing of diamondiferous gravel will take place on site using two 14ft rotary pans.

7.3.9 Ablution Facilities

Portable chemical toilets will be used for the management of sewage waste generated on site.

7.3.10 Site Office Area

A site office area will be erected at the sites.

7.3.11 Vehicle Parking Area

A vehicle parking area will be provided.

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
Constitution of the Republic of South Africa, (No. 108 of 1996)	The BA process	The proposed activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated to protect the environmental rights of South Africans.
Promotion of Access to Information Act (Act No. 2 of 2000) (PAIA)	The BA process and I&AP engagement	The BA process will be undertaken in terms of the NEMA and where required, the NWA, where the associated I&AP consultation process will be aligned with the PAIA in the sense that all I&APs will be given an opportunity to register as an I&AP prior to the initiation of the project and all registered I&APs will in turn be provided a fair opportunity to review and comment on any reports submitted to the competent authorities for decision making.
Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) (As amended)	Application for Mining in terms of Section 16	The application was submitted to and formally accepted by the DMPR.
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.	The Environmental Management Programme (EMPr) will regulate the applicant to apply for permits from the South African Heritage Resources Agency (SAHRA) for the destruction or relocation of graves or any other heritage resources prior to removal or relocation of any heritage resources. The BAR and EMPr will also be submitted to the SAHRA through the South African Heritage Resources Information System (SAHRIS) to determine whether any permits will be required.
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	This Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)	The application was submitted to and formally accepted by the DMPR. The BAR and EMPr will be submitted to the DMPR once finalised and have been subjected to a public participation process as required by Chapter 6 of the NEMA.
National Environmental Management: Waste Act, 2008 (Act 59 of 2008)	The project does not trigger activities listed in GNR92 1of the NEM: WA and will not require a Waste Management	The waste management hierarchy will be incorporated in the EMPr to govern waste management during the implementation of the project.

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
	Licence (WML) from the DMPR.	
National Environmental Management: Air Quality Act, 2008 (Act 59 of 2008) (NEM AQA)	This Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)	The principles of the NEM: AQA, focusing on minimisation of pollutant emissions will also be taken cognisance of in the development of the EMPr.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)	This Basic Assessment Report (BAR) and Environmental Management Programme (EMPr)	The EMPr will include measures to control and manage alien invasive plant species.
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)	Construction and operation of infrastructure within 100 m of a watercourse or 500m of a wetland	In terms of the NWA, any activities undertaken within 500 m of a wetland or within 100 m of a watercourse require a Section 21 (c) and (i) Water Use Authorisation (WUA). Should the impacts of the activities be of low significance, the activities may also be Generally Authorised (GA). According to the SANBI wetlands database, the proposed diamond mining area is located within 500m of a wetland and will therefore require a Section 21 (c) and (i) WUA.
Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), as amended in 2014.	Land Claims	There are no land claims associated with the affected properties.
Ngaka Modiri Molema District Municipality (DM) Spatial Development Framework (SDF)	Alternatives	The Ngaka Modiri Molema DM Spatial Development Framework shows that the area is not earmarked for any development by the DM.

9 Need and Desirability

9.1 Need

The proposed G and E Global Mining Project is intended to contribute to the continued development of South Africa's diamond mining sector while creating local economic opportunities.

The proposed mining operation will contribute to the supply of diamondiferous material and rough diamonds, thereby supporting the broader diamond value chain and contributing to economic activity within the sector. The project is also expected to create direct and indirect employment opportunities for people from the surrounding communities during the establishment, mining and processing phases.

In addition to employment creation, the project has the potential to generate local economic benefits through the procurement of goods and services from local businesses, employee expenditure and payments associated with applicable regulatory and statutory requirements. These activities may contribute to local economic development, household income and improved livelihoods within the surrounding communities.

The need for the project is further supported by the opportunity to make productive use of the identified diamond resource while implementing appropriate environmental management measures to avoid, minimise and mitigate potential environmental impacts. The project will incorporate measures for responsible resource extraction, pollution prevention, water and waste management, progressive rehabilitation and eventual closure of disturbed areas.

The proposed development therefore seeks to achieve a balance between the economic and socio-economic benefits associated with diamond mining and the need for responsible environmental management. Through appropriate planning, mitigation and rehabilitation measures, the G and E Global Mining Project has the potential to contribute to the local and regional economy while ensuring that environmental impacts are appropriately managed throughout the life of the project.

9.2 Environmental responsibility

It is expected that the mining project will have some negative environmental impacts, including, but not limited to the impacts that have been included in Section 13 of this report. Where possible, measures to mitigate the impacts of the project have been identified and included in the EMPr. The mitigation measures include designs and management practices that will be embarked on, to prevent and/or minimise the identified impacts on the social, cultural and environmental aspects. The EMPr also includes environmental monitoring programme that will allow G and E Global Mining to keep track of the impacts of the project on the environment and where required, to take remedial action.

9.3 Socio-economic benefits

The proposed mine is expected to have a positive socio-economic benefit through employment of locals. Recruitment of labour will be guided by G and E Global Mining recruitment policies which are expected to promote the employment of local labour by the mine as well as by any appointed contractors. G and E Global Mining will ensure that a transparent process of employment will be followed to limit opportunities for conflict that may arise.

9.4 No-go option

The no-go alternative entails not implementing the proposed G and E Global Mining Project and, consequently, not undertaking the planned mining and processing of the identified diamondiferous material.

Should the proposed project not be implemented, the applicant would forgo the opportunity to further investigate and exploit the identified diamond resource and to establish the quantity, quality and economic potential of the diamonds within the proposed mining area. The no-go alternative may therefore result in the loss of potential economic benefits associated with the project, including direct and indirect employment opportunities, local procurement and other opportunities for socio-economic development within the surrounding community.

The no-go alternative would, however, also have positive environmental implications. In the absence of mining activities, the potential environmental impacts associated with the project, such as vegetation

clearance, soil disturbance, dust generation, noise, waste generation, water use, potential hydrocarbon contamination and disturbance of surrounding environmental resources, would not occur.

10 Motivation

10.1 Preferred Site

The site has been chosen due to its high potential for diamond mineralisation supported by geology covering the area. History also supports the availability of diamonds in the preferred site. For these reasons, no other site was selected for mining of diamonds.

10.2 Technologies

The technology proposed for the mining projects will comply with national standards and best practices that have been tested through the years. This includes both mining and processing technologies.

10.3 Design/Layout

The mining pits were designed at 50m x 30m x 10m, this size is believed to be sufficient to optimally mine the desired amount of material needed, taking cognisance of the possible environmental impacts associated with the proposed activities.

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

The identification and investigation of alternatives is a key aspect during the EIA process. All reasonable and feasible alternatives must be identified and assessed to determine and assess the most suitable alternatives. There are however some significant constraints that must be considered when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which will be discussed in the evaluation of the alternatives. The preferred option is to be highlighted and presented to the authorities.

Alternatives can typically be identified according to:

- Location alternatives;
- Process alternatives;
- Technological alternatives; and
- Activity alternatives (including the No-go option).

For any alternative to be considered feasible, such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. The alternatives are described, and the advantages and disadvantages are presented. It is further indicated which alternatives are considered feasible from a technical as well as environmental perspective.

Incremental alternatives typically arise during the impact assessment process and are usually included as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation measures and are not specifically identified as distinct alternatives. This section provides information on the development footprint alternatives, the properties considered, as well as the type of activity, activity layout, technological and operational aspects of the activity.

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

The proposed G and E Global Mining Project will be undertaken on Portion 4 of the Farm Colga 132 JO, situated within the Ngaka Modiri Molema District Municipality, North West Province, South Africa.

The proposed project area contains diamondiferous gravel that will be mined and processed for the recovery of diamonds. The proposed mining activities will include the establishment of mining areas and associated infrastructure, including temporary access roads, a processing plant, slimes dam, diesel storage facilities, contractors' camp, site office, ablution facilities and vehicle parking areas.

The location and positioning of the proposed mining infrastructure will take into consideration the existing land use, topography, drainage patterns, environmental sensitivities and other identified environmental constraints within the property. Where possible, existing disturbed areas and access routes will be utilised to minimise additional environmental disturbance.

The proposed mining area is located within the Ngaka Modiri Molema District Municipality and will be accessed through the existing local road network, with temporary access roads established where necessary to facilitate access to the mining and processing areas.

The locality of the proposed G and E Global Mining Project is presented in Figure 6-1.

11.2 The Technology to be used in the Activity

The proposed G and E Global Mining Project will utilise conventional open cast/alluvial mining methods to extract diamondiferous gravel from the identified mining area on Portion 4 of the Farm Colga 132 JO. The mining method will be selected to suit the nature, depth and distribution of the

diamondiferous gravel and will focus on the efficient recovery of diamonds while minimising environmental disturbance.

The mining operation will primarily utilise diesel-powered mobile machinery and equipment, including excavators, front-end loaders, haulage vehicles and other ancillary equipment required for the excavation, loading, transportation and processing of diamondiferous gravel.

The diamondiferous gravel will be excavated using an excavator and loaded onto suitable transport or directly into the processing circuit. The material will then be transported to the designated plant site, where it will be processed using a 14-foot rotary pan. The rotary pans will facilitate the washing and separation of diamondiferous gravel from finer material and unwanted material. The recovered material will subsequently undergo appropriate concentration and sorting processes to facilitate the recovery of diamonds.

Water used during the processing of the diamondiferous gravel will be managed through a closed-loop water recovery and recycling system, where practicable. Process water and fine material generated during the washing process will be directed to the slimes dam for containment and settlement. Recovered water will be recycled back into the processing operation, thereby reducing the demand for fresh water and limiting the potential discharge of process water into the surrounding environment.

Diesel will be used to power the mining equipment and vehicles. A maximum of 30 m^3 of diesel will be stored above ground in designated diesel storage tanks. Appropriate spill-prevention and containment measures will be implemented to reduce the risk of soil and water contamination.

The technology and equipment used for the project will be maintained in good working condition and operated by appropriately trained personnel. Equipment maintenance, efficient fuel use and appropriate operational controls will be implemented to minimise dust, noise, emissions, hydrocarbon spills and other potential environmental impacts associated with the mining and processing activities.

Overall, the proposed technology has been selected to provide a practical and economically viable method of recovering diamonds from the identified diamondiferous gravel, while incorporating measures to promote responsible resource use, water recycling, pollution prevention and rehabilitation of disturbed areas.

11.3 The Operation Aspects of the Activity

The proposed mining activities will involve the excavation of mining pits, with appropriate earthmoving machinery being used to excavate, load and haul diamondiferous material to and from designated stockpile and processing areas. The mining and material-handling activities will be undertaken progressively and in accordance with the approved mining plan, applicable legislative requirements, national standards and recognised industry best practices.

The selected mining method is considered appropriate for the nature and occurrence of the diamondiferous gravel and is intended to facilitate the efficient recovery of the mineral resource while minimising unnecessary environmental disturbance.

Alternative operational methods were considered in the planning of the proposed activity. However, given the nature of the resource, the proposed scale of the operation, the equipment required and the need to comply with applicable health, safety and environmental requirements, the proposed conventional excavation, loading and hauling method was considered the most practical and appropriate option.

As such, no further operational alternatives were assessed. The selected operational approach will be subject to appropriate environmental management measures to minimise potential impacts such as vegetation disturbance, soil erosion, dust generation, noise, fuel spills and other impacts associated with mining activities.

11.4 The Option of Not Implementing the activity

The no-go alternative would entail not implementing the proposed G and E Global Mining Project and retaining the current land use within Portion 4 of the Farm Colga 132 JO. Under this alternative, the identified diamondiferous resource would not be mined or processed.

Should the proposed mining project not be implemented, the applicant would lose the opportunity to further investigate and determine the quantity, quality and economic potential of the diamonds that may be recoverable from the identified resource. The no-go alternative would also mean that the potential direct and indirect employment opportunities associated with the mining project would not be created, thereby limiting potential socio-economic benefits to the surrounding local community.

On the other hand, the no-go alternative would avoid the potential environmental impacts associated with the proposed mining activities, including vegetation clearance, soil disturbance, dust generation, noise, waste generation, water use and the potential risk of hydrocarbon contamination.

The no-go alternative therefore represents a situation where the potential socio-economic and economic benefits of the project would be forgone, while the potential environmental impacts associated with mining would also be avoided. The environmental, social and economic implications of the proposed project and the no-go alternative are assessed in detail in Section 13 of this report.

11.5 Details of the Public Participation Process Followed

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

The I&AP engagement process forms an important part of the impact assessment process. The I&AP engagement process is primarily aimed at affording I&APs the opportunity to gain an understanding of the proposed project. In addition, the purpose of consultation with the landowners, key I&APs, and I&APs 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 I&AP engagement process will be conducted in terms of NEMA, which provides clear guidelines for I&AP engagement during an EIA as summarised in Table 11-1.

Table 11-1: NEMA I&AP Guidelines

NEMA Section	Applicability to I&AP Engagement
Chapter 1	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) 326, promulgated on 8 December 2014, specify the minimum requirements for I&AP engagement in an EIA process conducted under the NEMA.
Section 24J of the NEMA	In 2017, the Minister of Environmental Affairs published, Section 24J of the NEMA in terms of**,** Public Participation Guidelines which guide the Public Participation Process to give effect to Section (2)(4)(f), (o) and 24 (1A) (C) of the NEMA.

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

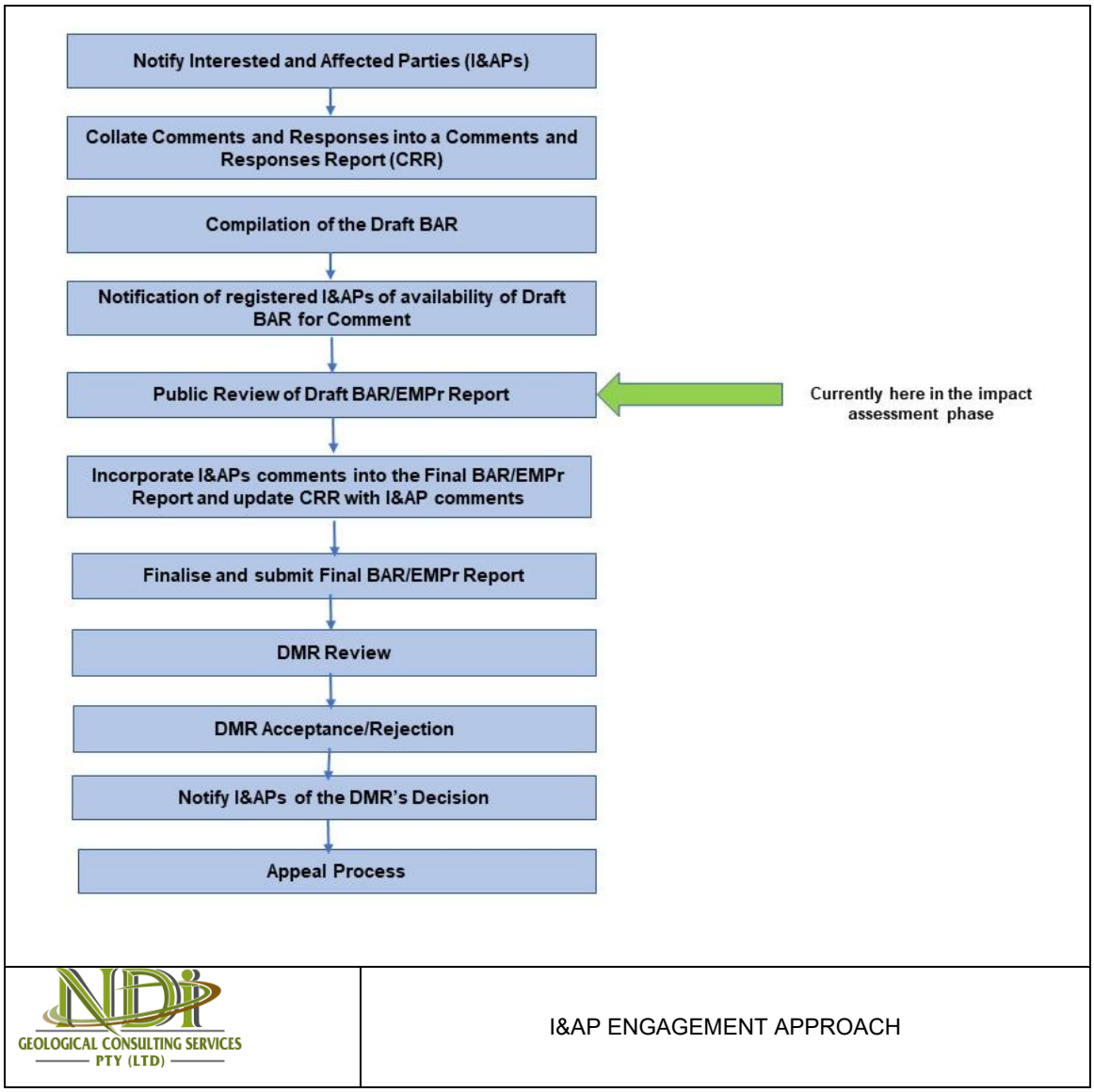


Figure 11-1: Summary of the I&AP Engagement Process followed

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

- DWS – Regional Office;
- SAHRA – Provincial;
- Mahikeng Local Municipality;
- Ngaka Modiri Molema District Municipality;
- North West Department of Agriculture and Rural Development (NWDARD);
- Department of Forestry, Fisheries and the Environment (DFFE);
- South African National Roads Agency SOC Limited (SANRAL); and
- Traditional Authorities and affected ward structures

All I&AP engagement documents have been included in Appendix 4.

11.5.1 I&AP Identification Interested and Affected Parties

An I&APs register was developed using information from the surveyor general's office and from I&APs 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 will be maintained for the duration of the study where the details of I&APs are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs will be an on-going activity.

The affected properties are provided in Table 11-2.

Table 11-2: List of Affected Farm and Farm Portions

Farm	Portions	21 Digit Survey General Code
Colga 132 JO	Portion 4	T0JO00000000013200004

The adjacent properties are provided in Table 11-5.

Table 11-3: List of Adjacent Farm and Farm Portions

Farm	Portions	21 Digit Surveyor General Code
Colga 132 JO	Portion 7	T0JO00000000013200007
Colga 132 JO	Remaining Extent of Portion 3	T0JO00000000013200003
Colga 132 JO	Remaining Extent of Portion 8	T0JO00000000013200008
Colga 132 JO	Portion 9	T0JO00000000013200009
Colga 132 JO	Portion 10	T0JO00000000013200010
Colga 132 JO	Portion 12	T0JO00000000013200012
Colga 132 JO	Portion 13	T0JO00000000013200013
Molopo-Ratshidi 302 JO	Remaining Extent	T0JO00000000030200000
Rooigrond 134 JO	Remaining Extent	T0JO00000000013400000

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

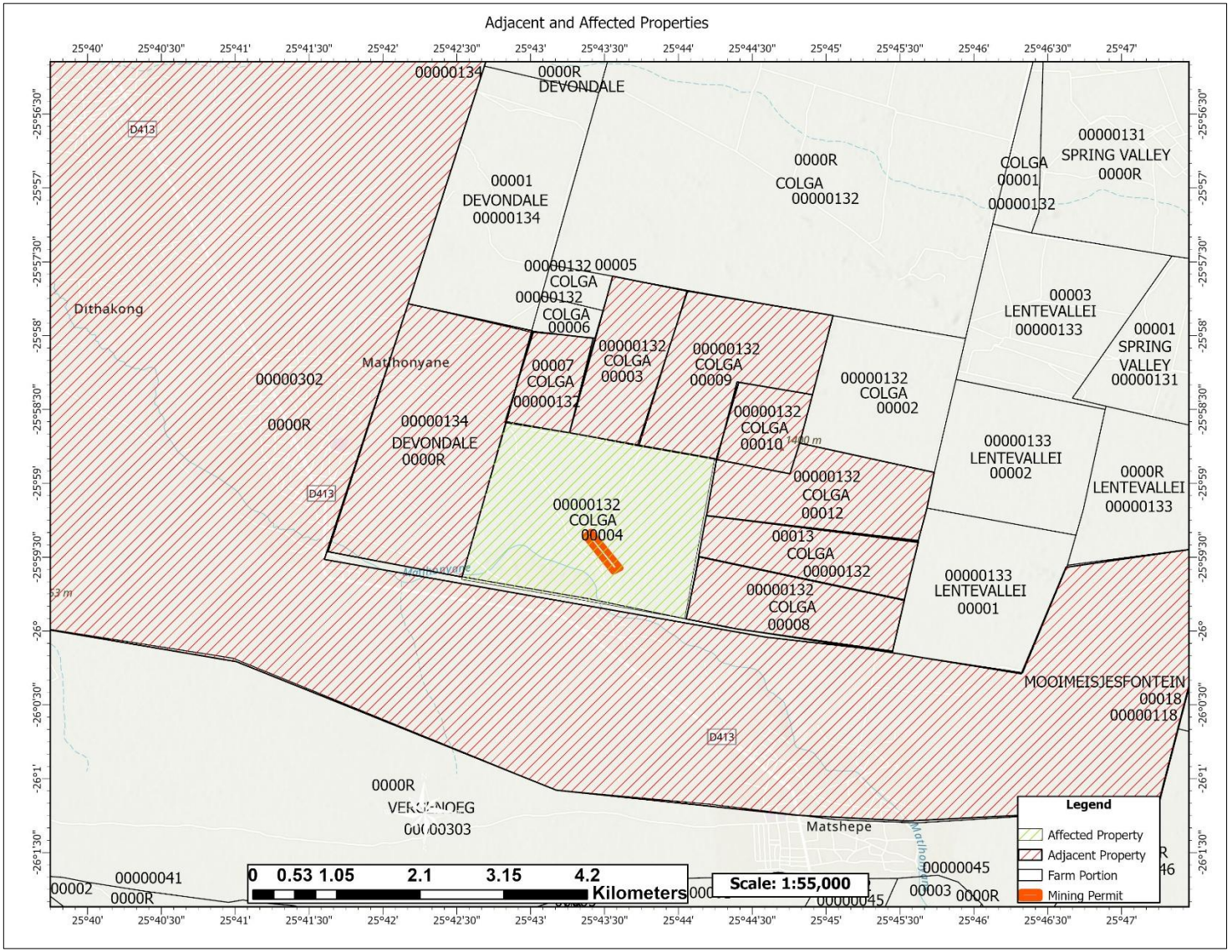


Figure 11-2: Affected and Adjacent Properties

11.5.2 Project Announcement

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

- Distribution of Notification Letters: Notification letters were sent to identified I&APs in August 2026, informing them of the proposed project.
- Site Notice Placements: Sites notice boards (Size A2: 600 mm X 420 mm) notifying I&APs and I&APs of the proposed mining were placed at conspicuous places in the project area.
- Newspaper Advertisements: Newspaper advertisements notifying I&APs about the proposed project and the opportunity to participate in the EIA process were placed in the Mahikeng Mail and Noordwester newspapers on 12 August 2026 as well as on the Mahikeng Mail and Noordwester newspaper on 14 August 2026.

11.6 Public Review of the Draft Basic Assessment Report

The Draft BAR was compiled in terms of the requirements of GNR 326 and will be made available to I&APs for 30 days between 14 August 2026 and 13 September 2026. All comments received during the announcement phase of the I&AP engagement process will be 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 will be made available at the venues listed in Table 11-4.

Table 11-4: 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 will also be made available to the competent and commenting authorities during the 30-day review and comment period.

11.7 I&AP Consultation Meeting

Depending on the responses received during the registration period and requested by the stakeholders, a public meeting may be held during the project's Basic Assessment Phase.

The stakeholders will have the opportunity to comment on the report and plan of study and raise issues that may need to be included in the impact assessment phase. All comments received will be incorporated into the final Basic Assessment Report.

11.8 Summary of Issues Raised by I&APs

Any comments received will be included in Table 11-5 which provides a summary of the comments received from I&APs.

Table 11-5: 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.**
AFFECTED PARTIES					
Landowner/s					
Municipal councillor					
Municipality					
No comments received to date.					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
Communities					
No comments received					
Dept. Land Affairs					
No comments received					
Traditional Leaders					
No comments received					
Dept. Environmental Affairs					
No comments received					
Other Competent Authorities affected					
No comments received					
OTHER AFFECTED PARTIES					
No comments received					

12 Environmental Attributes Associated with the Alternatives

12.1 Baseline Environment

12.1.1 Geographical

The proposed project area is situated in the Mahikeng Local Municipality (MLM)'s area of jurisdiction, within the Ngaka Modiri Molema District Municipality, in the North West Province. The Ngaka Modiri Molema District Municipality is a Category C municipality and comprises several local municipalities. The local municipalities bordering the district include Ramotshere Moiloa Local Municipality, Tswaing Local Municipality, Ditsobotla Local Municipality and Ratlou Local Municipality.

12.1.2 Topography

The project area is characterised by gently undulating to moderately sloping terrain, with elevations ranging from approximately 1305 mamsl along the western drainage corridors to about 1395 mamsl, increasing further to over 1470 mamsl toward the eastern part of the study area. The project area is therefore located on an elevated plateau, with a gradual regional rise in elevation from west to east.

The contour pattern indicates that the land surface generally slopes from the east and southeast towards the west and northwest, directing surface runoff towards the Potfonteinspruit, which flows along the southern boundary of the mining permit before joining the Lotlhakane River further downstream. The relatively wide spacing of the contours within the project area suggests gentle gradients, whereas the closer contour spacing to the east reflects steeper terrain associated with elevated hills or ridges.

The topography exerts a strong influence on the local drainage system, with rainfall runoff naturally concentrating within the ephemeral drainage channels during storm events. Owing to the moderate relief and absence of deeply incised valleys within the mining permit, the area is not expected to experience significant topographic constraints for mining development. However, appropriate stormwater management, erosion control measures, and protection of the Potfonteinspruit drainage channel will be essential to minimise sediment transport and preserve downstream water quality during mining operations. (Figure 12-1).

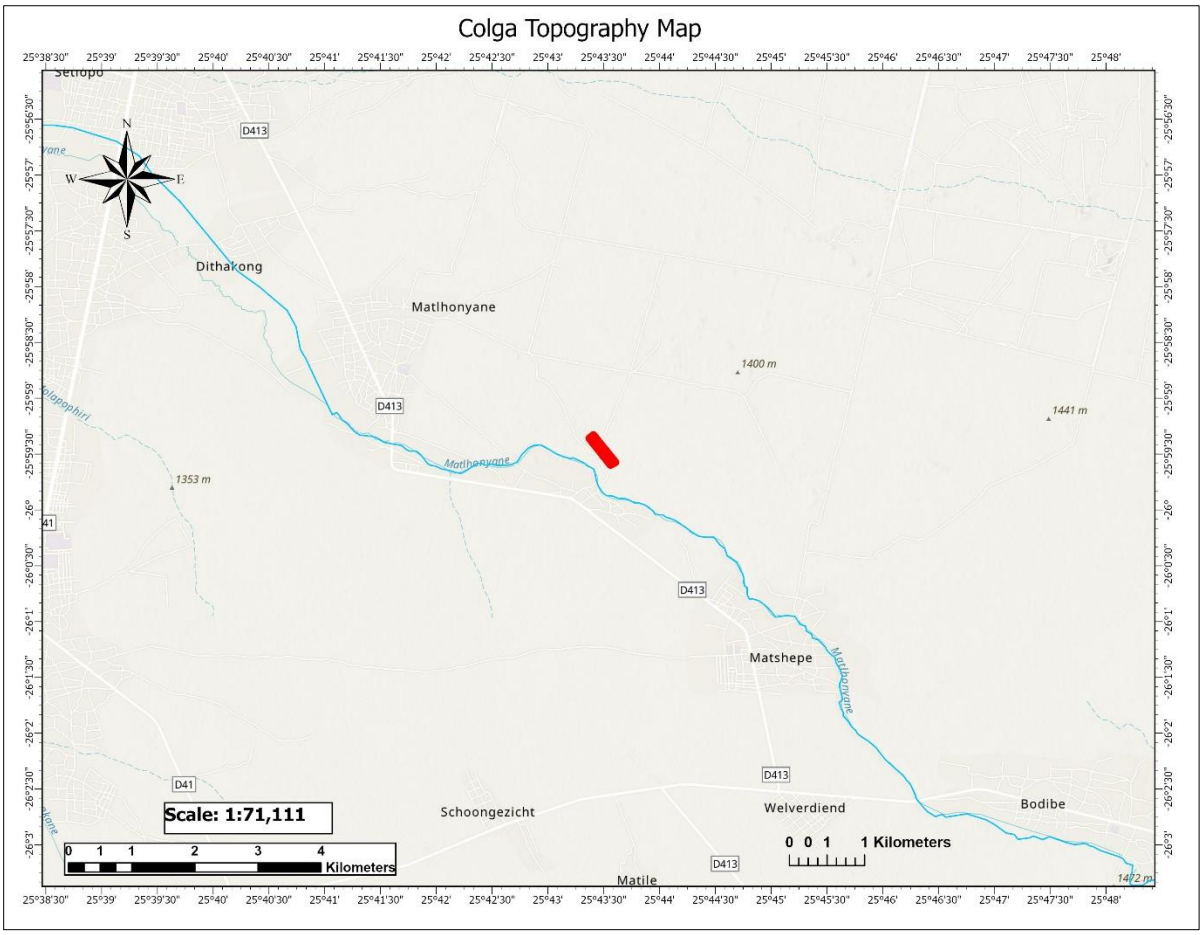


Figure 12-1: Topography

12.1.3 Climate

The proposed project area is located within the semi-arid climatic region of the North West Province, characterised by hot summers, cool to mild winters, and highly seasonal rainfall. The climate is typical of the western interior of South Africa, where rainfall is concentrated during the summer months (October to March), while winters (May to August) are generally dry with low humidity and little or no precipitation. The area experiences high evaporation rates throughout the year, often exceeding annual rainfall, resulting in a persistent moisture deficit and limited natural recharge to groundwater systems.

Mean annual rainfall in the project area ranges between 450 and 550 mm, with most precipitation occurring as short-duration, high-intensity convective thunderstorms during the summer months. These rainfall events generate rapid surface runoff into the ephemeral drainage channels, including the Potfonteinspruit and its associated tributaries, while prolonged dry periods dominate for the remainder of the year. The rainfall pattern contributes to episodic streamflow and limited sustained baseflow within local watercourses.

Temperatures are characterised by hot summers, with average daily maximum temperatures ranging from 30°C to 35°C and occasionally exceeding 38°C during heatwave conditions. Winters are generally mild during the day, with maximum temperatures of 18–24°C, while minimum temperatures may fall below 5°C, and occasional frost may occur during June and July. The combination of high summer temperatures and low relative humidity results in potential evaporation rates exceeding 1800–2000 mm per annum, substantially greater than the annual precipitation.

12.1.4 Surface Water Resources

The project area is located within the Crocodile (West) and Marico Water Management Area (WMA) and falls predominantly within the D41A Quaternary Catchment, with adjacent catchments including D41B, C31A, C31B, C31C, C31D, A31C, and A31D. The regional drainage network is controlled by the Molopo River, a perennial river situated north of the project area, which forms one of the principal drainage

features within the WMA. The Lotlhakane River and Potfonteinspruit are the main tributaries influencing local surface water flow, while several non-perennial streams traverse the surrounding landscape, conveying runoff primarily during and immediately after rainfall events.

The mining permit is adjacent to the Potfonteinspruit, an ephemeral drainage channel that ultimately contributes flow to the Lotlhakane River, which in turn drains into the Molopo River. Surface runoff across the site is therefore generally directed northwards and north-westwards through this interconnected drainage system. Due to the semi-arid climate of the region, streamflow in the local drainage channels is highly seasonal, with most channels remaining dry for much of the year and flowing only following significant rainfall events. Consequently, the drainage system is dominated by episodic runoff rather than sustained baseflow, making stormwater management and erosion control important considerations for the proposed mining activities to prevent sediment transport and protect downstream water resources.

Floodzone mapping

1:50-Year storm event

The 1:50-year flood map (Figure 12-2) indicates that flood-prone areas are largely confined to the existing river corridors located. The inundation zones generally follow the natural floodplain and remain relatively narrow, with flood depths ranging from 0.0 m to approximately 8.45 m in the deepest sections of the river channels. The proposed mining permit area is located immediately adjacent to this flood-prone zone. Consequently, infrastructure or mining activities within this area may be susceptible to periodic inundation during major flood events. Appropriate buffer zones, stormwater diversion structures, and flood protection measures should therefore be incorporated into the mine design to minimise flood-related risks and prevent impacts on adjacent watercourses.

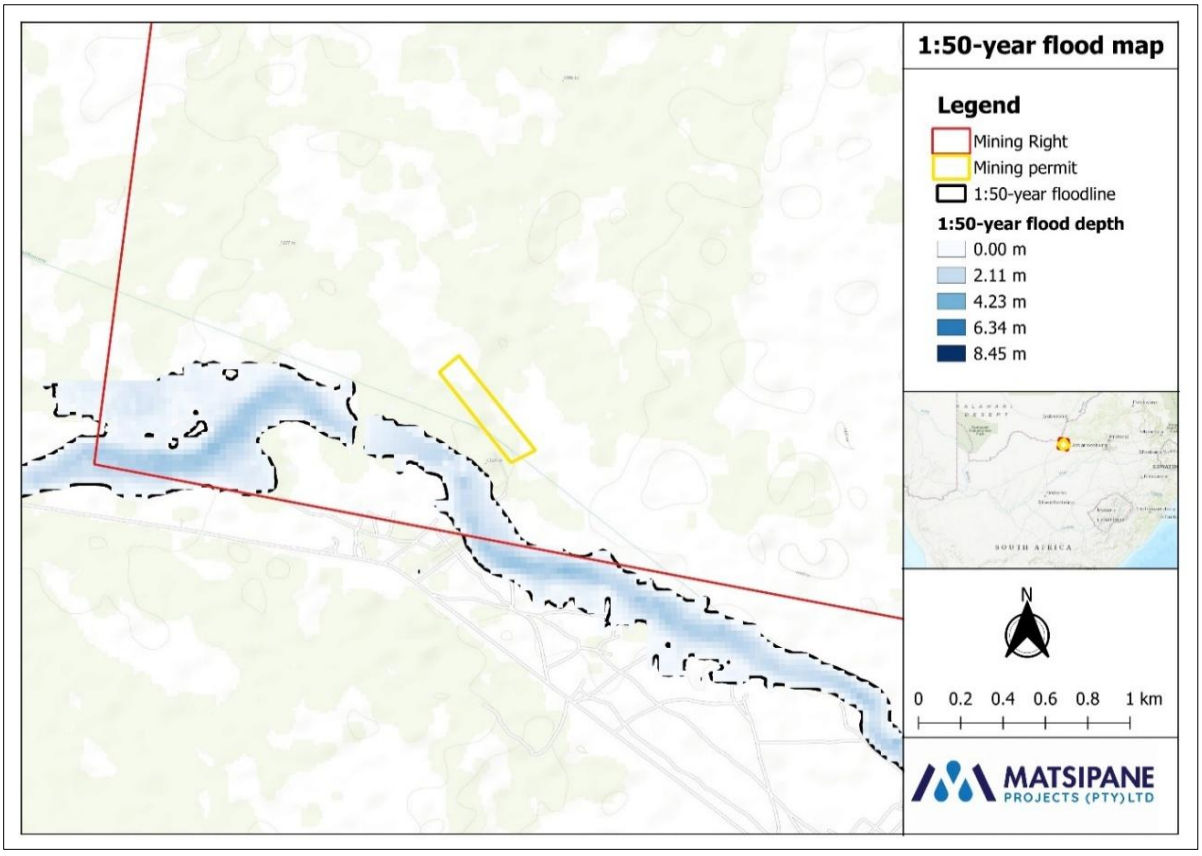


Figure 12-2: 1:50-year flood map zoomed for mining permit

1:100-year storm event

The 1:100-year flood map (Figure 12-3) represents a more extreme flood event with a lower probability of occurrence but a greater spatial extent. Compared to the 1:50-year scenario, the floodplain expands laterally along both the northern and southern river systems, with maximum flood depths increasing to approximately 9.79 m within the main river channels. The proposed mining permit area remains partially within or immediately adjacent to the inundation zone. This indicates that developments located close

to the southern drainage channel could be affected during extreme rainfall events. The 1:100-year floodline should therefore be regarded as the minimum development setback for permanent infrastructure, with flood management measures-including diversion channels, erosion protection, and adequate stormwater conveyance systems-implemented to ensure operational safety and protect downstream water resources.

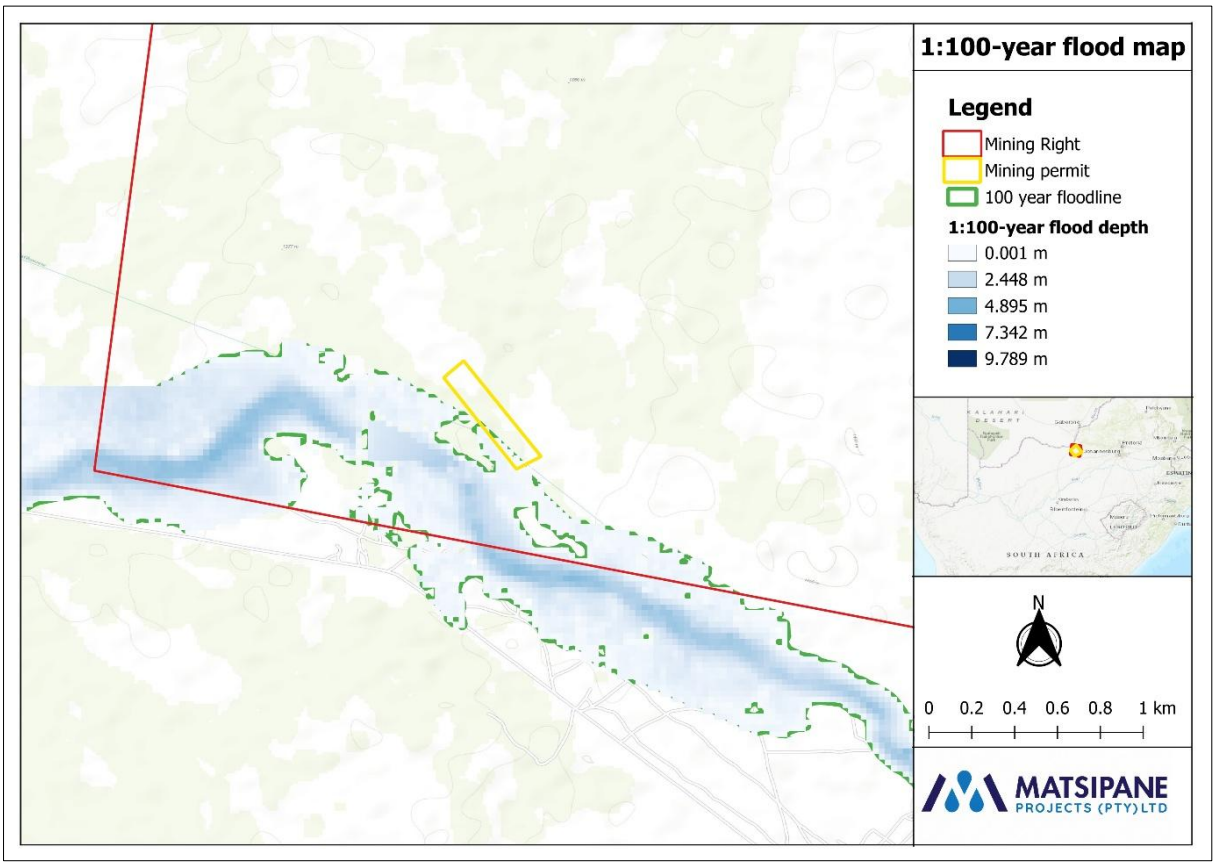


Figure 12-3: 1:100-year flood map zoomed for mining permit

12.1.5 Regional Geology

The project area is situated within the Transvaal Supergroup of the Kaapvaal Craton, a region characterized by sedimentary and volcano-sedimentary rocks of Proterozoic age that host significant manganese and iron ore mineralisation. Based on the geological map, the mining project is located predominantly on the Allanridge Formation, while the surrounding area comprises the Kalahari Group, Malmani Subgroup, Black Reef Formation, Dominion Group, and localized Quaternary deposits.

The Allanridge Formation, which underlies most of the project area, consists mainly of volcanic rocks, including basaltic and andesitic lavas, with intercalated volcaniclastic units. These rocks generally exhibit low primary porosity but may develop secondary permeability through weathering, jointing, and fracturing. To the north, the area is overlain by unconsolidated sediments of the Kalahari Group, comprising sands, silts, gravels, and calcrete that blanket much of the regional landscape. Along the southern portion of the project area, Quaternary alluvial deposits occur adjacent to the drainage channels and consist of unconsolidated sand, silt, and gravel derived from recent fluvial processes.

East and southeast of the mining permit, the Malmani Subgroup is exposed. This unit comprises thick successions of dolomite and limestone and is well known for the development of karst features, solution cavities, and productive groundwater aquifers. The Black Reef Formation, occurring locally south and southwest of the project area, consists predominantly of quartzite sandstones and conglomerates that mark the basal unit of the Transvaal Supergroup. Small outcrops of the older Dominion Group, composed mainly of volcanic rocks and associated sedimentary units, are present to the north of the project area.

Overall, the geology of the area reflects the transition between the unconsolidated Kalahari cover and the underlying Proterozoic bedrock of the Transvaal Supergroup. This geological framework controls

the occurrence of mineral resources, groundwater movement, and weathering processes within and around the project area, with groundwater expected to occur primarily within weathered and fractured bedrock and, locally, within the unconsolidated alluvial deposits associated with drainage channels.

Local Geology

According to the available 1: 250 000 geological map, sheet 2524 Mafikeng, the entire project area is underlain by andesitic and tuff rocks of the Allanridge formation, Platberg Group of Ventersdorp Supergroup which is further underlain by the dolomitic rocks of the Malmani subgroup.

The diamondiferous gravel deposits of the area are erosion remnants of a palaeo- fluvial system that transported material from the north and north-east along an ancient surface gradient towards the south and south-west (Wilson et al., 2006). Field evidence indicates that there are two, fundamentally- different types of diamondiferous gravels characterizing the project area. The geology of the study area is shown Figure 12-4.

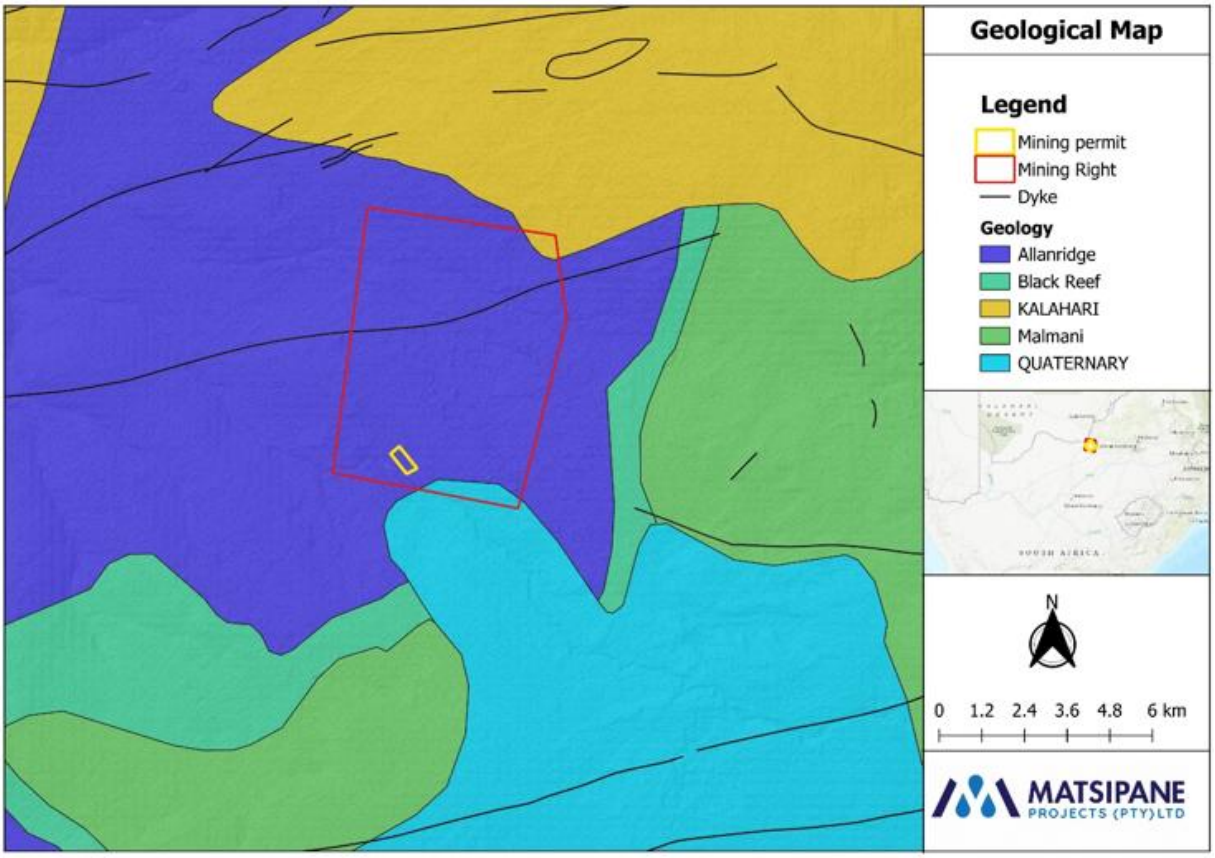


Figure 12-4: Geology of the proposed mining permit area

Rooikoppie Gravel

The Rooikoppie Gravel were identified on the northwestern part of the mining permit area and characterized by clast-supported gravel almost entirely consists of siliceous lithologies such as quartz, quartzite, chert and BIF. It has been defined as reddish brown, intact, gravely sand with angular quartzite cobles found over the hard massive calcrete rock.

The alluvial diamonds associated with this gravel deposits are generally of high quality, because of the presence of larger stones (50 to 200 ct). The Rooikoppie gravels occur as a 1-2m-thick, unsorted, matrix-supported, generally-upward-fining unit that has been completely lateritized.

These gravels dominated the upper section of the project area's and are generally overlain by a thin (0,5-1,0m), soil overburden.

This layer is believed to be because of post-depositional modification has resulted in the formation of colluvial and eluvial "Rooikoppie" deposits, which were preferentially mined by the artisanal diggers of the previous century...

12.1.6 Wetlands

According to the SANBI data, there is one wetland occurring near the study area as displayed in Figure 12-5.

It is important to note that the wetlands are recognised as a National Freshwater Priority Area by the SANBI. During the mining phase, a minimum of 32-50m buffer is recommended from the wetlands to protect and maintain the integrity of the wetland.

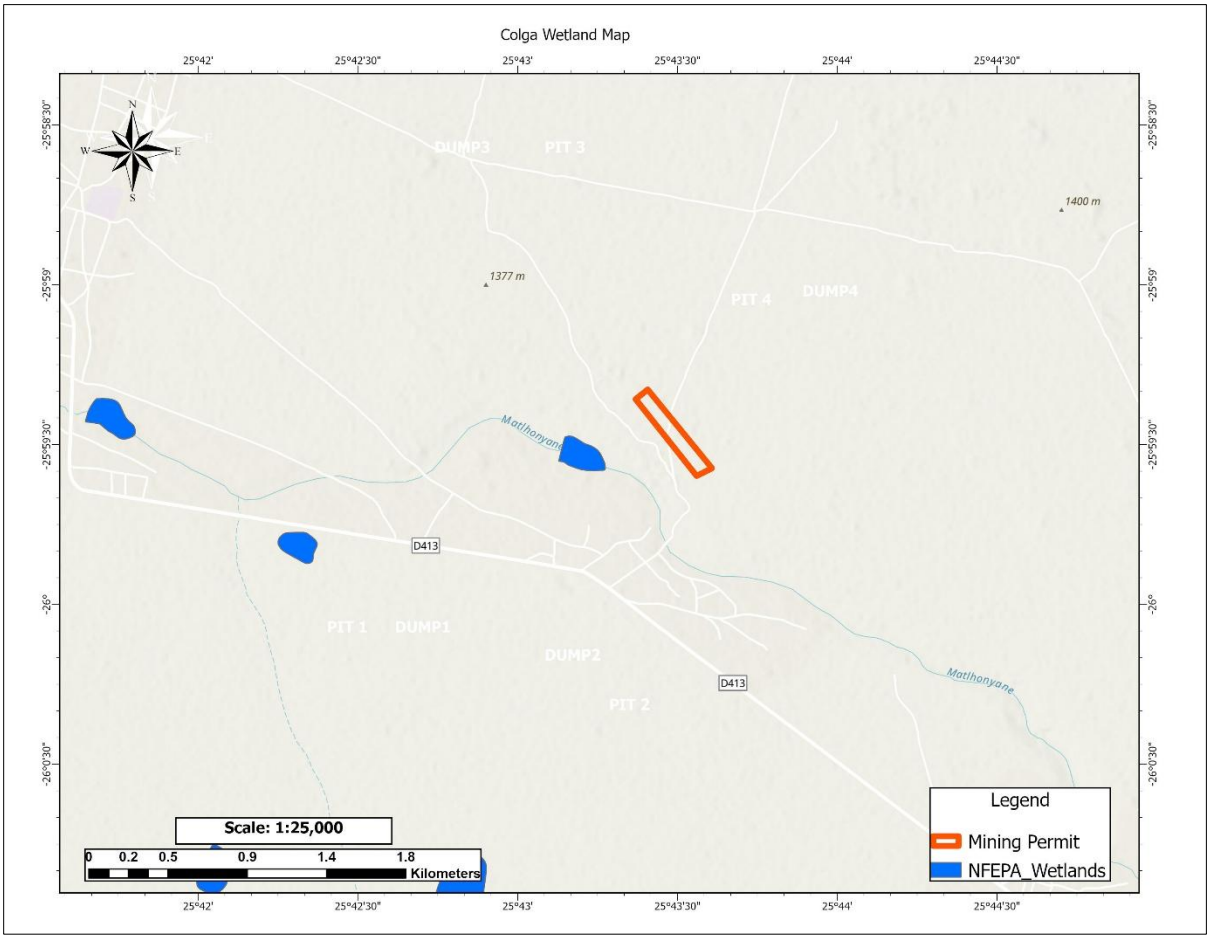


Figure 12-5: Wetlands

12.1.7 Hydrogeology

The hydrogeological map in **Figure** 12-6 indicates that the proposed mining permit area is situated predominantly within an intergranular and fractured aquifer with an estimated borehole yield of 0.1–0.5 L/s. This aquifer type is characterised by groundwater occurrence within the weathered regolith and secondary fractures in the underlying bedrock. Consequently, groundwater availability within the permit area is expected to be generally low to moderate, with borehole productivity controlled primarily by the degree of weathering and fracture connectivity rather than primary rock porosity.

The map further indicates that the mining permit is located within a hydrogeological unit having a transmissivity of approximately 25 m²/day, which reflects relatively low groundwater transmissivity. This suggests that groundwater movement through the aquifer is limited and that the aquifer has a modest capacity to transmit water. As a result, groundwater abstraction is unlikely to sustain high pumping rates without significant drawdown, and groundwater recharge is expected to be relatively slow.

A dyke traverses the hydrogeological unit in a generally east-west orientation north of the mining permit. Such geological structures can significantly influence groundwater flow by either acting as hydraulic barriers that restrict groundwater movement or as preferential flow paths where fractured. In this case, the dyke may compartmentalise the aquifer and locally influence groundwater levels and flow directions across the site. Hydrogeological investigations should therefore consider its potential impact when designing monitoring programmes or evaluating groundwater abstraction.

To the east of the mining permit, the hydrogeological conditions improve markedly, with aquifers exhibiting higher transmissivities (approximately 5,000 m²/day) and greater groundwater potential. These areas are likely associated with more productive geological formations capable of sustaining higher borehole yields. However, these favourable groundwater conditions lie outside the proposed mining permit and are therefore unlikely to be directly affected by mining activities.

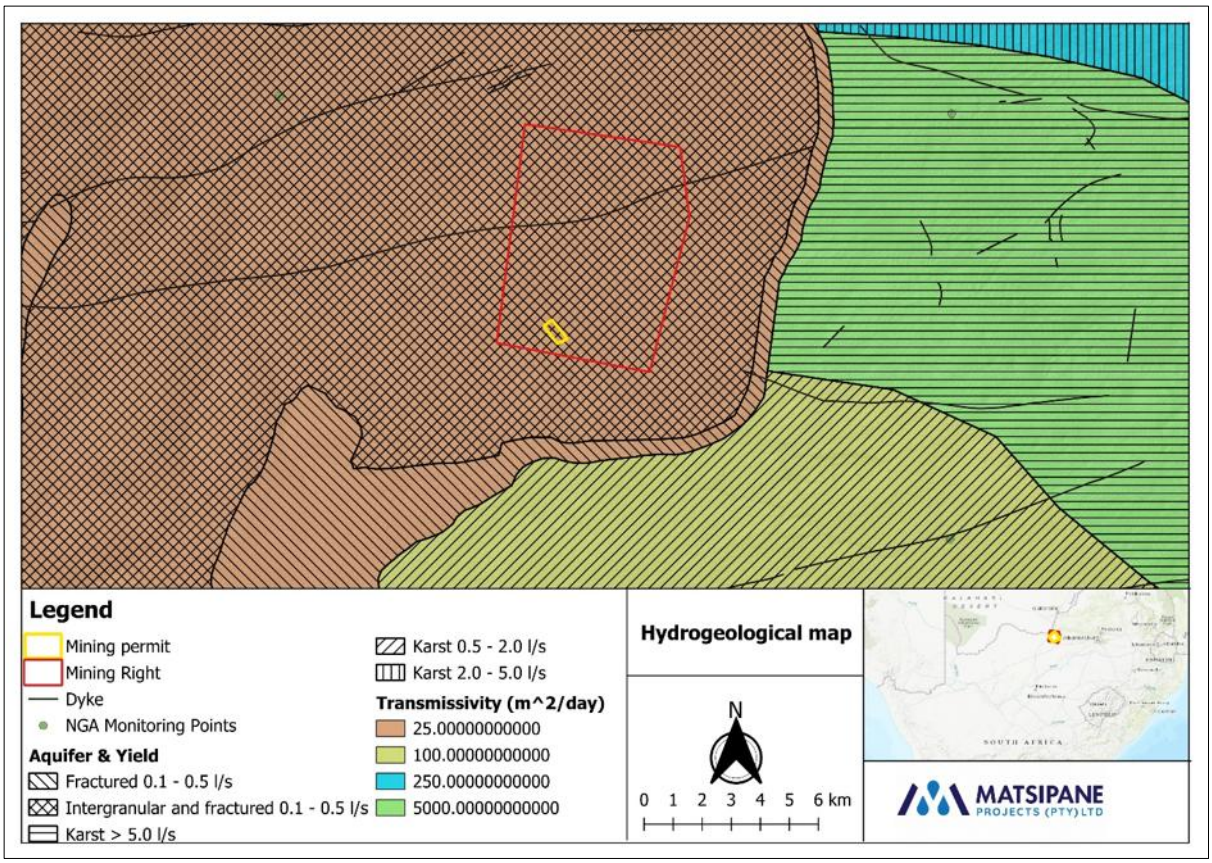


Figure 12-6: Hydrogeological map

12.1.8 Aquifer Vulnerability

The mining permit is situated close to the boundary between low and moderate vulnerability zones. To the east and south of the permit, vulnerability increases into moderate (Classes 1.89–2.11) and high vulnerability (Class 3.0) areas, represented by light green and dark red colours. These areas are hydraulically more sensitive because they are associated with higher groundwater permeability and more productive aquifers, allowing contaminants to migrate more rapidly if released (Figure 12-7).

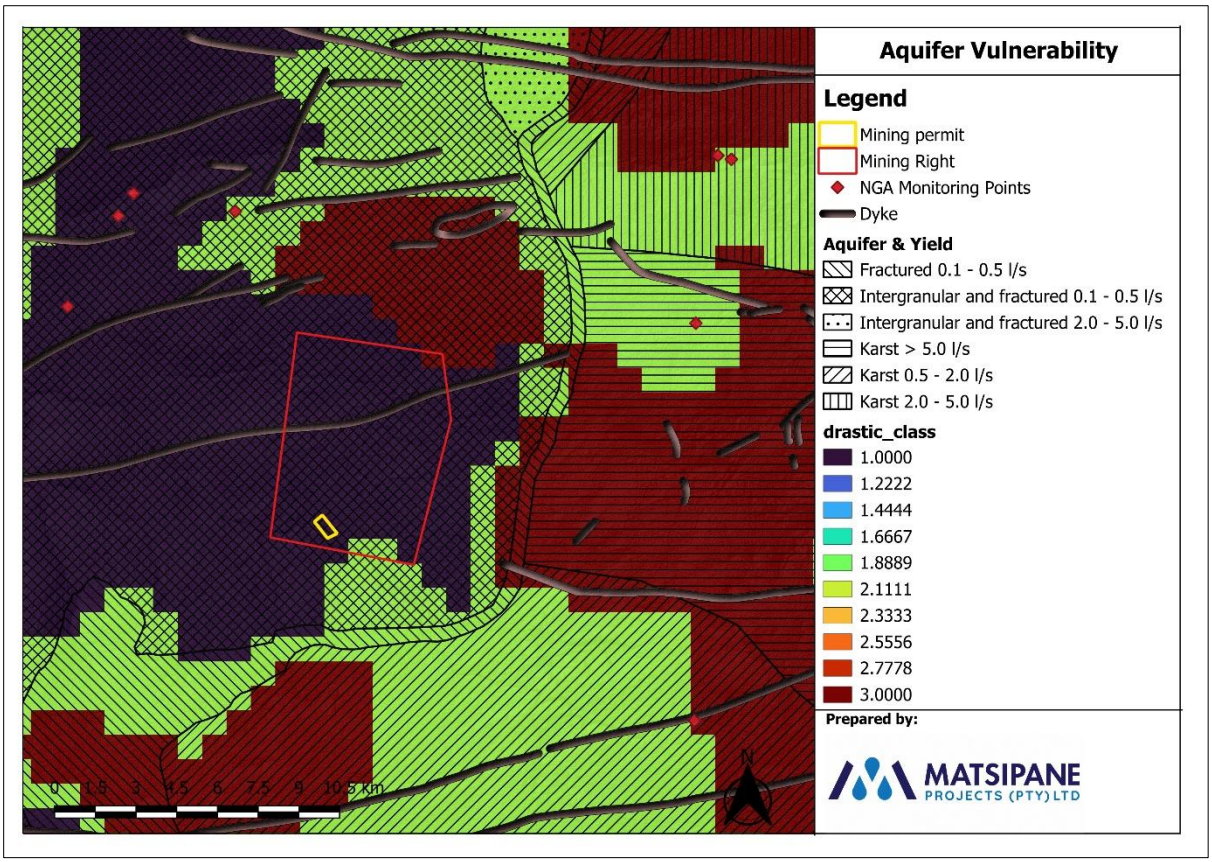


Figure 12-7: Aquifer Vulnerability

12.1.9 Groundwater levels

The groundwater level map indicates that groundwater across the study area occurs at moderately shallow to moderate depths, ranging from 13.6 to 24 m below ground level (mbgl). Two groundwater level zones are identified, with the 16.4–24 mbgl interval dominating the study area, while a smaller 13.6–16.4 mbgl zone is confined to the southwestern portion of the map.

The proposed mining permit is located entirely within the 16.4–24 mbgl groundwater level zone, indicating that the water table beneath the project area is generally encountered between approximately 16 and 24 m below the ground surface. This suggests that groundwater is relatively deep compared to the southwestern part of the study area and that the initial stages of mining are unlikely to intersect the groundwater table unless excavations extend beyond these depths.

The shallower groundwater level zone (13.6–16.4 mbgl) occurs outside the proposed mining permit, suggesting localized areas of higher groundwater availability or lower topographic elevation. As groundwater generally flows from areas of higher hydraulic head to lower hydraulic head, these shallower groundwater areas may represent local groundwater discharge zones or areas where recharge conditions differ from those within the mining permit.

Overall, the groundwater level distribution indicates stable and relatively deep groundwater conditions beneath the proposed mining area. The depth to groundwater reduces the likelihood of significant groundwater inflows during shallow mining operations; however, if mining progresses below approximately 16–24 m, groundwater interception and localized dewatering may become necessary. Routine groundwater level monitoring should therefore be undertaken throughout the life of the mine to detect any changes in groundwater levels resulting from mining activities or seasonal climatic variations.

12.1.10 Groundwater quality

The water quality map in Figure 12-8 presents the regional distribution of groundwater electrical conductivity (EC) and Total Dissolved Solids (TDS) within and surrounding the proposed mining permit. These parameters provide an indication of groundwater salinity and overall water quality. Lower EC and TDS values generally reflect fresher groundwater, whereas higher values indicate increased mineralisation resulting from prolonged water-rock interaction, evaporative concentration, or dissolution of naturally occurring minerals.

The proposed mining permit is situated predominantly within a groundwater quality zone characterised by electrical conductivity ranging between 70 and 300 mS/m, with a mean TDS of approximately 635 ppm. This indicates that groundwater within the mining permit is moderately mineralised but remains within the freshwater classification (TDS <1,000 mg/L). The observed groundwater chemistry is therefore considered typical of fractured-rock aquifers in semi-arid environments, where groundwater residence time and weathering contribute to moderate dissolved salt concentrations.

To the east of the mining permit, groundwater quality improves slightly, with mean TDS values of approximately 337–476 ppm, indicating lower mineralisation and fresher groundwater conditions. In contrast, areas to the south exhibit intermediate TDS values (480–558 ppm), reflecting moderate groundwater mineralisation. These spatial variations suggest that groundwater quality is influenced by lithology, groundwater flow paths, residence time, and structural geological features.

Several dykes traverse the study area and are likely to influence groundwater flow and water quality. These structures may compartmentalise the aquifer, restrict groundwater movement, or locally enhance flow where fractured. Consequently, they can create distinct groundwater quality zones by limiting hydraulic connectivity between different portions of the aquifer.

The distribution of National Groundwater Archive (NGA) monitoring points across the study area provides useful reference locations for assessing baseline groundwater quality. However, relatively few monitoring points occur within the proposed mining footprint, indicating that additional monitoring boreholes would improve the ability to detect any future changes in groundwater quality resulting from mining activities.

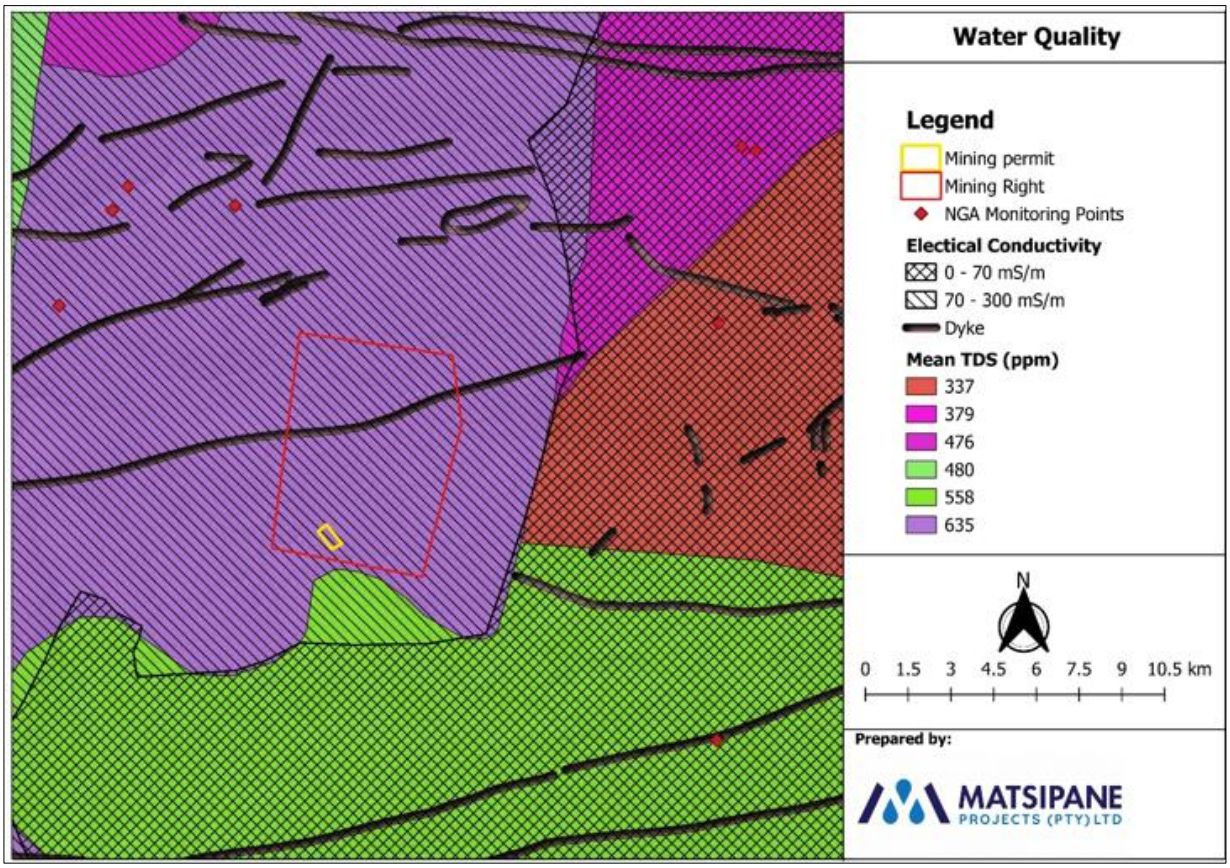


Figure 12-8: Groundwater quality

12.1.11 Protected Areas

The DFFE South African Conservation Areas Database (SACAD), South African Protected Areas Database (SAPAD) and the Important Biodiversity Area (IBA) database show that there are no protected areas or important bird areas affected by the proposed mining activities.

12.1.12 Biodiversity

Biomes

Mucina and Rutherford (2006) described the project application area as falling within the Dry Highveld Grassland biome. The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu Natal and the Eastern Cape. This biome (also known locally as Grassveld) is dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The Grassland Biome

It is the cornerstone of the maize crop, and many grassland types have been converted to this crop. Sorghum, wheat and sunflowers are also farmed on a smaller scale. Urbanization is a major additional influence on the loss of natural areas - the Witwatersrand is centred in this biome. The Grassland Biome is considered to have an extremely high biodiversity, second only to the Fynbos Biome. Rare plants are often found in the grasslands, especially in the escarpment area. These rare species are often endangered, comprising mainly endemic geophytes or dicotyledonous herbaceous plants. Very few grasses are rare or endangered. The scenic splendour of the escarpment region attracts many tourists (Mucina and Rutherford, 2006).

Vegetation

According to the new vegetation classification on BGIS (2012), the proposed site is located at the Klerksdorp Thornveld (Gh 13).

Klerksdorp Thornveld

The Klerksdorp Thornveld (Gh 13) shown in Figure 12-9 occurs in two patches, one in the Wolmaransstad, Ottosdal and Haarteesfontein and the other from Botsolano Game Park to the Madibogo. The dominating plant species include Acacia karroo, A. caffra, Celtis Africana, Acacia hebeclada, Gymnosporia senegalensis with low shrubs such as Asparagus laricinus, A suaveolens, Felicia muricata. The grass layer is dominated by Aristida congesta, Cynodon, dactylon, Eragrostis lehmanniana, Themenda triandra, Panicum coloratum, Sporobolus fimbriatus and Microchloa caffra. This vegetation is regarded as Vulnerable and only about 2.5% is conserved in the Mafikeng Game Reserve, Botsolano Game Park and Faan Meintjes Nature Reserve.

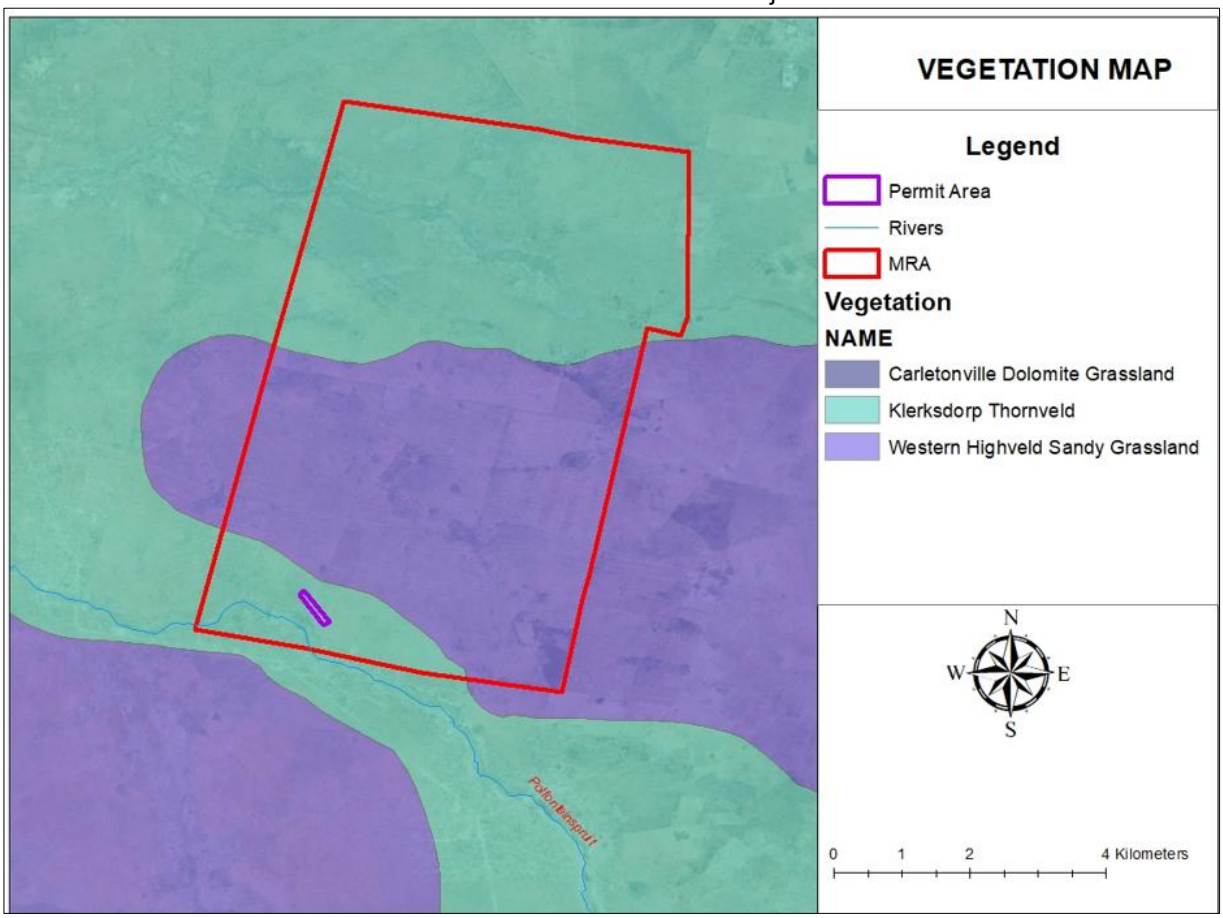


Figure 12-9: Vegetation type

12.1.13 Threatened ecosystem

The South African National Biodiversity Institute (SANBI), in conjunction with the Department of Environmental Affairs (DEA), released a draft report in 2009 entitled “Threatened Ecosystems in South Africa: Descriptions and Maps”, to provide background information on the List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was to present a detailed description of each of South Africa’s ecosystems and to determine their status using a credible and practical set of criteria. The following criteria were used in determining the status of threatened ecosystems:

- Irreversible loss of natural habitat;
- Ecosystem degradation and loss of integrity;
- Limited extent and imminent threat;
- Threatened plant species associations;
- Threatened animal species associations; and
- Priority areas for meeting explicit biodiversity targets as defined in a systematic conservation plan.

In terms of section 52 (1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), a new national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2012 (Government Notice 1002 (Driver *et. al.*, 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; *Critically Endangered* (CR), *Endangered* (EN), *Vulnerable* (VU), or *protected*. The purpose of categorizing these ecosystems is to prioritize conservation areas to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems. It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina *et al.,* 2006*)*.

The revised list identified 120 threatened terrestrial ecosystem types (51 Critically Endangered, 55 Endangered, and 14 Vulnerable) The proposed site is located within the Vulnerable e*cosystem* (***Klerksdorp Thornveld***). However, the Red List of Ecosystems (RLE) remnant ecosystem spatial dataset indicates that no remnant areas of the Rand Highveld Grassland ecosystem as well as the Klerksdorp Thornveld, occur within the mining area. This suggests that the mining permit deviation does not affect the remaining extent of these threatened ecosystems.

12.1.14 Conservation Plan

According to the North West Provincial Biodiversity Conservation Plan (C Plan), the entire Mining Permit area is regarded as not classified as shown in Figure 12-10.

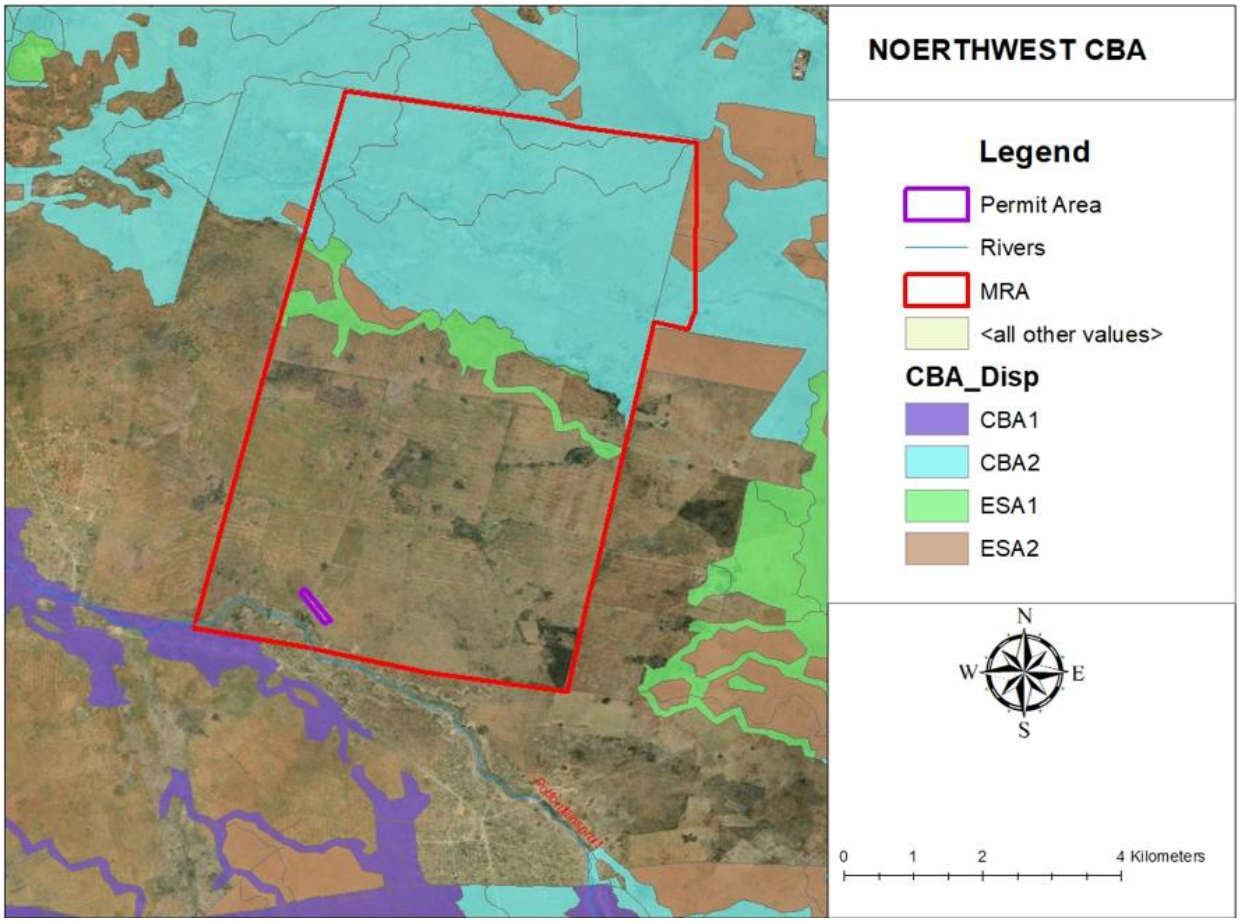


Figure 12-10: Critical Biodiversity Areas

12.1.15 Terrestrial Animal, Plant and Biodiversity Species

The Animal Species Theme for site is assigned as Low sensitivity by the DFFE Screening Tool due to the potential occurrence of avifaunal Species of Conservation Concern (SCCs). However, the terrestrial animal species assessment confirmed an overall low sensitivity based on the potential hunting on site. The site does provide suitable habitat for small mammals such as rabbits and antelopes.

The sensitivity of the site based on the Terrestrial Plant Species theme is considered low for the site since no protected plant species or red listed plants were recorded during desktop. The site investigation confirmed that there are no protected plants on site as the site was once previously cultivated as well as mined

The DFFE Environmental Screening Tool assigns the study area a Very High Terrestrial Biodiversity sensitivity due to the presence of Critical Biodiversity Areas (CBA 2) areas identified under the National Protected Area Expansion Strategy (NPAES). The field survey confirmed that the site is situated within the areas mapped as CBAs. Based on the findings of the field assessment, supported by available baseline information, the Site Sensitivity Verification classified the site is regarded Low.

The ST01 profile is characterized by a thin, dark organic-rich topsoil overlying a weakly developed brown subsoil, which grades rapidly into a thick, pale grey to white saprolitic weathered parent material containing abundant coarse fragments. The absence of strong clay illuviation, mottling, or carbonate accumulation suggests a well-drained upland landscape developed on highly weathered bedrock. The exposed saprolite indicates limited pedogenic development and relatively shallow effective soil depth, making the site more suitable for extensive grazing or low-intensity agriculture than for deep-rooted irrigated crops. From a mining perspective, the shallow soil mantle implies that topsoil stripping and stockpiling should be straightforward, while the underlying weathered saprolite may require more intensive excavation but is unlikely to present significant groundwater seepage problems under normal conditions.

12.1.16 Soil Profile Description

A soil profile sample (Figure 12-11) was collected within the mining permit area and designated ST01. The profile is characterised by a thin, dark, organic-rich topsoil layer overlying a weakly developed brown subsoil. The subsoil grades rapidly into a thick, pale grey to white saprolitic weathered parent material containing abundant coarse fragments. The absence of strong clay illuviation, mottling, or carbonate accumulation suggests a well-drained upland landscape developed on highly weathered bedrock. The exposed saprolite indicates limited pedogenic development and relatively shallow effective soil depth, making the site more suitable for extensive grazing or low-intensity agriculture than for deep-rooted irrigated crops. From a mining perspective, the shallow soil mantle implies that topsoil stripping and stockpiling should be straightforward, while the underlying weathered saprolite may require more intensive excavation but is unlikely to present significant groundwater seepage problems under normal conditions.



Figure 12-11: ST01 Soil Profile

The properties of the soil sample taken on the permit area are presented in Table 12-1

Table 12-1: Soil Profile Properties

Category	Parameter	Description
Horizon A (Topsoil)	Depth	0–0.20 m (estimated)
	Colour	Dark brown to very dark brown (moist); reddish-brown when dry
	Texture	Sandy loam to loamy sand
	Structure	Moderate fine to medium granular structure
	Consistence	Friable, slightly hard when dry
	Roots	Numerous fine and medium grass roots throughout the horizon
	Stoniness	Very low; occasional small gravel
	Boundary	Clear, smooth to slightly wavy boundary with underlying horizon
Horizon B (Pedogenic B)	Depth	0.20–0.45 m (estimated)
	Colour	Brown to yellowish-brown

	Texture	Sandy clay loam to clay loam
	Structure	Weak to moderate subangular blocky
	Consistence	Firm when moist; hard when dry
	Roots	Few fine roots extending from the topsoil
	Pedological Features	Slight clay accumulation; transitional weathering with weak ped development
	Boundary	Clear to abrupt, irregular boundary with C horizon
Horizon C (Weathered/Transitional)	Depth	0.45–1.80 m+ (estimated)
	Colour	Light grey to pale cream with whitish weathered material
	Texture	Gravelly sandy material with abundant weathered rock fragments
	Structure	Massive to weakly structured
	Consistence	Very firm to hard; locally friable where highly weathered
	Coarse Fragments	Abundant angular to subangular gravel and stones (>35%)
	Pedological Features	Strong weathering of parent material; minimal pedogenic development; evidence of saprolitic decomposition
	Boundary	Diffuse boundary into underlying saprolite
Underlying Material (Saprolite)	Depth	>1.80 m (not fully exposed)
	Description	Highly weathered, pale grey to white saprolitic parent material with residual rock fabric locally preserved; excavation reached weathered bedrock.
	Limitation	Hard material restricts root penetration, excavation, and water storage capacity.
Diagnostic Horizons		Orthic A Horizon overlying a weakly developed Pedogenic B Horizon, grading into a Saprolitic C Horizon.
Soil Classification	Probable Form	Glenrosa Form (provisional)
	Justification	Thin Orthic A horizon overlying shallow pedogenic material and weathered saprolite with limited soil development. The profile appears relatively shallow over weathered rock. Confirmation requires laboratory analyses and full field classification according to the South African Soil Classification System.
Land Use Interpretation	Strengths	Well-drained profile; generally suitable for grazing; moderate engineering foundation conditions; low risk of prolonged waterlogging.
	Limitations	Shallow effective rooting depth; abundant weathered rock fragments; limited moisture-holding capacity; low fertility expected; excavation difficulty increases with depth.
Irrigation Suitability	Suitability Class	Moderately suitable (S2) to Marginally suitable (S3) (provisional)
	Key Constraints	Shallow soil depth, coarse fragment content, limited available water capacity, potential low nutrient

		reserves, and restricted root development due to weathered saprolite.

12.1.17 Palaeontology

A wide range of possible fossil remains occur in the Cenozoic, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere. Deposits of cenozoic aged cave breccia associated with sinkholes and karst formations contain the remains of the ancestors of man (Groenewald and Groenewald 2014.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally VERY LOW to VERY HIGH.

All the land involved in the development was assessed (ni, nii) and none of the property is unsuitable for development.

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining development did not reveal any significant Archaeological material. This was partly due to the dense vegetation cover which reduced the visibility of archaeological material.

12.1.18 Heritage

Historical Buildings and Structures

The study noted that the proposed development is within an area that is heavily disturbed by previous agricultural and ongoing rural settlement activities, the study notes that structures associated with the agricultural activities are scattered across the study area. The study could not verify the exact ages of the structures.

Archaeological

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining development did not reveal any significant Archaeological material. This was partly due to the dense vegetation cover which reduced the visibility of archaeological material.

Burial sites and Graves

Human remains and burial sites are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites or occur sporadically anywhere because of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Archaeological and historical burials are usually identified when they are exposed through erosion and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials. The study did not identify any graves within the study area.

Public Monuments or Memorials

No Public Monuments or Memorials exist in the study area.

12.1.19 Noise

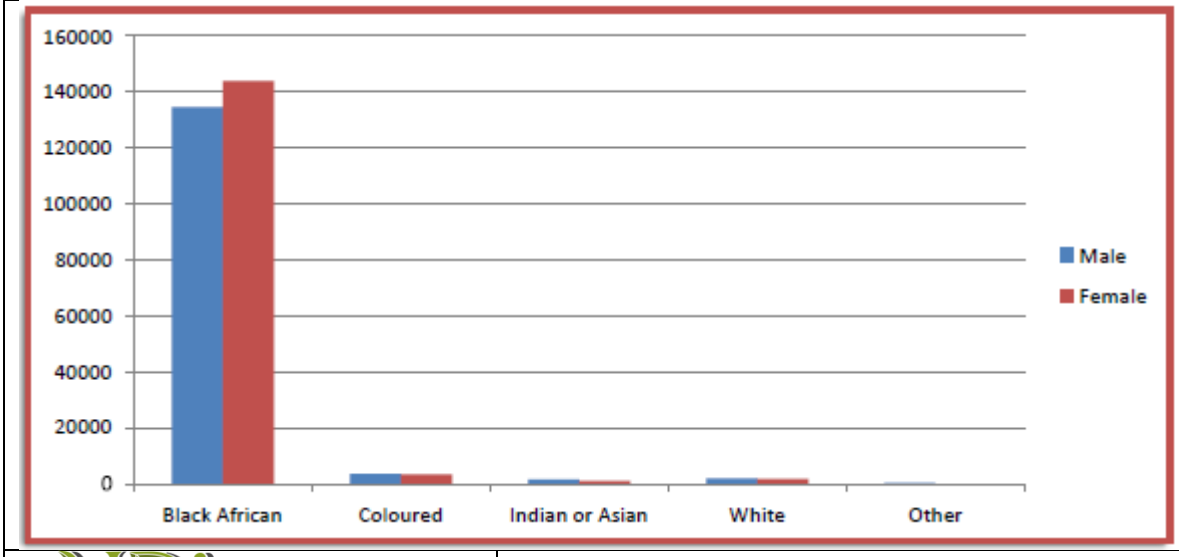
The typical noise rating in the area is expected to be that for rural districts with little road traffic. According to SANS 10103:2008, the continuous noise rating level is thus likely between 35 dB(A) at night to 45 /50 dB(A) during the day.

12.2 Socio-Economic

The proposed mining project is located within the Mahikeng Local Municipality (MLM) in the Ngaka Modiri District Municipality (NMDM) of the North West Province.

12.2.1 Population Age and Gender

The 2016 official community survey indicates that the population of Mahikeng Local Municipality has grown to 314 394 since 2016. It also indicates that the municipality has a predominantly African population with fewer Coloureds, Whites and Indian groups. It is estimated that the population growth has been 1.51%. The demographics also indicate that the municipality has a higher population of women than men. Statistics indicate that the municipality has the highest population of youth, therefore all programmes and budgeting must be directed at youth development and empowerment. These statistics are also reflected in the population composition and structure in Figure 12-12 and Figure 12-13.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)	MLM POPULATION

Figure 12-12: Population pyramid

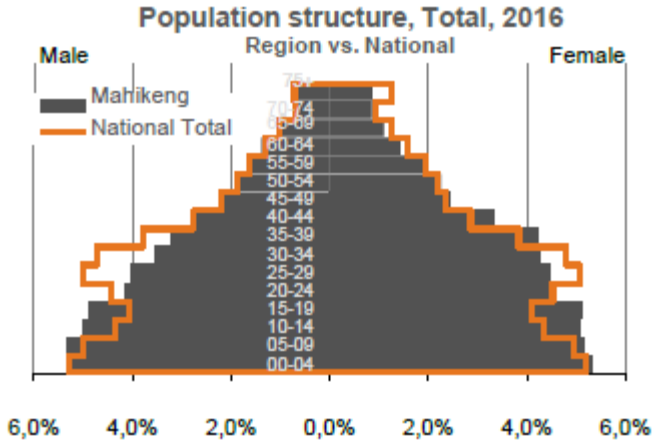


Figure 12-13: Age and Gender distribution

12.2.2 Income levels

The predominantly rural economy of the municipality is unable to provide individuals with remunerative jobs or self-employment opportunities. An estimated number of 13755 people in the municipality had no income in 2011. This amounts to 4.72% of the population. Taking the 1.16% annual growth to date into account, it means that to date this figure has risen to 14 405. In general terms, most households in the municipality earns less than the poverty baseline (about R1, 600 per household per month) and can be considered poor. Those classified as economically active are employed in the services sector. This sector is dominated by the departments that render services such as health, justice, local government, education, SAPS, etc. The table below indicates the income categories within the municipality. Table 12-2 depict the income levels as per StasSA data from 2011 Census.

Table 12-2: Annual household income by geography

Annual household income by Geography			
For Household weighted			
	North West	**DC38: Ngaka Modiri Molema**	**NW383: Mahikeng**
No income	176090	34587	14 405
R 1 - R 4800	44720	11335	4223
R 4801 - R 9600	76068	21338	7525
R 9601 - R 19 600	200531	51572	16506
R 19 601 - R 38 200	210842	48975	15338
R 38 201 - R 76 400	162965	24052	9368
R 76 401 - R 153 800	93223	15891	7365
R 153 801 - R 307 600	56610	11416	5827
R 307 601 - R 614 400	28028	5360	2987
R 614 001 - R 1 228 800	8266	1506	854
R 1 228 801 - R 2 457 600	2629	516	257
R 2 457 601 or more	2025	450	231

12.2.3 Drivers of the economy

The economic drivers in the district includes Agriculture, Tourism (Heritage sites and Game farms), Mining Houses (Kalgold, Slurry, Sephaku, Lafarge, Majemantsho informal mining and Diamond informal mining). The Strategic Location of the District offers great opportunities towards the economic development of the district underpinned by various development corridors. The economic opportunities that lie within the district and have the potential to create much-needed jobs, reduce poverty and inequality.

12.2.4 Mining

The primary sector in NMMD consists mainly of Agriculture, Tourism and Mining sectors. In 2017 the Agricultural sector experiences the highest annual growth of 25.5% whereas the Mining sector reached its highest point of growth of 19.5% in 2015. The Agricultural and Mining sectors experienced the lowest growth of -17% and 14% respectively during 2015 and 2014. The sector growth forecast shows an increase from R30.68 billion in 2018 to R32.67 billion in 2023 which is an average annual growth of 1.27%. Economic drivers in NMMD includes Agriculture, Tourism (heritage sites, game farms), Mining houses (Kal gold, Slurry, Majemantsho informal mining, Sephaku, Larfage and Diamond informal mining).

12.3 Description of the current land uses

The project area included various agricultural holdings (current and previously cultivated land) and mining area (Previous unrehabilitated area). Much of the vacant land was being used for grazing. Some portions of the vacant land were historically cultivated, while some areas were planted for pasture (Maize). The agricultural holdings included several alien invasive species, buildings and pasture.

12.4 Description of specific environmental features and infrastructure on the site

Please refer to Section 12.1.

12.5 Environmental and current land use map

An environmental and current land use maps is shown in **Figure 12-14**.

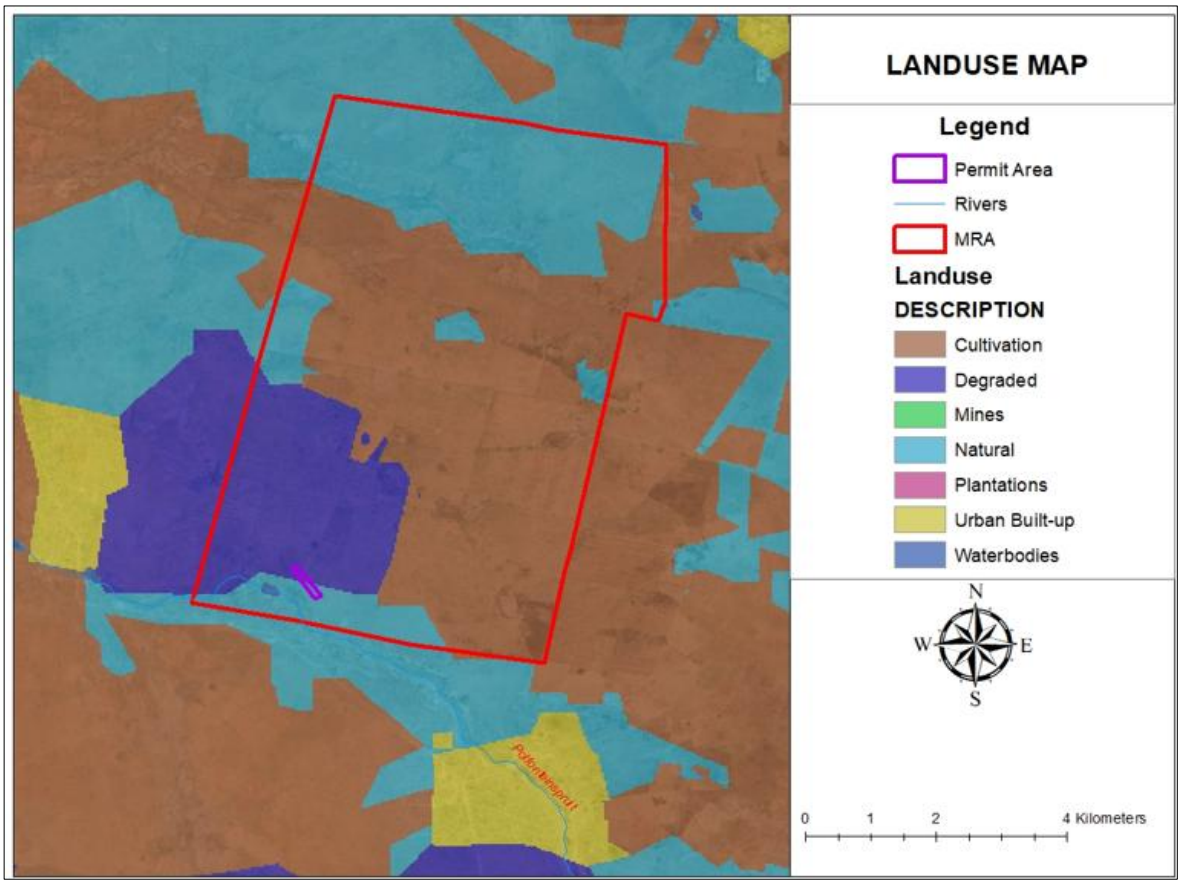


Figure 12-14: Current land use map

13 Impacts and Risks Identified

This section contains the assessment of potentially positive and negative environmental impacts that can be caused by the proposed project. The impacts are linked to the activities conducted for the proposed development, broadly relating to pre-construction, construction, operations and decommissioning phases. Specific emphasis was placed on any relevant environmental, social and economic impacts identified by the specialist studies, comments received during the I&AP engagement process, issues highlighted by relevant authorities; as well as a professional judgement of the EAP team through appraisals on the project description, listed activities and the receiving environment.

The objectives for each of the potential environmental impacts identified was to determine their significance and to promote mitigation measures to reduce the impacts to an acceptable level where required. Key potential positive and negative environmental issues relating to the proposed project were assessed according to the adopted methodology for assessing impacts as described in Section 14.

Table 13-1 provide a high-level assessment of the potential impacts and associated mitigation measures which could result from the proposed mining project 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.
Aquatic ecosystems, riparian and wetland areas	Possible impacts on aquatic ecosystems, riparian and wetland areas
Air Quality	Possible impact on Air Quality in the area.
Climate Change	Possible contribution to climate change through emission of Green House Gases
Vibrations	Possible impacts on private properties and fauna due to 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.
Heritage	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 Pre-Construction and Construction

The detailed description of activities to be undertaken during the pre-construction and construction phases is included in Section 7. The following impacts are envisaged during the pre-construction and construction phases.

13.1.1 Socio-Economic

The following socio – economic impacts are envisaged because of the construction phase of the proposed project:

- Positive impact on local economy due to economic opportunities for local and regional business (informal as well) from supplying services and materials to contractors during the construction phase;

- Negative impact associated with construction activities, including the clearing of land and excavations for the project dissecting the landscape which will impact on the sense of place;
- Negative impact due to the occurrence of additional trucks on the roads, and the incidence of construction workers on site, health and safety impacts on local communities may include construction workers lighting fires on site, littering and driving irresponsibly;
- Potential increase in social pathologies and negative health impacts due to contractor camp and potential squatting of job seekers; and
- As a result of construction activities, potential local employment opportunities will become available, increasing access to financial capital for workers.

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. Care should be taken during the utilisation and storage of hydrocarbons and chemicals, which may have an impact on groundwater quality because of spillages and uncontrolled release. 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 infrastructure. The impact on evapotranspiration is therefore expected to be negligible.

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 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 because 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.

13.1.4 Wetlands and Aquatic Ecosystems

It is expected that the removal of vegetation from the construction area will 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 wetland riparian species inhabiting the area. Impacts on the aquatic ecosystems and will include:

- Loss of habitat and aquatic ecosystem and wetlands and riparian ecological structure because of site clearance activities and uncontrolled aquatic ecosystem and riparian habitat degradation;
- Impact on the aquatic ecosystem and wetland systems because of changes to the sociocultural service provisions though site clearance, waste management and riparian disturbance;
- Potential poor planning, resulting in the placement of the infrastructure into aquatic ecosystem and wetland habitats, leading to altered habitat;
- Impact on the hydrological functioning of the aquatic ecosystem and wetland systems;
- Soil compaction and levelling because of construction activities and vehicle movement leading to loss of wetlands habitat; and
- Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of wetlands/riparian resources.

13.1.5 Heritage and Archaeological Resources

The following potential impacts are envisaged should any archaeological artefacts and graves be located on the site:

- The proposed project has the potential to impact on local graves within the area; and
- The proposed project has the potential to impact on sites of archaeological importance.

The final layout plan will be dependent on the location of local heritage and archaeological resources. The siting of the infrastructure will be in such a way as to avoid sensitive environments, which include graves and archaeological resources 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 (SCC) as a result of site clearing, alien species, waste management and soil compaction;
- Vegetation clearance may lead to floral habitat loss of potential SCC;
- 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 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 species trapping; and
- Impact on faunal SCC due to habitat loss and collision with construction vehicles.

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 Land use 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 waste. This will have the potential to result in soil pollution when not managed properly; and
- The erection of infrastructure and stockpiles, the current land capability and land use will be lost permanently.

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 Pre-Construction and Construction Phases

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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Site Establishment: Establishment of the required infrastructure																
Socio-economic	Influx of job seekers will have a negative social impact on the landowners and land occupiers.	2	1	2	2	2	20	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; 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	1	2	2	2	20	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	1	2	2	2	20	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	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Ineffective communication channels leading to community unrest.	2	1	2	2	2	20	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.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Possible boost in short term local small business opportunities.	2	1	2	2	2	20	Low (+)		2	1	2	2	2	20	Low (+)
	Possible creation of short-term employment for locals	2	1	2	2	2	20	Low (+)		2	1	2	2	2	20	Low (+)
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	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					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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; 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 infrastructure.	2	2	2	2	2	24	Low (-)	Ensure that topsoil is properly stored, away from the streams and drainage areas; No construction activities will be undertaken within 100 metres of the nearby steams and 500 meters from wetland and riparian areas without consent from the DWS; Vehicle and personnel movement within watercourses, wetland 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	2	2	2	2	24	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, Wetlands and Riparian Areas	Localised changes to the riparian and wetland 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 and wetland areas without consent from the DWS; No vehicles may be allowed to indiscriminately drive through the riparian and wetland areas or within the active stream channels;	1	1	1	1	2	9	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	2	9	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	2	9	Low (-)

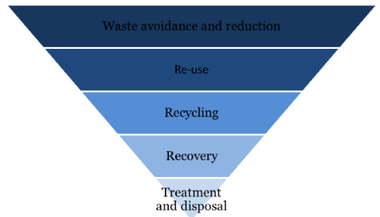
Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
	Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of riparian and wetland resources.	3	2	2	2	2	28	Medium Low (-)	All disturbed areas shall be re-vegetated with indigenous species; All construction materials shall be kept out of the riparian and wetland areas; and	1	1	1	1	2	9	Low (-)
	Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of riparian and wetland habitat.	3	2	2	2	2	28	Medium Low (-)	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	2	9	Low (-)
	Impact on the hydrological functioning of the aquatic ecosystems.	3	2	2	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
Heritage Resources	The proposed project has the potential to impact on local graves within the area.	2	1	2	2	2	20	Low (-)	Prior to the site establishment, a heritage impact assessment must be undertaken and mitigation and /or management measure for the protection of such resources must be implemented; 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 (-)
Palaeontological Resources	Clearance of the area 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 infrastructure and mining area.	3	3	2	2	2	32	Medium 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; 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; 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;	1	1	1	1	2	9	Low (-)
	Loss of localised floral species diversity including SCC and medicinal protected species due to site clearance and site establishment.	3	3	2	2	2	32	Medium Low (-)		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.	3	3	2	2	2	32	Medium Low (-)		1	1	1	1	2	9	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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 and wetland areas; 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; 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							

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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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) is 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, PM10 and PM2.5 as a result of bulk earthworks, operation of heavy machinery, and material movement.	3	2	2	2	2	28	Medium Low (-)	Dust suppression measures 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 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; 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.	3	2	2	2	2	28	Medium Low (-)		1	2	1	1	2	12	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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.	3	2	2	2	2	28	Medium 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.	3	2	2	2	2	28	Medium 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.	3	2	2	2	2	28	Medium 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.	3	2	2	2	2	28	Medium Low (-)	Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e. g. 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 fanbelts, 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;	1	1	1	2	1	9	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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).							
Soil, Land use and Land Capability	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 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	2	1	9	Low (-)
	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 (-)		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 on public roads 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	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.							
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 (-)	The management of waste on site will consider the principles of the NEM: WA and implement the waste management hierarchy of waste management as provided in Figure 13-1.  Figure 13-1: Waste Management Hierarchy to be followed 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; No littering shall be allowed in and around the site, a sufficient number of bins shall be provided for the disposal of waste; Where necessary dedicate a storage area on site for collection of construction waste. Storage of waste: No stockpiling of debris shall be permitted within 100 m of any water courses and drainage lines, or within 500 m of riparian and wetland areas; 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;	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						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									Bins shall be emptied regularly to prevent them 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 any area demarcated for waste will be contained, treated and reused; Flammable substances must be kept away from sources of ignition and from oxidizing agents; No construction rubble shall be disposed of to the wetland and riparian area; If construction rubble is not removed immediately, it shall be stockpiled outside the sensitive environments including 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. Disposal of hazardous waste: 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 The safe disposal certificate shall be stored and provided on request. Disposal of general waste: No dumping shall take place in or near the construction site; All general waste shall be disposed of to the nearest licensed landfill site; Demolition waste and builder’s rubble shall be disposed of to an appropriate licensed landfill site; and							

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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									The necessary permissions must be obtained to dispose of builders' rubble to the landfill site.							

13.2 Operational Phase

The detailed description of activities to be undertaken during the operational phase is included in Section 7. The quantitative impact assessment for the operational phase can be found in Table 13-3. The following impacts are envisaged during the operational phase.

13.2.1 Social-Economic

The following socio – economic impacts are envisaged as a result of the operational phase of the proposed project:

- Negative impact as a result of the project as there will be additional trucks on the roads, impacting on local communities' health and safety;
- 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;
- Positive impacts due to the implementation of the provisions of the EMPr; and
- Positive impact because of operation and associated activities, providing a potential for local employment opportunities; increasing access to financial capital for workers.

13.2.2 Groundwater

Potential operational phase impacts on groundwater are expected to be as follows:

- Handling of waste and transport of materials cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and cause contamination of the groundwater system.
- The use of machinery and vehicles on site poses the risk of chemical spillages including fuel and oils, which may leach into the groundwater.

13.2.3 Surface water

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

- The potential for contamination of surface water due to releases of dirty water due to transportation of gravel material. It is recommended that regular dust suppression be conducted as far as possible. Spillages and accidental discharges could result in the contamination of surface water resources.
- Improper site management may result in runoff from latrines and domestic waste which could pollute surface water resources.
- Impacts on surface water resources quality because of incorrect waste management practises and pollution.

13.2.4 Wetlands and Aquatic Ecology

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

- Loss of wetland and riparian habitat and aquatic ecological structure because of continual disturbance and uncontrolled degradation;
- Impact on the aquatic ecological systems because 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, riparian and wetland systems because of reduced aquatic ecosystem, riparian and wetland 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 because of continual disturbance of soil, leading to altered floral habitats, erosion and sedimentation;
- Impact on floral diversity because of possible uncontrolled fires;
- Potential spreading of alien invasive species because 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 proposed may result in the following impacts on the faunal environment during the operational phase:

- Continued loss of faunal diversity because of poaching and faunal species trapping;
- Impact of faunal species of conservational concern due to habitat loss and collision with vehicles transporting material; and
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts on faunal habitats during the operation phase.

13.2.7 Wetland and Aquatic Environmental Impacts

In addition to the impacts on aquatic habitats as explained in Section 13.1.5, the operational phase of the project is expected to have the following impacts on wetlands and aquatic ecosystems:

- Loss of habitat and wetland ecological structure because of continual wetland disturbance and uncontrolled wetland degradation;
- Impact on water quality and availability as a result in ineffective dirty water separation, and dirty water entering the wetland;
- Impact on the wetlands systems because of changes to the sociocultural service provisions through continued uncontrolled vegetation clearance, waste management and wetland disturbance; and
- Impact on the hydrological functioning of the wetland systems because of reduced wetland footprints and uncontrolled disturbance.

13.2.8 Soils, Land Use and Land Capability

The operation of the mine will inevitably scar the landscape. Soil contamination because of operational activities can be as a result of a number of activities (i.e., hazardous substance storage, incidental hydrocarbon leakages from construction vehicles). The use of vehicles during the operation of the project may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination and compaction of soils. The materials removed from the mining activities has potential for contamination should it not be managed properly, which may render the land not usable after backfilling operation.

13.2.9 Topography Impacts

As a result of operational phase activities, the following impacts are envisaged as a result of the operational phase:

- The continuous placement of mined material onto the demarcated stockpile area will modify the local topography of the site-specific area; and
- Mining of the diamonds will ultimately alter the topography.

13.2.10 Geology Impacts

Extraction of the diamonds will result in the removal of local geology.

13.2.11 Air Quality

During the operational phase there is potential for dust generation potentially resulting in nuisance and health effects on nearby receptors during operational activities. Dust generating activities associated with the operational phase activities include materials handling, vehicle entrainment of dust on the haul roads, windblown dust from the stockpiles and exposed areas. The impact the

proposed project is envisaged to have on the air quality of the area during the operational phase are as follows:

- Possible increase in dust generation, PM10 and PM2.5 as a result of stockpiling material, use of heavy machinery, and material movement;
- Increase in carbon emissions and ambient air pollutants (NO2 and SO2) as a result of movement of vehicles and operation of machinery/equipment.

13.2.12 Visual

The operational phase of the project will potentially result in visual impacts due to loss of sense of place due to:

- Mining activities and the gravel stockpiles;
- Additional vehicular activities impacting on the rural character of the region;
- Generation of dust leading to visual intrusion, visual exposure of receptors and impacts on the overall landscape character; and
- Night-time lighting should 24-hour operations taking place may impacting on receptors accustomed to a low district brightness during night-time.

13.2.13 Heritage, Archaeological Resources

The mining operations may result in the destruction of graves and other heritage resources.

13.2.14 Palaeontology Impacts

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

13.2.15 Ambient Noise

The following noise impact is envisaged as a result of the operational phase of the proposed project:

- The use of vehicles and machinery during the operational phase may generate noise in the immediate vicinity; and
- Increase in ambient noise levels as a result of the mining activities. The assembling of mine related equipment and/or structures during the operational phase will inherently generate a degree of noise emissions.

13.2.16 Traffic

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

13.2.17 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.

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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Socio-Economic	Positive impact as a result of operation and associated activities, providing a potential for local employment opportunities; increasing access to financial capital for workers	2	1	2	1	2	15	Low (+)	Where it is possible, hire/use local people; Identify opportunities for the employment/procurement and training of people and contractors from the local area; Opportunities for local employment may include activities related to office cleaning, ground maintenance and mining; Based on these opportunities, develop a recruitment and training strategy that operations recruiters will have to adhere to; Monitor implementation of local recruitment and training strategies, including monitoring of corruption and nepotism; Employment and training of the youth and females where possible; Implementation of employment and procurement policy; Communication with locals regarding job opportunities and skills requirements to manage expectations.	2	1	2	1	2	15	Low (+)
	Additional trucks on the roads may impact local communities' health and safety	2	1	2	1	2	15	Low (-)	Operation vehicles to be road worthy and drivers to adhere to speed limits; Develop and implement mine standards and requirements, Mine Safety Health and Environmental policies, as well as relevant South African regulations such as the Mine Health and Safety Act (Act No. 29 of 1996) as amended; Inform employees and neighbouring landowners and inhabitants about operation activities; Ensure a grievances procedure is in place.	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 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	2	1	1	2	2	16	Low (-)	Ensure a grievances procedure is in place for local people to log grievances; Implement local recruitment and training strategies and policies, and clearly communicate these locally through relevant authorities and media; Do not recruit informally at the gate but follow a formal recruitment process; Make use of local accommodation for contract workers, as opposed to a contractor's camp; Inform employees and neighbouring landowners and inhabitants about local recruitment strategies and policies, and give regular updates; Monitor the surrounding area for informal settlement and develop a strategy to deal with informal settling; Ensure that all contractors and their employees attend inception training, addressing mine standards and requirements, Mine Safety Health and Environmental policies, relevant South African regulations, the environmental management plan, and recruitment strategies.	1	1	1	1	1	6	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 (-)
Groundwater	The use of vehicles may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of the vegetation cover and soils.	3	2	2	2	2	28	Medium Low (-)	All spillages will need to be cleaned up as soon as practically possible; Proper management of stormwater drainage infrastructure should be ensured;	2	1	2	1	2	15	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
	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 (-)	Maintain construction vehicles and encourage contractors to report, react and manage all spills and leaks so that action can be taken to immediately minimise contamination to the groundwater; A groundwater monitoring programme must be developed by a groundwater specialist; Spill kits will be made available in areas of likely spillage; All hydrocarbon storage containers will be stored within a bunded area which are watertight and able to contain 110% of the stored volume; All equipment utilising hydrocarbons will be stored on a hard-standing surface. 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. Groundwater levels must be monitored to ensure that impacts on groundwater levels are minimised.	2	1	2	1	2	15	Low (-)
	The potential for contamination of surface water due to releases of dirty water (runoff and return water) from all access roads due to transportation of product. It is recommended that regular dust suppression be conducted as far as possible. Spillages and accidental discharges could result in the contamination of surface water resources.	2	3	3	2	2	32	Medium Low (-)		2	1	2	1	2	15	Low (-)
	Improper site management may result in runoff from latrines and domestic waste which could pollute surface water resources	2	3	3	2	2	32	Medium Low (-)		1	2	2	2	2	20	Low (-)
Surface Water	During operation, the decrease in local groundwater levels and potential contaminants in the groundwater due to infiltration of process water, may result in an indirect impact to local receptors including rivers and private boreholes	2	3	3	2	2	32	Medium Low (-)	Develop and implement controls to pick up oil/diesel leaks and spillages of any designated hazardous waste. The clean stormwater will be diverted which further mitigates the impact. All spillages will need to be cleaned up as soon as practically possible; Proper management of stormwater drainage infrastructure should be ensured; Maintain construction vehicles and encourage contractors to report, react and manage all spills and leaks so that action can be taken to immediately minimise contamination to the groundwater; A groundwater monitoring programme must be developed by a groundwater specialist; Spill kits will be made available in areas of likely spillage; All hydrocarbon storage containers will be stored within a bunded area which are watertight and able to contain 110% of the stored volume; All equipment utilising hydrocarbons will be stored on a hard-standing surface. A waste management plan will be compiled and approved for implementation of site. This management plant should focus on the waste hierarchy of the NEM: WA; No waste may be disposed of to land without the necessary legal permits; Waste will be removed from site by an accredited waste removal company and legally disposed of. Disposal certificates will be kept on site for audit purposes; Sufficient waste receptacles will be placed around the site allowing the separation of waste as source.	1	2	2	2	2	20	Low (-)
	Impacts on surface water resources quality as a result of incorrect waste management practises and pollution.	2	3	3	2	2	32	Medium Low (-)		1	2	2	2	2	20	Low (-)
	Loss of habitat and aquatic ecological structure as a result of continual disturbance and uncontrolled degradation;	2	2	2	2	2	24	Low (-)		1	2	2	2	2	20	Low (-)
	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.	2	2	2	2	2	24	Low (-)		1	2	2	2	2	20	Low (-)
Aquatic Ecology	Impact on the hydrological functioning of the aquatic ecological and riparian and wetland systems as a result of reduced aquatic ecosystem, riparian and wetland footprints and uncontrolled disturbance.	2	2	2	2	2	24	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 activities shall be allowed within 500 m of riparian zones and wetland areas without consent from the DWS; No vehicles may be allowed to indiscriminately drive through the riparian and wetland 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 and wetland areas; All vehicles shall be regularly inspected for leaks.	2	1	2	1	2	15	Low (-)
	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 (-)		2	1	2	1	2	15	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
	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 (-)	Re-fuelling must take place outside the project area, on a sealed surface area to prevent ingress of hydrocarbons into topsoil and aquatic ecosystems No dumping of waste should take place within wetland and riparian areas or their buffer zones. If any spills occur, they should be immediately cleaned up; Implement an alien vegetation control program within the wetland features and ensure establishment of indigenous species within areas previously dominated by alien vegetation;	2	1	2	1	2	15	Low (-)
Biodiversity	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 (-)	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. 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 mining area.	2	1	1	1	1	8	Low (-)
	Topsoil removal, storage and replacement during the excavation of the sumps will result. This will result in the disruption of the soils profile.	2	3	2	2	2	28	Medium Low (-)		2	1	1	1	1	8	Low (-)
	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).	2	3	2	2	2	28	Medium 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 mining area 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	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 (-)	Existing established roads should be used wherever possible; Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts should be installed to permit free drainage of existing water courses; The side drains of the roads can be protected with sediment traps and/or gabions to reduce the erosive velocity of water during storm events and where necessary geo-membrane lining can be used; Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment should be contained using a drip tray with plastic sheeting filled with absorbent material; Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste; Processing areas should be contained, and systems designed to effectively manage and dispose of contained stormwater, effluent and solids.	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 (-)		2	1	1	1	1	8	Low (-)
Air Quality	Scaring of the landscape as a result of the clearance of vegetation and preparation of the mine.	2	2	3	2	3	35	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. 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.	1	1	1	1	1	6	Low (-)
	Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.	1	2	2	3	3	30	Medium 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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									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. Odours 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	The mining operation 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 (-)	It is recommended that stockpiles be vegetated with indigenous vegetation in order to blend more easily into the existing landscape and for screening purposes; The design and height increase of stockpiles and dumps must be monitored to ensure that these components relate to acceptable environmental standards in terms of slope and elevation; Stockpiles are ideally to be shaped at an adequate slope from the commencement of the project to ensure that it integrates more successfully into the natural topography of the visual landscape; It must be ensured, wherever possible, that existing natural vegetation is retained in the vicinity of the infrastructure areas; The access gravel roads should be irrigated on a regular basis, with just enough moisture to keep the dust down without creating undue runoff; Soil stockpiles must be kept damp during the dry season, and preferably be vegetated in order to minimise the potential for dust generation; Vehicle speed on gravel roads must be reduced to limit dust generation; As far as possible, operational activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow; Outdoor lighting must be strictly controlled; The use of high light masts and high pole top security lighting should be avoided along the periphery of the operations. Any high lighting masts should be covered to reduce sky glow; Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surrounding of the mining infrastructure, thereby minimising the light spill and trespass; Censored and motion lighting may be installed at office areas, workshops and other buildings to prevent use of lights when not needed; Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night- time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow; The use of permanent signs and project signs should be in accordance with the requirements of the project and mining regulations, be minimised and visually unobstructive.	1	1	1	1	1	6	Low (-)
	Mining has potential to impact on palaeontological resources	2	1	2	2	1	20	Low (-)		1	1	1	2	2	12	Low (-)
Heritage Resources	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity	2	2	3	2	3	35	Medium Low (-)	Locate exploration borehole more than 50 m from the identified heritage sites.	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Palaeontological Resources	Increase in ambient noise levels as a result of the mining activities.	2	2	3	2	3	35	Medium Low (-)	Should fossils be exposed during mining, 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 (-)
Noise	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion on public roads as well as the farm roads around the mining area.	2	3	1	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 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.g., noise) in advance. Surrounding communities must be notified in advance of noisy 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 fanbelts, 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).	1	1	1	1	1	6	Low (-)
	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 (-)		1	1	1	1	1	6	Low (-)
Traffic	The placement of diamondiferous gravel material onto the demarcated stockpile areas will modify the local topography of the site-specific area.	3	3	2	2	2	32	Medium 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	Progressive mining of the mine expansion area will ultimately alter the topography.	3	3	2	2	2	32	Medium 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 (-)
Topography	Removal of local geology as a result of the expansion of the mine	2	2	3	2	2	28	Medium Low (-)	Bush clearance will only take place in designated areas and as minimal as possible; The operational site will be kept neat and tidy and free of litter; Building rubble will be removed daily;	2	2	2	2	2	24	Low (-)
	Potential water and soil pollution as a result of inappropriate waste management practices.	2	1	1	2	2	16	Low (-)		2	2	2	2	2	24	Low (-)
Geology									The extent of this impact is extremely localised, and the impact has been rated to have a low significance rating; Mining will be conducted strictly according to the mine plan to be submitted to the DMPR; Optimally exploit this resource.	1	2	2	2	2	20	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	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Waste Management									The management of waste on site will consider the principles of the NEM: WA and implement the waste management hierarchy of waste management as provided in Figure 13-1. Storage of waste 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 mining area 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 100 m of the water courses or within 500 m of riparian and wetland 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. Disposal of hazardous waste 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 The safe disposal certificate shall be stored and provided on request. Disposal of general waste No dumping shall take place in or near the mining area; and All general waste shall be disposed of to the nearest licensed landfill site.	1	1	1	1	1	6	Low (-)

13.3 Decommissioning and Closure

The main activity that will take place during this phase of the project is the demolition and removal of mining related infrastructure. The potential impacts associated with demolition activities are similar to the anticipated impacts to occur during the construction phase. The impacts and mitigation measures have been dealt with during the discussions of the construction activities and will not be recaptured in this section, only references will be made where applicable.

13.3.1 Demolition of Project Related Infrastructure

The decommissioning and closure of the mine will entail the demolition and removal of the majority of the project related Infrastructure:

13.3.2 Potential Impacts and Mitigation Measures

It is anticipated that the potential impacts of this activity in the rehabilitation phase will be the same as the anticipated impacts listed in the construction phase. It is therefore recommended that the mitigation/management measures applicable to the construction phase are implemented. 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)	Frequency: Impact	Significance	Significance Rating		Consequence			Likelihood (Probability)	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity				Management and Mitigation Measures	Severity	Spatial	Duration	Frequency Activity			
Socio-Economic	Loss of employment Reduced regional economic development Reduced community investment	1	3	2	2	2	24	Low (-)	Manage qualifications of mine workers and implement programmes in the EMPR to enable workers to source employment elsewhere on decommissioning of the mine.	1	1	1	1	2	9	Low (-)
Surface water, wetlands, riparian areas and aquatic ecosystem	Debris blocking watercourses if road continues to be used by the community.	1	3	2	2	2	24	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. Demolish during dry season, limit the disturbed footprint. Operate using best practices and clean spillages immediately they occur and remediate as necessary using spill kits.	1	1	1	1	2	9	Low (-)
	Impeding flow while under demolition	1	3	2	2	2	24	Low (-)		1	1	1	1	2	9	Low (-)
	Increased turbidity due to demolition.	1	3	2	2	2	24	Low (-)		1	1	1	1	2	9	Low (-)
	Accidental spillages of hazardous substances from construction vehicles used during demolition.	1	3	2	2	2	24	Low (-)		1	1	1	1	2	9	Low (-)
Air Quality	Rehabilitation and removal of the 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.	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 (-)
Visual	Removal of infrastructure and general decommissioning and closure activities leading to visual intrusion on sensitive receptors.	1	3	2	2	2	24	Low (-)	Decommissioning footprints and disturbed areas should be kept as small as possible and no further indigenous vegetation should be cleared or soils exposed for this purpose; All areas where infrastructure is removed must be resloped to resemble the pre-development landscape and revegetated as soon as possible; Concurrent/ progressive rehabilitation must be implemented, and disturbed areas must be rehabilitated as soon as possible and as soon as areas become available by replacing topsoil and revegetating disturbed areas; Indigenous and locally occurring plant species selected for use in re-vegetation should be selected taken quick growth rates into consideration in order to cover bare areas and prevent soil erosion; and Upon final rehabilitation, it must be aimed to remove all much surface infrastructure and to reshape the landscape	2	1	2	2	2	20	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			Likelihood (Probability)	Frequency: Impact	Significance	Significance Rating		Consequence			Likelihood (Probability)	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity				Management and Mitigation Measures	Severity	Spatial	Duration	Frequency Activity			
Soils, Land use and Land Capability	Soil Compaction	3	1	3	3	2	35	Medium-Low (-)	Heavy machinery/mining equipment should stick to demarcated routes to avoid soil compacting; If possible, vegetation clearance, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low to avoid surface crusting and sealing of exposed soils Direct surface disturbance of soils should be limited within demarcated areas where possible to minimise the intensity of compaction; and Compacted soils adjacent to the mining pit and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.	2	1	2	1	2	15	Low (-)
	Dust and Soil Erosion	3	1	3	3	2	35	Medium-Low (-)	Temporary erosion control measures may be used to protect the disturbed soils during the decommissioning and closure phase until adequate vegetation has established. Restrict vegetation clearance to priority areas of development. The footprint of the proposed mining and infrastructure areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible; Bare soils can be regularly dampened with water to suppress dust during the decommissioning and closure phase, especially when strong wind conditions are predicted according to the local weather forecast;	2	1	2	1	2	15	Low (-)
	Soil Degradation	3	1	3	3	2	35	Medium-Low (-)	Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible; Ensure all stockpiles are clearly and permanently demarcated and located in defined no-go areas; Separate stripping, stockpiling and replacing of soil horizons in the original natural sequence to combat hard setting and compaction, and maintain soil fertility; Stockpiles height should be restricted to that which can deposited without additional traversing by machinery. Maximum height of 2-3 m is proposed, and the stockpile should be treated with temporary soil stabilization; Stockpiled soils should be stored for a maximum of 3-5 years. Alternatively, concurrent rehabilitation should strongly be considered to reduce the duration of stockpile storage to ensure that the quality of stored soil material does not deteriorate excessively; especially with regard to leaching and acidification At decommissioning and rehabilitation phase, replace soil to appropriate soil depths in the correct order, and cover areas to mimic a natural topographic aspect so as to achieve a free draining landscape that is as close as possible the pre-mining land capability rating.	2	1	2	1	2	15	Low (-)
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices	2	3	2	2	2	28	Medium-Low (-)	Implement the mitigation measures contained in the construction phase assessment.	2	2	2	1	2	18	Low (-)

13.4 Cumulative Impacts

Incomparable activities can result in several complex effects on the natural biophysical and social environment. These impacts are mainly identified as direct and immediate effects on the environment by a single entity affecting a variable of the environment. These direct impacts have the potential to combine and interact with other activities, depending on the surrounding environmental state and land use. These impacts may aggregate or interact with other impacts to cause additional effects, not easily quantified when assessing an individual entity.

The NEMA, 2014, specifically requires that cumulative impacts be assessed. This section provides a description and analysis of the potential cumulative effects of the proposed mining project, and past and present projects hereby considering the effects of any changes on the:

- Biophysical; and
- Socio – Economic conditions.

For the analysis of cumulative effects to be utilised as a useful tool for decision makers and I&APs, it must be limited to the effects that can be meaningfully evaluated, rather that expanding on resources or receptors that are no longer affected by the development or are not of interest to the I&APs. Two important aspects require consideration prior to the evaluation of cumulative effects:

- The determination of an appropriate spatial and temporal boundaries for evaluation of cumulative effects of the project; and
- The evaluation of relevant projects for consideration in the cumulative effects' analysis.

Spatial and temporal boundaries for analysis of cumulative effects are dependent on several factors, including:

- The size and nature of the project and its potential effects;
- The size, nature and location of past and (known) future projects and activities in the area,
- The aspect of the environment impacted by the cumulative effect; and
- The period of occurrence of effects.

The spatial extent of the cumulative impact analysis is generally aligned with the zone of influence of the project and other projects in the vicinity. Most impact will be localised; however, others may be experienced on a regional scale. This is taken into consideration during the assessment of cumulative impacts. It is reasonably straightforward to identify significant past and present projects and activities that may interact with the proposed mining project to produce cumulative impacts, and in many respects, these are considered in the descriptions of the biophysical and socio- economic baseline.

13.4.1 Hydrological and Surface Water Impacts

The potential groundwater and surface water quality impacts associated with the construction and operation of the proposed mining project relate to the potential contamination as a result of leakages from vehicles and machinery. Mitigation measures have been proposed for the impacts on ground water and surface water contamination. It is expected that with the implementation of the mitigation measures, together with the fact that mining activities will be localised and of short duration, these impacts will be reduced to an acceptable level. The hydrological and surface water cumulative impacts resulting from the construction and operation phases of the mining project will be negligible.

13.4.2 Air Quality Impacts

The potential air quality impacts associated with the construction and operation of project relate to the potential generation of PM2.5, PM10 and fugitive dust emissions as a result of vehicular movements and mining activities.

Mitigation measures have been proposed to mitigate the potential air quality impacts. It is expected that the implementation of these mitigation measures will reduce the impacts to an acceptable standard. It is expected that the cumulative air quality impacts from the construction and operation of the proposed mining project will be negligible.

13.4.3 Biodiversity

The proposed development will result in the clearance of vegetated areas and the potential displacement of faunal species within the local area. Furthermore, ineffective control and monitoring of edge effects can result in the spread of AIP species to the surrounding natural areas, which will further alter faunal habitat and subsequently faunal diversity within this area. However, due to the nature of mining activities, the areas to be cleared of vegetation will be limited in footprint and the impacts will be of short duration.

Due to the limited size of the development footprint, it is highly unlikely that the proposed development will impact conservation targets for sensitive floral and faunal species.

13.4.4 Noise Impacts

The potential noise nuisance associated with the construction and operation of the project relates to the movement of vehicles and operation of machinery on site. Mitigation measures have been proposed to avoid and/or reduce the nuisance noise impacts. It is expected that with the implementation of the mitigation measures the impacts will be reduced to an acceptable level. It is therefore anticipated that the cumulative noise impacts from the construction and operation of the project will be negligible.

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 activities[1], aspects[2] and impacts which may occur during the commencement and implementation of a project. This is supported by the identification of receptors[3] and resources[4], which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. Environmental impacts[5] (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

[1]An ***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.
[2]An ***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.

Table 14-1. 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

[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.

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

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 (within the MPA boundary)	2
Local area (within 5 km of the MPA site 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

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

LIKELIHOOD

Consequence

Likelihood														
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	1	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

Please refer to Section 13 for positive and negative impacts.

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

The location of the proposed project components is constrained to the location of the resource (diamond). The location of the proposed mining permit was also selected due to its potential for diamond mineralisation.

As such, no property alternatives were considered for the location of the mining area. In addition, no red flags were identified for the preferred site during the baseline characterisation and impact assessment.

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

The application for mining has been proposed in order to source the diamonds. The applicant has chosen this site due to its potential to host diamonds as supported by literature review and desktop study.

The technology proposed for mining the diamonds will comply with national standards and best practices and the mining pits were designed to optimally mine the desired amount of material needed, taking cognisance of the possible environmental impacts associated with the proposed activities.

The layout plan will be designed to avoid sensitive environments such as aquatic ecosystems, wetlands, 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 I&AP consultation process is currently being undertaken in a manner to be interactive, providing the landowners and identified I&APs 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. I&APs 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 provided were collated into the Comments and Responses Register, which will also be attached to the final BAR, and will also be 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 Upper Vaal WMA and Groundwater Vulnerability Reports;
    - The Municipal Integrated Development Plan for Mahikeng Local Municipality; and
    - The Spatial Development Framework for Ngaka Modiri Molema Baard District Municipality.

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

All the impacts identified and assessed in Section 13 are of medium to low significance and can be mitigated to be of low significance.

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

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SI m
Site Establishment and site clearance for the construction of infrastructure: • Ablution facilities; • Access roads; • Topsoil Stockpile • Fences; • Office site; • Plant site; • Slimes dam; and • Vehicle parking	Generation of waste and incorrect disposal from construction material leading to disturbance of natural vegetation.	Flora	Construction and decommissioning	M
	Impact of faunal species of conservational concern due to habitat loss and collision with construction vehicles	Fauna	Construction and decommissioning	M
	Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.	Flora and Fauna	Construction and decommissioning	M
	Loss of faunal diversity and ecological integrity as a result of construction activities, erosion, poaching and faunal specie trapping	Fauna	Construction, operation and decommissioning	M
	Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of wetland and riparian resources	Flora	Construction, operation and decommissioning	M
	Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of wetland and riparian habitat	Wetlands and Aquatic Ecosystems	Construction, operation and decommissioning	M
	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity	Social	Construction and decommissioning	M
	Clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	Soil, Land Use and Land Capability Impacts	Construction and decommissioning	Lo
	Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint.		Construction and decommissioning	M

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SI m
	Potential to impact on sites of archaeological importance.	Heritage Resources	Construction and decommissioning	Lo
	Potential sealing-in or destruction of the fossils during earth moving activity	Fossils	Construction and decommissioning	Lo
	Removal of local geology as a result of the mine	Geology	Construction and operation	Mo
	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	Climate	Construction, Operation and decommissioning	Lo
Mining and operation of associated infrastructure	The use of vehicles may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of the vegetation cover and soils.	Human health and Social	Operation	Lo
	Storage of hydrocarbons and chemicals, which may impact on groundwater as a result of spillages and uncontrolled release.	Groundwater	Operation	Mo
	Storage of waste on the waste stockpiles holding/concentration pond and evaporation ponds may result in contamination of groundwater.	Groundwater	Operation	Mo
	The potential for contamination of surface water due to releases of dirty water (runoff and return water) from all access roads due to transportation of product. It is recommended that regular dust suppression be conducted as far as possible. Spillages and accidental discharges could result in the contamination of surface water resources.	Surface Water	Operation	Mo
	Improper site management may result in runoff from latrines and domestic waste which could pollute surface water resources	Surface Water	Operation	Mo
	During operation, the decrease in local groundwater levels and potential contaminants in the groundwater due to infiltration of process water, may result in an indirect impact to local receptors including rivers and private boreholes	Surface Water	Operation	Mo
	Impacts on surface water resources quality as a result	Surface Water	Operation	Mo

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SI m
	of incorrect waste management practices and pollution.			
	Loss of habitat and wetland ecological structure as a result of continual wetland disturbance and uncontrolled wetland degradation.	Wetlands and aquatic ecology	Operation	Lo
	Impact on the wetlands systems as a result of changes to the sociocultural service provisions through uncontrolled vegetation clearance, waste management and wetland disturbance	Wetlands and aquatic ecology	Operation	Lo
	Impact on the hydrological functioning of the wetland systems as a result of reduce wetland footprints and uncontrolled disturbance during maintenance activities	Wetlands and aquatic ecology	Operation	Lo
	Impacts on the hydrological functioning of the wetland as a result of the mine expansion	Wetlands and aquatic ecology	Operation	Lo
	Possible increase in dust generation, PM10 and PM2.5 as a result of stockpiling material, use of heavy machinery, and material movement.	Air Quality, Social and Human Health	Operation	Mo
	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).	Soil, land use and land capability	Operation	Mo
	The proposed project has the potential to impact on sites of archaeological importance. Historic power line pylons are present within the proposed footprint.	Heritage Resources	Operation	Lo
	Sealing-in or destruction of the fossils during earth moving activity	Fossils	Operation	Lo
	Mining of diamonds will ultimately alter the topography.	Topography	Operation	Mo
Transportation of diamond material	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity	Social	Operation	Mo
	Loss of employment	Socio-Economic	Decommissioning and closure	Mo

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SI m
Closure and rehabilitation of mine and infrastructure sites. *Removal of equipment and infrastructure* • Ablution facilities; • Access roads; • Topsoil Stockpile • Fences; • Office site; • Plant site; • Slimes dam; and • Vehicle parking	Reduced regional economic development Reduced community investment			
	Debris blocking watercourses if road continues to be used by the community.	Surface Water	Decommissioning and closure	M
	Removal of infrastructure and general decommissioning and closure activities leading to visual intrusion on sensitive receptors.	Visual and Social	Decommissioning and closure	M
	Soil Compaction	Soils, Land use and Land Capability	Decommissioning and closure	M
	Dust and Soil Erosion	Soils, Land use and Land Capability	Decommissioning and closure	M
	Ineffective rehabilitation and monitoring of disturbed areas could lead to loss of floral species diversity	Biodiversity	Decommissioning and closure	M
	Loss of floral habitat	Biodiversity	Decommissioning and closure	M
	Proliferation of alien and invasive floral species in disturbed areas may lead to altered vegetation communities within the project area	Biodiversity	Decommissioning and closure	M

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

20 Summary of specialist reports

The specialist studies conducted as part of this application are summarised in the table below.

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.
Soil Suitability Assessment	**Topsoil Management** • Strip all topsoil (Orthic A Horizon) separately from subsoil prior to any construction or mining activities. • The stripping depth should be determined in the field by a qualified soil scientist but is expected to range between 100 mm and 300 mm, depending on the soil profile. • Topsoil from the higher agricultural potential soils (ST02 and ST04) should be stockpiled separately from soils with lower agricultural potential (ST01 and ST03). • Topsoil must not be mixed with overburden, weathered rock, waste material or tailings. • Stockpile heights should not exceed 2 m to preserve soil biological activity and minimise compaction. • Topsoil stockpiles should be protected against erosion by establishing temporary vegetation cover and constructing diversion berms where necessary. **Soil Conservation** • Minimise the area disturbed at any one time through phased mining and construction. • Restrict vehicle movement to designated haul roads to minimise soil compaction.	N/A	Section 12

	• Avoid unnecessary disturbance of undisturbed areas outside the approved mining footprint. • Implement stormwater control measures before vegetation clearing commences. • Install temporary erosion protection measures on steep slopes and stockpiles. **Infrastructure Development** • Locate permanent infrastructure, where practical, on areas with lower agricultural potential, particularly within gravelly soils similar to ST03. • Processing plants, workshops, fuel storage areas and laydown areas should be established on engineered platforms with appropriate drainage. • Fuel storage tanks must be bunded in accordance with applicable South African standards to prevent soil contamination. • Septic conservancy tanks should be sealed and maintained to prevent seepage into surrounding soils. **Mineral Processing** • The proposed mineral processing system (vibrating grizzly, rotary scrubber, diamond pan and dewatering screens) does not involve chemical beneficiation and therefore presents a relatively low contamination risk. • Processing areas should nevertheless be constructed on compacted or concrete surfaces to prevent slurry infiltration into surrounding soils. • Any accidental spills should be cleaned immediately and contaminated soil removed for disposal at an approved facility. **Tailings and Waste Management** • Tailings should continue to be dewatered prior to backfilling mined-out excavations as proposed. • Concurrent rehabilitation should be implemented wherever mining has been completed.		

	• Waste rock dumps should be designed with stable side slopes and protected against erosion. • Tailings and waste material should not be placed directly onto undisturbed topsoil without prior stripping and stockpiling. **Rehabilitation** • Progressive rehabilitation should commence immediately after completion of mining in each excavation block. • Backfilled areas should be reshaped to approximate pre-mining landforms. • Stockpiled topsoil should be replaced uniformly across rehabilitated areas. • Compacted areas should be deep ripped prior to topsoil replacement to improve infiltration and root penetration. • Revegetation should utilise indigenous grass species representative of the surrounding vegetation. • Rehabilitation success should be monitored until acceptable vegetation cover and soil stability have been achieved. **Agricultural Potential** • Most of the project area exhibits low to moderate agricultural potential, with grazing representing the most suitable post-mining land use. • Localised areas represented by ST02 and ST04 possess moderate agricultural capability and should receive priority during topsoil management and rehabilitation. • Following rehabilitation, the objective should be to restore land capability equivalent to or as close as reasonably practicable to the pre-mining condition. **Department of Agriculture (DALRRD/Former DAFF)** The soil investigation undertaken for Portions 4 of the Farm Colga 132 JO has been completed in accordance with generally accepted soil survey and land		

	capability assessment principles applicable to mining developments in South Africa. The assessment confirms that: • Soil resources within the project area are predominantly shallow to moderately deep residual and transported soils with low to moderate agricultural potential, while only isolated areas exhibit moderate agricultural capability. • No exceptionally high-value irrigated agricultural land or unique soil resources were identified within the investigated portions. • The proposed mining activities will result in temporary and permanent disturbance of soil resources within the approved mining footprint. • Appropriate soil conservation measures, including separate topsoil stripping, stockpiling, erosion control, progressive rehabilitation and revegetation, have been incorporated into the project design. • With implementation of the recommended mitigation measures, the long-term loss of agricultural capability is expected to be limited and largely confined to the active mining footprint. • The proposed rehabilitation programme provides for reinstatement of soil resources and restoration of post-mining land capability suitable for extensive grazing and, where practical, limited dryland agricultural use. Accordingly, the proposed development is considered acceptable from an agricultural soil resource perspective, provided that all recommended mitigation measures and rehabilitation commitments are fully implemented throughout the life of the mine. **Department of Water and Sanitation (DWS)** The proposed mining operation has been assessed with respect to potential impacts on soil resources that may		

	influence surface water and groundwater quality. The assessment confirms that: • The proposed mining method incorporates progressive backfilling of mined-out excavations using dewatered tailings, thereby reducing long-term erosion and sediment transport. • Mineral processing is based on physical separation techniques (screening, scrubbing, gravity concentration and dewatering) and does not involve chemical leaching or chemical beneficiation processes. • Slimes dams, water storage facilities and wastewater infrastructure should be designed, constructed and operated in accordance with applicable engineering standards to minimise seepage and protect surrounding soil and groundwater resources. • Hydrocarbon storage areas should be bunded and managed to prevent soil contamination. • Stormwater management measures should separate clean and dirty water systems in accordance with the principles of Government Notice R704 of 4 June 1999 (Regulations on the Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources). • Disturbed soils should be stabilised through progressive rehabilitation to minimise sediment generation and downstream impacts. • Topsoil conservation and erosion control measures will reduce sedimentation of nearby drainage lines and support the restoration of natural infiltration characteristics following mine closure. Provided that the recommendations contained in this report, the Environmental Management Programme (EMPr), and any applicable Water Use Licence conditions are implemented, the proposed mining activities are not expected to result in unacceptable long-term impacts on soil resources that could		

	adversely affect surface water or groundwater resources. **Final Compliance Statement** The soil assessment indicates that the proposed Mining Permit application over Portion 4 of the Farm Colga 132 JO is acceptable from a soil and agricultural resource perspective, subject to the implementation of the recommended mitigation measures, progressive rehabilitation, and ongoing environmental management. The proposed development is capable of achieving a satisfactory post-mining land capability that is broadly comparable with the pre-mining condition and is consistent with the objectives of sustainable land management envisaged by the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983), the National Environmental Management Act, 1998 (Act 107 of 1998), the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), and the applicable requirements of the National Water Act, 1998 (Act 36 of 1998).		
Palaeontological Impact Assessment: Desktop Study	<u>Recommendation</u>: Concerns/threats to be added to the EMPr (1k, l, m): 1. The overburden and inter-burden must always be surveyed for fossils. Special care must be taken during the clearing, digging, drilling, and excavating of foundations, trenches, channels and footings and removal of overburden if applicable not to intrude fossiliferous layers. 2. Threats are earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance. The recommendations are (1g): 1. The impact of mining on the fossil heritage is MODERATE. A Phase 1 Palaeontological Impact Assessment: Field Study is only recommended if fossils are found during excavating,		Section 12

	trenching, drilling, or clearing (according to SAHRA protocol). 2. Mitigation (Protocol for a Chance Fossil Find) is needed if fossils are found, permission needed from NWPG/SAHRA. 3. No consultation with parties was necessary. 4. The development may go ahead, but the ECO must survey the mining area for fossils after drilling or trenching, material must be scrutinised as well, in line with the legally binding Environmental Management Programme (EMPr) this must be updated to include the involvement of a palaeontologist/ archaeozoologist when necessary. 5. The EMPr will cover the conservation of heritage and paleontological material that may be exposed during mining activities. The protocol is to immediately cease all mining activities if a fossil is unearthed, construct a 30 m no-go barrier, and contact SAHRA for further investigation.		
Hydrological Assessment	The hydrogeological assessment demonstrates that the proposed alluvial diamond mining project is situated within a low-yield fractured and intergranular aquifer characterised by relatively deep groundwater levels, low transmissivity, and low intrinsic vulnerability. These hydrogeological conditions indicate that groundwater resources beneath the mining permit are naturally afforded a moderate degree of protection and that significant groundwater inflows into the planned opencast excavations are unlikely during the early stages of mining. Although the groundwater resource is considered to have relatively low vulnerability, mining-related infrastructure—including slimes dams, process water facilities, workshops, diesel storage areas, and tailings disposal facilities—has the potential to adversely affect groundwater quality if not appropriately designed and managed. The incorporation of progressive rehabilitation and roll-over mining practices will minimise the extent and duration of land disturbance, thereby		Section 12

	reducing the long-term environmental footprint of the operation. Overall, the proposed mining development is considered hydrogeologically feasible. Provided that groundwater protection measures, pollution prevention strategies, and routine groundwater monitoring are implemented throughout the operational and closure phases, the proposed project is unlikely to result in significant long-term adverse impacts on groundwater resources. The study therefore supports the proposed development from a groundwater perspective, subject to compliance with the conditions of the Water Use Licence and Environmental Management Programme (EMPr). Recommendations To minimise groundwater impacts and ensure sustainable water resource management throughout the life of the mine, the following recommendations are made: • Establish a groundwater monitoring network consisting of strategically located monitoring boreholes upgradient and downgradient of the mining and processing areas, with particular focus on the eastern and southern boundaries where aquifer vulnerability is higher. • Monitor groundwater levels quarterly and groundwater quality biannually for key parameters including pH, EC, TDS, major ions, sulphate, nitrate, hydrocarbons, and trace metals to detect any mining-related changes. • Construct slimes dams, pollution control dams, and process water ponds with engineered impermeable liners and seepage collection systems to prevent groundwater contamination. • Store fuels, diesel, lubricants, and hazardous chemicals within bunded, impermeable containment facilities and implement comprehensive spill prevention and emergency response procedures. • Operate groundwater abstraction boreholes within licensed abstraction limits and periodically review abstraction		

	rates based on groundwater monitoring results to avoid excessive drawdown. • Implement effective clean- and dirty-water separation systems, stormwater management infrastructure, and erosion control measures to prevent contaminated runoff from entering drainage channels and infiltrating the groundwater system. • Continue the planned progressive rehabilitation programme by backfilling mined-out areas with appropriately managed inert material and stabilising disturbed land to minimise long-term groundwater and surface water impacts. • Review the groundwater management programme regularly throughout the operational, closure, and post-closure phases to ensure compliance with the Water Use Licence conditions and to enable adaptive management should groundwater conditions change.		
Hydrological Assessment	Based on the findings of the floodline assessment and hydraulic modelling, the following recommendations are proposed to minimise flood risk and ensure environmentally responsible mining operations: • Maintain Development Setbacks: Permanent infrastructure, including offices, workshops, fuel storage facilities, processing areas, and waste storage areas, should be located outside the 1:100-year floodline. The delineated 1:100-year flood extent should be adopted as the minimum development setback for all permanent infrastructure. • Protect Natural Watercourses: No mining activities should encroach into the active river channels or their associated floodplains unless specifically authorised. Existing drainage channels and riparian vegetation should be preserved to maintain natural flood conveyance and reduce erosion.		Section 12

	• Implement Stormwater Management: A comprehensive stormwater management system should be developed in accordance with the Best Practice Guidelines for Water Resource Protection in the South African Mining Industry. Clean and dirty water systems should be separated to prevent contamination of natural watercourses during rainfall events. • Control Erosion and Sedimentation: Erosion protection measures, including diversion berms, energy dissipators, silt traps, sediment retention ponds, and stabilisation of disturbed slopes, should be installed to minimise sediment transport into surrounding watercourses during high-flow events. • Design Hydraulic Structures for Extreme Events: Culverts, crossings, stormwater channels, and other drainage infrastructure should be designed to safely convey at least the 1:100-year flood event without causing upstream flooding or downstream erosion. • Restrict Stockpiles and Hazardous Materials: Overburden stockpiles, ore stockpiles, fuel storage areas, chemical storage facilities, and waste management areas should be located outside the mapped floodplain to prevent material wash-off and pollution during flood events. • Establish Buffer Zones: Appropriate buffer zones should be maintained along the Potfonteinspruit, and other drainage features to protect aquatic ecosystems, reduce bank erosion, and preserve natural floodplain functions. • Implement Flood Monitoring and Emergency Preparedness: A flood monitoring and emergency response plan should be developed to provide early warning during extreme rainfall events. Mining activities within low-lying areas should be		

	suspended when significant flooding is forecast. • Undertake Routine Inspection and Maintenance: Stormwater infrastructure, culverts, drainage channels, and erosion protection structures should be inspected regularly, particularly before and after the rainy season, to ensure they remain functional and free of sediment or debris. • Progressive Rehabilitation: Areas disturbed by mining should be progressively rehabilitated through re-contouring, topsoil replacement, and revegetation to restore natural drainage patterns, reduce runoff velocities, and minimise long-term erosion and sedimentation. • Periodic Review of Flood Risk: The floodline assessment should be reviewed if there are significant changes to the mine layout, catchment characteristics, drainage infrastructure, or land use within the surrounding catchment, to ensure that flood management measures remain appropriate throughout the life of the mining operation.		
Archaeological and Cultural Heritage Impact Assessment	At the request of Ndi Geological Consulting Services (Pty) Ltd, Ruins Archaeo- Heritage Consulting (Pty) Ltd conducted a Phase I Archaeological and Heritage Impact Assessment Study for the proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore Mining Permit Application on a portion of Portion 4 of the farm Colga 132 JO within the Mahikeng Local Municipality of Ngaka Modiri Molema District in the Northwest Province. Desktop research revealed that the project area would have been rich in Stone Age artefacts, but none were found during the field survey. The potential for chance finds, remains and the applicant and contractors are urged to lookout for chance finds during mining. The procedure for reporting chance finds has clearly been laid out and if this report is adopted by SAHRA, then there are no archaeological reasons why the proposed mining development cannot be approved. Subject to the recommendations herein made and the		Section 12

	implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. SAHRA may approve the project as planned with special commendations to implement the recommendations here in made: 1. It is recommended that SAHRA/NWPHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements; 2. It is recommended that SAHRA/ NWPHRA make a decision in terms of Section 38 (4) of the NHRA to approve the proposed mining development; 3. A phase two study should be commissioned to verify the ages of the identified structures in the event that the structures are in the direct path/footprint of development; 4. The study did not identify any graves and burial sites, however, they may exist within the proposed development area, should they be encountered during mining activities, the developer is urged that in terms of Section 36 of the NHRA Act, burial sites must be protected from proposed mining activities and any accidental damage; 5. Mining workers must be inducted about potential impacts of proposed mining activities on heritage sites and how these impacts can be minimised without compromising the project schedule; 6. The Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and communicated to the SAHRA through the proposed project development Archaeologist. This form of extended community involvement would pre-empty any potential disruption that may arise from previous unknown cultural heritage matters that may have escaped the attention of the study; and 7. From a heritage perspective supported by the findings of this study, the project is supported.		

	However, mining activities should be approved under the observation that the dimensions do not extend beyond the area considered in this report.		
Terrestrial Ecological Study	From the desktop assessment it seems that half of the site is still in natural state while the other half has been disturbed through cultivation. The proposed area for mining is regarded as having a conservation value of High due to the dominance presence of protected trees as well as the proximity to the National Protected Area. It is therefore important that the placement of the mining sites including structures is done with these sensitive areas in mind and as per the composite map on appendix A, the placement of the holes must be outside the area with the remaining natural area. The placement of drilling sites must consider the area contains protected and red listed plants. It is then advised that drilling prospecting may continue provided that the mitigation measures as suggested can be implemented, then the overall impact of the development components would be of low overall significance and it is unlikely that the development would result in an overall net loss of biodiversity or long-term degradation of the receiving environment as the area to be drilled is smaller in terms of vegetation removal. Other mitigation measures include: - All alien invasive, weeds and potential invasive plants generated by the development will have to be entirely cleared after mining; - Based on general environmental guidelines for protected areas in South Africa, a standard buffer zone often recommended around protected areas is approximately 5 km. This zone, often referred to as an Eco-Sensitive Zone, acts as a transition area to regulate activities and protect the core, biodiversity-rich areas of the reserve, therefore a 5km buffer from Malebogo (Blouberg) Nature Reserve must be maintained; - 100 meters' buffer has also been provided to protect all NFEPA with the project application area; - An ongoing monitoring program will be necessary to control		

	and/or eradicate newly emerging invasive; - Newly cleared soils will have to be revegetated and stabilised as soon as construction has been completed; and; - Soils are prone to erosion and need to be stabilised by a permanent grass or suitable indigenous vegetation layer Careful consideration must be afforded each of the mitigation measures provided in this report. If environmental authorisation is issued for this project, proven ecological (or environmental) controls and mitigation measures must be entrenched in the management framework. It is clear from the regional ecological overview, as well as the baseline data collected to date that parts of project area are in a pristine condition and has only been minimally altered both historically and presently.		

Attach copies of Specialist Reports as appendices (Copies of the specialist studies have been attached in Appendix 7)

21 Environmental impact statement

21.1 Summary of key findings

The impacts evident from the detailed impact assessment (Section 13) of the proposed project are both positive and negative in nature. The key positive and negative findings outlined below.

21.1.1 Key Positive Impacts After Mitigation

The main positive impacts identified for the project relate to socio-economic impacts that the construction and operation of the project will have. The socio-economic impacts were determined to have a positive impact, either directly or through the spinoffs generated by the development and operation of the proposed project and associated infrastructure.

21.1.2 Key Negative Impacts After Mitigation

The assessment found that there are a number of negative impacts that are expected as a result of the proposed mine. The most significant impacts identified were on the biodiversity, groundwater and surface water resources.

- Biodiversity: There is potential for vegetation loss due to vegetation clearing leading to habitat loss, degradation and fragmentation as well as proliferation of alien invasive plant species. The impact significance of the proposed mining activities prior to mitigation affecting floral habitat, diversity and SCC are considered to be medium significance impacts.
- Socio – Economic: Transportation of material to and from the study area will result in additional trucks and construction vehicles on the study area roads, which can cause damage to the road surface and increase the potential for accidents in the area. The influx of additional people looking for employment will result in impacts on the social dynamics in the area.
- Groundwater Impacts: Local spillages of hydrocarbons and chemicals used during the pre-construction and construction phase which may leach to groundwater.
- Surface Water: Movement and use of vehicles and machinery as well as improper storage of hazardous substance may have Impacts on surface water and groundwater quality due to accidental spillages of hazardous substances. Contaminated dirty water runoff from the mining area to surrounding areas resulting in the impact on local surface water quality.
- Wetland Impacts: The NFEPA database shows that is an unchanneled valley bottom wetland located on the site of the proposed mine area` , therefore, there is potential for impacts on these wetlands located on the property. Indiscriminate movement into and access to wetlands areas will result in:
    - Loss of habitat and wetland ecological structure as a result of site clearance activities and uncontrolled wetland degradation;
    - Impact on the wetlands systems as a result of changes to the sociocultural service provisions
    - Impact on the hydrological functioning of the wetland systems;
    - Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of wetland and riparian resources; and
    - Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of wetland and riparian habitat.
- Air Quality Impacts: The movement of vehicles in the area will have an impact on ambient air quality as follows:
    - Possible increase in dust generation, PM_{10} and $PM_{2.5}$ as a result of bulk earthworks, operation of heavy machinery, and material movement.

- 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.

- Visual Impacts due to:
  - Visual intrusion as a result of the movement of machinery and the erection of contractor camps;
  - Scaring of the landscape as a result of the clearance of vegetation and preparation of the mine areas; and
  - Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.
- Noise Impacts: The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity. The environment of the proposed mine is rural, and mining activities will therefore result in an increase in ambient noise levels as a result of the mining activities
- Soil, Land Use and Land Capability: There is potential for chemical potential pollution of soils due to use of vehicles and machinery and storage of hazardous material at the mine. Other impacts include:
  - Clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion;
  - Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint;
  - As a result of construction activities, the land use will have altered from grazing and agriculture to that of construction for mining activities;
  - Handling and storage of building materials and different kinds of waste leading to soil sterilisation.
- Heritage Impacts: There is a possibility that heritage resources may be impacted by the proposed project. These heritage resources may not be relocated or destroyed without written approval from the SAHRA. Implementation of mitigation measures included in Section 13 will result in the reduction of the significance of the impact, if any, ion heritage resources.
- Palaeontology Impacts: Sealing-in or destruction of the fossils during earth moving activity. Implementation of the mitigation measures in Section 13 of this report will reduce the potential for loss of fossils.

Closure and Decommissioning

The main impacts that will result from the closure phase will relate to the ineffectiveness of the construction and operational phases to eradicate alien vegetation, which will ultimately result in the loss of indigenous fauna and flora. In addition, the decommissioning activities may further impact on the established vegetation in the area, resulting in the loss of biodiversity species, habitats and ecological structure. All the impacts that may result from the decommissioning activities of the proposed project have been effectively addressed in the impact assessment in Section 13.3, as well as the EMPr.

The positive and negative implications were assessed according to the construction, operational and decommissioning phases of the proposed Project. Please refer to Section 13 for a comprehensive impact assessment.

21.2 Final Site Map

Please refer to Figure 21-1 and Appendix 5 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 DMPR 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 within the proposed project site.

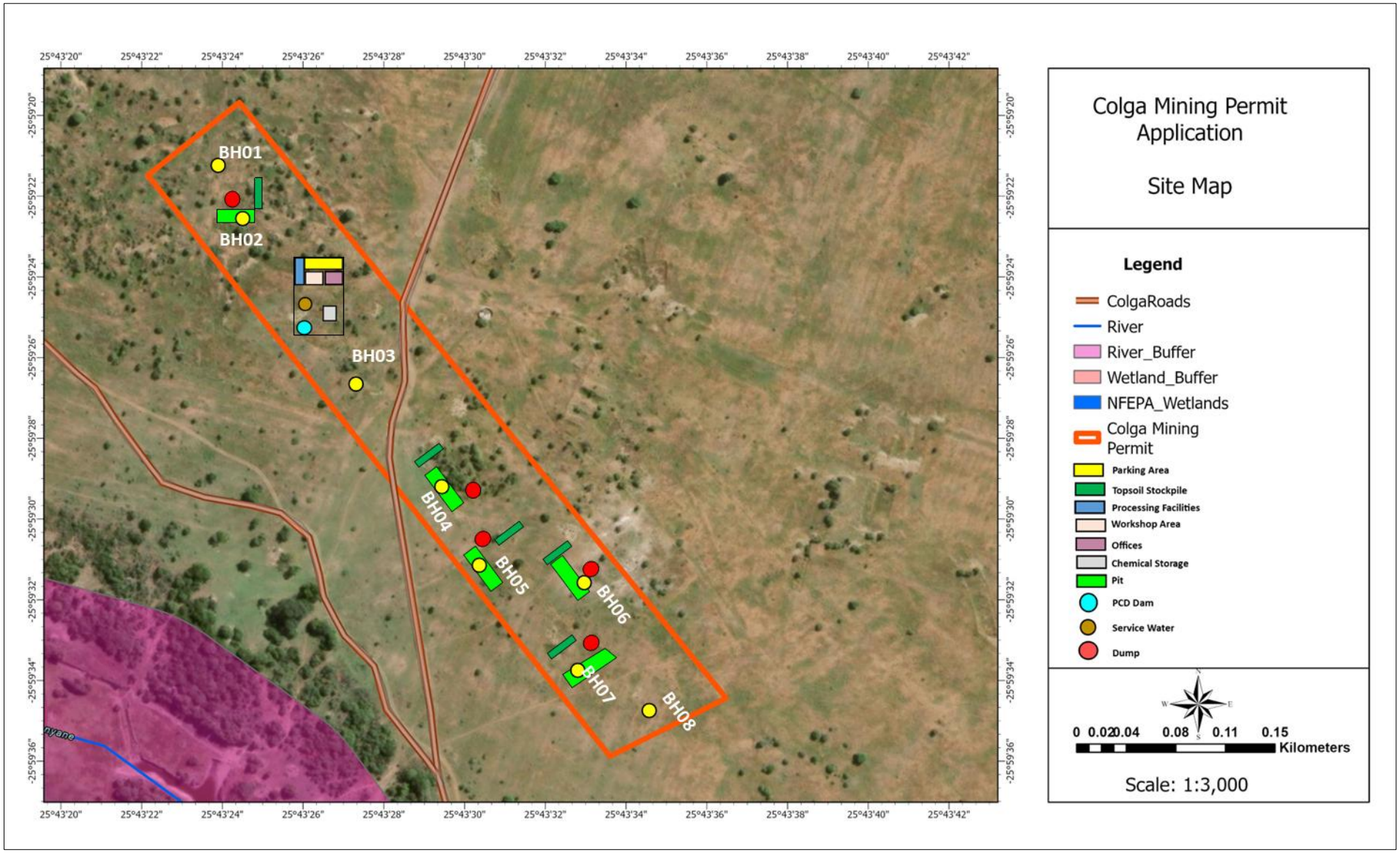


Figure 21-1: Preliminary Site Map

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

The positive and negative implications were assessed according to the construction, operational and decommissioning phases of the proposed project. A detailed description of the main impacts is provided in Section 13, and the main impacts are provided in Section 18.1. A short summary is provided below for each phase of the project.

21.3.1 Construction Phase

During the construction phase of the proposed project the majority of the negative impacts are associated with site clearance and vegetation removal activities. Topsoil loss should be limited by storing and protecting the topsoil to be used for rehabilitation purposes. The establishment of the proposed project may result in loss of wetland habitat.

Vegetation clearance during construction will also result in loss of natural vegetation and disturbance to fauna on site. Site clearance and vegetation removal will also result in a loss in land capability. Natural vegetation removal is expected to have moderate significance impacts. Where possible, the implementation of mitigation measures such as commencing rehabilitation activities in tandem with or immediately following construction will reduce the duration and significance of the impacts. The main negative implications associated with other general construction activities are nuisance noise, traffic, dust and visual impacts.

From a socio-economic perspective the development of the mine will have a positive impact on employment creation, economic and social upliftment and community development. An increase in employment opportunities, household income and skills development will contribute to a positive growth in the local and regional economy.

21.3.2 Operational Phase

The majority of the impacts identified for the operational phase are associated with the mining activities. The operation of surface infrastructure may lead to deterioration of water quality. Stormwater management measures will be in place to ensure clean and dirty water separate. Topsoil loss has been identified as a potential impact during the operational phase as a result of rainwater runoff and wind erosion from soil stockpiles. In addition, alien vegetation may establish on the topsoil. This can be prevented by planting indigenous grass mixture, which will also assist in erosion reduction. Seepage of hydrocarbons into groundwater may result in groundwater contamination and can impact on surface water quality.

Ineffective rehabilitation of construction areas will lead to proliferation of alien invasive plant species.

Similar to the construction phase, nuisance noise, dust and visual impacts of moderate negative significance are expected from general operation activities such as loading, hauling and stockpiling. All of these impacts can be mitigated.

21.3.3 Decommissioning Phase

During the decommissioning phase positive impacts will occur from rehabilitation activities including the restoration of land capability to its pre-mining state or agreed upon alternative, the restoration of vegetation and habitat types as well as the rehabilitation of infrastructure footprint areas.

The main expected negative impacts are associated with the movement of machinery to dismantle and remove equipment and infrastructure and rehabilitate the disturbed areas. Negative impacts resulting from soil loss, erosion and dust emissions were also identified.

Post closure monitoring is essential to determine if rehabilitation was successful and sustainable.

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

The EMPr seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment and surrounding communities will be mitigated, controlled and monitored.

The EMPr will address the environmental impacts and possible unplanned events during each phase of the project (construction, operational, decommissioning and post-closure). Due regard must be given to environmental protection during the entire project; a number of environmental recommendations are made to achieve environmental protection.

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts, assess their significance and implement appropriate mitigation and management measures to avoid, minimise and/or remediate the associated impacts where they cannot completely be avoided.
- Implement an adequate monitoring programme to:
  - Ensure that mitigation and management measure are effective.
  - Allow quick detection of potential impacts, which in turn will allow for quick responses to issues/impacts.
  - Reduce duration of any potential negative impacts.

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 manner 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.

Table 22-1: Impact Management Objectives and Management Outcomes

Objectives	Outcomes
Soil	
Ensure suitable removal, storage, transportation of topsoil for reuse during rehabilitation. To manage soil erosion.	No visual evidence of erosion. No visual evidence of erosion from topsoil stockpiles and from areas where topsoil has been reinstated.
Flora	
Minimise unnecessary clearance of indigenous vegetation. Preserve protected flora species. Control alien plants and noxious weeds.	Clearance of vegetation to be limited to mining area. No disturbance to SCC without permits. Ongoing eradication of alien invasive plants and noxious weeds.

Objectives	Outcomes
Fauna	
Ensure the protection of animals.	No direct / indirect harm to animals from construction activities.
Surface Water	
Minimise impact to wetland areas. Minimise environmental impacts associated with stormwater. Minimise stormwater runoff from the site.	Reduced impact to wetland areas. Rehabilitation of wetland areas. No visual evidence of erosion caused by wastewater or stormwater practices. No environmental contamination associated with wastewater or stormwater practices.
Noise	
Minimise noise nuisance.	No complaints regarding noise pollution. Comply with SANS 10103:2008. Comply with blasting-related legislation and standards.
Air Quality	
Minimise dust generation	No complaints regarding air pollution
Visual	
Objectives	Outcomes
Minimise impacts to the aesthetics / visual quality. Ensure that the visual appearance of the site is not an eyesore the adjacent areas.	No complaints regarding impacts to visual quality.
Safety and Security	
Provide a safe and healthy working environment to construction workers and the public.	No complaints regarding impacts to safety and security. No reportable health and safety incidents. Compliance with the OHS Act, Construction Regulations (2014) and other relevant regulations.
Traffic	
Ensure the safety of all road users by implementing proper signage and traffic control measures. Minimise traffic disruptions.	No reports of construction vehicles using other unauthorised routes. No transporting of unsafe loads. Permits are to be obtained for abnormal loads. No speeding. No accidents.
Heritage	
To avoid damage to or destruction of previously unknown or excavated heritage resources and archaeological artefacts during construction. The preservation and appropriate management of new findings should these be discovered during construction.	No archaeological and cultural resources or graves to be damaged during construction.
Waste	

Objectives	Outcomes
Minimise environmental impacts associated with waste.	No littering on construction site. Maintain a clean and tidy site. 100% record of all waste generated and disposed at waste disposal facilities. Valid disposal certificates for all waste disposed. Provision of adequate waste containers that are easily accessible and maintained.

23 Aspects for inclusion as conditions of Authorisation

The studies and impact assessment have been based on the proposed mine location and other available information from the applicant. The management of the impacts identified for the construction, operation and closure phase is through a comprehensive range of programmes and plans contained in the EMPr. Implementation of these plans and programmes together with mitigation measures stipulate in the EMPr will be institutionalized through regular monitoring and auditing.

In order to achieve relative environmental management standards and ensure that the findings of the environmental assessment are implemented through practical measures, the recommendations and management measures from this EIA study are included within an EMPr.

The EMPr must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for the life cycle phases of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

In addition, the following key conditions should be included as part of the authorisation:

- No activities may be undertaken within 500 m of wetlands and/or within 100 m of watercourses without approval from the DWS.
- No removal and/or relocation of protected species may be undertaken without relevant permits.
- No graves and/or cultural and palaeontological resources may be relocated and/or destroyed without relevant permits from SAHRA.
- The proponent is not exempted from complying with any other statutory requirements that is applicable to the undertaking of the activity. Relevant key legislation that must be complied with by the proponent includes *inter alia*:
    - Provisions of the National Environmental Management Waste Act (No. 59 of 2008);
    - Provisions of the National Water Act, 1998 (Act No 36 of 1998);
    - Provisions of the National Forests Act (Act No 84 of 1998); and
    - Provisions of the National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- The proponent must appoint a suitably experienced (independent) ECO for the construction phase of the development that will have the responsibility to ensure that the mitigation and rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPr;
- A Stormwater Management Plan must be developed and adhered to;
- The EMPr must be enforced throughout the life of the project; and
- Environmental audits reports must be submitted to the DMPR on a monthly basis once construction has begun and on an annual basis during the operational phase. This is to ensure that mitigation measures are being implemented and to prevent environmental degradation (e.g., erosion) during the construction and operational phases.

24 Description of any assumptions, uncertainties and gaps in knowledge

24.1 Assumptions

The information used by the EAP team was from existing information from other processes, environmental databases and municipal IDPs and SDFs. All the data and information are assumed to be accurate and applicable. It is also assumed that the applicant will comply with all legislation pertaining to the activities of this proposed project and that all permits and license that may be required will be identified and applied for prior to commencement of construction activities.

The public involvement process has been sufficiently effective in identifying the critical issues needing to be addressed in the EIA / EMPr by the EAP. The I&AP consultation is not yet complete. The Draft BAR was updated once the 30-day public review and comment period had lapsed. Comments from the I&APs were incorporated into the Final BAR to be submitted to the DMPR;

Ndi Geological assumes that G and E Global Mining will implement the measures contained in the EMPr and will adhere to any monitoring procedures. A monitoring and evaluation system, including auditing, will be established and operationalised to track the implementation of the EMPr ensuring that management measures are effective to avoid, minimise and mitigate impacts and that corrective action is being undertaken to address shortcomings and/or non-conformances.

24.2 Limitations

The following limitations should be considered when interpreting the findings and conclusions of this report:

- The assessment is based on the information, specialist studies, existing reports and available baseline data provided for the project area at the time of assessment.
- The baseline conditions described in the report represent conditions observed or documented during the respective specialist investigations and may change over time due to natural processes and ongoing land-use activities.
- The availability and quality of historical and secondary data varied between specialist disciplines. Where recent site-specific information was unavailable, existing published information and previously conducted specialist studies were used.
- Field surveys were undertaken within defined study areas and during specific survey periods. Consequently, seasonal variations and conditions outside the survey periods may not be fully represented.
- The assessment of potential impacts is based on the proposed project activities and infrastructure as described at the time of assessment. Any significant changes to the project design, footprint or activities may require the relevant assessments to be reviewed.
- The identification of environmental constraints is based on the information available at the time of the assessment. Additional environmental sensitivities may be identified during subsequent detailed investigations, construction or monitoring.
- The findings and recommendations of this report should therefore be read together with the relevant specialist studies and supporting technical documentation.

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.

An assessment of proposed project was undertaken with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements and no fatal flaws were identified by the EAP. It is therefore the considered opinion of the EAP that the activity may be authorised.

The application for mining has been proposed in order to source diamond material. The applicant has chosen this site due to its potential to host diamonds as supported by literature review and desktop study.

The no-go alternative would entail not mining the diamonds. Should the mining permit not be granted, the applicant will have to missed out on an opportunity to mine diamonds and contribute to the world supply and the economy. This will also translate in a lost opportunity to create jobs for the local community.

The I&APs were also requested to review the draft Bar and submit their comments. All comments received during the Public Participation Process were included in the final BAR and EMPr. These comments were addressed 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 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.

With the correct and effective mitigation and management measures, including the protection of wetlands located outside the footprints of the mining areas and infrastructure, the mining operations are feasible. Rehabilitation must be implemented based on best practice principles and the DMPR, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed mining operation.

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 total duration of the mining activities is planned for five (5) years. However, under mining permit applications the applicant can only apply for a period of two (2) years, with potential to renew the MP. The MP will be renewed three (3) times to make up for the 5 years required.

27 Undertaking

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

The estimated rehabilitation cost related to the project is anticipated to be R 148 320 as shown in **Error! Reference source not found.**.

Table 0-1: Environmental Cost Estimate Expenditure

CALCULATION OF THE QUANTUM

Applicant: **G and E Global Mining (Pty) Ltd** **Ref No.:** **NW30/5/1/3/2/12219MP**

: Evaluators **Ndi Geological Consulting Services (Pty) Ltd** **Date:** **Date: Aug-26**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (Including overland conveyors and powerlines)	m3	0	17,91	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	249,45	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	367,62	1	1	0
3	Rehabilitation of access roads	m2	100	44,64	1	1	4464
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	433,26	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	236,33	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	498,91	1	1	0
6	**Opencast rehabilitation including final voids and ramps**	**ha**	**0**	**253918,43**	**0,52**	**1**	**0**
7	Sealing of shafts adits and inclines	m3	0	133,92	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0	174355,57	1	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	217156,72	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	630726,4	1	1	0
9	Rehabilitation of subsided areas	ha	0	145996,53	1	1	0
10	General surface rehabilitation	ha	0,6	138119,02	1	1	82871.41
11	River diversions	ha	0	138119,02	1	1	0
12	Fencing	m	0	157,55	1	1	0
13	Water management	ha	0	52516,74	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	1	18380,86	1	1	18380,86
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		105716.3
1	Preliminary and General		12685.95		weighting factor 2 1		12685.95
2	Contingencies		10571.63				10571.63
					Subtotal 2		168120,97
					VAT (15%)		19346,08
					Grand Total		**148320**

27.1 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 DMPR 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 DMPR in January 2005 in order to empower the personnel at Regional DMPR 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 DMPR guidelines.

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

The amount required for rehabilitation cost related to the project is anticipated to be R 148 320. G and E Global Mining will fund the operation.

The applicant hereby confirms that the amount can be provided for from the operating expenditure.

28 Specific Information required by the competent Authority

28.1 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: -

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

No specific report was generated for the purposes of the socio-economic conditions. Potential socio-economic impacts will include:

- Nuisance noise due to onsite activities and movement of machinery and vehicles;
- Poor access control resulting in impacts on activities outside the demarked boundaries;
- 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.

It is anticipated that employment opportunities for local and/or regional communities will result from the mining activities, throughout the LOM.

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

Noise due to construction activities and mining:

- Directly affected and adjacent landowners and land occupiers must be informed of the planned dates of the mining activities and a grievance lodging mechanism must be made available to the I&APs.
- Site activities shall be concluded during daytime hours (0700 to 1730), to avoid night-time noise disturbances and night-time collisions with fauna.

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; and
- Where necessary, the South African Police Service (SAPS) will be notified of unauthorised persons encountered on site.

Visual Impact:

- Dust suppression will be undertaken to manage nuisance dust from 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 to minimise visual impacts.

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

Potential heritage impacts have been identified and assessed, and mitigation measures have been included in Section 13 of this BAR. Please refer to Section 13 of this report and the accompanying EMPr.

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

Section 24(4)(b)(i) of the NEMA (as amended), provides that an investigation must be undertaken of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity.

No alternatives were considered for the project as the project location chosen this site was due to its potential to host diamonds which is supported by literature review and desktop study. It was also deemed not necessary to revise the site layout plan as there were no fatal flaws that were identified during the baseline characterisation and impact assessment processes.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

29 Draft Environmental Management Programme

29.1 Details of the EAP

Details of the EAP are included in Part A Section 3

29.2 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 7 of this report as required.

29.3 Composite Map

Please refer to Figure 29-1 and Appendix 6 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:

- Wetland; and
- River

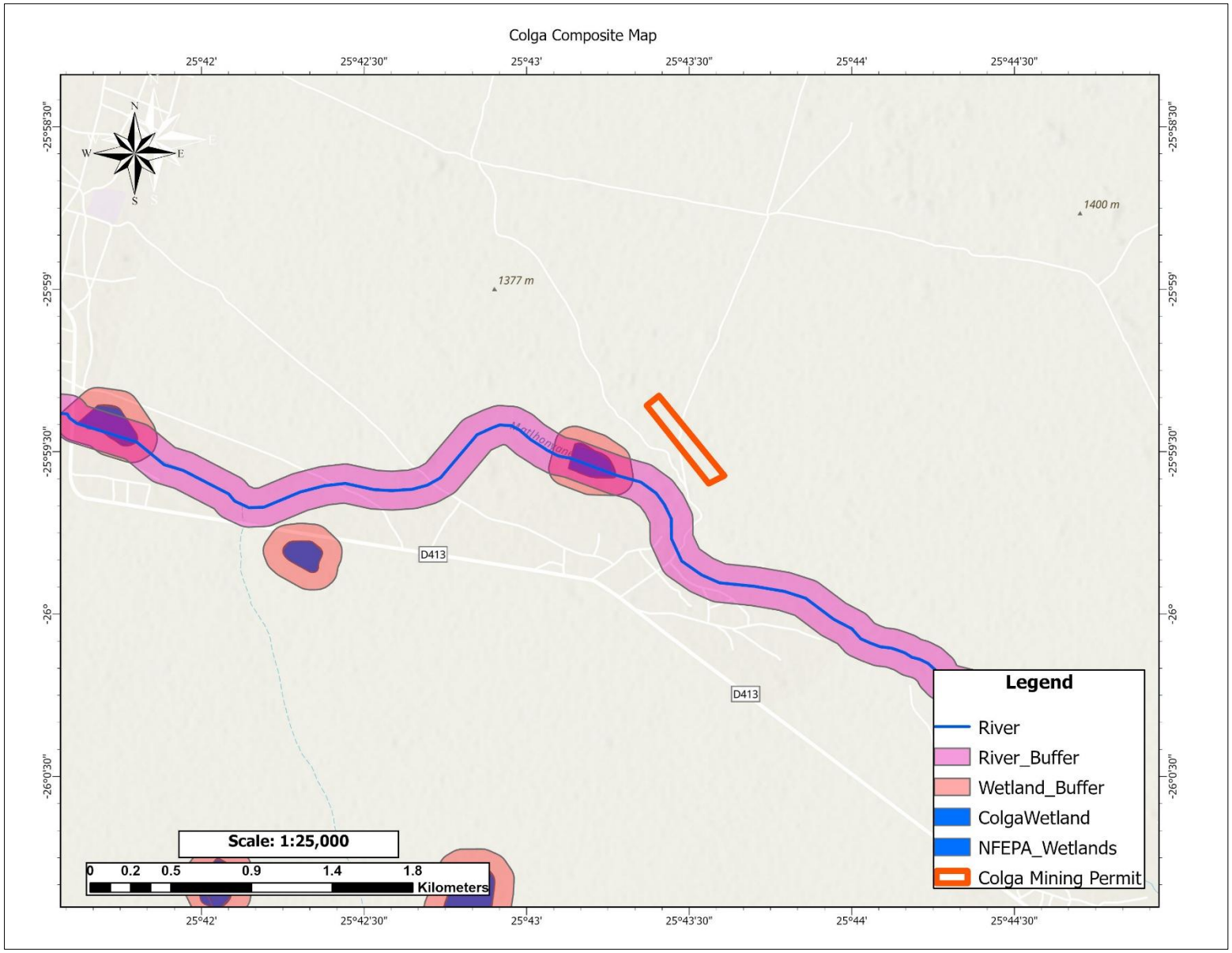


Figure 29-1: Composite Map

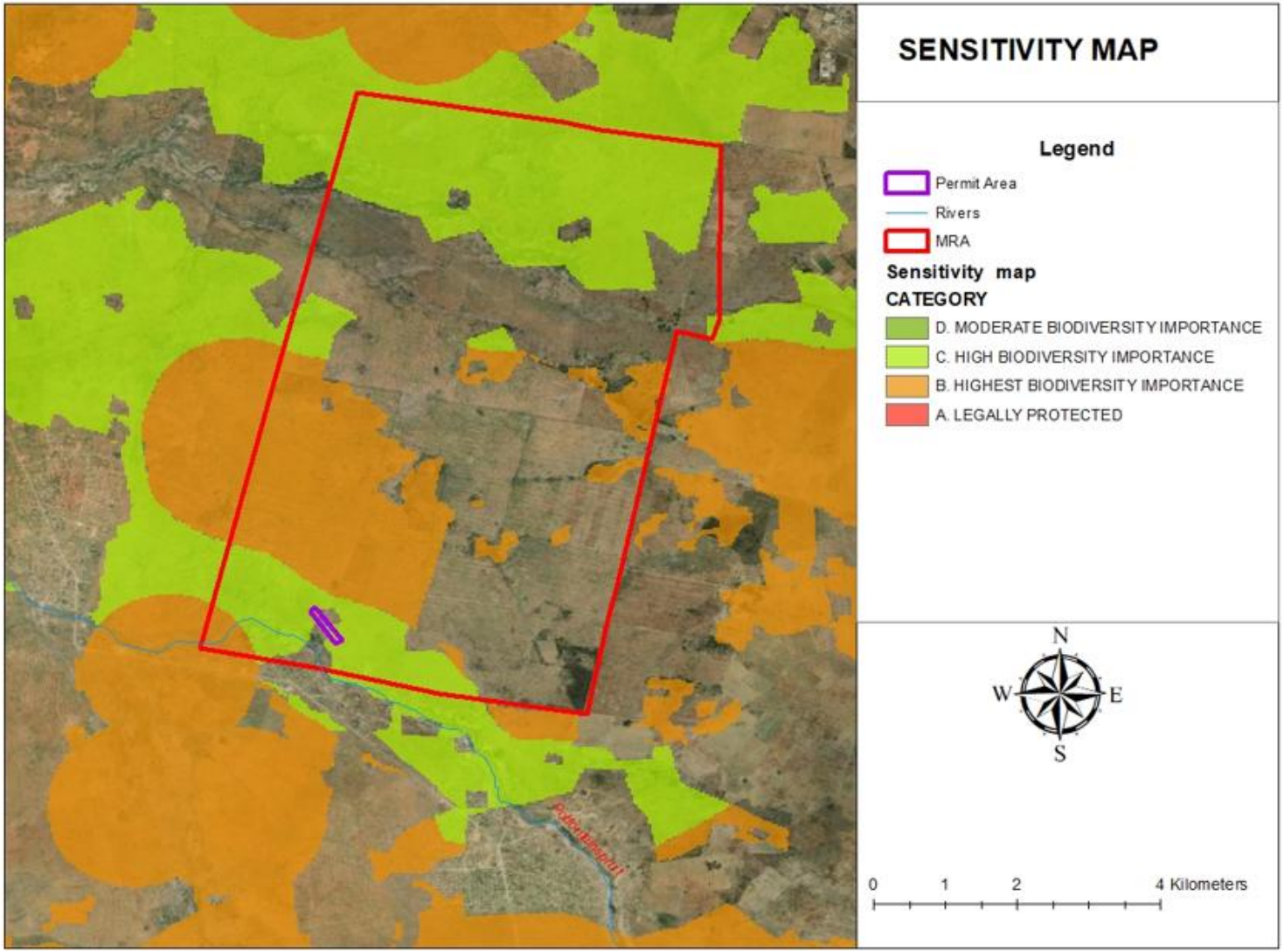


Figure 29-2: General Composite Map

30 Description of Impact management objectives including management statements

30.1 Determination of closure objectives.

The main aim in developing G and E Global Mining's rehabilitation plan is to mitigate the impacts caused by the mining activities and to restore land back to a satisfactory end land use. The rehabilitation plan must be developed as early as possible and maintained throughout the LoM. It is important that the project's closure plan is clearly defined and understood by all involved before starting the process and is complementary to the rehabilitation objectives. The closure vision for the G and E Global Mining diamond project is intended to inform the closure objectives and as such is currently stated as:

To implement a post mining landscape that is safe, stable and non-polluting over the long term, through collaboration with affected I&APs

The overall closure objectives for the proposed project are as follows:

- Adequate reinstatement and rehabilitation of construction and mining area; and
- Conduct concurrent or progressive rehabilitation of areas affected by construction and operation activities associated with mining.
- Minimise the area to be disturbed and to ensure that the areas disturbed during the activities are rehabilitated, as per the measures provided in the EMPr and the conditions of the Environmental Authorisation.
- Remove mine infrastructure that cannot be used by a subsequent landowner or a third party.
- Where infrastructure can be used by a third party, arrangements will be made to ensure their long-term sustainable use;
- Clean up all stockpiles and loading areas and rehabilitate these as far as possible to a land capability similar to that which existed prior to mining;
- Rehabilitate the disturbed land to a state that facilitates compliance with applicable environmental quality objectives,
- Landscape the rehabilitated areas in alignment with the surrounding topography to prevent the unnecessary pooling of water which will reduce the runoff in the catchment;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible, reducing the overall visual impact;
- Physically and chemically stabilise any remaining structures to minimise residual risks;
- Leave a safe and stable environment for both humans and animals;
- To limit soil and surface/groundwater contamination by managing all water on site;
- Comply with local and national regulatory requirements;
- Form active partnerships with local communities to take care of management of the land after mining, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation and, if monitoring shows that the objectives have been met, making an application for closure.

Successful rehabilitation must be monitored to ensure sustainability. This requires an understanding of the basic baseline environment, as well as project management to ensure that the rehabilitation program is a success.

31 Volumes and rate of water use required for the operation

The water required for the project will be approximately 10 000L/day. It is anticipated that the required water will be sourced from the Polfonteinspruit River.

32 Has a water use licence has been applied for?

The project occurs within a regulated area of a watercourse and involves abstraction of water, it triggers activities that are listed under Section 21 (a), (c) and (i) of the National Water Act (Act No. 36 of 1998). As such an Integrated Water Use Licence (WULA) application process will also be required. The applicant will submit a Water Use Licence application to the DWS.

33 Impacts to be mitigated in their respective phases

The full impact assessment with associated mitigation and management measures are presented in Section 13.

34 Impact Management outcomes

Table 34-1: Impact Management During the Pre-Construction and Construction Phase Mitigation Type

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Project Kick Off and Planning		Social	Pre-Construction	• This EMPr must form part of the contractual agreements with the specific contractors.	Control potential deviations from the approved EMPr.	Ensure contractors are aware of the required management measures stipulated in the EMPr.	Condition of the EMPr is met
Project Kick Off and Planning		Social	Pre-Construction, Construction and Decommissioning	• The contractor is expected to have safety "toolbox" talks in accordance with the risks and trends associated with the project. Proof of these talks shall be kept on site.	Control potential deviations from the approved EMPr.	Ensure all construction staff is familiar with the Environmental Awareness Plan.	Environmental Awareness is promoted
Project Kick Off and Planning		Social	Pre-Construction	• The contractor will develop a specific emergency procedure and plan.	Control potential deviations from the approved EMPr.	Ensure that all staff is familiar with the emergency procedure and plan.	Environmental Awareness is promoted
Site Establishment and site clearance for the construction of infrastructure: • Ablution facilities; • Access roads; • Topsoil Stockpile • Fences; • Office site; • Plant site; • Slimes dam; and • Vehicle parking	Groundwater and Surface water contamination	Groundwater and surface water	Pre-Construction and Construction	• No site establishment shall be permitted within sensitive landscapes; • Avoid stripping of areas outside the construction sites and rehabilitate areas that may have been mistakenly stripped; • Proper waste management facilities will be put in place at the campsite and construction sites. • Any hydrocarbon spill from the site establishment will be remediated as soon as possible; • 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; • 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 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; • Bunded areas shall contain 110% of the stored volume; • Bund areas must be impermeable; • Bund area must have a facility such as a valve/sump to drain or remove clean stormwater, • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • 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 conducted off site; • Runoff from this area shall be contained; and	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Implementation of the mitigation measures will ensure that the quality of streams and groundwater within the site will comply with the DWS target water quality objective and construction will be following the regulations under the GN704. G and E Global Mining will be required to obtain all necessary authorisations in terms of Section 21 of the National Water Act (No.36 of 1998) where specific targets will be set to ensure the protection of water resources in the area	Impact on ground and surface water quality avoided/minimised

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Spill kits shall be made available, and all personnel shall be trained, and training records shall be made available on request.			
	Contamination of surface water resources	Surface water resources (drainage lines, rivers and wetlands)	Pre-Construction and Construction	• The footprint area of all proposed infrastructure should be limited to what is necessary. • Disturbance to the surrounding natural habitat should be kept to a minimal; • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of sensitive habitat units such as wetlands; • Ensure that topsoil is properly stored, away from the wetlands, streams and drainage areas; • Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses and wetlands from dirty water. • Refuelling areas will be bunded and nozzles protected from spillage during refuelling; • All spillages will need to be cleaned up as soon as practically possible; • Proper management of stormwater drainage infrastructure should be ensured; • Hazardous substances stored on site will be stored within a designated bunded areas fitted with a sump and value. Collection of water within the bunded areas will be deemed hazardous and disposed of as such; • Bunded areas will be watertight and inspected for leaks on a frequent basis; • Leaks to the bunded areas will be rectified as soon as possible; • Drip trays will be utilised for the collection of leaks from vehicles and machinery parked for long period of time; • Should a spill occur, this will be handled at the source of the leak and prevented from transpiring to nearby watercourse; • Ensure that routine maintenance on all vehicles is undertaken as per maintenance schedule and records are kept; • Minimise the areas that are to be stripped of vegetation; • Erosion can also be limited by ensuring that mine vehicles and human movement is limited to project specific dedicated access ways;	Monitoring through rehabilitation and management of spills Rehabilitate contaminated areas	Implementation of the mitigation measures will ensure that the quality of streams and groundwater within the site will comply with the target DWS target water quality objective and construction will follow the regulations under the GN704.	Surface water quality Impact avoided/minimised
	Loss of Species of Conservation Concern	Biodiversity	Pre-Construction and Construction	• Prior to the commencement of construction activities that the entire construction servitude, including lay down areas and stockpile areas etc., must be fenced off and clearly demarcated, including no-go zones such as wetlands located outside the area affected by the project; • Prior to the commencement of construction activities on site an alien vegetation management plan should be compiled for implementation throughout the construction and operational phases; • Prior to the commencement of construction activities on site a rehabilitation plan should be developed for implementation throughout the development phases • No stripping of topsoil and vegetation will be allowed during site establishment; • Any area that may result into the disturbance of the vegetation cover must be rehabilitated immediately on discovery; • Cutting down, relocation or disturbance of floral SCC not affected by the project shall be strictly forbidden;	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	The implementation of mitigation measures will ensure that the establishment of the construction site and associated infrastructure/equipment do not have detrimental impact on the area's flora, in particular indigenous species and species that are of conservation importance.	Rehabilitation standards and flora SCC are protected No Alien Invasive Plant Species in the area

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• The floral SCC are to be handled with care and the relocation of sensitive plant species to suitable similar habitat is to be overseen by a botanist; • The proposed development footprint shall be kept to the minimum; • Where possible 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; • 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; • Construction vehicles shall only be allowed on designated roadways and access roads to limit the ecological footprint of the project; • Edge effects of activities including erosion and alien/ weed control will be strictly managed in the affected areas; • All sites disturbed by construction activities shall be monitored for colonisation by exotic or invasive plants; • An alien invasive plant special management and control program must be developed and implemented within all disturbed areas; • A bi-annual alien vegetation clearance programme should be implemented during the construction phase in order to prevent the establishment of alien and invasive plants; • A rehabilitation plan shall be developed for implementation throughout the development phases; and • Exotic or invasive plants shall be controlled as they emerge.			
	Migration of animal life due to disturbance caused proposed project:	Biodiversity	Pre-Construction and Construction	• The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas; • Site activities will be conducted during daytime hours 07h00 – 17h30 to avoid night-time noise disturbances and night-time collisions with fauna; • Vehicle speed will be reduced, particularly in highly vegetated areas to avoid deaths by vehicle impacts; • No trapping or hunting of fauna shall be permitted; • Uncontrolled and unauthorised fire shall be strictly prohibited; • Where a burning regime is implemented, this should be overseen by a qualified and experienced professional; • The mining and construction personnel should be informed about fire control and prevention measures to reduce the frequency of uncontrolled veld fires in areas surrounding and within the project area; • A fire management plan shall be developed and implemented in case of unplanned fire • 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;	Relocation of affected species of conservation importance Management of site activities	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Rehabilitation standards and fauna habitats are protected

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Should any faunal 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; and • Poaching will be prohibited.			
	Mortality and disturbance of fauna	Biodiversity	Pre-Construction and Construction	<u>Death/injury during vegetation clearing and earth works</u> • An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor for, and manage, any wildlife-human interactions. The ECO should be trained in inter alia, snake handling; and • As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas, such as open trenches and voids. <u>Vehicle-wildlife collisions</u> • Road signage indicating the potential presence and movement of wildlife should be installed within the construction footprints and along public roads. <u>Hunting, snaring and poisoning</u> • The handling, poisoning and killing of on-site fauna by mine and construction workers and contractors must be strictly prohibited; and • Employees and contractors should be made aware of the presence of, and rules regarding, fauna through suitable induction training and on-site signage. <u>Noise, vibrations and lights (sensory disturbances)</u> • General noise abatement equipment should be fitted to machinery and vehicles; • As required, noise shields, including earth berms, should be constructed around sites of noise origin; • Dust suppression using water bowsers/sprayers should be undertaken on all sites/facilities where dust entrainment occurs; and • Plan the lighting requirements of facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. Possible options include: o Zoning of areas of high and low lighting requirements; o Movement activated lights as opposed to permanent lights; and o Reducing height and angle of lights.	Management of site activities	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Rehabilitation standards and fauna SCC are protected
	Loss of soils, erosion of the soils and impacts on landowner's livelihood	Soils, land use and Land Capability	Pre-Construction and Construction	• A spill prevention and emergency spill response plan shall be compiled to guide the construction works; • An emergency response contingency plan shall be put in place to address clean-up measures should a spill and/or a leak occur. • No soil stripping will be allowed during site establishment; • Any activity that may result in the disturbance of the soils must be rehabilitated immediately on discovery; • Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Implementation of mitigation measures will ensure that the activities in the development of the construction sites and associated infrastructure do not have detrimental impacts on the soils, land use and land capability.	Rehabilitation standards, end use objectives

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				necessary, culverts should be installed to permit free drainage of existing water courses; • Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment shall be contained using a drip tray filled with absorbent material; • Any hydrocarbon spill from the site establishment will be remediated as soon as possible; • Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEM: WA, or can 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; • Institute adequate sedimentation control measures where necessary when excavation or disturbance of the riverbanks takes place; • The time in which soils are exposed during construction activities shall be kept to a minimum; • 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; • Minimise stockpile height to <3m. • Topsoil should never be used as a filling material for roads • Soil stockpiles must be sampled, ameliorated (if necessary) and re-vegetated as soon after construction as possible. • Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; • Separate stripping, stockpiling and replacing of soil horizons in the original natural sequence to combat hard setting and compaction, and maintain soil fertility; • 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; and • Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes			
Vegetation clearance and site excavation Transportation of material and movement of vehicles and machinery on construction areas	Wetland destruction and loss of wetland habitat and hydrological functions	Wetland and Aquatic Environmental Impacts	Pre-Construction and Construction	• Access to wetland areas outside of the construction areas shall be strictly forbidden and the wetlands must be demarcated as no-go areas for vehicles and construction personnel; • No vegetation clearance shall be permitted outside the footprints of the project infrastructure; • Construction activities will be limited to be more than 500 m from the edge of the wetlands and riparian zones without consent from the DWS;	Control of access to wetland areas and within the 500 m regulated buffer area	Implementation of mitigation measures will assist with avoiding loss of and maintaining the current state wetland features within the project area and will enable the project to comply with the requirements of the NWA	Wetland loss is avoided and impacts on wetland habitat is reduced and/or avoided NWA

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• The stormwater management plan must be developed and incorporated into the design of the project in order to prevent erosion and the associated sedimentation of the aquatic system; • No vehicles may be allowed to indiscriminately drive through the wetland; • All disturbed areas shall be re-vegetated with indigenous species; • All construction materials shall be kept out of the wetlands; 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 ecosystem.			
Transportation of material and movement of vehicles and machinery on construction areas	Possible increase in nuisance dust and carbon emissions and ambient air pollutants (NO_2 and SO_2) due to movement of vehicles and operation of machinery and equipment	Air Quality	Pre-Construction and Construction	• Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust. • Dust suppression measures shall be implemented on dry weather days and periods of high wind velocities; • Rehabilitation of disturbed areas shall be undertaken in tandem with construction activities; • Limit load size to reduce spillage and cover final product loads with tarpaulins where needed. • Attend to dust control when loading trucks by minimising drop heights and prevention of over loading. • A routine emissions and ambient air quality monitoring program shall be developed and implemented to determine whether there are any significant increases in emissions and impacts at sensitive receptors. • 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; • Design road alignments to minimise travel distances and eliminate unnecessary traffic • Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; and • A routine emissions and ambient air quality monitoring program shall be developed and implemented to determine whether there are any significant increases in emissions and impacts at sensitive receptors. <u>Odours:</u> • Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer; • All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency; and • Traffic will be restricted to demarcated areas and traffic volumes and speeds within the construction site will be controlled;	Dust control measures Dust fallout monitoring	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.	Dust and Particulate Matter levels National Air Quality Standards

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Vegetation clearance and excavation of construction sites	Visual intrusion as a result of movement of machinery and erecting of contractor camps as well as clearance of vegetation	Visual	Pre-Construction and Construction	• The relevant exposed construction site areas and access gravel roads will be irrigated on a regular basis, with just enough moisture to keep the dust down without creating undue runoff; • Natural vegetation, wherever practical, must be retained on and around the construction sites; • All lights used for illumination (except for lighting associated with security) should be faced inwards and shielded to avoid light escaping above the horizon; • Construction site will be screened from sensitive receptors and rubble removed from site on a daily basis; • Litter and dust management measures should be in place at all times; • Maintain the construction site in a neat and orderly condition at all times; • Create designated areas for material storage, waste sorting and temporary storage, batching and other potentially intrusive activities; • Limit the physical extents of areas cleared for material laydown, vehicle parking and the like as much as possible and rehabilitate these as soon as is feasible; • Repair unsightly and ecologically detrimental erosion damage to steep or bare slopes as soon as possible and re-vegetate these areas using a suitable mix of indigenous plant species. • Construct and/or paint offices and workshop buildings in colours that are complementary to the surrounding landscape, such as olive green, light grey, grey green, blue grey, dark buff, rust, ochre variations of tan; • Utilise construction materials that have matt textures where possible; and • On site construction activities will be limited to be undertaken between 6am and 6pm.	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Measures will be undertaken to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives and ensure that all operations during the construction phase do not result in detrimental visual impacts on surrounding properties, communities and road users.	Rehabilitation standards Traffic impacts reduced
Transportation of material and movement of vehicles and machinery on construction areas	Increase in ambient noise levels due to movement of vehicles and machinery	Noise	Pre-Construction and Construction/Operation	• Conduct baseline noise monitoring prior to construction activities; • Implement a noise monitoring programme to measure against the baseline noise assessment; • The maximum speed limit shall be limited to 40 km/hr subject to risk assessment; • 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; • Ensure that the employees are issued with earplugs and that they are instructed to use them; • Educate employees on the dangers of hearing loss due to mine machinery noise; • Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e.g., 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;	Management and maintenance of construction vehicles. Management using 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	The mitigation measures ensure that the noise levels from the construction 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 and will ensure that the noise levels emanating from the construction sites will not have detrimental effects on the construction workers and surrounding communities/landowners.	Noise levels reduced National Noise Control Regulations, SANS 10103:2008 Guidelines

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• 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 fanbelts, 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 must be operated in such a way that the equipment is operated throughout the working periods instead of operating several items simultaneously; • 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; • Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 17H30 and Saturday 07H00 - 14H00). However, no noise/vibration producing activities shall be undertaken on Saturdays unless this has been agreed to by the community.			
Vegetation clearance and excavation of construction sites	Potential destruction of graves and areas of archaeological importance	Heritage Resources	Pre-Construction and Construction/Operation	• Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible; • Contractors shall be made aware of the archaeological resources that were identified during the HIA; • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site without approval from SAHRA; and • Should any graves be identified during the pre-construction phase the contractors must: ○ Fence off and install a gate around graves; and ○ Maintain a buffer zone of 100 metres around all graves during construction and mining phases. • Should this buffer zone not be feasible, a phase 2 study must be conducted followed with a destruction permit application from SAHRA;	Control through clear demarcation of construction sites to ensure avoidance of graves and other heritage sites	The construction will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not have detrimental impacts on heritage sites	Impact avoided
Vegetation clearance and excavation of construction sites	Potential sealing and loss of fossils	Fossils	Pre-Construction and Construction/Operation	• If any palaeontological material is exposed during digging, excavating and mining activities, SAHRA must be notified. All development activities must be stopped, and a palaeontologist should be called in to determine proper mitigation measures, especially for shallow cave	Management of topsoil integrity for the reuse in rehabilitation	The construction will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not have detrimental impacts on fossil resources	Impact avoided
Waste Management	Improper waste management has potential to	Water resources (surface and	Pre-Construction and	*Separation of waste*	Waste management	The mitigation measures will result in reduced the amounts of waste	Waste Management Impact on water resources avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
	contaminate water sources and wetlands.	groundwater) and wetlands	Construction/Operation	• 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 in waste that can be recycled and or reused; • No littering shall be allowed in and around the site, a sufficient number of bins shall be provided for the disposal of waste; • Where necessary dedicate a storage area on site for collection of construction waste. *Storage of waste:* • No stockpiling of material shall be permitted within 100 m of water courses and/or drainage lines, or within 500 m of wetlands; • General waste will be collected in an adequate number of litter bins located throughout the construction site Bins shall be located no more than 50 m from construction sites; • 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 any area demarcated for waste will be contained, treated and reused; • Flammable substances must be kept away from sources of ignition and from oxidizing agents; • 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; *Disposal of hazardous waste:* • 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 • The safe disposal certificate shall be stored and provided on request; • Disposal of general waste: • No dumping shall take place in or near the construction site; • All general waste shall be disposed of to the nearest licensed landfill site; • 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 waste to a registered landfill site		produced, will encourage re-use of material where possible and recycling of the material where possible. Disposal will be utilised as the last resort. The mitigation measures will also ensure that the management of waste will be in accordance with the National Environmental Management: Waste Act, 2008 (Act 51 of 2008)	

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Vegetation clearance	Changes in the topography may be experienced as a result of bush clearing and construction vehicles on site	Topography	Pre-Construction and Construction/Operation	• Clearance will only take place in designated areas and kept as minimal as possible; • Construction foots prints shall be kept demarcated and to a minimum • Rubble will be removed frequently; • The construction activities will be screened to minimise the visual disturbance to surrounding landowners.	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas.	Implementing mitigation measure will minimise changes in topography and visual impacts	Rehabilitation standards End use objectives
Excavations	Removal of local geology as a result of construction activities	Geology	Pre-Construction and Construction/Operation				
Transportation of material and movement of vehicles and machinery on construction areas	Increased traffic on public roads may result in conflicts	Traffic/Social	Pre-Construction and Construction/Operation	• Ensure that where existing public roads are used to access the construction areas, adequate construction signage is in place to inform the public of increased construction activities in the affected areas; • Traffic signs shall be installed around the project site and surrounding areas to warn community road users of the presence of construction vehicles; • 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 construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents; • The number of construction vehicles and trips shall be kept to a minimum • Materials transported on public roads must be covered.	Speed control and limitation of the times when construction vehicles may be on the roads	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles	Impact avoided
Recruitment	Impact from the influx of job seekers and employment of farm labourers:	Social	All phases	• Recruitment will not be undertaken on site; • Recruitment process shall favour locals; • Where required, liaise with the SAPD to ensure safety of landowners in the areas; • Prepare an influx management plan • Develop a local employment procedure and recruitment process • Prepare a code of conduct for all workers and contractors associated with the mine • Ensure that employees are provided with adequate health support, including the dissemination of the Health and Safety Policy • Ensure that employees are provided with any other awareness training required as part of the general employment contract with contract or permanent staff • Monitor for any escalation of poaching, petty crime or establishment of illegal settlements on land surrounding the mine. Such cases need to be addressed immediately and appropriately	Management of the implementation of the EMPR	Implementing mitigation measures will ensure recruitment of locals and will minimise conflicts with surrounding landowners and communities.	Impact managed/reduced

Table 34-2: Impact Management During the Operational Phase

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Transportation of product	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site; • Load wet suppression of materials transported by road (i.e., load spraying) or load covering with tarpaulins to reduce fugitive dust generation; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; • Avoidance of dust track-on onto neighbouring paved roads; and • Wind speed reduction through sheltering (where possible).	Soil monitoring and management of spills	With the implementation of the mitigation measures and monitoring of the air quality, the mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Dust levels Particulate Matter levels
Fugitive vehicle emissions from the gravel maintenance road	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site;	Dust control Air quality monitoring	With the implementation of the mitigation measures and monitoring of the air quality, the mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Dust levels Particulate Matter level
Heavy vehicle exhaust emissions	CO, NO_2, SO_2 and fine particulate emissions affecting ambient air quality	Air quality	Operation	• All vehicles and other equipment should be maintained and serviced regularly to ensure that exhaust particulate emissions are kept to a minimum; • Vehicles should use low sulphur fuels; and • Vehicles should not be allowed to idle for more than 5 minutes when not in use to reduce particulate and combustion emissions.	Air quality monitoring		Particulate Matter level
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Contamination of soils by hydrocarbon pollutants	Soil, Land Use and Land Capability	Operation	• Accidental spills (concrete, chemicals, process water, hydrocarbons, waste) need to be reported as soon as practical so that effective remediation and clean-up strategies and procedures can be implemented. • Where possible, soil that is contaminated by fuel or oil spills, for example, from vehicles, will be collected to be treated at a pre-determined and dedicated location, or will be treated in situ, using sand, soil as absorption medium. • Practice good housekeeping in chemical storage areas and ensure that storage areas are bunded. • Remedy by treatment of contaminated soils.	Management and monitoring of spills		
Operational activities	Establishment and spread of alien invasive species	Flora, wetlands	Operation	• Monitoring of relocation success of rescued and relocated floral SCC should take place during the operational phase; • Harvesting of protected floral species by mining and operational personnel should be strictly prohibited. • The operational footprint must be kept as small as possible in order to minimise impact on the surrounding environment;	Management and monitoring of vegetation clearance and wetland areas	The implementation of mitigation measures will ensure that the mining activities do not have detrimental impact on the area's flora, in particular indigenous species and species that are of conservation importance.	Alien Invasive Plant Species Eradication

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Edge effect control needs to be implemented within disturbed areas; • Erosion berms and hessian sheets are to be used in areas where soils are susceptible to high levels of erosion; • No vehicles are allowed to indiscriminately drive through sensitive wetland and natural areas; • Upon completion of construction activities and decommissioning of temporary access road, all impacted and disturbed areas should be ripped, re-profiled and reseeded with an indigenous veldgrass mixture that will assist to stabilise soils as soon as possible; • During the operational phases of the project, erosion berms may be installed to prevent gully formation and siltation of the wetland resources associated with improved floral habitat; *Minimisation* • An AIPS control programme must be developed and implemented during all phases of the proposed project; • AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site; • It is recommended that the programme include: o A combined approach using both chemical and mechanical control methods; o Periodic follow-up treatments, informed by regular monitoring; and o Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas. *Rehabilitation* • Rehabilitate cultivated land in the project site that is not used for crop production; • Rehabilitate all sites that are disturbed by construction phase activities, as per the rehabilitation programme; and • Rehabilitate all disturbed footprints during the closure and rehabilitation phases, as per the rehabilitation programme.			
Movement of vehicles	Mortality and disturbance of fauna	Fauna	Operation	<u>Death/injury during vegetation clearing and earth works</u> • An Environmental Compliance Officer (ECO) should be on-site during vegetation clearing to monitor for, and manage, any wildlife-human interactions. The ECO should be trained in inter alia, snake handling; and • As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas, such as open trenches and voids. <u>Vehicle-wildlife collisions</u> • Road signage indicating the potential presence and movement of wildlife should be installed within the construction footprints and along public roads. <u>Hunting, snaring and poisoning</u> • The handling, poisoning and killing of on-site fauna by mine and construction workers and contractors must be strictly prohibited; and • Employees and contractors should be made aware of the presence of, and rules regarding, fauna through suitable induction training and on-site signage.	Management and enforcement of road speed limits	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Impact avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				Noise, vibrations and lights (sensory disturbances) • General noise abatement equipment should be fitted with machinery and vehicles; • As required, noise shields, including earth berms, should be constructed around sites of noise origin; • Dust suppression using water bowsers/sprayers should be undertaken on all sites/facilities where dust entrainment occurs; and • Plan the lighting requirements of facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. Possible options include: o Zoning of areas of high and low lighting requirements; o Movement activated lights as opposed to permanent lights; and • Reducing height and angle of lights.			
Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Wetlands and water courses	Operation	• Areas to be cleared should be clearly demarcated to prevent unnecessary clearing outside of these sites as to avoid approaching too close to the adjacent rivers. • See further mitigation measures detailed in the terrestrial ecology report. • An aquatic biomonitoring programme must be developed and implemented during all phases of the proposed project. • Avoid the accumulation of non-perennial bodies of water such as flooded mining pits / drainage canals and floodplain depressions where possible. • The mine should implement a monthly monitoring programme for surface water at all the recommended aquatic monitoring points and the data used for comparative analysis between the upstream and downstream sites. • Information from this monitoring can be used to quickly implement management actions should there be a significant change in water quality directly downstream of the project area. • Contain and/or avoid potential spills which could make their way to adjacent water resources. • Maintain service roads to avoid erosion and excessive dust formation;	Surface water quality monitoring Wetland Monitoring	Implementation of mitigation measures will assist with avoiding loss of and maintaining the current state wetland features within the project area and will enable the project to comply with the requirements of the NWA	Impact avoided Extent of wetlands not reduced
Operational phase activities	Loss of ecological communities within wetlands due to increased sedimentation and the potential mobilisation of pollutants	Wetlands Soils Flora	Operation	• Implement low impact techniques to minimise the impact on the surrounding environment; • Vegetation clearing should be restricted to the proposed development footprints only, with no clearing permitted outside of these areas; • Adequate storm water management must be incorporated into the design of the proposed development throughout all phases to prevent erosion of topsoil and the loss of floral and faunal habitat. In this regard, special mention is made of: • Sheet runoff from cleared areas, paved surfaces and access roads shall be curtailed; • Runoff from paved surfaces should be slowed down by the strategic placement of berms; • All topsoil and waste stockpiles must have berms and catchment paddocks at their toe to contain runoff of the facilities. • All disturbance footprints must be separated from	Monitoring of vegetation on site Monitoring and management of wetland areas, particularly the 500m regulated areas	Implementation of mitigation measures will assist with avoiding loss of and maintaining the current state wetland features within the project area and will enable the project to comply with the requirements of the NWA	Impact avoided Extent of wetlands not reduced Impacts on flora, especially SCC is reduced or avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				adjacent wetlands by a fence, either a security fence or five strand cattle fences. • All disturbed areas outside the direct development footprints should be rehabilitated and re-vegetated as soon as possible.			
Operational phase noise	Noise nuisance experienced at Receptor 3	Noise	Operation	*Materials handling activities:* • The drop height policy should be maintained onsite. All equipment operators should be trained in the policy such that drop height reduction is implemented onsite; and • Wind speed reduction through sheltering (where possible). *Vehicle noise during ore haulage:* • Rigorous speed control reduces the noise from vehicle traffic. It is recommended that a maximum speed of 20 km/h to be set on all unpaved roads and 40km/h on paved roads; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; and • Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up and associated noise. *Heavy vehicle/machinery noise:* • Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures; • All vehicles and other equipment should be maintained and serviced regularly to ensure that the noise levels are reduced; and • Vehicles should not be allowed to idle for more than 5 minutes when not in use.	Management and monitoring noise levels	The mitigation measures ensure that the noise levels from blasting activities will be managed, and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines and will ensure that the noise levels emanating from the mine will not have detrimental effects on the mine workers and surrounding communities/landowners.	Impact Avoided
Operational phase	Employment	Socio- Economic	Operation	• Community within the vicinity of mine should be given special consideration in terms of the benefits arising from the project because they will be the most affected by the project. It is recommended that the following mitigation measures be implemented: • A local skills database must be developed and updated regularly. The skills database should be used for recruitment purposes to minimise the probability of nepotism or corruption during the recruitment process; • A monitoring system should be put in place to ensure that G and E Global Mining's recruitment policy is adhered to.	Management of the implementation of the EMPR		Impact enhanced
Operational phase	Skills transfer and development	Socio- Economic	Operation	G and E Global Mining will: • Comply with the requirements of the Skills Development Act.	Management of the implementation of the EMPR	Implementing mitigation measures will ensure recruitment of locals and will minimise conflicts with surrounding landowners and communities.	Impact enhanced
Operational phase	Community development	Socio- Economic	Operation	• G and E Global Mining will engage I&APs in the area to gauge whether they can align with any of their efforts to collaborate on some development initiatives planned for the communities. • Additionally, the selection of project beneficiaries should be fair and directly affected parties should be given first preference.	Management of the implementation of the EMPR	Implementing mitigation measures will ensure recruitment of locals and will minimise conflicts with surrounding landowners and communities.	Impact enhanced
Operational phase	Health and safety risk	Socio- Economic	Operation	• G and E Global Mining must adhere to all requirements contained in the Occupational Health and Safety Act (Act 85 of 1993) and the Mine Health and Safety Act (Act 29 of 1996). • The mine will be maintained during its lifetime to minimise the risk of mine personnel being injured	Manage through health and safety policies and training		Impact avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				because of failed machinery, and so forth. • Rigorous operational health and safety programmes should be implemented.			
Operational phase	Possibility of unearthing unknown graves or other buried cultural/archaeological items	Archaeology and cultural heritage	Operation	• Chance find procedures will be implemented: • All work in the immediate vicinity of the find will cease; • The area will be demarcated with barrier tape or other highly visible means; o SAHRA will be notified immediately; o An archaeologist accredited with the Association for Southern African Professional Archaeologists (ASAPA) will be commissioned to assess the find and determine appropriate mitigation measures, which may include obtaining the necessary authorisation from SAHRA to undertake the mitigation measures; and o Access to the find by unqualified people will be prevented until the assessment and mitigation processes have been completed.	Management of access to heritage resources and sites	Mitigation measures will ensure compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not have detrimental impacts on heritage sites	Impact avoided
Movement of construction vehicles	Risk of vehicle collision	Traffic	Operation	• Indicate areas where heavy vehicles are expected with adequate signage.	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades where required	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles and will reduce conflict with other road users.	Impact avoided
	Risk of pedestrian accidents	Traffic	Operation	• Clearly indicate pedestrian crossings. • Educate drivers on potential areas of high pedestrian and cyclist activity. • Educate community on dangers of construction vehicles new to their area.			
	Degradation of Public Roads	Traffic	Operation	• The deterioration over time must be monitored and a maintenance plan must be negotiated with the Provincial Authority.			
	Health and Safety Risk	Roads and Traffic	Operation	• The deterioration of public roads over time must be monitored, and a maintenance plan must be negotiated with the National Road Administration, with specific mention of the Monitoring and Planning departments that should be consulted.	Manage through health and safety policies and training	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles and will reduce conflict with other road users.	Impact avoided
Transportation by road	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site; • Load wet suppression of materials transported by road (i.e., load spraying) or load covering with tarpaulins to reduce fugitive dust generation; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; • Avoidance of dust track-on onto neighboring paved roads; and • Wind speed reduction through sheltering (where possible).	Dust control Air quality monitoring	With the implementation of the mitigation measures, mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Particulate Matter Levels Dust levels
Storage of chemicals and fuel	Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel	Soil, Land Use and Land Capability Groundwater Surface Water	Operation	• Accidental spills (concrete, chemicals, processing water, hydrocarbons, waste) need to be reported as soon as practical so that effective remediation and clean-up strategies and procedures can be implemented.	Management and monitoring of spills Monitoring and management of the	Implementation of mitigation measures will ensure that the mining activities do not have detrimental impacts on the soils, land use and land capability.	Impact avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
	leakages from vehicles and machinery			• Where possible, soil that is contaminated by fuel or oil spills will be collected to be treated at a pre-determined and dedicated location, or will be treated in situ, using sand, soil as absorption medium. • Practice good housekeeping in chemical storage areas and ensure that storage areas are bounded. • On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where it is necessary to contain any spillages during the loading and off-loading of the material. • Bunded areas shall contain 110% of the stored volume. • Bunding areas must be impermeable. • Bund area must have a facility such as a valve/sump to drain or remove clean stormwater. • Place oil traps under stationary machinery, only re-fuel machines at fueling station, construct structures to trap fuel spills at fueling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • 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 conducted off site; • Runoff from the chemical storage area shall be contained;	integrity of infrastructure		

Table 34-3: Impact Management During the Decommissioning and Closure Phase

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils	Soil, Land Use and Land Capability	Decommissioning and closure	• Ensure proper handling of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets (SDS); • Dismantling of plant equipment and machinery should be carried out in designated appropriate facilities fitted with spillage containment, floors and sumps to capture any fugitive oils and greases. Develop detailed procedures for spills containment and soil clean up.	Management and monitoring of spills	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Removal of redundant infrastructure	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil, Land Use and Land Capability	Decommissioning and closure	• Conduct soil assessment to determine post decommissioning/ closure soil quality on rehabilitated infrastructural footprint. • Where possible, re-use stockpiled soil within as short a period as possible. • Use appropriate soil handling machinery, preferably avoiding heavy earth moving equipment used for decommissioning activities to minimise compaction.	Management and monitoring of soil stockpiles	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Grading of project site to ensure long-term drainage conditions on site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities, may result in degradation of soil quality due to soil disturbance. Contamination of soil by handling of soil with contaminated earth moving Machinery (machinery previously used for handling mine waste such as waste rock). Insufficient soil volumes to meet end land use soil requirements.	Soil, Land Use and Land Capability	Decommissioning and closure	• Limit vehicle traversing on both stockpiles and rehabilitated areas as far as possible. • Prepare rehabilitated areas properly and monitor regularly.	Management and monitoring of soil stockpiles	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Destruction of all surface infrastructure;	Potential groundwater contamination resulting from remaining surface infrastructure	Groundwater, wetlands	Decommissioning and closure	• Remove buildings for which alternative post-mining use is identified and rehabilitate site to pre-agreed conditions	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
	Potential groundwater contamination from poor waste and sanitation management	Groundwater, wetlands	Decommissioning and closure	• Remove infrastructure unless post-mining use is identified and rehabilitate to pre-agreed conditions.	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
	Potential groundwater contamination caused by spillages and accidents	Groundwater, wetlands	Decommissioning and closure	• Good housekeeping, and adherence to good health and safety practices during closure activities	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Removal of redundant infrastructure	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils.	Downstream water resources, wetlands	Decommissioning and closure	• Ensure that all contaminated areas are adequately removed and disposed of to a permitted waste site. • Clean up spillages immediately and dispose of contaminated materials to a permitted waste site.	Management of spills Water quality monitoring	The surface water leaving the rehabilitation site will comply with the DWS target water quality parameters.	Rehabilitation Standards End use objectives
Grading of project site to ensure long-term drainage conditions on site	Soil compaction in areas where active heavy machinery will be mobilised	Downstream water resources, wetlands	Decommissioning and closure	• Re-use stockpiled soil within as short a period as possible.	Water quality monitoring	The surface water leaving the rehabilitation site will comply with the DWS target water quality parameters.	Rehabilitation Standards End use objectives

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
	for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.			• Use appropriate soil handling machinery to Minimise compaction • Limit vehicles traversing on both stockpiles and rehabilitated areas as far as possible. • Prepare rehabilitated areas properly and monitor regularly.			
Soil placement and revegetation of project site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities may result in erosion and sedimentation. Contamination of soil by handling of soil with contaminated earth moving machinery (machinery previously used for handling mine waste such as waste rock).	Downstream water resources, wetlands	Decommissioning and closure	• Revegetate as quickly as possible to limit erosion and sedimentation in downstream water resources.	Water quality monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Vegetation clearing and earth works	Establishment and spread of alien invasive species	Terrestrial ecology, wetlands	Decommissioning and closure	*Minimisation* • An alien invasive species (AIS) control programme must be developed and implemented during all phases of the proposed project; • AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site; • It is recommended that the programme include: o A combined approach using both chemical and mechanical control methods; o Periodic follow-up treatments, informed by regular monitoring; and o Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas. *Rehabilitation* • Rehabilitate cultivated land in the project site that is not used for crop production; • Rehabilitate all sites that are disturbed by construction phase activities, as per the rehabilitation programme; and • Rehabilitate all disturbed footprints during the closure and rehabilitation phases, as per the rehabilitation programme.	Management of alien invasive plant species Monitoring of rehabilitation areas Rehabilitation of affected areas	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Decommissioning and closure phase activities	Permanent alteration of site topographical and visual character of due to presence of overburden dump	Visual	Decommissioning and closure	• Dismantle and remove all visible surface-built infrastructure during decommissioning; • Re-shape all footprint areas to be as natural in appearance as possible and actively revegetate using locally occurring grass species; • Stabilise and backfill the decline shaft, and contour to ensure it is free draining; and • Establish a vigorous and self-sustaining vegetation cover using locally occurring grass species;	Management of visual impacts Monitoring of rehabilitated areas	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Downscaling and retrenchment	Loss of employment	Socio- economic	Decommissioning and closure	• Timely and adequate consultation with employees who are dependent on the mine for employment. • Assisting employees in seeking alternative employment at other power plants or related facilities.			

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Training and education of employees to equip them with skills that could benefit them in other industries. • During the operational phase, members of the workforce will be encouraged to obtain skills or qualifications that are recognised by the National Qualifications Framework and are registered through the Mining Qualifications Authority. These qualifications include non-mining skills that will assist employees in areas other than mining. • Initiatives should be aligned with EMPR commitments relating to downscaling and retrenchment.			
Downscaling and retrenchment	Reduced regional economic development	Socio- economic	Decommissioning and closure	• Engage local and regional government with respect to the decommissioning phase.			
Closure phase	The closure and rehabilitation phase should have no impact on any identified cultural and heritage resources	Archaeology and cultural heritage resources	Decommissioning and closure	• It is not expected that any mitigation measures will be required.			
Movement of construction vehicles	Risk of vehicle collision	Traffic	Decommissioning and closure	• Indicate areas where heavy vehicles will be expected with adequate signage.			
Movement of construction vehicles	Risk of pedestrian accidents	Traffic	Decommissioning and closure	• Clearly indicate pedestrian crossings. • Educate drivers on potential areas of high pedestrian and cyclist activity. • Educate community on dangers of construction vehicles new to their area.			
Movement of construction vehicles	Degradation of Public Roads	Traffic	Decommissioning and closure	• The deterioration over time must be monitored and a maintenance plan must be negotiated with the Provincial Authority.			

35 Impact Management Actions

Table 35-1: Impact Management Actions for the Construction Phase

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning stage	Ensure contractors are aware of the required management measures stipulated in the EMPr.
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning Stage	Ensure all construction staff is familiar with the Environmental Awareness Plan.
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning Stage	Ensure that all staff is familiar with the emergency procedure and plan.
Site Establishment and site clearance for the construction of infrastructure: • Ablution facilities; • Access roads; • Topsoil Stockpile • Fences; • Office site; • Plant site; • Slimes dam; and • Vehicle parking	Groundwater Contamination	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Pre-construction and Construction phases	Compliance with the regulations under the GN704. Compliance with the NWA
	Contamination of surface water resources	Monitoring through rehabilitation and management of spills Rehabilitate contaminated areas	Pre-construction and Construction phases	Compliance with the regulations under the GN704. Compliance with the NWA
	Loss of Species of Conservation Concern	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Pre-construction and Construction phases	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 animal life due to disturbance caused proposed project:	Relocation of affected species of conservation importance Management of site activities	Pre-construction and Construction phases	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation
	Mortality and disturbance of fauna	Management of site activities	Pre-construction and Construction phases	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation
	Loss of soils, erosion of the soils and impacts on landowner's livelihood	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas
Vegetation clearance and site excavation Transportation of material and movement of vehicles and machinery on construction areas	Wetland destruction and loss of wetland habitat and hydrological functions	Determine, in consultation with the DWS if the area is considered a wetland. Control of access to wetland areas and within the 500m regulated area determined by the specialist.	Pre-construction and Construction phases	Compliance with the NWA
Transportation of material and movement of vehicles and machinery on construction areas	Possible increase in nuisance dust and carbon emissions and ambient air pollutants (NOx and Sox) due to movement of vehicles and operation of machinery and equipment	Dust control measures	Pre-construction and Construction phases	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
Vegetation clearance and excavation of construction sites	Visual intrusion as a result of movement of machinery and erecting of contractor camps as well as clearance of vegetation	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum. Vehicles and machinery required for construction activities will be kept to a minimum
Transportation of material and movement of vehicles and machinery on construction areas	Increase in ambient noise levels due to movement of vehicles and machinery	Management and maintenance of construction vehicles. Management using 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	Pre-construction and Construction phases	Remain within the Noise Regulation Standards for Rural Areas. Ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines
Vegetation clearance and excavation of construction sites	Potential destruction of graves and areas of archaeological importance	Control through clear demarcation of construction sites to ensure avoidance of graves and other heritage sites	Pre-construction and Construction phases	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Vegetation clearance and excavation of construction sites	Potential sealing and loss of fossils	Management of topsoil integrity for the reuse in rehabilitation	Pre-construction and Construction phases	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Waste Management	Improper waste management has potential to contaminate water sources and wetlands.	Waste management	Pre-construction and Construction phases	Comply with the requirements of the National Environmental Management: Waste Act, 2008 (Act 51 of 2008)

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards
Vegetation clearance	Changes in the topography may be experienced as a result of bush clearing and construction vehicles on site	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum.
Excavations	Removal of local geology as a result of construction activities	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum.
Transportation of material and movement of vehicles and machinery on construction areas	Increased traffic on public roads may result in conflicts	Speed control and limitation of the times when construction vehicles may be on the roads	Pre-construction and Construction phases	Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times

Table 35-2: Impact Management Actions for the Operational Phase

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
Transportation of product by road	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	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
Fugitive vehicle emissions from the gravel maintenance road	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	
Heavy vehicle exhaust emissions	CO, NO_2, SO_2 and fine particulate emissions affecting ambient air quality	Air quality monitoring	Operation	
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Contamination of soils by hydrocarbon pollutants	Management and monitoring of spills	Operation	Comply with the NEM: WA
Operational activities	Establishment and spread of alien invasive species	Control and management of alien and invasive plant species	Operation	Comply with the requirements of the EMPr
Movement of vehicles	Mortality and disturbance of fauna	Monitoring of groundwater levels	Operation	Comply with the NWA
Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Management of excavation activities to ensure the footprints are kept to a minimum Monitoring of soil stockpiles Soil assessment	Operation	Minimise footprints
Operational phase activities	Loss of ecological communities within wetlands due to increased sedimentation and the potential mobilisation of pollutants	Control of access to wetland areas	Operation	Comply with the NWA
Operational phase noise	Noise nuisance	Minimise and manage nuisance noise	Operation	Comply with provisions of the Occupational Health and Safety Act Comply with the provisions of the Mine Health Act Noise Regulation Standards for Rural Areas. Ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines
Operational phase	Employment	Management of the implementation of the EMPr	Operation	Comply with provision of the EMPr and Employment policies
Operational phase	Skills transfer and development		Operation	
Operational phase	Community development		Operation	
Operational phase	Regional and economic development		Operation	
Operational phase	Loss of employment (construction workers)	Management of the implementation of the EMPR	Operation	
Operational phase	Health and safety risk	Manage through health and safety policies and training	Operation	Comply with provisions of the Occupational Health and Safety Act Comply with the provisions of the Mine Health Act
Operational phase	Possibility of unearthing unknown graves or other buried cultural/archaeological items		Operation	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Movement of construction vehicles	Risk of vehicle collision	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades	Operation	Comply with road speed controls and limits
	Risk of pedestrian accidents	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades s	Operation	Comply with road speed controls and limits
	Degradation of Public Roads	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades	Operation	Maintenance of access roads and upgrade of roads where required
	Health and Safety Risk	Manage through health and safety policies and training	Operation	Comply with provisions of the Occupational Health and Safety Act Comply with the provisions of the Mine Health Act
Disposal of waste rock on the waste stockpile	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	Comply with the provisions of the National Air Quality Standards.
Storage of chemicals and fuel	Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Management and monitoring of spills Monitoring and management of the integrity of infrastructure	Operation	Comply with the requirement of the NEM: WA

Table 35-3: Impact Management Actions for the Decommissioning and Closure Phase

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Spillage of chemical solutions during the dismantling of plant equipment, or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives. Comply with the requirements of the NEM: WA
Removal of redundant infrastructure	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil monitoring and management of spills	Decommissioning and closure	Comply with the closure objectives
Grading of project site to ensure long-term drainage conditions on site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities, may result in degradation of soil quality due to soil disturbance. Contamination of soil by handling of soil with contaminated earth moving machinery. Insufficient soil volumes to meet end land use soil requirements.	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA
Destruction and removal of all surface infrastructure; .	Potential groundwater contamination resulting from remaining surface infrastructure Potential groundwater contamination from poor waste and sanitation management Potential groundwater contamination caused by spillages and accidents	Groundwater monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA
Removal of redundant infrastructure	Spillage of chemical solutions during the dismantling of plant equipment, or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils.	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA
Grading of project site to ensure long-term drainage conditions on site	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA
Soil placement and revegetation of project site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities may result in erosion and sedimentation. Contamination of soil by handling of soil with contaminated earth moving machinery.	Management of erosion	Decommissioning and closure	Minimise soil loss NEM: WA
Vegetation clearing and earth works	Establishment and spread of alien invasive species	Control and management through implementation of the Alien Invasive Plant Species eradication programme	Decommissioning and closure	Comply with the Alien Invasive Species Eradication Programmes
Vegetation clearing and earth works	Loss or alteration of habitat: riparian vegetation and/or in-stream channel habitat	Control of access to wetland areas and within the 100 m ZOI determined by the specialist. Monitoring of rehabilitation and reestablishment of vegetation	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA
Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Surface water quality monitoring	Decommissioning and closure	
Construction, operational and closure phase activities	Disturbance of wetland habitat	Control of access to wetland areas and within the 100 m ZOI determined by the specialist.	Decommissioning and closure	
Decommissioning and closure phase activities	Permanent alteration of site topographical and visual character of due to presence of overburden dump	• Monitor and manage visual impacts	Decommissioning and closure	Reprofile the area as much as possible Revegetate the dump to minimise visual impacts
Decommissioning and closure phase activities	Reinstatement of visual resource value due to dismantling of mining buildings and subsequent rehabilitation of footprint areas. Visible dust plumes during rehabilitation.	• Monitor and manage visual impacts • Dust control	Decommissioning and closure	
Downscaling and retrenchment	Loss of employment	• Manage qualifications of mine workers and implement programmes in the EMPR to enable workers to source employment elsewhere on decommissioning of the mine.	Decommissioning and closure	Comply with provisions of the EMPR Comply with provisions of the Labour Relations Act
Downscaling and retrenchment	Reduced regional economic development		Decommissioning and closure	

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
Downscaling and retrenchment	Reduced community investment		Decommissioning and closure	Comply with provisions of the EMPR Comply with provisions of the Labour Relations Act
Closure phase	The closure and rehabilitation phase should have no impact on any identified cultural and heritage resources	• Manage and control access to heritage sites	Decommissioning and closure	Comply with provision of the NHRA
Movement of construction vehicles	Risk of vehicle collision	• Management and enforcement of road speed limits •	Decommissioning and closure	Comply with road speed limits
Movement of construction vehicles	Risk of pedestrian accidents	• Management and enforcement of road speed limits	Decommissioning and closure	
Movement of construction vehicles	Degradation of Public Roads	• Road upgrading	Decommissioning and closure	

36 Financial Provision

36.1 Determination of the amount of Financial Provision.

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

The main aim in developing G and E Global Mining's rehabilitation plan is to mitigate the impacts caused by the mining activities and to restore land back to a satisfactory end land use. The rehabilitation plan must be developed as early as possible and maintained throughout the LoM. It is important that the project's closure plan is clearly defined and understood by all involved before starting the process and is complementary to the rehabilitation objectives. The closure vision for the G and E Global Mining diamond project is intended to inform the closure objectives and as such is currently stated as:

To implement a post mining landscape that is safe, stable and non-polluting over the long term, through collaboration with affected I&APs

The overall closure objectives for the proposed project are as follows:

- Adequate reinstatement and rehabilitation of construction and mining pit area; and
- Conduct concurrent or progressive rehabilitation of areas affected by construction and operation activities associated with the pits.
- Minimise the area to be disturbed and to ensure that the areas disturbed during the activities are rehabilitated, as per the measures provided in the EMPr and the conditions of the Environmental Authorisation.
- Remove mine infrastructure that cannot be used by a subsequent landowner or a third party.
- Where infrastructure can be used by a third party, arrangements will be made to ensure their long-term sustainable use;
- Clean up all stockpiles and loading areas and rehabilitate these as far as possible to a land capability similar to that which existed prior to mining;
- Rehabilitate the disturbed land to a state that facilitates compliance with applicable environmental quality objectives,
- Landscape the rehabilitated areas in alignment with the surrounding topography to prevent the unnecessary pooling of water which will reduce the runoff in the catchment;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible, reducing the overall visual impact;
- Physically and chemically stabilise any remaining structures to minimise residual risks;
- Leave a safe and stable environment for both humans and animals;
- To limit soil and surface/groundwater contamination by managing all water on site;
- Comply with local and national regulatory requirements;
- Form active partnerships with local communities to take care of management of the land after mining, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation and, if monitoring shows that the objectives have been met, making an application for closure.

Successful rehabilitation must be monitored to ensure sustainability. This requires an understanding of the basic baseline environment, as well as project management to ensure that the rehabilitation program is a success.

36.1.2 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 I&APs were incorporated into the final BAR and EMPr and were collated into a Comments and Responses Register.

36.1.3 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.

The proposed mining pit area will cover an area approximately 5 ha in extent. The location and extent of the infrastructure sites cannot be determined at this stage. Mapping of the actual mining activities cannot be undertaken.

The potential impacts will be limited in spatial extent, and management plan is provided in such a manner as to ensure concurrent rehabilitation. The rehabilitation of the site will entail:

- The removal of all logistical facilities, the ripping/scarifying of the affected area and allowing for natural regrowth to occur so that the site can form part of the surrounding veld.
- 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 until an effective vegetation cover of 45% must be achieved. Re-seeding will be undertaken if the vegetation cover has not been achieved.

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

The Rehabilitation Plan has been compiled in support of the primary closure objectives which are to remove the mining infrastructure and rehabilitate the land to a suitable land use which represent pre-mining conditions and provides a safe and sustainable environment for surrounding receptors.

36.1.5 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 DMPR 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 DMPR in January 2005 in order to empower the personnel at Regional DMPR 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 estimated rehabilitation cost related to the project is anticipated to be R 148 320 as shown in Table 36-1.

Table 36-1: Environmental Cost Estimate Expenditure

CALCULATION OF THE QUANTUM

Applicant: **G and E Global Mining (Pty) Ltd** **Ref No.:** **NW30/5/1/3/2/12219MP**

: Evaluators **Ndi Geological Consulting Services (Pty) Ltd** **Date:** **Aug-26**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (Including overland conveyors and powerlines)	m3	0	17,91	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	249,45	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	367,62	1	1	0
3	Rehabilitation of access roads	m2	100	44,64	1	1	4464
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	433,26	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	236,33	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	498,91	1	1	0
6	**Opencast rehabilitation including final voids and ramps**	**ha**	**0**	**253918,43**	**0,52**	**1**	**0**
7	Sealing of shafts adits and inclines	m3	0	133,92	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0	174355,57	1	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	217156,72	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	630726,4	1	1	0
9	Rehabilitation of subsided areas	ha	0	145996,53	1	1	0
10	General surface rehabilitation	ha	0,6	138119,02	1	1	82871.41
11	River diversions	ha	0	138119,02	1	1	0
12	Fencing	m	0	157,55	1	1	0
13	Water management	ha	0	52516,74	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	1	18380,86	1	1	18380,86
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		105716.3
1	Preliminary and General		12685.95		**weighting factor 2** 1		12685.95
2	Contingencies		10571.63				10571.63
					Subtotal 2		168120,97
					VAT (15%)		19346,08
					Grand Total		**148320**

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

The amount required to cover the rehabilitation cost related to the project is estimated to be R 148 320 at this stage as provided in Table 36-1.

G and E Global Mining will fund the operation and hereby undertakes to fund the operations and to manage the operations. The applicant (G and E Global Mining) hereby confirms that the financial provision will be provided as determined in Table 36-1.

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

37.1 Monitoring of Impact Management Actions

Please refer to Table 37-1.

37.2 Monitoring and Reporting Frequency

Please refer to Table 37-1.

37.3 Responsible Persons (Roles and Responsibilities)

In order to plan, construct and operate the proposed project, it is important that all parties understand their duties and responsibilities. G and E Global Mining and their contractors will be responsible for the construction of the proposed project and ensure that all activities undertaken by G and E Global Mining are undertaken in compliance with the project's EA and EMPr. G and E Global Mining will monitor construction activities at a frequency, which will be determined by the construction schedule. The following sections describe the functions of the key team members.

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

- DMPR,
- 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.

37.3.1 Competent Authority (Department of Mineral and Petroleum Resources (DMPR)

The DMPR plays a lead role in the implementation of environmental policies, legislation and regulations. Their role is to ensure that the construction and operation of the proposed diamond mine is conducted in a sustainable manner, in compliance with the relevant environmental legislation. DMPR is responsible for approving the EMPr for the project and any revisions and amendments thereto.

37.3.2 Project Developer (G and E Global Mining)

The Project Developer (G and E Global Mining) 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 G and E Global Mining will appoint the Environmental Control Officer, EHS Manager and Site Manager.

G and E Global Mining will be responsible for:

- Ensuring that all team members are aware of their roles and responsibilities;
- Taking overall responsibility for all activities that occur in the proposed project and associated infrastructure;
- Ensuring that all commitments/conditions contained in the EA and EMPr are communicated and adhered to by G and E Global Mining employees to all team members and contractors.

During the construction phase G and E Global Mining must:

- Appoint a Project Management Team to oversee the Contractor and act as a liaison between the Environmental Control Officer (ECO) and the Contractor;

- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedies problems timeously and to the satisfaction of the authorities;
- Appoint an independent and suitably qualified ECO to ensure that the Contractor abides by the EMPr;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.

During the operation phase G and E Global Mining must:

- Ensure that the Project Management Team oversees the Contractor/s and act as a liaison between the ECO and the Contractor/s;
- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedy problems timeously and to the satisfaction of the authorities;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.

During decommissioning phase G and E Global Mining must:

- Ensure that the Project Management Team oversees the Contractor/s and act as a liaison between the ECO and the Contractor/s;
- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedy problems timeously and to the satisfaction of the authorities;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.
- Environmental legislation by parties.

37.3.3 Operations Manager

The Operations Manager will report to the G and E Global Mining and be responsible for:

- Complying with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhering to any instructions issued by the project manager on advice of the ECO.

37.3.4 Contractor (s) and sub-contractors

The Contractor (s) (including Sub-Contractors) will report to the Project Management Team and be responsible for:

- Appointing an Environmental Representative who will ensure that all construction activities on site are undertaken in accordance with the EMPr;
- Drafting Environmental Method Statements to mitigate environmental impacts;
- Informing all employees and sub-contractors of their roles and responsibilities in terms of the EMPr;
- Ensuring that all employees and sub-contractors comply with this EMPr;
- Complying with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhering to any instructions issued by the project manager on advice of the ECO;
- Submitting an environmental report at identified site meetings on the environmental incidents that have occurred within the period before the site meeting;
- Arranging that all employees and those of the subcontractors receive appropriate training prior to the commencement of construction, taking cognisance of this EMPr and EA.

The Contractor has a duty to demonstrate respect and care for the environment in which they are operating. The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

37.3.5 Environmental Control Officer

The ECO will report to G and E Global Mining, and the ECO shall be an independent qualified environmental professional with the relevant environmental expertise and shall be responsible for:

- Fully understanding the commitments in the EMPr and EA;
- Ensuring that the EA conditions are upheld;
- Familiarising him / herself with the project and EMPr, and ensuring compliance with the relevant legislation applicable to the project and G and E Global Mining Safety Health and Environmental Policy and procedures;
- Advising management on environmental issues and recommendations for the proposed development;
- Informing key, on-site staff through initial environmental awareness briefing of their roles and responsibilities in terms of the EMPr;
- Communicating the contents of the EMPr and EA to the contractor and sub-contractor staff members. Training will be required to ensure all staff members are aware of the requirements of the EMPr;
- Liaising with environmental statutory bodies, including but not limited to, DMPR and DWS, where deemed necessary;
- Monitoring the implementation of the EMPr and EA throughout the project, by means of site inspections and meetings;
- Arranging for liaison with Interested and Affected Parties (I&AP) s on environmental issues of concern;
- Authorising the removal of personnel and / or equipment should they contravene the conditions of the EMPr and EA;
- Compiling a checklist of areas of non-compliance;
- Identifying areas of non-compliance, and recommending measures to rectify them in consultation with G and E Global Mining and the Contractor;
- Ensuring follow-up and resolution of all non-compliance;
- Compiling monthly progress reports for submission to the Project Manager and DMPR;
- Reporting directly to G and E Global Mining;
- Reviewing and approving Environmental Method Statements submitted by the contractor to mitigate environmental impacts;
- The audit report will be submitted to the Contractor for comment prior to submission to the G and E Global Mining;
- Undertaking a post-construction inspection, which may result in recommendations for additional clean-up and rehabilitation measures; and
- Undertaking regular site inspections to assess compliance with the EMPr and EA and take appropriate action to rectify non – conformances.

37.3.6 Safety, Health and Environmental Representative

The Safety, Health and Environmental (SHE) Representative will report to Project Management Team and be responsible for:

- Ensuring that all environmental and health and safety conditions are undertaken by all staff and contractors on site;
- Overseeing all work done by the ECO; and
- Ensuring that corrective actions are followed up and closed out.

37.4 Time Period for Implementing Impact Management Actions

Please refer to Table 37-1.

37.5 Mechanism for Monitoring Compliance

Please refer to Table 37-1.

Table 37-1: Mechanisms for Monitoring

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
Air quality	• Construction phase impacts and operational phase impacts	• Six (6) months prior to the construction phase (as agreed with the ECO), a suitable baseline dust fallout and particulate monitoring network should be installed along the boundary of the mining operation to establish baseline concentrations prior to the construction phase; • During construction, the baseline monitoring network should be maintained along the boundary of the mining operation to meet the NEM: AQA requirements; • The air monitoring network includes at a minimum dust fallout, PM_{10}, $PM_{2.5}$ and gaseous monitoring (SO_2 and NO_2); • A meteorological station should be installed onsite one month prior to the construction phase as this data is required for several NEM: AQA reporting requirements; and • Any complaints as to the management of onsite air quality should be directed to the site management. Complaints and any actions arising from a complaint will be recorded in a complaint register to be maintained by site management.			G and E Global Mining, ECO, Contractors	Monthly monitoring and reporting
Soil stockpiles	• Maintain and minimise the quality and degradation of soil stockpiles	• Collection of at least one composite sample per stockpile	• Soil stockpiles	• pH and Salinity; • Major anions and cations; • Organic matter content for the topsoil; • Content of major plant nutrients (CEC);	G and E Global Mining, ECO, Contractors	Biannually

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
				• Major cations and anions; • Metal and hydrocarbons; • Stockpile height (<3 m).		
Soil erosion	• Mitigate and minimise soil erosion	• Infrastructure and surface water bodies on-site to be maintained in accordance with the surface water management plan	• Soil stockpiles Developed areas Haul roads	• Visual assessment of soil stockpile heights and conditions (i.e., gullies and rills); • Assess the condition and effectiveness of vegetation on the stockpiles; • Assess any evidence of erosion (as per the Surface water management plan); • Assess the effectiveness of water versus other dust suppression substances (e.g., molasses or bitumen).	G and E Global Mining, ECO, Contractors	Quarterly
Land Use change	• Maintain and minimise land use change within	• Evaluation of changes in land	• Mining	• Collection of satellite	G and E Global Mining, ECO,	Every two years

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
	the mining area	use within the mining precinct using satellite imagery	license area	imagery	Contractors	
Rehabilitated Areas	• Maintain the quality and condition of rehabilitated areas	• Continuous monitoring of rehabilitated areas for closure compliance	• Disturbed areas	• Organic content of topsoil; • Content of major plant nutrients; • Contamination assessment (pH, metals, hydrocarbons, electrical conductivity, total dissolved solids, nitrates, sulphate and phosphates); • Volume of soil replaced;	G and E Global Mining, ECO, Contractors	Annually
Groundwater	• Monitoring groundwater levels and water quality	• A groundwater monitoring programme will be developed and implemented. • Groundwater pumping testing must be conducted. • Groundwater will be monitored for the following parameters: *Physical Parameters* • Groundwater levels *Chemical Parameters:*			G and E Global Mining, ECO, Contractors Groundwater specialist	Water quality monitoring on a quarterly basis Pump testing every 2 years

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
		• Field measurements: pH, EC • Laboratory analyses: Anions and cations (Ca, Mg, Na, K, NO_3, Cl, SO_4, F, Fe, Mn, Al, & Alkalinity) • Other parameters (pH, EC, TDS) • Petroleum hydrocarbon contaminants (where applicable, near workshops and petroleum handling facilities) • Sewage related contaminants (E. coli, faecal coliforms) in borehole in proximity to sewage package plant.				
Surface water	• Earth works and vegetation clearing during construction, operation and decommissioning	• Assess area for erosion and spillages			G and E Global Mining, ECO, Contractors, water quality specialist	Weekly or daily during high rainfall periods until construction and decommissioning are complete
Surface water	• Use and storage of chemicals, including refueling areas	• Maintain storage areas; • Clean and dispose of legislation.			G and E Global Mining, ECO, Contractors, water quality specialist	Daily inspection to ensure no leaks are visible; Clean-up in the event of spills.
Surface water	• Operations	• Monitor and maintain stormwater containment systems;			G and E Global Mining, ECO, Contractors, water quality specialist	Weekly or daily inspection during high rainfall periods;

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
Terrestrial Ecology	• Establishment and spread of alien invasive species.	• An alien invasive species (AIS) control programme must be developed and implemented during all phases of the proposed project; • AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site; • It is recommended that the programme include: o A combined approach using both chemical and mechanical control methods; o Periodic follow-up treatments, informed by regular monitoring; and o Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas.			G and E Global Mining, ECO, Contractors, Ecologist	Bi-annually
Health and Safety	• 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, Contractor	Routine inspection and Quarterly reporting
Waste Management	• 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 monthly
Heritage resources	• Destruction of graves and cultural resources	• No activities shall impact graves and sites of heritage or cultural importance without a permit from SAHRA			ECO, Site Manager Heritage Specialist- when required	Monthly monitoring and reporting

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
Paleontology	• Destruction and sealing of fossils	• No activities shall impact fossils without a permit from SAHRA			ECO, Site Manager Paleontologist, when required	Monthly monitoring and reporting
Stormwater Management	• 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 monthly Annual GN704 audits

38 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 DMPR.

39 Environmental Awareness Plan

39.1 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 39-1. The purpose of this schedule is to ensure that onsite employees are not only trained, but that the principles are continuously re-enforced.

Table 39-1: 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.

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

As prescribed in Table 39-1, 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 will potentially affected landowners.

  In the even 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.

39.3 Specific information required by the Competent Authority

No specific information has been requested by the Competent Authority to date.

40 UNDERTAKING

The EAP herewith confirms

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

b) the inclusion of comments and inputs from I&APs 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 Consulting Services (Pty) Ltd

Name of company:

13 August 2026

Date:

-END-

Appendices

Appendix 1: The Qualifications of the Environmental Assessment Practitioner



Environmental Assessment Practitioners Association of South Africa

Registration No. 2020/1554

Herewith certifies that

NDIVHUDZANNYI MOFOKENG

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1)
of the Section 24H Registration Authority Regulations
(Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the
National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar

SAQA

Appendix 2: Curriculum Vitae of the EAP

NDIVHUDZANNYI MOFOKENG 1

Address: Herlear, Kimberley, Northern Cape Province, South Africa
Email: atshidzaho@gmail.com
Mobile: +27 (0) 82 760 8420
Citizen : Republic of South Africa

PERSONAL DETAILS

Names	: Ndivhudzannyi
Surname	: Mofokeng
Nationality :	: South African
Gender :	: Female
Marital Status :	: Married
Drivers License	: Code B
Home Language :	: Tshivenda
Other Languages	: English and Setswana

CAREER SUMMARY

Ndivhudzannyi graduated with an Honours degree in Earth Science majoring in Mining and Environmental Geology. She is a self-motivated and hardworking Geologist with 8 years' experience in the environmental, mining exploration, open cast work and consulting in the mining industry. She has proven leadership skills from supervising exploration rigs (Reverse Circulation and Percussion Drilling). Proven field experience in exploration i.e. mapping, borehole logging, borehole sampling, sample preparation for laboratory analysis, supervisory duties in the field. Ndivhudza also has experience in writing geological reports including Prospecting Work Programmes and Environmental Management Plans, handling DMR documents in general.

KEY SKILLS

- Data management
- QAQC analysis
- Geological modeling
- Rock core logging
- Rock drilling supervision
- Geological surface mapping
- Surface mining supervision
- Geological and resource modelling in 3D
- Technical report writing

KEY PROFFESSIONAL ASSOCIATIONS AND QUALIFICATIONS

GEOLOGICAL SOCIETY OF SOUTH AFRICA (GSSA)

2009 BACHELOR OF SCIENCE IN MINING AND ENVIRONMENTAL GEOLOGY (BESMEG), GEOLOGY (HONOURS)
University of Venda, South Africa

Ndivhudzannyi Mofokeng 2

- Have the financial and technical ability to run a project
- Section 11 and 102 Applications, Closure Applications
- Annual Reporting-Performance Assessment Report

February 2013 – May 2014 Consultant Geologist – Centre for Advanced Satellite and Mineral Exploration- Geoscientific Mineral Resources Consulting

In this role I reported to the CEO

Responsibilities:

- I was appointed as a geologist to compile Geological Packages for Africa and Asia (Liberia, Angola, Mali, Nigeria, Portugal, South Africa, Zambia, Republic of the Union of Myanmar and Mongolia).
- Interpretation based on Quickbird 600mm Resolution Archive Satellite Image Data, Digital Elevation Data, Satellite Image Data ASTER, Satellite Image Data LANDSAT LCDM, Satellite Image Data Pléiades, Spectral Analysis, Synthetic Aperture Radar and Satellite Image Data RapidEye).
- Provide geological information for mining
- Site visit for inspection in the mine
- Mining Work Programme
- Financial and technical ability
- Environmental management Plan/Programme
- Scoping Report
- Social and Labour Plan
- Prospecting work programme
- Report on Results of Consultation
- Section 11 and 102 Application
- Closure application
- Annual Reporting-Performance Assessment Report
- Supervising and training of field staff on iron ore and gold projects

EMPLOYMENT HISTORY

May 2014 – to date **Environmental Assessment Practitioner –**
Ndi Geological Consulting Services (Pty) Ltd

Responsibilities:

- Compilation of Environmental Management Plans/Programmes
- Writing of Scoping Report, Social& Labour Plan, Prospecting Work Programme. Reporting on Results of Consultation
- Undertaking Environmental Impact Assessments, Waste Management Licence and Water Use Licence Applications for various projects
- Undertaking stakeholder engagement as part of the EA and WML processes
- Undertaking Environmental Audits
- Compiling geological reports for various areas to be incorporated in the Prospecting Work Permits (PWP) and Mining Permit applications for various commodities in South Africa as required in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002)
- Producing sketch plans and geological maps to be incorporated in the PWPs for Prospecting Right, Mining Permit and MWP applications
- Writing desktop studies reports for various commodities in South Africa and other African countries
- Interpretation of sampling analytical results and review of small-scale mining projects
- Provide geological information for mining
- Conduct site visit for inspection on the mines
- Compiling Mining Work Programme

Major Projects
- Geological Desktop Study Report for Liberia, Angola, Mali, Nigeria, Portugal, South Africa, Zambia, Republic of the Union of Myanmar and Mongolia.

Achievements
- Successful Mining Right application, Mining Permit application and Prospecting Right

February 2012 – December 2012 **Geologist – Pikwane Diamonds Mining Company**

In this role I reported to the Chattered Accountant and the CEO (small scale mine).

Responsibilities:

- I was appointed as a geologist to uplift section 54 issued for Bo-Karoo Company (Douglas) in January 2012 in which it was successful. Furthermore, the company was standing due to failure of compliance with rehabilitation plan. The financial provision quantum required a guarantee of R16.5M to be paid immediately. After the negotiation with the DMR to give me 1month to show the company commitment on rehabilitation, in three weeks period when I was supervising the rehabilitation, the new financial provision quantum required drop down to R13M.
- I received complement from the 10 miners I was supervising, the work ethics, communication and motivation they received was overwhelming.
- Workers were refusing to work overtime in order to meet the DMR deadline due to some in house problems occurred previously, but with my negotiation skills, motivation, and problem solving skills we end up working on 10hrs shift Monday to Sunday. The target and deadline was met with positive results within 3 weeks.
- The management where impressed with my work but I give the guys credit for giving me the opportunity to work with them.
- Grade control, face mapping, pebbles counting and drawing of cross sections
- Capturing geological data and management of database

Ndivhudzannyi Mofokeng 3

- Provide geological information for mining
- Continuous supervision to the mining process to improve quantity and quality mined
- Status Report on the DMR documents
- Compiling prospecting work programme
- Site visit for inspection in the mine
- Field mapping
- Minor report writing and give recommendation

Major Projects
- Bo-Karoo.

Achievements
- The financial provision quantum required a guarantee of R16.5M to be paid immediately. After the negotiation with the DMR to give me 1month to show the company commitment on rehabilitation, in three weeks period when I was supervising the rehabilitation, the new financial provision quantum required drop down to R13M.

January 2010 – October 2011 Exploration Geologist- Geo-Rock International (Pty) Ltd

In this role I reported to the Administrator, Manager and the Principal Geologist

Responsibilities:
- Directly managing 2 geo-technicians, 3 fields assistant and the drilling contractors. Received complement from my seniors and client when I was overseeing Lohatlha and Doornfontein project.
- Involved in the supervision of prospecting and mining of different commodities (which includes supervision of trenching sites, RC drilling, field mapping and taking manganese and iron samples to the laboratory for further analysis.
- Compiling prospecting work programme.
- Conduct basic assessments and Environmental Management Programme.
- Produce Sketch Plans (Survey plan, combined plan, Topographic plan, Locality plan and Prospecting plan using Arc view 9 software), and locating the areas using GPS, and map-source.
- Setting Borehole layouts and give coordinates using the Arcview 9 software.
- Digitizing maps using Global Mapper 9 Application.
- Geological report writing for the client (desktop study).

Ndivhudzannyi Mofokeng 4

- Sampling.
- Grade control, face mapping, pebbles counting and drawing of cross sections.
- Capturing geological data and management of database.
- Training vocational students and geologist assistance.

Major Projects
Klipdam 157, Holpan 161, Saxendrift 20, Lanyon Vale 376/ Wouterspan, Makoenskloof/ Rieds Drift 74, Blaauw Bosch 78, and Zweetfontein 76

Achievements
Completed over 2000 RC boreholes between 2007 and 2008. Completed ±350 trenches in two months (October – November 2008).

Vacation Work

- IThemba Laboratory, Department of Geophysics December 2006 to January 2007
- Rio Tinto Mining and Exploration June 2005 – August 2006

PROFESSIONAL COURSES ATTENDED

Year	Course Attended	Course Offered By
22-23 August 2012	4th Annual Mineral Resources Compliance & Reporting Conference	Department of Mineral and Resources
June - September 2010	Microsoft office and excel 2007 Training	Georock International
2008	Mentoring course	Macvlei Company
24 - 24 August 2007	Annual diamond and kimberlite symposium Kimberley, South Africa	Geological Society of South Africa Directorate of Professional Programmes' (DPP)

- Drawing of cross-sections using Rockworks, Turbo-Cad and Turbo-sketch.
- Database management
- Mentoring Geo-technicians

Major Projects
- Lohatlha and Doornfontein project

Achievements
- When I was overseeing the Drilling at Lohatlha we Complete 350 boreholes of reverse circulation in three months period just before the client prospecting permit expires within 2 days.

January 2010 – October 2011 **Exploration Geologist- Rockwell diamonds Mining Company**

In this role I reported to the Mineral Resource Manager

Responsibilities:

- Directly managing 2 Exploration drilling machines and attending to complaints from contractors on site.
- Supervise exploration drilling (Reverse Circulation) and Percussion drilling.
- Pit and trench logging.
- Phase mapping.
- Samples logging.
- Provide geological information for mining and pit planning.
- Continuous supervision to the mining process to improve quantity and quality of gravel mined.

TECHNICAL SKILLS AND PERSONAL ATTRIBUTES

COMPUTING

- Microsoft Office (Word, Excel, PowerPoint)
- GIS (arc view) software
- Google earth
- Map Source
- Global mapper
- Topo and Rec map
- Turbo-sketch
- Turbo-Cad
- Corel Draw
- Rockwork 2006
- Base Map

Ndivhudzannyi Mofokeng 5

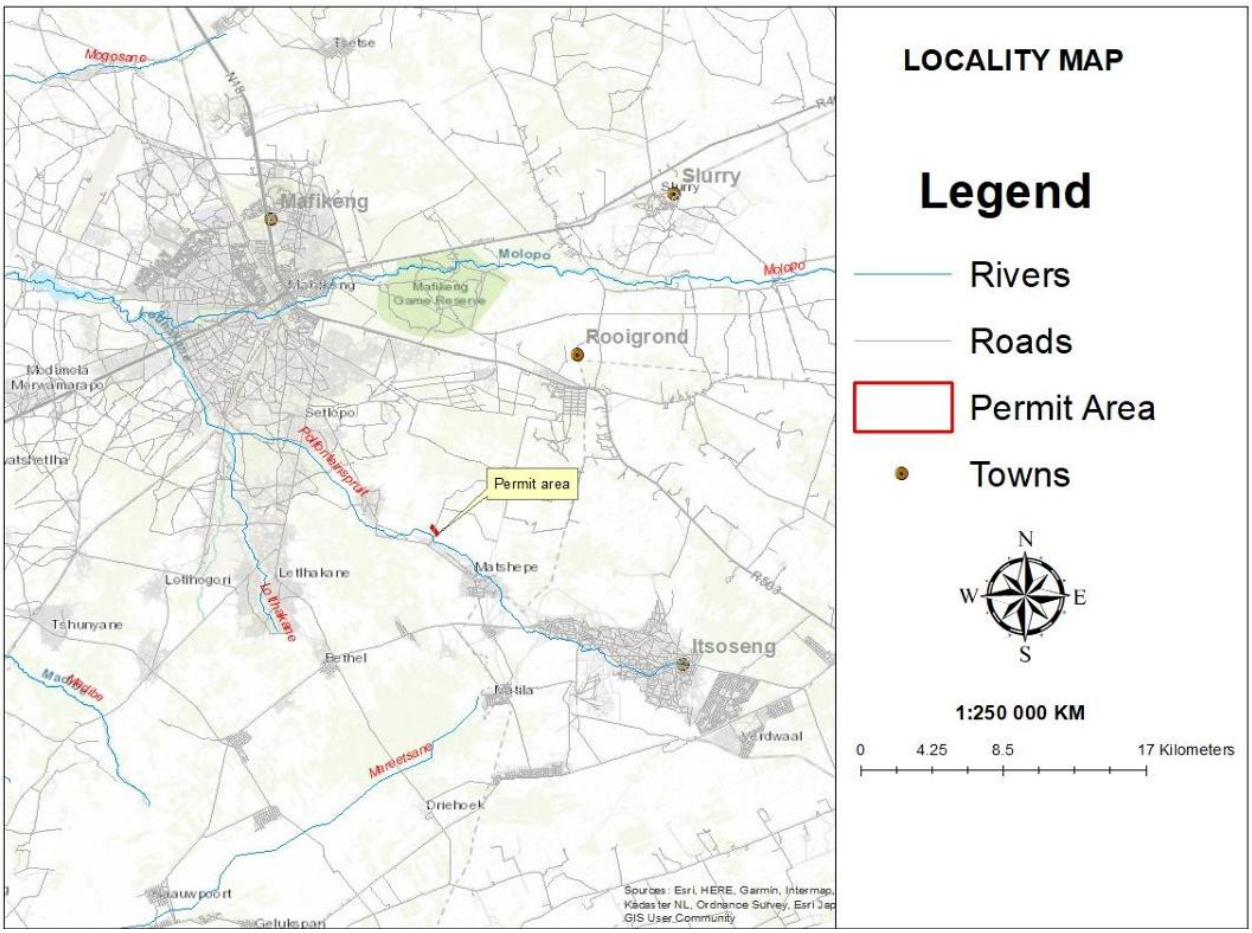
KEY PERSONAL ATTRIBUTES

- Adaptable
  - Able to handle change and adapt to new situations.
  - Flexibility and positive attitude to change
- Communication
  - Able to communicate orally, in writing, or via electronic means
  - Excellent listener and communicator, effectively conveys information verbally and in writing.
  - Able to interact with other people at all levels of the organization.
- Confident
  - Effective judgment and decision making skills.
  - Able to see opportunities and to set and achieve goals.
  - Able to work on own initiative, with minimum supervision.
- Customer Service
  - Service oriented attitude and great customer facing skills
  - Excellent internal and external negotiation skills with ability to engage and influence clients.
  - Experience in recognition of customer needs and how to deliver an effective customer experience.
- Enthusiasm
  - Willing to learn and adapt to changing environments
  - Enthusiastic with the ability to motivate self and others in a pressurized environment.
- Leadership
  - An inspiring leader with the ability to think laterally, provide solutions and exercise independent judgment in the resolution of problems.
  - Proven leadership skills involving managing, developing and motivating teams to achieve their objectives.
- Motivated
  - Focused, self motivated and target driven; determined to succeed.
  - Self-motivated
  - High personal drive

REFEREES

Available on request

Appendix 3: Locality and Layout Map



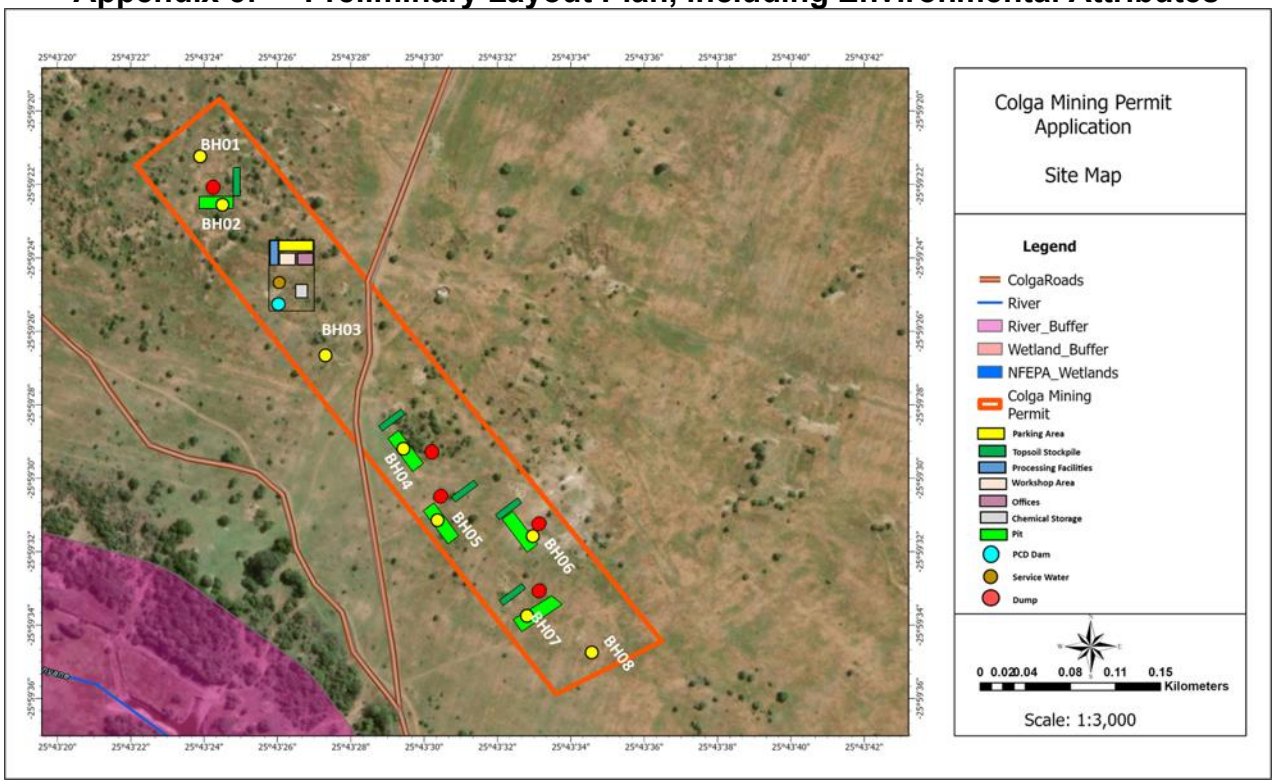
Locality Map

Appendix 4: Public Engagement Documentation

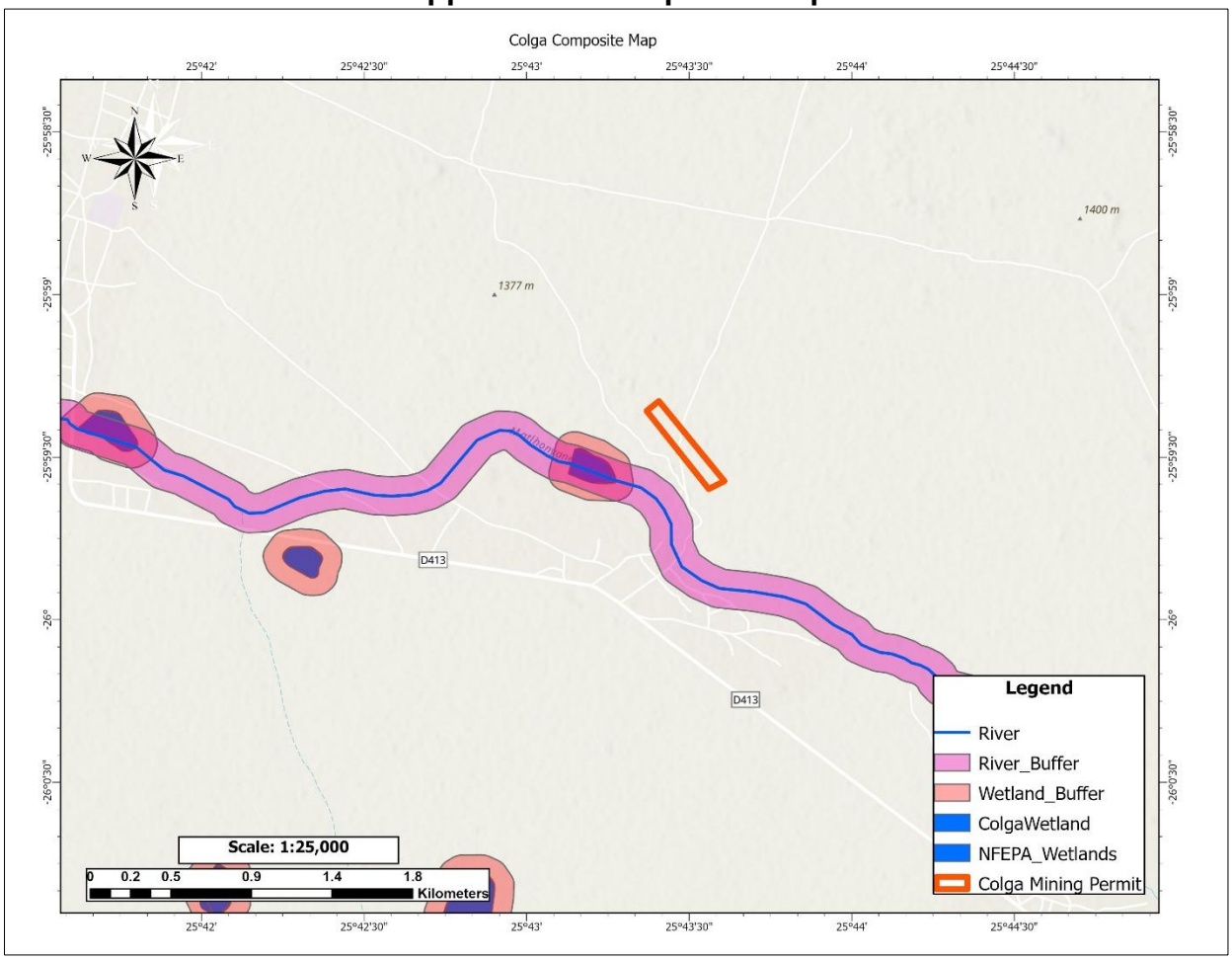


Site Notice Pictures

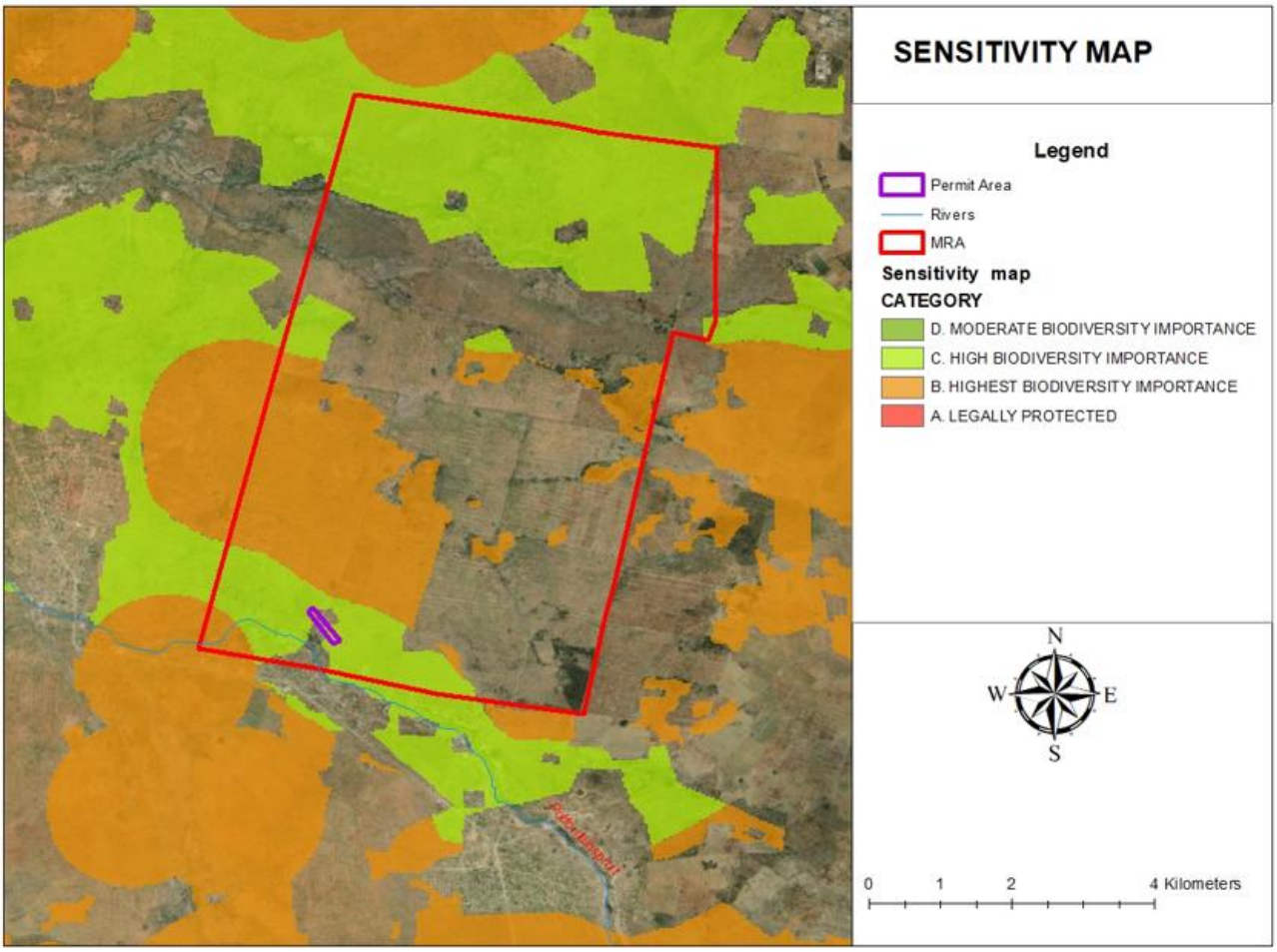
Appendix 5: Preliminary Layout Plan, including Environmental Attributes



Appendix 6: Composite Map



Permit specific composite map



Generalised composite map

Appendix 7: Specialist studies

SOIL SUITABILITY ASSESSMENT FOR FOR DIAMOND, DIAMOND (ALLUVIAL), DIAMOND (KIMBERLITE), AGGREGATE, LEAD, MANGANESE ORE, LIMESTONE, SAND AND GOLD ORE PROJECT PORTIONS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 AND THE REMAINING EXTENT OF THE FARM COLGA 132 JQ, NORTHWEST PROVINCE, SOUTH AFRICA

Prepared By

Nyamoki Consulting Pty Ltd

info@nyamokiconsulting.co.za

Prepared for

G and E Global (Pty) Ltd

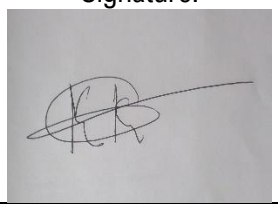
Date: August 2026

DECLARATION OF INDEPENDENCE

I, K Khiba, declare that I:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the study and compiling this report, I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this study was done objectively. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being a member of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings, and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken concerning the application by a competent authority to such a relevant authority and the applicant.
- I have expertise and experience in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, regulations and all other applicable legislation.
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

APPROVED

Date of Report	04/08/ 2026
Date	Prepared by: Mr Khiba Katleho
04/08/2026	Signature: 

GLOSSARY OF TERMS

Base status:	A qualitative expression of base saturation. See base saturation percentage
Base Saturation:	Base saturation refers to the proportion of the cation exchange sites in the soil that are occupied by the various cations (hydrogen, calcium, magnesium, potassium). The surfaces of soil minerals and organic matter have negative charges that attract and hold the positively charged cations. Cations with one positive charge (hydrogen, potassium, sodium) will occupy one negatively charged site. Cations with two positive charges (calcium, and magnesium) will occupy two sites.
Buffer capacity:	The ability of soil to resist an induced change in pH.
Calcareous:	Contains calcium carbonate or magnesium carbonate.
Catena:	A sequence of soils of similar age, derived from similar parent material, and occurring under similar macroclimatic conditions, but having different characteristics due to variation in relief and drainage.
Cutan:	Cutans occur on the surfaces of peds or individual particles (sand grains, stones). They consist of material which is usually finer than, and that has an organisation different to the material that makes up the surface on which they occur. They originate through deposition, diffusion or stress. Synonymous with clay skin, clay film, argillan.
Erosion:	The group of processes whereby soil or rock material is loosened or dissolved and removed from any part of the earth's surface.
Fertilizer:	An organic or inorganic material, natural or synthetic, which can supply one or more of the nutrient elements essential for the growth and reproduction of plants.
Fine sand:	(1) A soil separate consisting of particles 0, 25-0,1mm in diameter. (2) A soil texture class (see the texture) with fine sand plus very fine sand (i.e. 0, 25-0,05mm in diameter) more than 60% of the sand fraction.
Gleying:	The process whereby the iron in soils and sediments is bacterially reduced under anaerobic conditions and concentrated in a restricted horizon within the soil profile. Gleying usually occurs where there is a high water table or where an iron pan forms low down in the soil profile and prevent run-off, with the result that the upper horizons remain wet. Gleyed soils are typically green, blue, or grey.
Land capability:	The ability of the land to meet the needs of one or more uses under defined conditions of management.
Land type:	(1) A class of land with specified characteristics. (2) In South Africa it has been used as a map unit denoting land, map-able at 1:250000 scale, over which there is a marked uniformity of climate, terrain form and soil pattern.
Land use:	The use to which land is put.
Orthic A horizon	A surface horizon that does not qualify as organic, humic, vertic or melanic topsoil although it may have been darkened by organic matter. Overburden:

	Material that overlies another material difference in specified respect, but mainly referred to in this document as materials overlying weathered rock.
Ped:	Individual natural soil aggregate (e.g. block, prism) as contrasted with a clod produced by artificial disturbance.
Pedocutanic, diagnostic B-horizon:	The concept embraces B-horizons that have become enriched in clay, presumably by illuviation (an important pedogenic process which involves downward movement of fine materials by, and deposition from, water to give rise to cutanic character) and that have developed moderate or strong blocky structure. In the case of a red pedocutanic B-horizon, the transition to the overlying A-horizon is clear or abrupt.
Pedology:	The branch of soil science treats soils as natural phenomena, including their morphological, physical, chemical, mineralogical and biological properties, their genesis, their classification and their geographical distribution.
Saline, soil:	Soils that have an electrical conductivity of the saturation soil extract of more than 400 mS/m at 25°C.
Slicken sides:	In soils, these are polished or grooved surfaces within the soil resulting from part of the soil mass sliding against adjacent material along a plane which defines the extent of the slickensides. They occur in clayey materials with high smectite content.
Swelling clay:	Clay minerals such as the smectites that exhibit interlayer swelling when wetted, or clayey soils which, on account of the presence of swelling clay minerals, swell when wetted and shrink with cracking when dried. The latter is also known as heaving soils.
Texture soil:	The relative proportions of the various size separate in the soil as described by the classes of soil texture shown in the soil texture chart (see diagram on next page). The pure sand, sand, loamy sand, sandy loam and sandy clay loam classes are further subdivided (see diagram) according to the relative percentages of the coarse, medium and fine sand sub separates.
Vertic, diagnostic A-horizon:	A-horizons that have both, high clay content and a predominance of smectitic clay minerals possess the capacity to shrink and swell markedly in response to moisture changes. Such expansive materials have a characteristic appearance: structure is iv strongly developed, ped faces are shiny, and consistency is highly plastic when moist and sticky when wet.

ACRONYMS

ARC-ISCW	**Agricultural Research Council Institute for Soil Climate and Water**
ET	Evapotranspiration
GIS	Geographic Information Systems
GPS	Global positioning system
IRP	Integrated Resource Plan
M	Meter
NEMA	National Environmental Management Act
SACNASP	South African Council For Natural Scientific Professions
TDP	Transmission Development Plan

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1. INTRODUCTION

The conservation of South Africa's limited soil resources is essential for ensuring environmental sustainability and supporting human livelihoods. Historically, inappropriate land use practices, often resulting from inadequate soil classification and a limited understanding of land capability, have contributed to severe soil erosion, land degradation, and the disruption of natural ecosystems. To accurately evaluate soil characteristics, a comprehensive soil survey using established and recognised methodologies is required. Such surveys provide detailed information on the distribution, properties, and extent of soil resources within a defined area. The resulting data enable the assessment of land capability and agricultural potential, facilitating informed land-use planning and sustainable resource management. Furthermore, soil mapping is critical for identifying soil types, soil depth, land capability classes, and stripping ratios. These findings form the basis for practical recommendations aimed at protecting soil resources, optimising agricultural productivity, and ensuring that land is used according to its capability while maintaining ecosystem integrity.

2. Project Description

2.1. Mineral Processing Flow

a. Sizing:

Raw gravel will be fed into a vibrating grizzly. Material greater than 40 mm, regarded as waste material, will be discarded immediately to optimise fuel efficiency.

b. Liberation:

Material smaller than 40 mm will be fed into a rotary scrubber. This process is critical to clean and liberate diamonds by removing calcium and clay coatings that may hinder recovery.

c. Pan Separation Process:

The washed gravel will be fed into a 14-foot diamond pan. A central shaft rotates triangular tines through a slurry of water and fine sand. Lighter waste material, such as quartz and sand is discharged via a central weir while heavier minerals, including diamonds and garnet indicators, migrate to the outer wall.

d. Tailings Management:

Tailings and waste material will be dewatered using dewatering screens before being backfilled into mined-out areas to facilitate concurrent rehabilitation.

2.1. Proposed Mining Infrastructure

The proposed mining infrastructure may include:

- A 1-hectare mineral processing plant at each mining section, including a slimes dam;
- A central processing plant;
- Slime dams;
- Water abstraction infrastructure, including transfer pipelines from borehole areas;
- Ablution facilities;
- Septic conservancy tanks at each mining section for wastewater collection and storage;
- Parking areas;
- Water storage tanks and dams;
- Diesel storage tanks and fuel trailers;
- Generators and associated power cables;
- Workshop facilities;
- Laydown areas;
- Topsoil stockpiles;
- Tailings and waste dumps;
- Office (mobiles);
- Kitchen facilities (mobiles); and
- Labour quarters (mobiles).

3. Terms of References

This report presents the findings of a soil suitability investigation conducted to assess the potential for irrigation development on the proposed site. The study was undertaken in accordance with the requirements of the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform, as required for the issuing of a Plough Certificate. The objective of the investigation is to evaluate the physical and chemical properties of the soils, determine their irrigation suitability, and provide recommendations for sustainable agricultural use.

4. SITE DESCRIPTION

4.1. Location

The project area is located approximately 22 km southeast of Mahikeng, Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ, in the North West Province of South Africa. The project site is located approximately 22 km southeast of Mafikeng on Route R503, which joins an unnamed gravel road approximately 20 km from the CBD. The site is

located approximately 800 m north of this road intersection. Mafikeng is approximately 281 km from Johannesburg city centre and can be reached through a national road. Communication is available through four cellular telephone networks.

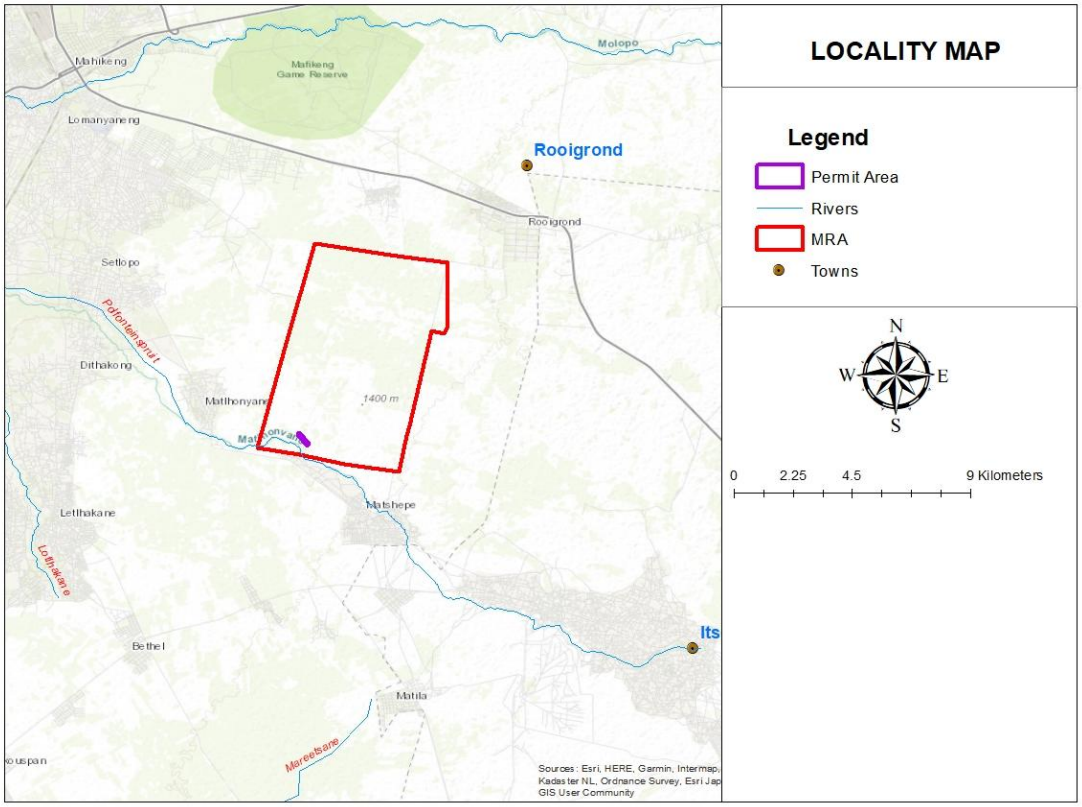


Figure 1: Locality Map (Topography).

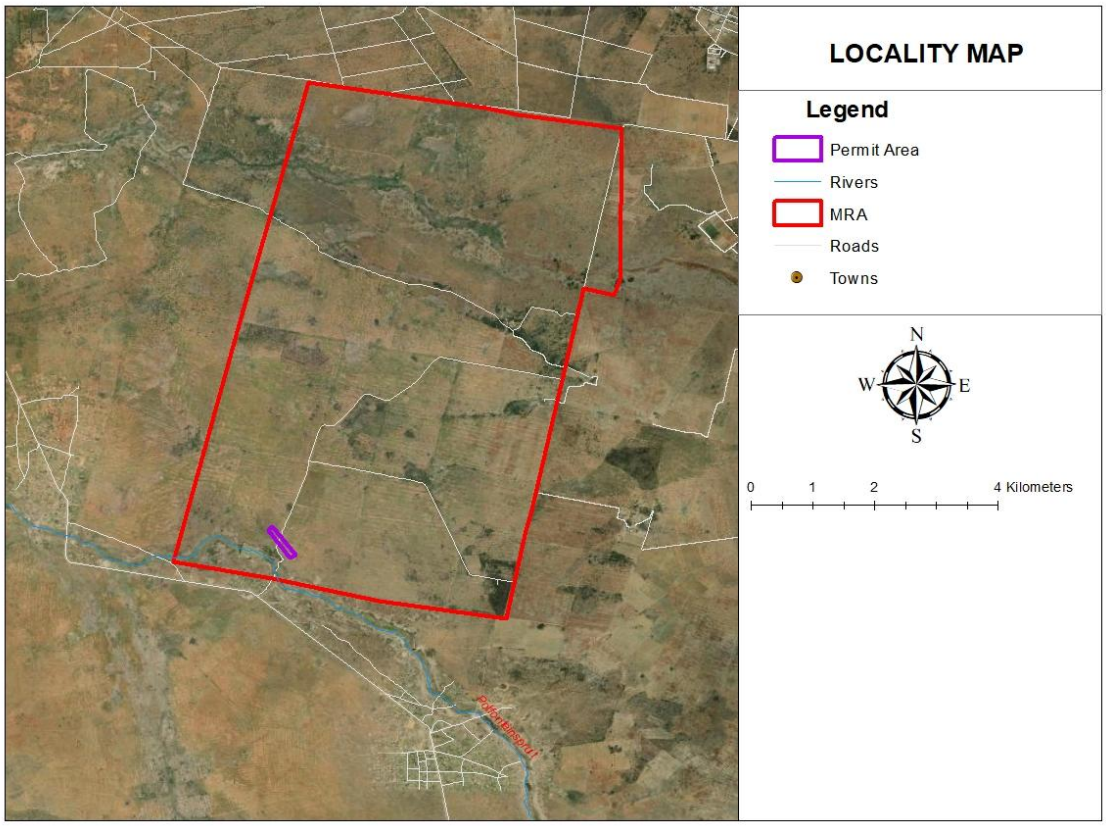


Figure 2: Locality Map (Google view).

4.2. Climate

The project area falls within the climatic conditions of the Mahikeng (formerly Mafikeng/Mmabatho) region, which is characterized by a semi-arid climate with warm, wet summers and cool, dry winters. The area receives an average annual rainfall of approximately 442 mm, with the majority of precipitation occurring during the summer months between October and March. January is typically the wettest month, receiving an average rainfall of 89 mm, while June is the driest month, with virtually no recorded rainfall.

Average daytime temperatures range from approximately 19°C in June to 31.8°C in January. Winter nights are generally cold, with minimum temperatures averaging around 0°C in July, while summers are characterized by hot daytime conditions. These climatic conditions influence seasonal surface water availability, groundwater recharge, vegetation growth, and agricultural productivity within the project area.

4.3. Topography

The project area is characterized by a gently undulating to nearly flat topography, with ground elevations ranging from approximately 1,370 m to 1,372 m above mean sea level (amsl). The minimal relief promotes gradual surface runoff and limited topographic variation across the site.

The natural vegetation forms part of the Savanna Biome, which is the dominant vegetation type in the Mahikeng region of the North West Province. Vegetation consists primarily of open bushveld interspersed with indigenous grasses and scattered woody shrubs, adapted to the region's semi-arid climatic conditions.

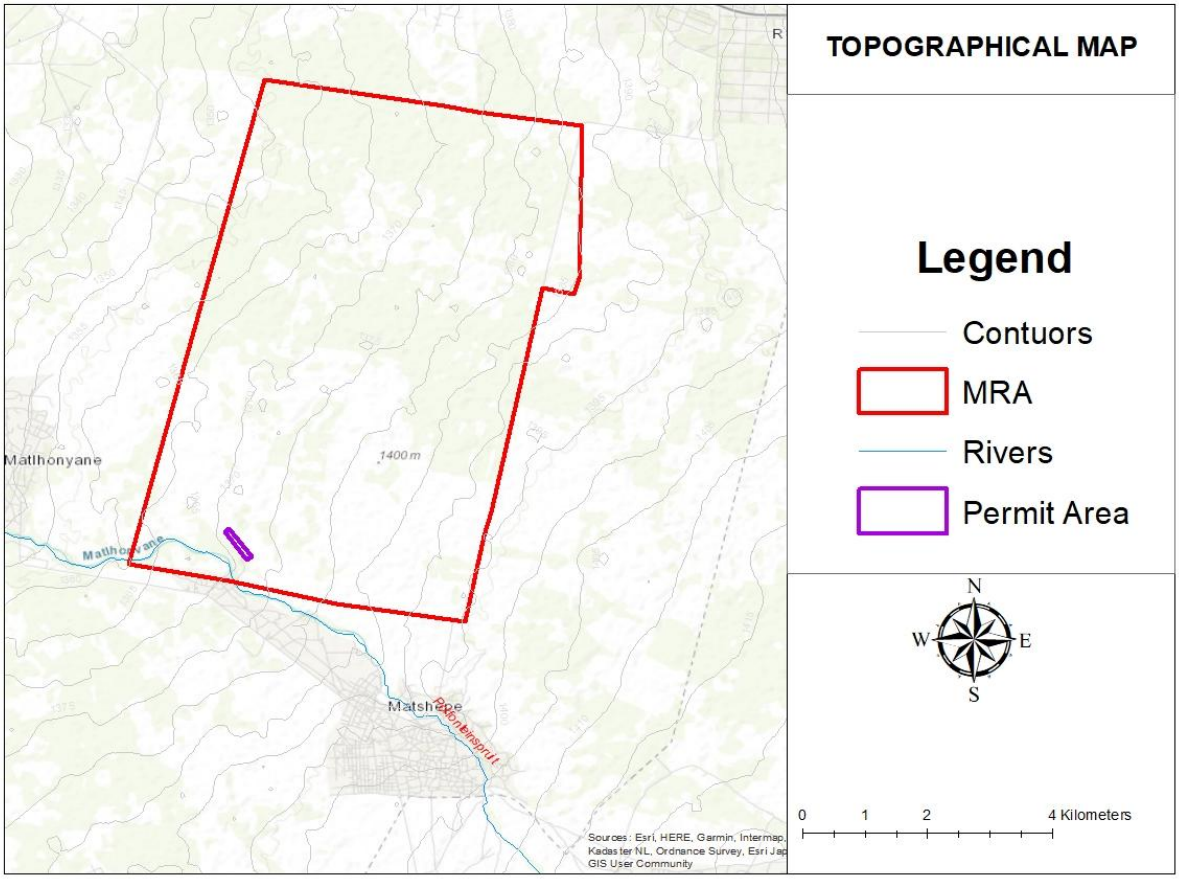


Figure 3: Topographical map.

4.4. Geology

South Africa possesses one of the world's most diverse geological landscapes, preserving a geological record that spans approximately 4 billion years of Earth history (SACS, 1980). The country's geology comprises a wide range of igneous, metamorphic, and sedimentary rock formations that reflect multiple episodes of tectonic activity, sedimentation, magmatism, and metamorphism.

The northeastern part of South Africa is underlain predominantly by the Archaean Kaapvaal Craton, one of the oldest and most stable continental crustal blocks on Earth. This craton consists mainly of granitic and granitoid rocks interspersed with volcanic and sedimentary

greenstone belts, which have played a significant role in the country's mineral wealth. In contrast, much of the remainder of South Africa is covered by younger Phanerozoic sedimentary sequences, including the extensive Karoo Supergroup and other sedimentary basins that host important coal, groundwater, and industrial mineral resources.

4.5. Local Geology

The project area is situated within the western margin of the Karoo Basin, where the bedrock is predominantly underlain by flat-lying Dwyka Group sedimentary rocks of the Karoo Supergroup. These rocks are extensively developed within the Harts River region of the North West Province and extend towards the Molopo River and the Polfonteinspruit drainage system, which traverses the broader project area.

The Dwyka Group is composed mainly of matrix-supported diamictite (tillite) with interbedded siltstone and mudstone. The diamictite contains a heterogeneous assemblage of locally derived and transported pebbles, cobbles, and boulders embedded within a fine-grained, rock-flour matrix, reflecting deposition under Late Carboniferous to Early Permian glacial conditions. Isolated dropstones and glaciogenic sedimentary structures are common within the sequence.

The Dwyka Group unconformably overlies volcanic rocks of the Ventersdorp Supergroup, while, in some areas, sedimentary rocks of the Griqualand West Supergroup, including shale, quartzite, and dolomite, occur beneath the Karoo succession. These older basement rocks are locally disrupted by regional faulting and are intruded by dolerite dykes and sills of Jurassic age, although these intrusive bodies are generally poorly exposed due to extensive soil cover and weathering.

The structural framework, including faults, fractures, and dolerite intrusions, influences local groundwater occurrence, weathering patterns, and the distribution of alluvial sediments along present-day drainage channels. These geological features are therefore important considerations for alluvial diamond exploration and the interpretation of subsurface conditions within the project area.

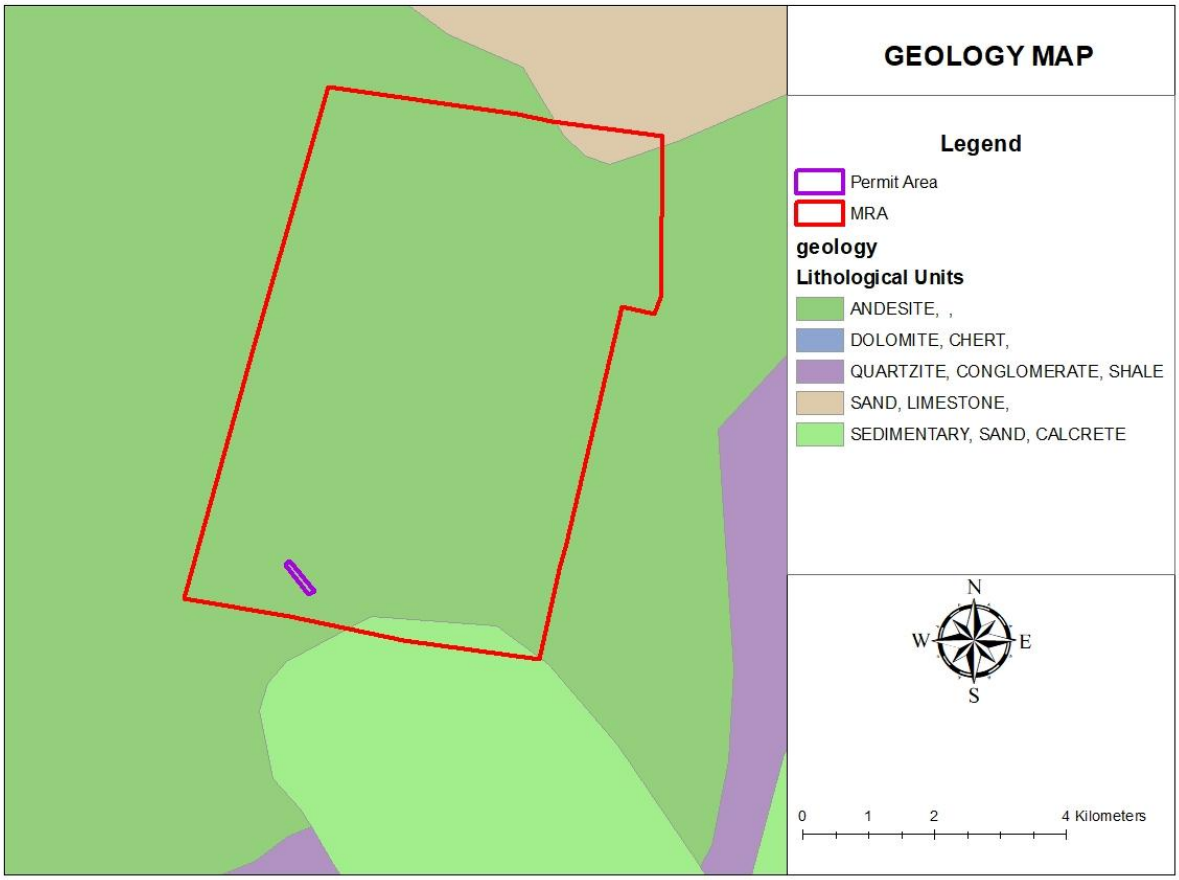


Figure 4: Geological Map.

4.6. Soil Classification

The soil class map indicates that the mining permit area is dominated by Lithosols (shallow soils on hard or weathering rock), which occupy the majority of the project area. These soils are generally shallow, stony, and weakly developed due to the close proximity of bedrock or weathered rock to the surface. They are characterised by limited profile development, low organic matter content, and relatively low water-holding capacity. The coarse texture and shallow depth promote rapid surface runoff and restrict root penetration, making these soils of low to moderate agricultural potential. Within the project area, the Lithosols are consistent with the occurrence of Rooikoppie Gravel deposits and shallow gravelly sandy soils overlying calcrete and weathered bedrock.

A second soil class occurs as a narrow corridor along the Polfonteinspruit in the southwestern part of the project area. These soils are classified as imperfectly drained soils, often shallow and frequently associated with a plinthic horizon. Their occurrence reflects the influence of the drainage line, where seasonal water accumulation and fluctuating groundwater levels have promoted periodic saturation. The presence of plinthic material indicates restricted drainage and the potential development of hard iron-rich layers upon repeated wetting and drying cycles.

The proposed mining footprint is located predominantly within the Lithosol unit, with only a small portion extending into the imperfectly drained soils adjacent to the drainage line. Mining activities within the drainage-associated soils will require careful management to minimise soil disturbance, erosion, sediment transport, and impacts on the adjacent watercourse. Topsoil stripping should be undertaken separately for each soil unit, with stockpiles maintained for subsequent rehabilitation to preserve the limited soil resource.

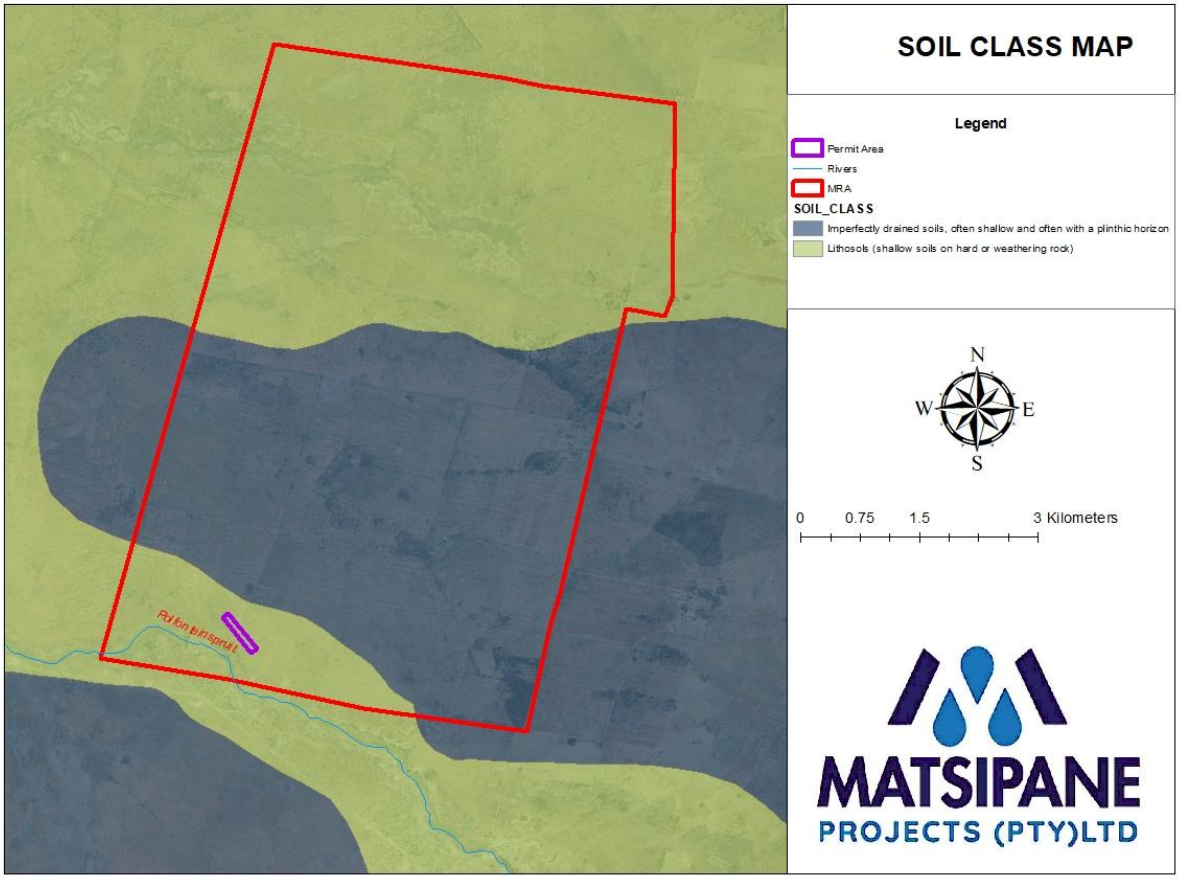


Figure 5: Soil class.

4.7. Dominant Soil Types

The dominant soil map indicates that the proposed mining permit area is underlain predominantly by Petric Calcisols (CLp), while a small area to the southwest, beyond the proposed permit area, is occupied by Haplic Arenosols (ARh).

Petric Calcisols (CLp) constitute the principal soil type across almost the entire project area. These soils are characterised by a shallow to moderately deep sandy surface horizon overlying a strongly cemented petrocalcic (calcrete) horizon. The calcrete layer forms through the accumulation and cementation of calcium carbonate under semi-arid climatic conditions and significantly restricts root penetration, water infiltration, and soil profile development. The

presence of the petrocalcic horizon corresponds with field observations of hard, massive calcrete underlying the Rooikoppie Gravel deposits. Consequently, these soils exhibit low to moderate water-holding capacity, limited natural fertility, and relatively low agricultural potential. However, the shallow soil cover and resistant calcrete provide favourable conditions for the preservation of residual and colluvial gravel deposits that are prospective for alluvial diamond mineralisation.

The coarse-textured surface horizons of the Petric Calcisols are consistent with the observed reddish-brown gravelly sands containing abundant quartz, quartzite, chert, and banded iron formation (BIF) clasts. Soil depth is generally limited to approximately 0.5–1.0 m before encountering gravel or calcrete, confirming the shallow nature of the soil profile across most of the mining area.

A relatively small area south-west of the project area is mapped as Haplic Arenosols (ARh). These soils are deep, well-drained, sandy soils with weak horizon development and low clay content. They typically possess high infiltration rates but poor water and nutrient retention due to their coarse texture. As shown on the map, this soil unit lies largely outside the proposed mining permit area and therefore is unlikely to be significantly affected by the proposed mining activities.

The dominant soil distribution indicates that the project area is almost entirely underlain by Petric Calcisols, reflecting the semi-arid environmental conditions and the widespread occurrence of calcrete within the region. These findings are consistent with the field observations of shallow gravelly soils overlying Rooikoppie and colluvial gravel deposits. From a mining perspective, the thin soil resource should be stripped separately from the underlying gravel, stockpiled appropriately, and conserved for use during progressive rehabilitation and post-mining site restoration.

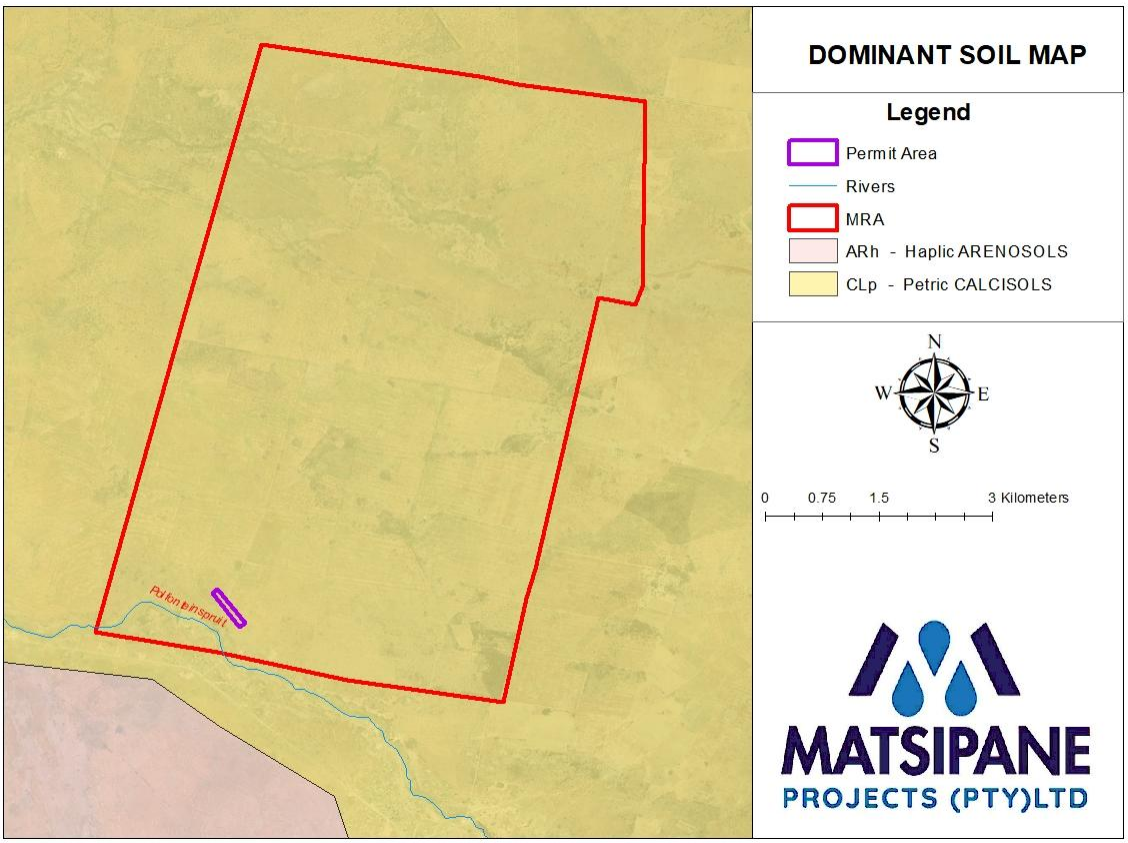


Figure 6: Dominant soil.

5. METHODOLOGY

The investigation was conducted in accordance with Annexure A_1 requirements and included:

5.1 Field Investigation

- Auger drilling to depths of up to 3 m or restrictive layer
- Soil profile pits excavated and described
- Observation density aligned with 1 point per hectare

5.2. Soil Classification

- Conducted according to:
  - *Soil Classification: A Taxonomic System for South Africa (Blue Book)*
- Identification included:
  - Master horizons
  - Diagnostic horizons
  - Soil forms

5.3. Laboratory Analysis

5.3.1. Physical Analysis

- Terrain unit and slope
- Stoniness
- Infiltration rate
- Water retention capacity
- Drainage potential
- Compaction risk
- Particle size distribution

5.3.2. Chemical Analysis

- pH (KCl)
- Exchangeable cations (Ca, Mg, Na, K)
- Phosphorus (Bray I)
- CEC and base saturation

6. Soil Profile Description

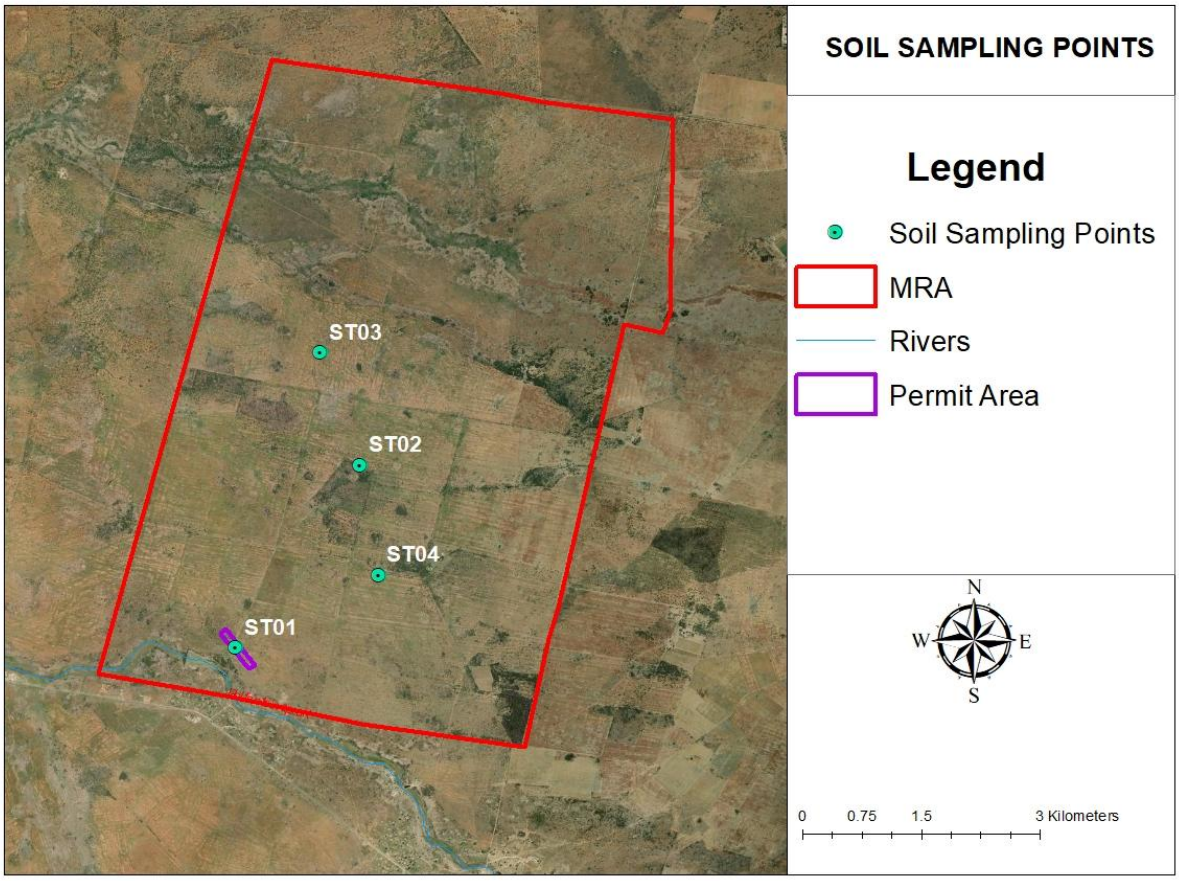


Figure 7: Soil sampling.

6.1. Sample ST01



Figure 8: ST 01

Category	Parameter	Description
Horizon A (Topsoil)	Depth	0–0.20 m (estimated)
	Colour	Dark brown to very dark brown (moist); reddish-brown when dry
	Texture	Sandy loam to loamy sand
	Structure	Moderate fine to medium granular structure
	Consistence	Friable, slightly hard when dry
	Roots	Numerous fine and medium grass roots throughout the horizon
	Stoniness	Very low; occasional small gravel
	Boundary	Clear, smooth to slightly wavy boundary with underlying horizon
Horizon B (Pedogenic B)	Depth	0.20–0.45 m (estimated)
	Colour	Brown to yellowish-brown
	Texture	Sandy clay loam to clay loam
	Structure	Weak to moderate subangular blocky
	Consistence	Firm when moist; hard when dry
	Roots	Few fine roots extending from the topsoil
	Pedological Features	Slight clay accumulation; transitional weathering with weak ped development
	Boundary	Clear to abrupt, irregular boundary with C horizon
Horizon C (Weathered/Transitional)	Depth	0.45–1.80 m+ (estimated)
	Colour	Light grey to pale cream with whitish weathered material
	Texture	Gravelly sandy material with abundant weathered rock fragments
	Structure	Massive to weakly structured
	Consistence	Very firm to hard; locally friable where highly weathered
	Coarse Fragments	Abundant angular to subangular gravel and stones (>35%)
	Pedological Features	Strong weathering of parent material; minimal pedogenic development; evidence of saprolitic decomposition
	Boundary	Diffuse boundary into underlying saprolite
Underlying Material (Saprolite)	Depth	>1.80 m (not fully exposed)
	Description	Highly weathered, pale grey to white saprolitic parent material with residual rock fabric locally preserved; excavation reached weathered bedrock.
	Limitation	Hard material restricts root penetration, excavation, and water storage capacity.
Diagnostic Horizons		Orthic A Horizon overlying a weakly developed Pedogenic B Horizon, grading into a Saprolitic C Horizon.
Soil Classification	Probable Form	Glenrosa Form (provisional)
	Justification	Thin Orthic A horizon overlying shallow pedogenic material and weathered saprolite with limited soil development. The profile appears relatively shallow over weathered rock. Confirmation requires laboratory analyses and full field classification according to the South African Soil Classification System.
Land Use Interpretation	Strengths	Well-drained profile; generally suitable for grazing; moderate engineering foundation conditions; low risk of prolonged waterlogging.

	Limitations	Shallow effective rooting depth; abundant weathered rock fragments; limited moisture-holding capacity; low fertility expected; excavation difficulty increases with depth.
Irrigation Suitability	Suitability Class	Moderately suitable (S2) to Marginally suitable (S3) (provisional)
	Key Constraints	Shallow soil depth, coarse fragment content, limited available water capacity, potential low nutrient reserves, and restricted root development due to weathered saprolite.

The ST01 profile is characterized by a thin, dark organic-rich topsoil overlying a weakly developed brown subsoil, which grades rapidly into a thick, pale-grey to white saprolitic weathered parent material containing abundant coarse fragments. The absence of strong clay illuviation, mottling, or carbonate accumulation suggests a well-drained upland landscape developed on highly weathered bedrock. The exposed saprolite indicates limited pedogenic development and relatively shallow effective soil depth, making the site more suitable for extensive grazing or low-intensity agriculture than for deep-rooted irrigated crops. From a mining perspective, the shallow soil mantle implies that topsoil stripping and stockpiling should be straightforward, while the underlying weathered saprolite may require more intensive excavation but is unlikely to present significant groundwater seepage problems under normal conditions.

6.2. Sample ST02



Figure 9: ST02.

Category	Parameter	Description
Horizon A (Topsoil)	Depth	0–0.15 m (estimated)
	Colour	Dark brown (7.5YR 3/2–3/3, moist)
	Texture	Sandy loam to loam
	Structure	Moderate fine to medium granular
	Consistence	Friable; soft when moist, slightly hard when dry
	Roots	Numerous fine grass roots throughout the horizon
	Stoniness	None to very few fine gravel fragments
	Boundary	Clear, smooth boundary with Horizon B
Horizon B (Pedogenic B)	Depth	0.15–0.70 m (estimated)
	Colour	Strong brown to reddish-brown (7.5YR 4/4–5/6)
	Texture	Sandy clay loam to clay loam
	Structure	Moderate medium subangular blocky becoming weak blocky with depth
	Consistence	Firm when moist; hard when dry
	Roots	Common fine roots in upper portion, decreasing rapidly with depth
	Pedological Features	Moderate clay accumulation (cutan development inferred); good ped development; no visible mottling or carbonate accumulation
	Boundary	Gradual, irregular boundary into weathered material
Horizon C (Weathered/Transitional)	Depth	0.70–1.00 m (estimated)
	Colour	Yellowish-brown to pale brown with light grey weathered zones
	Texture	Gravelly sandy clay loam
	Structure	Weakly developed to massive
	Consistence	Firm to very firm
	Coarse Fragments	Common weathered gravel and partially decomposed rock fragments (15–30%)
	Pedological Features	Weathering of parent material evident; decreasing pedogenic development; transition to saprolite
	Boundary	Diffuse boundary with underlying saprolite
Underlying Material (Saprolite)	Depth	>1.00 m
	Description	Highly weathered saprolitic parent material with pale grey, cream and brown mottled weathered rock. Original rock fabric locally preserved with abundant decomposed rock fragments.
	Limitation	Weathered rock limits rooting depth, reduces available water storage, and increases excavation resistance.
Diagnostic Horizons		Orthic A Horizon overlying a well-developed Pedogenic B Horizon grading into a Saprolitic C Horizon.
Soil Classification	Probable Form	Hutton Form (provisional)
	Justification	The profile exhibits a relatively deep, well-developed red-brown apedal to weakly structured B horizon with no evidence of prolonged wetness, overlying weathered saprolite. The absence of mottling and the considerable profile depth are characteristic of Hutton soils. Final classification requires field texture determination and laboratory confirmation according to the South African Soil Classification System.

Land Use Interpretation	Strengths	Deep effective rooting zone (>0.7 m); well-drained profile; moderate to good water-holding capacity; suitable for dryland cropping, grazing, and rehabilitation; favourable engineering conditions in upper horizons.
	Limitations	Increasing clay content with depth may reduce permeability; weathered saprolite restricts very deep rooting; moderate erosion risk if vegetation cover is removed.
Irrigation Suitability	Suitability Class	Moderately suitable to Highly suitable (S1–S2)
	Key Constraints	Moderate clay accumulation in the B horizon, reduced permeability at depth, moderate nutrient management requirements, and weathered saprolite below approximately 1 m.

The ST02 profile represents a deep, well-drained residual soil developed over weathered bedrock. A thin, organic-rich Orthic A horizon overlies a thick reddish-brown pedogenic B horizon, indicating prolonged weathering and clay formation under stable landscape conditions. The absence of grey mottles or gleying suggests that internal drainage is good and seasonal waterlogging is unlikely. The profile grades into a weathered saprolitic horizon at approximately 0.7–1.0 m, where decomposed parent material and weathered rock fragments become increasingly abundant.

6.3. Sample ST03



Figure 10: ST03

Based on the exposed soil profile visible in Sample ST03, the profile appears to consist of a shallow topsoil overlying a thick gravelly colluvial/alluvial deposit with little evidence of a well-developed pedogenic B horizon. The descriptions below are field interpretations derived from the photograph and should be verified through detailed field logging and laboratory analyses.

Category	Parameter	Description
Horizon A (Topsoil)	Depth	0–0.10 m (estimated)
	Colour	Dark brown to brown (10YR 3/3–4/3)
	Texture	Sandy loam
	Structure	Weak fine granular
	Consistence	Friable when moist; loose when dry
	Roots	Common fine grass and shrub roots
	Stoniness	Slight; scattered fine gravel
	Boundary	Abrupt, smooth boundary with underlying material
Horizon B (Pedogenic B)	Depth	Weakly developed or absent
	Colour	Yellowish-brown to brown (10YR 5/4–6/4)
	Texture	Gravelly sandy loam
	Structure	Weak subangular blocky to single-grained
	Consistence	Slightly firm
	Roots	Few fine roots
	Pedological Features	Very limited pedogenic development; no visible clay skins or mottling
	Boundary	Gradual transition into coarse gravelly horizon
Horizon C (Weathered/Transitional)	Depth	0.15–1.50 m+ (estimated)
	Colour	Yellowish-brown to pale yellow-brown (10YR 6/4–7/4)
	Texture	Very gravelly sand to gravelly sandy loam
	Structure	Massive to single-grained
	Consistence	Loose to slightly firm
	Coarse Fragments	Very abundant rounded to sub-rounded gravel and pebbles (40–70%) with occasional cobbles
	Pedological Features	Thick colluvial/alluvial gravel deposit with little pedogenic alteration; stratification faintly visible; good internal drainage

	Boundary	Lower boundary not exposed
Underlying Material (Saprolite)	Depth	Not exposed
	Description	Parent material not visible. The gravel deposit likely overlies weathered bedrock or older alluvial sediments at greater depth.
	Limitation	Excavation depth insufficient to identify saprolite or competent bedrock.
Diagnostic Horizons		Thin Orthic A Horizon directly overlying a weakly developed gravelly C Horizon. Pedogenic B horizon is absent or poorly expressed.
Soil Classification	Probable Form	Oakleaf Form (provisional) or a young lithic/colluvial soil requiring field confirmation.
	Justification	The profile consists of a shallow Orthic A horizon overlying thick gravelly transported material with minimal horizon differentiation. The weak profile development indicates a relatively young soil formed in colluvial or alluvial deposits. Final classification requires confirmation using the South African Soil Classification System.
Land Use Interpretation	Strengths	Excellent drainage; low shrink-swell potential; easy surface runoff; suitable for grazing and infrastructure requiring free-draining foundations.
	Limitations	Very shallow topsoil; extremely high gravel content; low water-holding capacity; low natural fertility; restricted rooting depth; high susceptibility to drought stress.
Irrigation Suitability	Suitability Class	Marginally Suitable (S3) to Not Suitable (N1)
	Key Constraints	High gravel content, low available water capacity, rapid drainage, shallow fertile soil layer, and poor nutrient retention requiring frequent irrigation and fertiliser applications.

The ST03 profile is dominated by a thick gravel-rich colluvial or alluvial deposit, characterized by abundant rounded pebbles and coarse sand with only a very thin surface topsoil. There is little evidence of significant pedogenic development, indicating that the soil is relatively young and has formed through the accumulation of transported material rather than prolonged in-situ weathering. The high proportion of coarse fragments results in excellent drainage but poor water and nutrient retention, limiting agricultural productivity without intensive management.

6.4. Sample ST04



Figure 11: ST04

Based on the visible characteristics of Sample ST04, the soil profile appears to be deep, well-drained, and moderately developed, with a relatively thick brown subsoil overlying weathered parent material. The profile shows no obvious evidence of prolonged saturation or strong horizon differentiation. The descriptions below are based on field interpretation from the photograph and should be verified through detailed field descriptions and laboratory analyses.

Category	Parameter	Description
Horizon A (Topsoil)	Depth	0–0.15 m (estimated)
	Colour	Dark brown to brown (10YR 3/3–4/3)
	Texture	Sandy loam
	Structure	Moderate fine to medium granular
	Consistence	Friable; slightly hard when dry
	Roots	Abundant fine grass roots and occasional medium roots

	Stoniness	None to very slight
	Boundary	Clear, smooth boundary with underlying B horizon
Horizon B (Pedogenic B)	Depth	0.15–0.90 m (estimated)
	Colour	Brown to yellowish-brown (7.5YR 4/4–5/6)
	Texture	Sandy clay loam to clay loam
	Structure	Moderate medium subangular blocky becoming weak blocky with depth
	Consistence	Firm when moist; hard when dry
	Roots	Common fine roots in the upper portion, decreasing with depth
	Pedological Features	Moderate pedogenic development with evidence of clay accumulation; no visible mottles, carbonate nodules, or gleying
	Boundary	Gradual, diffuse transition into weathered material
Horizon C (Weathered/Transitional)	Depth	0.90–1.20 m+ (estimated)
	Colour	Yellowish-brown to light brown
	Texture	Sandy clay loam with weathered rock fragments
	Structure	Weak blocky to massive
	Consistence	Firm to very firm
	Coarse Fragments	Few to common weathered gravel and decomposed rock fragments
	Pedological Features	Slight weathering of parent material with reduced pedogenic development
	Boundary	Lower boundary not exposed
Underlying Material (Saprolite)	Depth	>1.20 m (not exposed)
	Description	Probable highly weathered saprolitic parent material below the exposed profile, grading into weathered bedrock.
	Limitation	Excavation did not reach fresh bedrock; saprolite depth requires confirmation by augering or drilling.
Diagnostic Horizons		Orthic A Horizon overlying a well-developed Pedogenic B Horizon, grading into a Weathered C Horizon.
Soil Classification	Probable Form	Hutton Form (provisional)
	Justification	The profile exhibits a deep, well-drained brown pedogenic B horizon with no evidence of prolonged wetness or lithic contact within the exposed depth. The soil appears to have developed through prolonged in-situ weathering under stable landscape conditions. Final classification should be confirmed according to the South African Soil Classification System using field morphology and laboratory analyses.
Land Use Interpretation	Strengths	Deep rooting depth; good drainage; moderate to high moisture storage capacity; suitable for cultivation, grazing, and rehabilitation; favourable engineering characteristics in the upper profile.
	Limitations	Moderate clay accumulation may reduce permeability at depth; susceptible to erosion where vegetation is removed; fertility may require supplementation for intensive agriculture.
Irrigation Suitability	Suitability Class	Suitable (S2)
	Key Constraints	Moderate clay content in the B horizon, potential compaction under heavy machinery, and moderate nutrient management requirements.

The ST04 profile represents a deep, moderately weathered residual soil developed on weathered bedrock. A relatively thin Orthic A horizon overlies a thick, well-developed brown Pedogenic B horizon, indicating prolonged soil formation and good internal drainage. The absence of grey mottles, gleying, or carbonate accumulations suggests that the profile experiences minimal seasonal waterlogging, while the gradual transition into the weathered C horizon indicates progressive in-situ weathering of the parent material.

7. SOIL SUITABILITY REQUIREMENTS

7.1. Summary of Soil Conditions (Interpretation)

To be discussed when laboratory samples are available.

8. IMPACT ASSESSMENT

A detailed soil assessment was undertaken across the proposed mining area to evaluate soil resources, determine agricultural potential and identify the likely impacts associated with the proposed mining activities. Soil observations (ST01–ST04) indicate that the project area is dominated by shallow to moderately deep sandy residual and transported soils developed over weathered granite and alluvial/colluvial deposits.

The soils are generally well drained and moderately susceptible to erosion following vegetation removal. Although localized areas possess moderate agricultural potential, particularly where deeper Hutton-type soils occur (ST02 and ST04), much of the site consists of gravelly alluvial soils with limited moisture storage capacity (ST03) or shallow residual soils (ST01). Consequently, agricultural capability across most of the mining area is considered low to moderate, with grazing representing the dominant sustainable land use.

The proposed mining activities will involve open-pit excavation, mineral processing, temporary stockpiling of topsoil and waste rock, construction of processing facilities and progressive rehabilitation of mined-out areas. These activities have the potential to alter soil properties if not properly managed.

Project Phase	Activity	Potential Soil Impact	Affected Soil Resource	Impact Significance (Before Mitigation)	Recommended Mitigation Measures	Residual Impact
Construction	Site clearing and vegetation removal	Loss of vegetation exposes soil to erosion and reduces organic matter	Topsoil (Orthic A Horizon)	High	Limit vegetation clearing to active work areas; progressively rehabilitate disturbed areas; install erosion control measures	Low
	Topsoil stripping	Loss of fertile topsoil, reduced soil biological activity and soil fertility	ST01, ST02, ST03 and ST04 topsoil	High	Strip topsoil separately (150–300 mm depending on soil depth); stockpile separately; protect stockpiles from erosion; avoid mixing with subsoil	Moderate
	Construction of processing plants, workshops, offices and laydown areas	Permanent loss of soil function beneath infrastructure	All soil units	High	Restrict infrastructure footprint; locate facilities on previously disturbed or lower agricultural potential land where possible	Moderate
	Construction of access roads and parking areas	Soil compaction reduces infiltration and increases runoff	Mainly ST02 and ST04	Moderate	Minimise traffic areas; rip compacted areas during closure	Low
	Installation of pipelines and water supply infrastructure	Temporary disturbance and mixing of soil horizons	Localised soils along pipeline routes	Moderate	Reinstate soil horizons after trenching; replace topsoil immediately	Low
	Construction of slimes dams and tailings facilities	Permanent disturbance of soil profile beneath facilities	Localised footprint	High	Strip and store topsoil prior to construction; construct containment facilities to engineering specifications	Moderate
	Fuel storage, workshops and generators	Hydrocarbon contamination of soil	Localised areas	Moderate	Bund all fuel storage; provide spill kits; remove contaminated soil immediately	Low
Operational	Open-pit mining of alluvial diamonds, kimberlite, aggregate, sand, limestone, lead, manganese and gold	Complete removal of soil profile within mining footprint	All soil horizons	High	Progressive mining; minimise disturbed area; concurrent rehabilitation; strip and store topsoil separately	Moderate
	Excavation of alluvial gravels	Removal of shallow gravelly soils and transported sediments	ST03	High	Restrict excavation to approved mining blocks; progressively backfill excavated areas	Moderate

	Rotary scrubbing and diamond recovery plant	Localised soil disturbance due to accidental slurry spills	Processing plant footprint	Moderate	Concrete processing areas; containment drains; immediate clean-up of spills	Low
	Tailings disposal	Burial of natural soil beneath tailings	Tailings storage areas	Moderate	Dewater tailings; return tailings to mined-out pits; minimise permanent storage	Low
	Slimes dam operation	Localised seepage may alter soil moisture conditions	Adjacent soils	Moderate	Line slimes dams; monitor seepage; maintain freeboard	Low
	Waste rock stockpiles	Burial of soil and erosion from stockpiles	Waste dump footprint	Moderate	Shape and stabilise waste dumps; install stormwater controls	Low
	Heavy vehicle movement	Soil compaction and surface sealing	Haul roads and plant areas	Moderate	Restrict vehicle movement to designated roads; rip compacted areas during rehabilitation	Low
	Dust generation	Dust deposition may reduce vegetation productivity	Adjacent agricultural soils	Low to Moderate	Water haul roads; implement dust suppression programme	Low
	Hydrocarbon spills from machinery	Soil contamination	Workshops, refuelling points	Moderate	Regular equipment maintenance; spill response procedures; contaminated soil remediation	Low
Closure and Rehabilitation	Removal of infrastructure	Localised disturbance during demolition	Infrastructure footprint	Moderate	Remove foundations where practical; rehabilitate disturbed areas	Low
	Backfilling of mined-out pits	Restoration of landform	Mining footprint	Positive	Backfill excavations using dewatered tailings and waste rock; re-establish natural drainage	High Positive
	Replacement of topsoil	Restoration of soil productivity	Entire rehabilitated area	Positive	Replace stored topsoil evenly; avoid compaction; scarify surface before seeding	High Positive
	Deep ripping of compacted areas	Improved infiltration and root penetration	Roads, laydown areas and processing sites	Positive	Rip compacted soils to appropriate depth before topsoil placement	High Positive
	Revegetation	Restoration of ecological and agricultural function	Entire disturbed area	Positive	Seed with indigenous grass species; monitor vegetation establishment	High Positive

	Monitoring of rehabilitation	Long-term improvement in soil quality and stability	Entire site	Positive	Annual monitoring of erosion, vegetation cover and soil stability until closure objectives are achieved	High Positive

Table 1: Agricultural Suitability of Identified Soil Units.

Soil Unit	Probable Soil Form	Agricultural Potential	Mining Sensitivity	Suitability for Rehabilitation
ST01	Glenrosa (Probable)	Moderate grazing; limited cultivation	Moderate	Good following topsoil replacement
ST02	Hutton (Probable)	Moderate to high agricultural potential	High (valuable soil resource)	Excellent if topsoil is preserved
ST03	Oakleaf/Colluvial (Probable)	Low agricultural potential; suitable mainly for grazing	Low to Moderate	Good due to coarse texture and rapid drainage
ST04	Hutton (Probable)	Moderate to high agricultural potential	High	Excellent with proper rehabilitation

Table 2: Soil Suitability for the Proposed Mining Development

Assessment Criterion	Finding
Dominant soil types	Shallow residual soils, deep red-brown residual soils, gravelly alluvial/colluvial soils and weathered saprolitic soils
Agricultural potential	Predominantly low to moderate, with isolated areas of moderate to high potential (ST02 and ST04)
Major soil limitations	Shallow rooting depth, coarse fragment content, moderate erosion risk and low moisture storage in gravelly soils
Most sensitive soils	Deep Hutton-type soils (ST02 and ST04) due to higher agricultural capability
Principal mining impacts	Topsoil loss, soil compaction, erosion, mixing of soil horizons and hydrocarbon contamination
Rehabilitation potential	High, provided that topsoil is stripped separately, stockpiled correctly, progressively replaced and disturbed areas are revegetated
Overall impact after mitigation	Low
Overall agricultural impact	Loss of moderate agricultural land is localised and reversible through appropriate rehabilitation. Most of the site is more suitable for grazing than intensive crop production.

9. CONCLUSSIONS

The proposed mining area contains predominantly low- to moderate-potential agricultural soils, with only localized areas of moderate capability associated with the deeper Hutton-type profiles (ST02 and ST04). The gravel-rich transported soils (ST03) and shallow residual soils (ST01) have limited cropping potential due to restricted rooting depth, high coarse fragment content, and low available water-holding capacity. Consequently, the direct loss of high-value agricultural land is expected to be limited.

Provided that topsoil is stripped separately, stockpiled appropriately, protected from erosion and contamination, and replaced during concurrent rehabilitation, the long-term impacts on soil resources can be substantially reduced. The proposed mining method, which includes progressive backfilling of mined-out areas with dewatered tailings and the reinstatement of stored topsoil, aligns with accepted rehabilitation practices for alluvial and shallow open-pit

mining. With effective implementation of the Environmental Management Programme (EMPr), erosion control measures, stormwater management, and post-mining revegetation, the residual impact on soil resources is expected to be Low, and the rehabilitated land should be capable of supporting extensive grazing and limited dryland agricultural use comparable to its pre-mining capability. This conclusion is considered appropriate for both the Mining Permit and Mining Right applications over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ.

10. RECOMMENDATIONS

Based on the field investigation, soil profile descriptions (ST01–ST04), and the proposed mining activities for the extraction of alluvial diamonds, kimberlite, aggregate, sand, limestone, lead, manganese ore, and gold ore over approximately 3 927 ha, the following recommendations are made to minimise impacts on soil resources and maintain post-mining land capability.

10.1 Topsoil Management

- Strip all topsoil (Orthic A Horizon) separately from subsoil prior to any construction or mining activities.
- The stripping depth should be determined in the field by a qualified soil scientist but is expected to range between 100 mm and 300 mm, depending on the soil profile.
- Topsoil from the higher agricultural potential soils (ST02 and ST04) should be stockpiled separately from soils with lower agricultural potential (ST01 and ST03).
- Topsoil must not be mixed with overburden, weathered rock, waste material or tailings.
- Stockpile heights should not exceed 2 m to preserve soil biological activity and minimise compaction.
- Topsoil stockpiles should be protected against erosion by establishing temporary vegetation cover and constructing diversion berms where necessary.

10.2 Soil Conservation

- Minimise the area disturbed at any one time through phased mining and construction.
- Restrict vehicle movement to designated haul roads to minimise soil compaction.
- Avoid unnecessary disturbance of undisturbed areas outside the approved mining footprint.
- Implement stormwater control measures before vegetation clearing commences.

- Install temporary erosion protection measures on steep slopes and stockpiles.

10.3 Infrastructure Development

- Locate permanent infrastructure, where practical, on areas with lower agricultural potential, particularly within gravelly soils similar to ST03.
- Processing plants, workshops, fuel storage areas and laydown areas should be established on engineered platforms with appropriate drainage.
- Fuel storage tanks must be bunded in accordance with applicable South African standards to prevent soil contamination.
- Septic conservancy tanks should be sealed and maintained to prevent seepage into surrounding soils.

10.4 Mineral Processing

- The proposed mineral processing system (vibrating grizzly, rotary scrubber, diamond pan and dewatering screens) does not involve chemical beneficiation and therefore presents a relatively low contamination risk.
- Processing areas should nevertheless be constructed on compacted or concrete surfaces to prevent slurry infiltration into surrounding soils.
- Any accidental spills should be cleaned immediately and contaminated soil removed for disposal at an approved facility.

10.5 Tailings and Waste Management

- Tailings should continue to be dewatered prior to backfilling mined-out excavations as proposed.
- Concurrent rehabilitation should be implemented wherever mining has been completed.
- Waste rock dumps should be designed with stable side slopes and protected against erosion.
- Tailings and waste material should not be placed directly onto undisturbed topsoil without prior stripping and stockpiling.

10.6 Rehabilitation

- Progressive rehabilitation should commence immediately after completion of mining in each excavation block.

- Backfilled areas should be reshaped to approximate pre-mining landforms.
- Stockpiled topsoil should be replaced uniformly across rehabilitated areas.
- Compacted areas should be deep-ripped prior to topsoil replacement to improve infiltration and root penetration.
- Revegetation should utilise indigenous grass species representative of the surrounding vegetation.
- Rehabilitation success should be monitored until acceptable vegetation cover and soil stability have been achieved.

10.7 Agricultural Potential

- The majority of the project area exhibits low to moderate agricultural potential, with grazing representing the most suitable post-mining land use.
- Localised areas represented by ST02 and ST04 possess moderate agricultural capability and should receive priority during topsoil management and rehabilitation.
- Following rehabilitation, the objective should be to restore land capability equivalent to or as close as reasonably practicable to the pre-mining condition.

10.8. Department of Agriculture (DALRRD/Former DAFF)

The soil investigation undertaken for Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ has been completed in accordance with generally accepted soil survey and land capability assessment principles applicable to mining developments in South Africa.

The assessment confirms that:

- Soil resources within the project area are predominantly shallow to moderately deep residual and transported soils with low to moderate agricultural potential, while only isolated areas exhibit moderate agricultural capability.
- No exceptionally high-value irrigated agricultural land or unique soil resources were identified within the investigated portions.
- The proposed mining activities will result in temporary and permanent disturbance of soil resources within the approved mining footprint.
- Appropriate soil conservation measures, including separate topsoil stripping, stockpiling, erosion control, progressive rehabilitation and revegetation, have been incorporated into the project design.

- With implementation of the recommended mitigation measures, the long-term loss of agricultural capability is expected to be limited and largely confined to the active mining footprint.
- The proposed rehabilitation programme provides for reinstatement of soil resources and restoration of post-mining land capability suitable for extensive grazing and, where practical, limited dryland agricultural use.

Accordingly, the proposed development is considered acceptable from an agricultural soil resource perspective, provided that all recommended mitigation measures and rehabilitation commitments are fully implemented throughout the life of the mine.

10.2 Department of Water and Sanitation (DWS)

The proposed mining operation has been assessed with respect to potential impacts on soil resources that may influence surface water and groundwater quality.

The assessment confirms that:

- The proposed mining method incorporates progressive backfilling of mined-out excavations using dewatered tailings, thereby reducing long-term erosion and sediment transport.
- Mineral processing is based on physical separation techniques (screening, scrubbing, gravity concentration and dewatering) and does not involve chemical leaching or chemical beneficiation processes.
- Slimes dams, water storage facilities and wastewater infrastructure should be designed, constructed and operated in accordance with applicable engineering standards to minimise seepage and protect surrounding soil and groundwater resources.
- Hydrocarbon storage areas should be bunded and managed to prevent soil contamination.
- Stormwater management measures should separate clean and dirty water systems in accordance with the principles of Government Notice R704 of 4 June 1999 (Regulations on the Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources).
- Disturbed soils should be stabilised through progressive rehabilitation to minimise sediment generation and downstream impacts.
- Topsoil conservation and erosion control measures will reduce sedimentation of nearby drainage lines and support the restoration of natural infiltration characteristics following mine closure.

Provided that the recommendations contained in this report, the Environmental Management Programme (EMPr), and any applicable Water Use Licence conditions are implemented, the proposed mining activities are not expected to result in unacceptable long-term impacts on soil resources that could adversely affect surface water or groundwater resources.

Final Compliance Statement

The soil assessment indicates that the proposed Mining Permit and Mining Right application over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ is acceptable from a soil and agricultural resource perspective, subject to the implementation of the recommended mitigation measures, progressive rehabilitation, and ongoing environmental management. The proposed development is capable of achieving a satisfactory post-mining land capability that is broadly comparable with the pre-mining condition and is consistent with the objectives of sustainable land management envisaged by the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983), the National Environmental Management Act, 1998 (Act 107 of 1998), the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), and the applicable requirements of the National Water Act, 1998 (Act 36 of 1998).

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Proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand, and Gold Ore Mining Project near Mahikeng, Northwest Province

Mahikeng Local Municipality, Ngaka Modiri Molema District Municipality, North West Province

Farm: Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, Remaining Extent Colga 132-JO

Fourie, H. Dr

Palaeontological Impact Assessment: Desktop Study

Facilitated by: Nyamoki Consulting (Pty) Ltd

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2026/08/05

Ref: NW 30/5/1/2/2/1027 MR

Regisaurus (ESI)



FINDINGS

B. Executive summary

Outline of the development project: Nyamoki Consulting appointed Dr H. Fourie, a palaeontologist, to undertake a Palaeontological Impact Assessment (PIA), Desktop Study of the Proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand, and Gold Ore Mining Project near Mahikeng, Northwest Province in the Mahikeng Local Municipality, Ngaka Modiri Molema District Municipality on Farm: Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, Remaining Extent Colga 132-JO.

The applicant, G and E Global (Pty) Ltd ("G and E Global") intends extracting diamonds and several other minerals using opencast mining methods.

The Project includes one locality Alternative (see Figure 2):
Alternative 1: A polygonal area outlined in red 11.5 km southeast of Mahikeng, the R52/R503 Road is directly north, and Rooigrond is northeast. The approximate size of the site is 3927 hectares of mining.

Legal requirements:-

The **National Heritage Resources Act (Act No. 25 of 1999) (NHRA)** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

"palaeontological" means any fossilised remains or fossil trace of animals or plants which lived in the geological

past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or traces.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of **LOW** to **VERY HIGH** palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (Act No.25 of 1999):
(i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.

This report adheres to the guidelines of Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50 m in length; (c) any development or other activity which will change the character of a site (see Section 38); (d) the re-zoning of a site exceeding 10 000 m² (1 ha) in extent; (e) or any other category of development provided for in regulations by SAHRA or a PHRA authority.

This report aims (**1c)** to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

METHODOLOGY

Methodology:

A Desktop Study is conducted due to the presence of a geological formation with a **MODERATE** sensitivity as fossils occurring in this formation are often younger and rare. The mining operations will be shallow. It includes a background study that may miss heritage present below the surface. For this reason, a Protocol for Chance Fossil Find is included.

On the geological section below a wider area is used for the assessment, it includes all underlying and overlying formations and concealed boundaries. These formations have an influence on the fossil heritage as it may be intruded. Developers often move the development footprint due to the outcome of other specialist studies or engineering reports. It therefore, makes more sense to survey a broader area.

Outline of the geology and the palaeontology:

The geology was obtained from map 1:100 000, Geology of the Republic of South Africa (Visser 1984) and the 1:250 000 geological map of Mafiking 2524 (Michaluk and Keyser 1992).

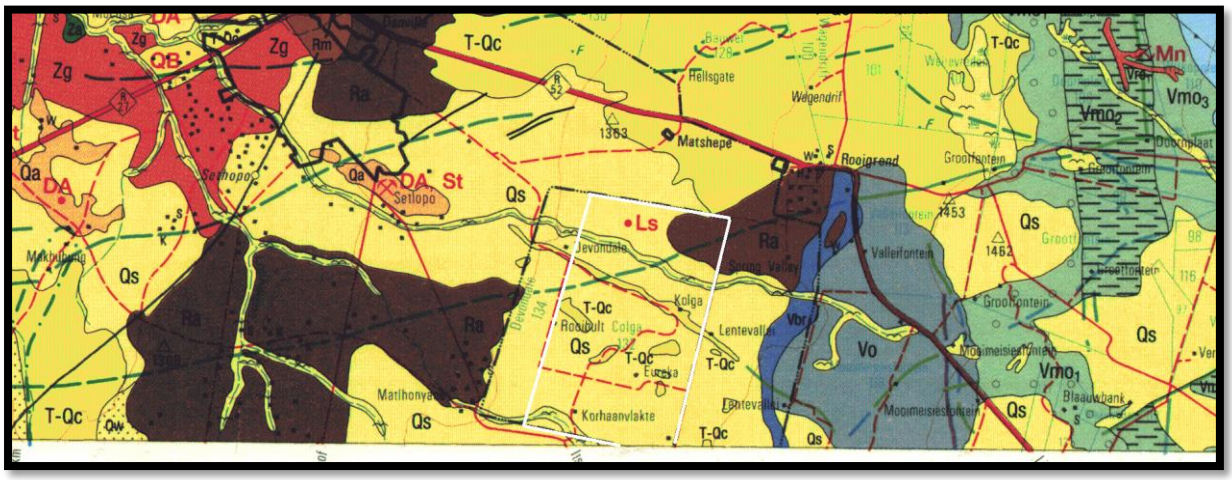


Figure: The geology of the development area.

Legend to Figure and short explanation.

Qs – Superficial deposits (light yellow). Quaternary.

T-Qc – Calcrete (yellow). Tertiary.

Ra – Andesitic to basaltic lava, minor tuff (brown). Allanridge Formation, Ventersdorp Supergroup. Randian.

---f--- – (black) Fault.

……. – Undifferentiated linear structure.

----- - Concealed geological boundary.

┬10˚ - Strike and dip.
□ – Approximate area of prospecting (in white on figure).

Summary of findings: The Palaeontological Impact Assessment Desktop Study was undertaken in August 2026 in winter in cold conditions (Appendix 6 of Act, **1(d)**). As this is a desktop study, the season (vegetation) and time (shadow) have no influence on the outcome. The following is reported:

Over areas totalling fully 40% of Southern Africa the 'hard rocks', from the oldest to the Quaternary, are concealed by normally unconformable deposits – principally sand, gravel, sandstone, and limestone. Inland deposits are much more extensive than marine deposits and are terrestrial and usually not-fossiliferous. Some of these deposits date back well into the Tertiary, whereas others are still accumulating. Owing to the all-to-often lack of fossils and of rocks suitable for radiometric or palaeomagnetic dating, no clear-cut dividing line between the Tertiary and Quaternary successions could be established (Kent 1980). The alluvium sands were deposited by a river system and reworked by wind action (Snyman 1996). A thick cover of Kalahari reddish sand blankets most outcrops and is dominated by the typical Kalahari thornveld (Norman and Whitfield 2006).

Palaeontology - Fossils in South Africa mainly occur in rocks of sedimentary nature and seldom in rocks from igneous or metamorphic nature. Therefore, the palaeontological sensitivity can range from **VERY LOW** to **VERY HIGH**, and here in the development **MODERATE** for the Quaternary (SG 2.2 SAHRA APMHOB, 2012) (Almond and Pether 2009).

A wide range of possible fossil remains occur in the Cenozoic, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere. Deposits of cenozoic aged cave breccia associated with sinkholes and karst formations contain the remains of the ancestors of man (Groenewald and Groenewald 2014).

The mining will take place on the Quaternary sediments near the river in the south.

Recommendation:
Concerns/threats to be added to the EMPr (**1k,l,m**):

1. The overburden and inter-burden must always be surveyed for fossils. Special care must be taken during the clearing, digging, drilling, and excavating of foundations, trenches, channels and footings and removal of overburden if applicable not to intrude fossiliferous layers.
2. Threats are earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance.

The recommendations are (**1g)**:

1. The impact of the prospecting on the fossil heritage is **MODERATE**. A Phase 1 Palaeontological Impact Assessment: Field Study is only recommended if fossils are found during excavating, trenching, drilling, or clearing (according to SAHRA protocol).

2. Mitigation (Protocol for a Chance Fossil Find) is needed if fossils are found, permission needed from NWPG/SAHRA.
3. No consultation with parties was necessary.
4. The development may go ahead, but the ECO must survey the prospecting area for fossils after drilling or trenching, material must be scrutinised as well, in line with the legally binding Environmental Management Programme (EMPr) this must be updated to include the involvement of a palaeontologist/ archaeozoologist when necessary.
5. The EMPr will cover the conservation of heritage and palaeontological material that may be exposed during prospecting activities. The protocol is to immediately cease all prospecting activities if a fossil is unearthed, construct a 30 m no-go barrier, and contact SAHRA for further investigation.

Stakeholders: Developer – G and E Global (Pty) Ltd. Tel:
Environmental – Nyamoki Consulting (Pty) Ltd. 1850 Berg Avenue, Doreg AH, Akasia, 0182. Tel: 076 327 1827.
Landowners – Not available.

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D. Background information on the project

Report

This report is part of the environmental impact assessment process under the National Environmental Management Act, as amended (Act No. 107 of 1998) (NEMA) and includes Appendix 6 (GN R38282 of 4 December 2014) of the Environmental Impact Assessment Regulations (see Appendix 1 bold in text). It is also in compliance with SG 2.2 SAHRA APMHOB Guidelines, 2012. Minimum standards for palaeontological components of Heritage Impact Assessment Reports, Pp 1-15 (**2**).

Outline of development

This report discusses and aims to provide the developer with information regarding the location of palaeontological material that will be impacted by the development. Depending on the presence or absence of fossils in the pre-construction phase it may be necessary for the developer to apply for the relevant permit from the South African Heritage Resources Agency (SAHRA / PHRA).

The applicant, G and E Global (Pty) Ltd ("G and E Global") intends extracting diamonds and several other minerals using opencast mining methods due to the shallow nature of the mineral deposit.

A desktop study, geophysical survey, and lidar survey has been conducted as non-invasive methods. Rehabilitation will take place at the same time as part of the roll-over mining practices.

Local benefits of the proposed development include benefits to the local economy, create local employment and ease poverty.

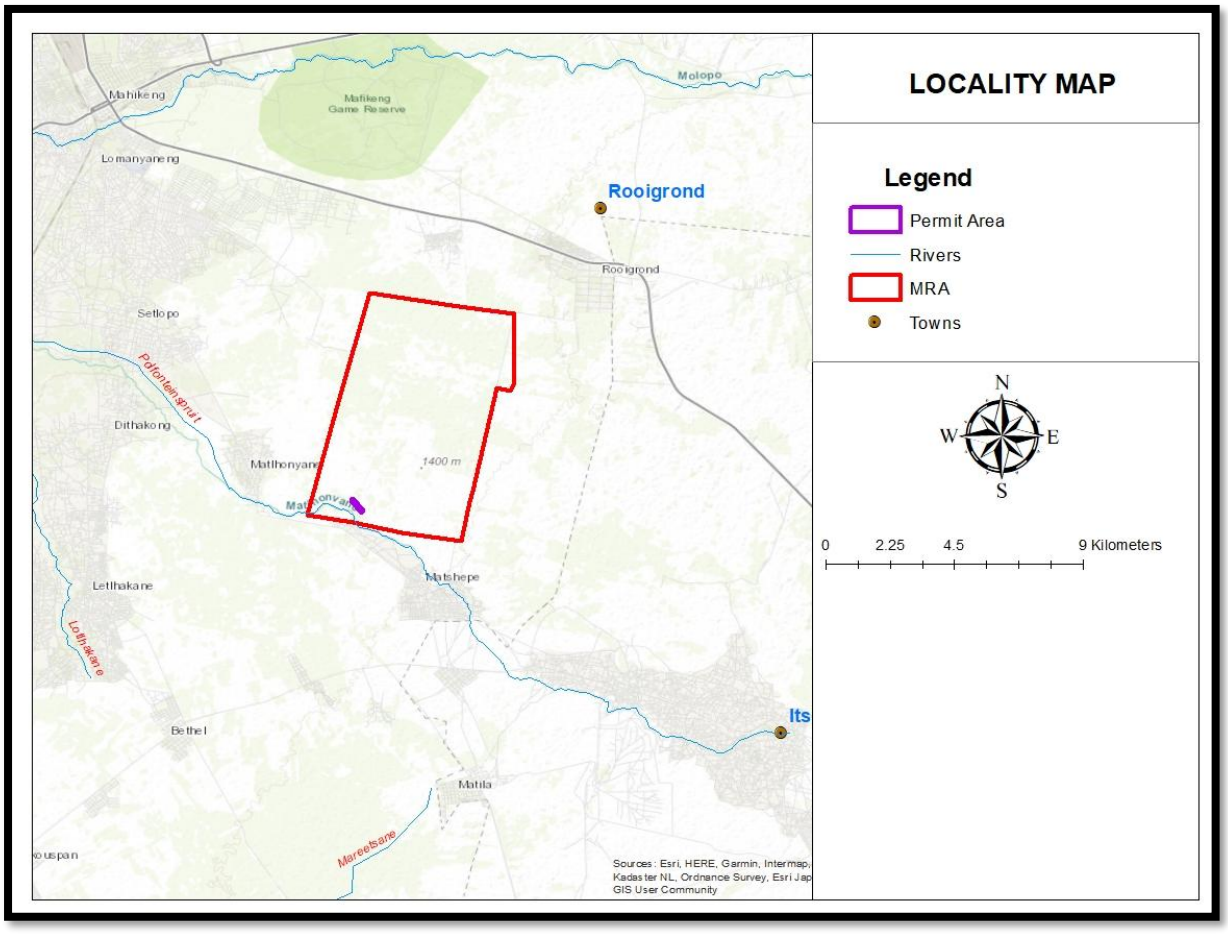


Figure 1: Topographic figure showing location (Nyamoki).

The following infrastructure is anticipated:

- A 1-hectare mineral processing plant at each mining section, including a slimes dam
- Access roads and fence
- Generators and associated power cables
- Diesel storage tanks and fuel trailers
- Septic conservancy tanks at each mining section for wastewater collection and storage
- Ablution facilities
- Water abstraction infrastructure, including transfer pipelines from borehole areas
- Water storage tanks and dams
- Laydown areas
- A central processing plant
- Topsoil stockpile
- Tailings and waste dumps
- Workshop facilities
- Kitchen facilities
- Labour quarters (mobile)
- Mobile office, and
- Vehicle parking area.

The Project includes one locality Alternative (see Figure 2):
Alternative 1: A polygonal area outlined in red 11.5 km southeast of Mahikeng, the R52/R503 Road is directly north, and Rooigrond is northeast. The approximate size of the site is 3927 hectares of mining.

Rezoning/ and or subdivision of land: To Mining.
Name of Developer and Consultant: G and E Global (Pty) Ltd. and Nyamoki Consulting (Pty) Ltd.
Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a palaeontological impact assessment to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.
*Short Curriculum vitae (**1ai,ii**):* Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research (now ESI), University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. At present she is curator of a large fossil invertebrate, Therapsid, dinosaur, amphibia, fish, reptile, and plant collections at Ditsong: National Museum of Natural History. She has published seven papers in mostly scientifically accredited journals and has been conducting impact assessments since 2012. For the past 20 years she carried out field work in the North West, Western Cape, Northern Cape, Eastern Cape, Limpopo, Mpumalanga, Gauteng and Free State Provinces and has done more than 300 Palaeontological Impacts Assessments including powerlines, dams, solar plants, wind turbine plants, rehabilitations, mine projects, roads, townships, bridges refuse dumps, water and sanitation works; and farming expansions. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 32 years.
Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act (Act No. 25 of 1999). An electronic copy of this report must be supplied to SAHRA.

E. Description of property or affected environment
Location and depth:
The Proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand, and Gold Ore Mining Project will be situated near Mahikeng, Northwest Province in the Mahikeng Local

Municipality, Ngaka Modiri Molema District Municipality on Farm: Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, Remaining Extent Colga 132-JO.

Depth is determined by the related infrastructure, such as the foundations to be developed and the thickness of the formation. Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to determine due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. Geological maps do not provide depth or superficial cover, it only provides mappable surface outcrops.

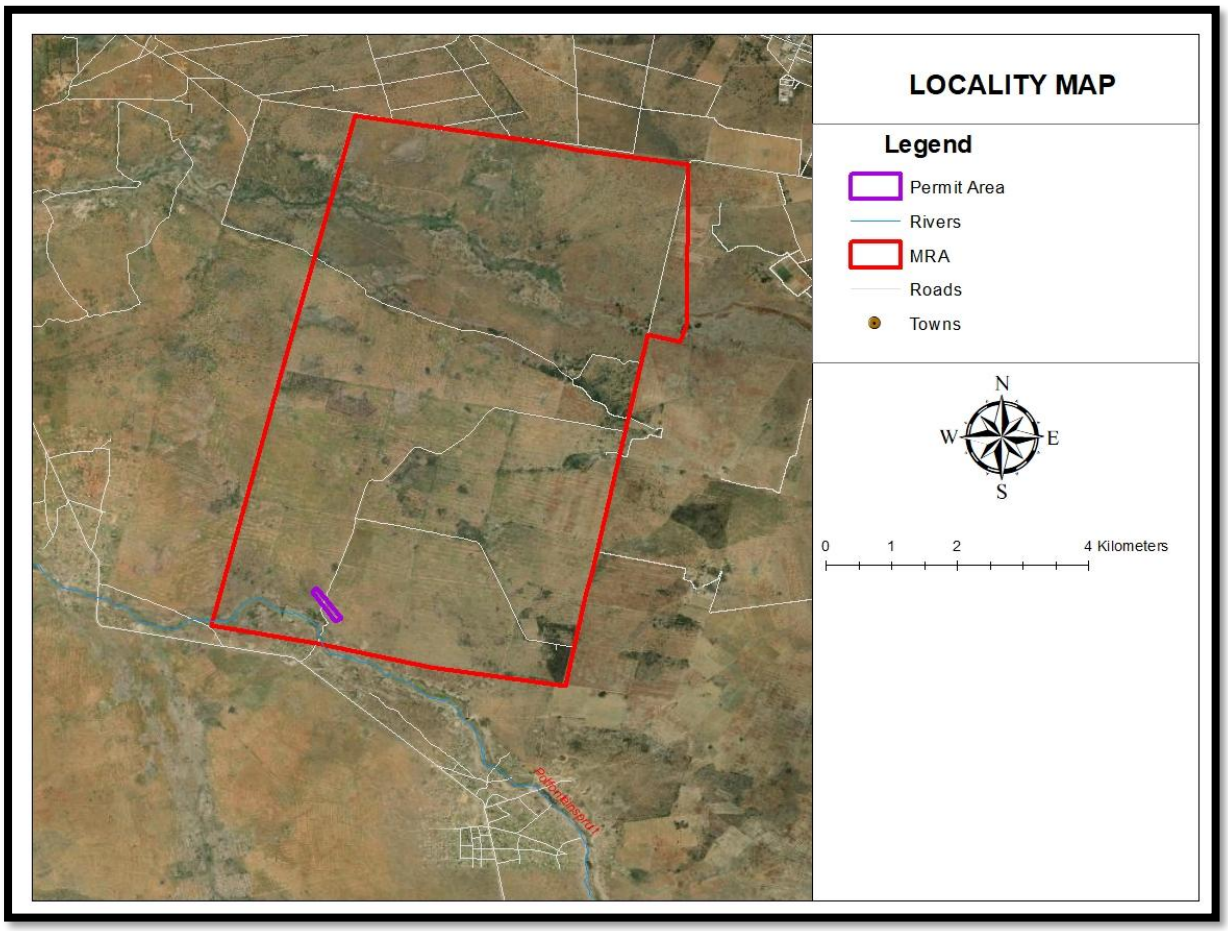


Figure 2: Google Earth location map (Nyamoki).

F. Description of the Geological Setting

Description of the rock units:

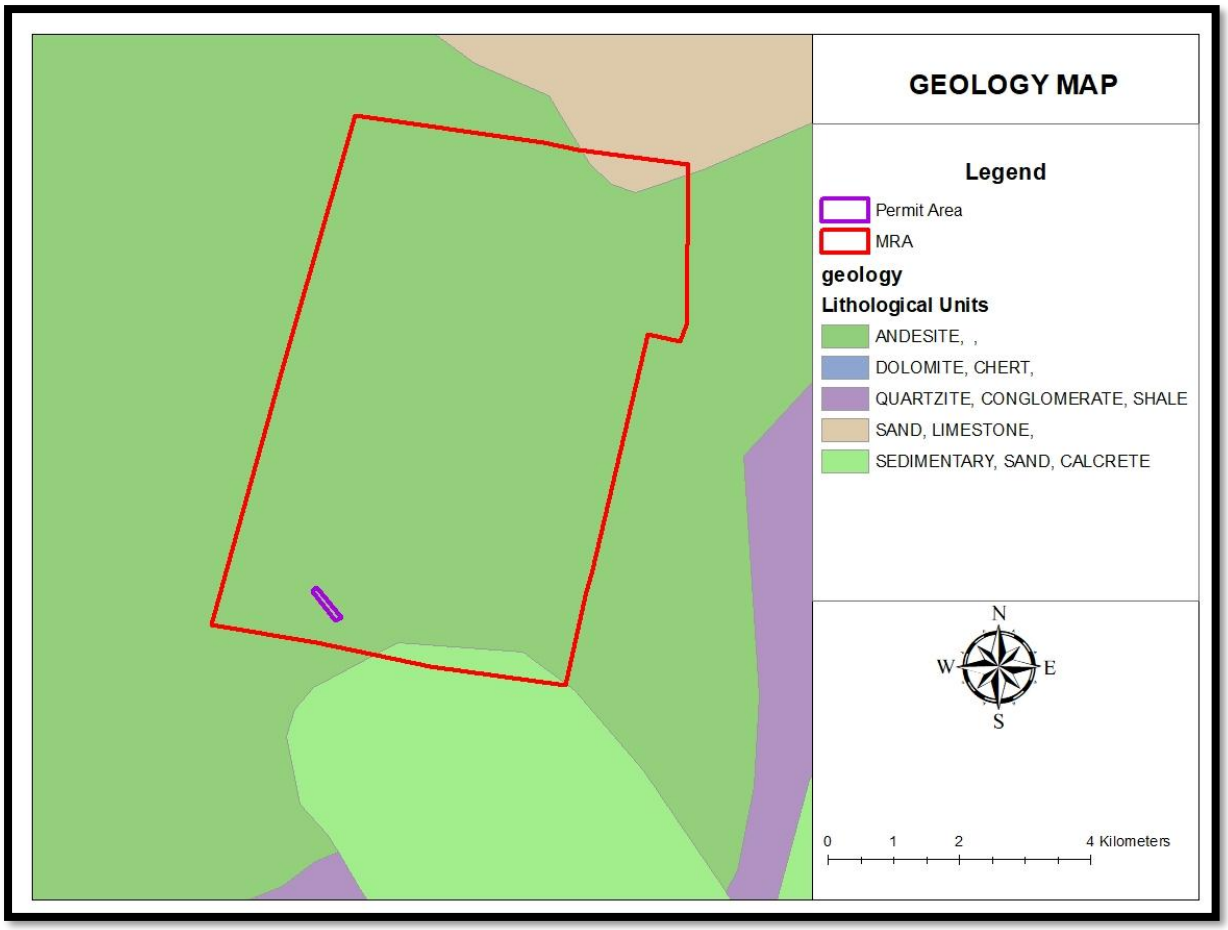


Figure 3: Geology of the area (**1h)**. Legend on Map (Nyamoki).
Legend to Figure and short explanation.
---f--- – (black) Fault.
……. – Undifferentiated linear structure.
----- - Concealed geological boundary.
┬10˚ - Strike and dip.
□ – Approximate position of prospecting (in white on figure).

Mining Activities in study area
DA – Diamonds Alluvial Ls – Limestone St – Stone aggregate (gravel).
Therefore, the mining past and present will have an influence on this development.

Over areas totalling fully 40% of Southern Africa the 'hard rocks', from the oldest to the Quaternary, are concealed by normally unconformable deposits – principally sand, gravel, sandstone, and limestone. Inland deposits are much more extensive than marine deposits and are terrestrial and usually not-fossiliferous. Some of these deposits date back well into the Tertiary, whereas others are still accumulating. Owing to the all-to-often lack of fossils and of rocks suitable for radiometric or palaeomagnetic dating, no clear-cut dividing line between the Tertiary and Quaternary successions could be established (Kent 1980). The alluvium sands were deposited by a river system and reworked by wind action (Snyman 1996). A thick cover of Kalahari reddish sand blankets most outcrops and is dominated by the typical Kalahari thornveld (Norman and Whitfield 2006).

Diamondiferous gravel deposits of the area are erosion remnants of a palaeo- fluvial system that transported material from the north and nort-east along an ancient system (Crysbol (Pty) Ltd.).

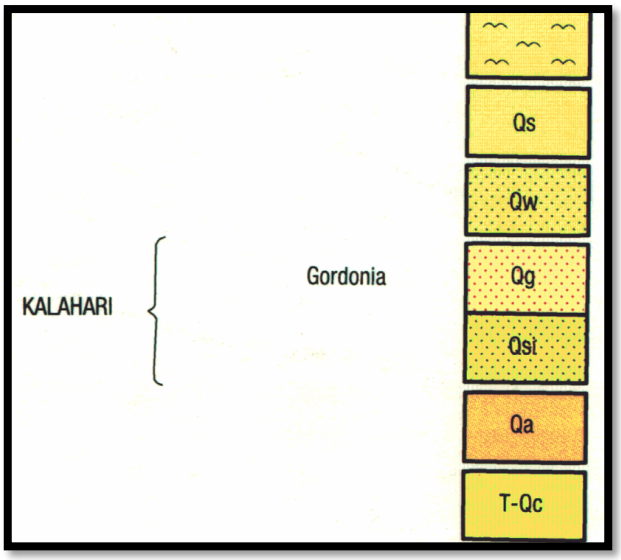


Figure 4: Lithology (Michaluk and Keyser 1992).

G. Background to Palaeontology of the area

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desktop and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012).

A wide range of possible fossil remains occur in the Cenozoic, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere. Deposits of cenozoic aged cave breccia associated with sinkholes and karst formations contain the remains of the ancestors of man (Groenewald and Groenewald 2014).

Table 1: Taken from Palaeotechnical Report (Groenewald and Groenewald 2014) **(1cA, 1cB)**.

Qs; Qw; Q; Q40; T5; Qc; Qf; Tc; Q-c; T; @mo2; Te7; Q27; Q3; Q10; Q28		Aeolian sand, alluvium, colluvium, spring tufa (calcareous) and sinter (siliceous), lake deposits, peats, pedocretes or duricrusts (calcrete, ferricrete), soils and gravel (diamondiferous in places, Q10; Q28)	Very wide range of possible fossil remains, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms and other microfossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens	See archaeological literature for fossil subfossil remains from archaeological sites (eg Wonderwerk Cave near Kuruman, Kathu Pan near Sishen) Fossil leaves and palynomorphs within calc tufa. Calcareous tufas at edge of Ghaap Escarpment might be highly fossiliferous (cf Taung – abundant Makapanian Mammal Age vertebrate remains, including australopithecines)

Lonely (Qlo)		Fluvial gravels, sands, lacustrine and pan mudrocks, diatomites and diatomaceous limestones, evaporites, consolidated to unconsolidated aeolian sands, pedocretes (especially calcrete) Late Cretaceous to Recent 90 Ma to 0 Ma	Palynomorphs, root casts (rhizomorphs / rhizoliths) and burrows (eg termitaria), rare vertebrate remains (mammals, fish, ostrich egg shell etc), diatoms, freshwater stromatolites, freshwater and terrestrial shells (gastropods, bivalves), ostracods, charophytes	Fossils mainly associated with ancient pans, lakes and river systems Palaeontology poorly studied. Basal Late Cretaceous gravels and lacustrine clays probably fossiliferous (bones, teeth, petrified wood, palynomorphs) but v. rarely exposed.
Makolanen (@mo; @mo1; @mo2; @mo3)				
Eden (Te; Te1; Te2; Te3; Te4; Te5; Te6; Te7; Te8)				
Budin (Tbu; Tbu1)				
T-Qc; Tl; T12				

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally **VERY LOW** to **VERY HIGH**.

Table 2: Criteria used (Fossil Heritage Layer Browser/SAHRA):

Rock Unit	Significance/vulnerability	Recommended Action
Quaternary	**Moderate**	Desktop Study required
Tertiary	**High**	Desktop Study, Field Assessment likely

Databases and collections: Ditsong: National Museum of Natural History.
Impact: **HIGH** and **MODERATE.** There may be significant fossil resources that may be impacted by the development and if destroyed are no longer available for scientific research or other public good.

The Project includes one locality Alternative (Figure 2) (**1f,j)** with the above palaeontological sensitivity.
Alternative 1: A polygonal area outlined in red 11.5 km southeast of Mahikeng, the R52/R503 Road is directly north, and Rooigrond is northeast. The approximate size of the site is 3927 hectares of mining.

All the land involved in the development was assessed **(ni,nii)** and none of the property is unsuitable for development (see Recommendation B).

H. Description of the Methodology (1e)
The palaeontological impact assessment study was undertaken in August 2026. A Phase 1: Field Study will entail a walkthrough of the affected portion with photographs (in 20 mega pixels) taken of the site with a digital camera (Canon PowerShot SX620HS). A Global Positioning System (GPS (Garmin eTrex 10) can be used to record the outcrops. A literature survey is included, and the study relied on literature, geological maps, Google Maps and Google Earth images.

SAHRA document 7/6/9/2/1 (SAHRA 2012) requires track records/logs from archaeologists not palaeontologists as palaeontologists concentrate on outcrops which may be recorded with a GPS. Isolated occurrences of rocks usually do not constitute an outcrop. Fossils can occur in dongas, as nodules, in fresh rock exposures, and in riverbeds. Finding fossils require the experience and technical knowledge of the professional palaeontologist, but that does not mean that an amateur can't find fossils. The geology of the region is used to predict what type of fossil and zone will be found in any particular region. Archaeozoologists concentrate on more recent fossils in the quaternary and tertiary deposits.

Assumptions and Limitations **1(i)**: -
The accuracy and reliability of the report **may be** limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.

2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. Lack of rocky outcrops.
6. Inaccessibility of site – not done.
7. Insufficient data from developer and exact lay-out plan for all structures - sufficient.

A Phase 1 Palaeontological Impact Assessment: Field Study will include:

1. Recommendations for the future of the site.
2. Background information on the project.
3. Description of the property of affected environment with details of the study area.
4. Description of the geological setting and field observations.
5. Background to palaeontology of the area.
6. Field Rating.
7. Stating of Significance (Heritage Value).

A Phase 2 Palaeontological Impact Assessment: Mitigation will include:

1. Recommendations for the future of the site.
2. Description of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan.
6. Possible declaration as a heritage site or Site Management Plan.

The National Heritage Resources Act No. 25 of 1999 further prescribes:

Act No. 25 of 1999. National Heritage Resources Act, 1999.
National Estate: 3 (2) (f) archaeological and palaeontological sites,
(i)(1) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens,
Heritage assessment criteria and grading: (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance;
(b) Grade 11: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and (c) Grade 111: Other heritage resources worthy of conservation.
SAHRA is responsible for the identification and management of Grade 1 heritage resources.
Provincial Heritage Resources Authority (PHRA) identifies and manages Grade 11 heritage resources.
Local authorities identify and manage Grade 111 heritage resources.

No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provincially protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provincial protection.
Archaeology, palaeontology and meteorites: Section 35.
(2) Subject to the provisions of subsection (8) (a), all archaeological objects, palaeontological material and meteorites are the property of the State.
(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources

authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available: Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

I. Description of significant fossil occurrences

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to determine due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot.

A wide range of possible fossil remains occur in the Cenozoic, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere. Deposits of cenozoic aged cave breccia associated with sinkholes and karst formations contain the remains of the ancestors of man (Groenewald and Groenewald 2014).

The threats are:

- Earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction and operational.

- The sealing-in or destruction of fossils by development, vehicle traffic, clearing, prospecting, mining, and human disturbance. See Description of the Geological Setting (F) above.

RECOMMENDATION AND CONCLUSION

J. Recommendation (1o,p,q)

a. There is no objection (see Recommendation B) to the development, it may be necessary to request a Phase 1: Palaeontological Impact Assessment: Field Study if fossils are found during excavating, clearing, trenching, or drilling as the palaeontological sensitivity is **HIGH**, but mostly **MODERATE**.
b. Preferred choice: Only one locality Alternative is presented and possible.
c. Care must be taken during the grading of roads, digging of foundations and removing topsoil, subsoil and overburden (see Executive Summary) or blasting of bedrock if applicable. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or clearing SAHRA must be notified. All drilling activities must be stopped, a 30 m no-go barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures.
d. This report must be submitted to NWPG together with the HIA.

Sampling and collecting:
Wherefore, a permit is needed from the South African Heritage Resources Agency (SAHRA / PHRA).

a. Objections: Cautious. See heritage value and recommendation.
b. Conditions of development: See Recommendation.
c. Areas that may need a permit: Yes.
d. Permits for mitigation: Needed from SAHRA/PHRA if fossils are found.

K. Conclusions

a. All the land involved in the development was assessed and none of the property is unsuitable for development (see Recommendation B).
b. All information needed for the Palaeontological Impact Assessment Study was provided by the Consultant. All technical information was provided by Nyamoki Consulting.
c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
d. The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, or drilling, SAHRA must be notified. All prospecting activities must be stopped, a 30 m no-go barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures, for example, shallow caves.
e. No consultation with parties was necessary (**1o,p,q).**
f. This project may benefit the economy, the growth of the community and social development in general.
g. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment (fossils) and adjacent areas as well as for safety and security reasons.

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Declaration (Disclaimer) (1b)

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological assessment. There are no circumstances that compromise the objectivity of me performing such work.

I accept no liability, and the client, by receiving this document, indemnifies me against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

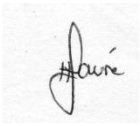
It may be possible that the Desktop Study may have missed palaeontological resources in the project area as the presence of outcrops are not known or visible due to vegetation while others may lie below the overburden of earth and may only be found once development commences.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.

POPI Act 2013 Statement

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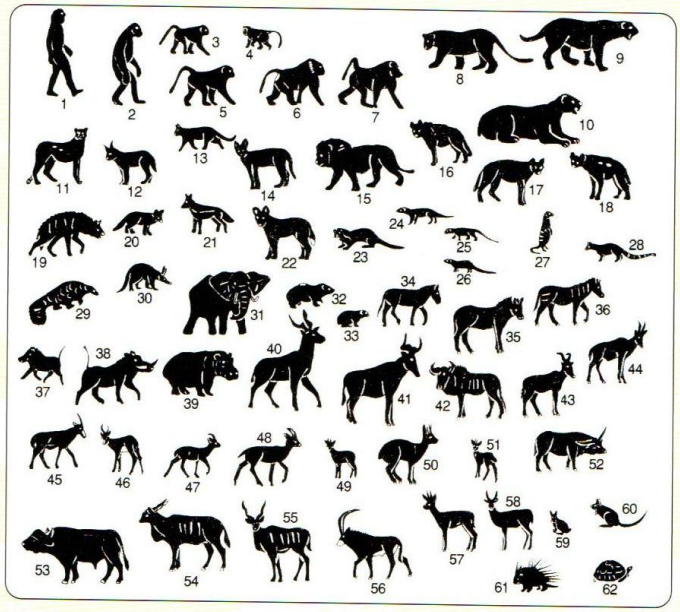


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Heidi Fourie

2026/08/05

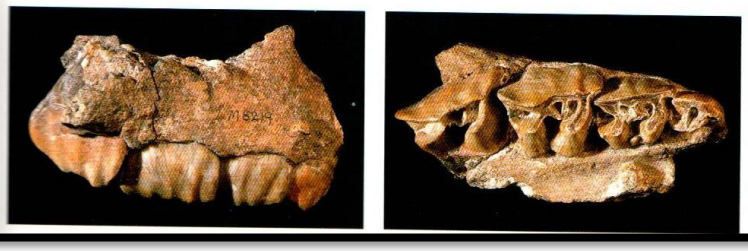
Appendix1: Examples of Quaternary age fossils (MacRae 1999).



Silhouette representation of the larger vertebrates whose remains are represented in Members 1-3 of the Swartkrans site on the outskirts of the town of Krugersdorp. Numbers after each taxon comprise minimum numbers of individuals represented in the remains of the lower bank (Member 1), hanging remnant (Member 1), Member 2 and Member 3 respectively.
Courtesy of Dr C.K. Brain.
Museum of Natural History, Pretoria

FAUNA FROM MEMBERS 1 - 3, SWARTKRANS (Makapanian Mammal Age)
Courtesy Dr B. Brain, - Museum of Natural History, Pretoria

1: *Homo erectus* (man) 1,3,2,0. **2**: *Australopithecus robustus* (robust apeman) 13,87,17,9. **3**: *Parapapio jonesi* 0,8,0,0. **4**: *Cercopithecoides* sp. 1,0,0,0. **5**: *Papio hamadryas robinsoni* 6,38,8,11. **6**: *Theropithecus oswaldi danieli* 1,17,1,14. **7**: *Dinopithecus ingens* 1,26,0,0. **8**: *Panthera pardus* (leopard) 4,12,2,5. **9**: *Dinofelis* sp. (false sabre-toothed cat) 0,1,0,0. **10**: *Megantereon* sp. (dirk-toothed cat) 0,1,0,1. **11**: *Acinonyx jubatus* (cheetah) 0,1,0,1. **12**: *Felis caracal* (caracal) 1,0,0,0. **13**: *Felis lybica* (African wild cat) 0,0,0,1. **14**: *Felis serval* (serval) 1,0,0,0. **15**: *Panthera leo* (lion) 1,1,0,0. **16**: *Hyaena brunnea* (brown hyaena) 1,4,2,3. **17**: *Chasmaporthetes nitidula* (hunting hyaena) 2,8,1,2. **18**:*Crocuta crocuta* (spotted hyaena) 0,2,1,1. **19**: *Proteles* sp. (large fossil aardwolf) 1,1,0,1. **20**: *Vulpes* sp. (fox) 0,2,0,3. **21**: *Canis mesomelas* (black-backed jackal) 3,4,4,5. **22**: Large canid gen. and sp. indet. 0,0,1,1. **23**: *Aonyx capensis* (Cape clawless otter) 2,0,1,2. **24**: *Atilax* sp. (water mongoose) 0,0,1,1. **25**: *Cynictis penicillata* (yellow mongoose) 0,0,1,1. **26**: *Herpestes ichneumon* (large grey mongoose) 1,0,0,0. **27**: *Suricata suricatta* (suricate) 0,0,2,1. **28**: *Genetta tigrina* (large-spotted genet) 0,0,0,1. **29**: *Manis* sp. (pangolin) 0,0,0,1. **30**: *Orycteropus afer* (antbear) 1,0,1,1. **31**: cf. *Elphas* sp. 2,0,0,1. **32**: *Procavia transvaalensis* (large fossil dassie) 3,8,3,5. **33**: *Procavia antiqua* (fossil dassie) 17,16,10,11. **34**: *Hipparion lybicum steytleri* (three-toed horse) 1,1,1,1. **35**: *Equus capensis* (giant Cape horse) 2,6,3,5. **36**: *Equus burchelli* (Burchell's zebra) 0,0,0,1. **37**: *Phacochoerus* sp. (warthog) 1,0,3,1. **38**: cf. *Tapinochoerus meadowsi* (large fossil pig) 1,7,1,1. **39**: *Hippopotamus* sp. (hippopotamus) 1,0,0,1. **40**: Giraffid 0,1,1,1. **41**: *Megalotragus* sp. (giant hartebeest) 0,3,1,3. **42**: *Connochaetes* sp. (wildebeest) 7,19,7,7. **43**: Medium alcelaphine: *Alcelaphus* sp. or *Beatragus* sp. (hartebeest) 3,22,3,6. **44**: *Rabaticerus porrocornutus* 0,2,0,0. **45**: *Damaliscus* sp. (blesbok) 2,4,6,6. **46**: *Antidorcas marsupialis australis* (springbok) 11,0,10,18. **47**: *Antidorcas recki* 0,6,2,1. **48**: cf. *Gazella* sp. (gazelle) 5,6,5,14. **49**: *Oreotragus oreotragus* (klipspringer) 1,0,0,1. **50**: *Oreotragus major* (fossil klipspringer) 0,1,0,0. **51**: *Raphicerus campestris* (steenbok) 1,0,1,3. **52**: *Makapania* sp. (musk ox) 0,3,0,0. **53**: *Syncerus* sp. (buffalo) 2,3,2,3. **54**: *Taurotragus oryx* (eland) 0,0,1,1. **55**: *Tragelaphus strepsiceros* (kudu) 0,4,0,1. **56**: *Hippotragus* cf. *niger* (sable) 0,0,1,3. **57**: *Pelea* sp. (rhebck) 0,2,0,2. **58**: *Redunca arundinum* (reedbuck) 0,1,0,0. **59**: Lagomorph gen. and sp. indet. (hare) 9,0,4,7. **60**: *Pedetes* sp. (springhare) 1,0,1,1. **61**: *Hystrix africaeaustralis* (porcupine) 2,2,1,2. **62**: *Chelonia* indet. (tortoise) 1,0,2,2.



Left: Teeth of the white rhino *Ceratotherium simum* from Makapansgat. **Right**: View from above shows the sharp cutting edges of the tooth row of this predominant grazer. Specimen 170 mm long.
In the collection of the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand, Johannesburg.
Photograph C.S. MacRae

Appendix 2: **Table 3:** Listing points in Appendix 6 of the Act and position in Report (in bold).

Section in Report	Point in Act	Requirement
B	1(c)	Scope and purpose of report
B	1(d)	Duration, date and season
B	1(g)	Areas to be avoided
D	1(ai)	Specialist who prepared report
D	1(aii)	Expertise of the specialist

F Figure 3	1(h)	Map
F	1(ni)	Authorisation
F	1(nii)	Avoidance, management, mitigation and closure plan
G Table 1	1(cA)	Quality and age of base data
G Table 2	1(cB)	Existing and cumulative impacts
G	1(f)	Details or activities of assessment
G	1(j)	Description of findings
H	1(e)	Description of methodology
H	1(i)	Assumptions
J	1(o)	Consultation
J	1(p)	Copies of comments during consultation
J	1(q)	Information requested by authority
Declaration	1(b)	Independent declaration
Appendix 3	1(k)	Mitigation included in EMPr
Appendix 3	1(l)	Conditions included in EMPr
Appendix 3	1(m)	Monitoring included in EMPr
D	2	Protocol or minimum standard

Appendix 3: Management Plan and Protocol for Chance Finds (**1k,l,m)**.
This section covers the recommended protocol for a Phase 2 Mitigation process as well as for reports where the Palaeontological Sensitivity is **LOW**; this process guides the palaeontologist / palaeobotanist on site and should not be attempted by the layman / developer.

The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities.

- As part of the Environmental Authorisation conditions, an Environmental Control Officer (ECO) will be appointed to oversee the construction/prospecting/mining activities in line with the legally binding Environmental Management Programme (EMPr) so that when a fossil is unearthed, they can notify the relevant department and specialist to further investigate.
- The ECO should familiarise him- or herself with the applicable formations and its fossils.
- The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities.
- It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO or during the digging and excavation phase of the development.
- The ECO must visit the site after clearing, drilling, excavations and blasting and keep a photographic record.
- The developer may be required to survey the areas affected by the development and indicate on plan where the construction / development / mining will take place. Trenches may have to be dug to ascertain how deep the sediments are above the bedrock (can be a few hundred metres). This will give an indication of the depth of the topsoil, subsoil, and overburden, if need be, trenches should be dug deeper to expose the interburden.
- For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation. Construction workers must be informed that this is a no-go area.
- A representative sample must be put aside for inspection. This sample can be sent to a recognised palaeontological repository for curation and safe keeping after the permit was obtained.

- The palaeontological impact assessment process presents an opportunity for identification, access and possibly salvage of fossils and add to the few good localities. Mitigation can provide valuable onsite research that can benefit both the community and the palaeontological fraternity. A Phase 2 study is very often the last opportunity we will ever have to record the fossil heritage within the development area. Fossils excavated will be stored at a National Repository.

Mitigation will involve recording, rescue and judicious sampling of the fossil material present in the layers sandwiched between the geological / coal layers. It must include information on number of taxa, fossil abundance, preservational style, and taphonomy. This can only be done during mining or excavations. In order for this to happen, in case of coal mining operations, the process will have to be closely scrutinised by a professional palaeontologist / palaeobotanist to ensure that only the coal layers are mined, and the interlayers (siltstone and mudstone) are surveyed for fossils or representative sampling of fossils are taking place.

The palaeontological impact assessment process presents an opportunity for identification, access and possibly salvage of fossils and add to the few good plant localities. Mitigation can provide valuable onsite research that can benefit both the community and the palaeontological fraternity.

A Phase 2 study is very often the last opportunity we will ever have to record the fossil heritage within the development area. Fossils excavated will be stored at a National Repository.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include (SAHRA) -

1. Recommendations for the future of the site.
2. Description and purpose of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan and map.
6. Possible declaration as a heritage site or Site Management Plan.
7. Stakeholders.
8. Detailed report including the Desktop and Phase 1 study information.
9. Annual interim or progress Phase 2 permit reports as well as the final report.
10. Methodology used.

Three types of permits are available: Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

The Palaeontological Society of South Africa (PSSA) does not have guidelines on excavating or collecting, but the following is suggested:

1. The developer needs to clearly stake or peg-out (survey) the areas affected by the mining/ construction/ development operations and dig representative trenches and if possible, supply geological borehole data.
2. When clearing topsoil, subsoil or overburden and hard rock (outcrop) is found, the contractor needs to stop all work.
3. A Palaeobotanist / palaeontologist (contact SAHRIS for list) must then inspect the affected areas and trenches for fossiliferous outcrops / layers. The contractor / developer may be asked to move structures and put the development on hold.
4. If the palaeontologist / palaeobotanist is satisfied that no fossils will be destroyed or have removed the fossils, development and removing of the topsoil can continue.

5. After this process the same palaeontologist / palaeobotanist will have to inspect and offer advice through the Phase 2 Mitigation Process. Bedrock excavations for footings may expose, damage or destroy previously buried fossil material and must be inspected.
6. When permission for the development is granted, the next layer can be removed, if this is part of a fossiliferous layer, then with the removal of each layer of sediment, the palaeontologist / palaeobotanist must do an investigation (a minimum of once a week).
7. At this stage the palaeontologist / palaeobotanist in consultation with the developer / mining company must ensure that a further working protocol and schedule is in place. Onsite training should take place, followed by an annual visit by the palaeontologist / palaeobotanist.

SAHRA Documents:
Guidelines to Palaeontological Permitting Policy.
Minimum Standards: Palaeontological Component of Heritage Impact Assessment reports.
Guidelines for Field Reports.
Palaeotechnical Reports for all the Provinces.

RESULT OF THE IMPACT ASSESSMENT ON IDENTIFIED RESOURCES

Appendix 4: Impact Statement
The development footprint is situated on a geological layer with a **MODERATE** palaeontological sensitivity. The nature of the impact is the destruction of Fossil Heritage. Loss of fossil heritage will have a negative impact.
In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be permanent. The loss of resources occurs but natural cultural and social processes continue, albeit in a modified manner. With Mitigation the impact will be moderate and the cumulative impact is low. Impacts on palaeontological heritage during the construction and preconstruction phase could potentially occur but are regarded as having a moderate possibility. The significance of the impact occurring will be:

Impact	**Pre-Mitigation**	**Post-Mitigation**
The extent of the impact only extends in the region of the development activity footprint and may include transport routes.	2	2
The expected duration of the impact is assessed as potentially permanent.	5	5
The intensity/magnitude of the impact is moderate as it may continue in a modified way.	8	8
The probability of the impact occurring will be low.	3	3
S = (E+D+M) P, S = (2+5+8)3	Medium	
	S = 45 Medium (30-60).	S = 45 (30-60)
The Impact on geology as a whole is Medium and cannot be mitigated, comparing managed versus unmanaged scenarios is meaningless.		Medium

Mitigation measures:

1. For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation. Construction workers must be informed that this is a no-go area.
2. A representative sample must be put aside for inspection. This sample can be sent to a recognised palaeontological repository for curation and safe keeping after the permit was obtained.
3. Outcrops should be avoided and existing roads should be used.
4. The Management Plan includes, managing chance finds, including, at minimum, a requirement that employees or contractors shall not further disturb any chance find until an evaluation by competent professionals is made and actions consistent with the requirements of Chapter 3.7 (*IRMA Standard)*; managing potential impacts to cultural heritage from contractors and visitors; allowing continued access to cultural sites, subject to SAHRA legislation.
5. Preferred choice: The development may go ahead.

All phases of the development will have the same impact.

HYDROLOGICAL ASSESSMENT REPORT FOR THE PROPOSED DIAMOND, DIAMOND (ALLUVIAL), DIAMOND (KIMBERLITE), AGGREGATE, LEAD, MANGANESE ORE, LIMESTONE, SAND AND GOLD ORE MINING PROJECT NEAR MAHIKENG, NORTHWEST PROVINCE.

PREPARED BY:

Matsipane Projects (Pty) Ltd

PREPARED FOR:

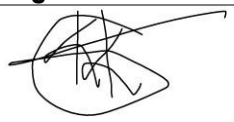
G and E Global (Pty) Ltd

AUGUST 2026

SPECIALIST DECLARATION

I, Khiba Katleho (BSc. Hons Geohydrology, UFS), declare that I:

- Consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the study and compiling this report, I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being a member of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings, and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant.
- I have expertise and experience in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, regulations and all other applicable legislation.
- I realize that a false declaration is an offense in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Verification	Capacity	Signature	Date
Author	K Khiba: BSc Hydrology & Water Resources Management, BSc (Hons) Geohydrology		Aug 2026
Reviewer			Aug 2026

EXECUTIVE SUMMARY

Matsipane Projects (Pty) Ltd was appointed to undertake a baseline floodline assessment for the proposed alluvial diamond mining project on Portions 1–10, 12 and the Remaining Extent of Farm Colga 132 JQ, located approximately 11.5 km southeast of Mahikeng in the North West Province. The assessment forms part of the specialist studies required to support the Mining Right Application, Environmental Authorisation, Waste Management Licence, and Water Use Licence Application. The proposed operation will employ opencast mining with progressive rehabilitation to minimise the environmental footprint.

The study assessed the potential flood risk associated with the Molopo River, Potfonteinspruit and the surrounding drainage network using HEC-HMS for hydrological analysis, HEC-RAS for hydraulic modelling, and QGIS for floodline delineation. Design flood events for the 1:50-, and 1:100-year return periods were simulated using design rainfall data representative of the study area.

Hydraulic modelling indicates that the 1:50-year flood event is characterised by a peak discharge of approximately 500 m^3/s, while the 1:100-year event increases to approximately 2,000 m^3/s. The larger flood event results in greater water surface elevations, wider floodplain inundation, higher flow velocities, and increased erosion potential, particularly within confined river reaches. Despite these increases, flooding remains largely confined to the natural river corridors and associated floodplains.

Floodline mapping demonstrates that the majority of the proposed mining right is situated outside both the 1:50-year and 1:100-year flood extents. The primary flood risk is limited to the southern boundary of the mining area where Potfonteinspruit traverses the property. Consequently, mining activities can proceed with a low overall flood risk, provided that permanent infrastructure is located outside the 1:100-year floodline and appropriate stormwater management, erosion control, and flood mitigation measures are implemented.

The results provide a sound technical basis for project planning and support the proposed Mining Right, Environmental Authorisation, Waste Management Licence, and Water Use Licence Application, subject to implementation of the recommended mitigation measures and ongoing monitoring of drainage systems throughout the life of the mine.

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1. INTRODUCTION

Matsipane Projects (Pty) Ltd was contracted by NDI Geological Consulting (Pty) Ltd to conduct a baseline hydrological assessment for the proposed alluvial diamond mining on behalf of G and E Global . G and E Global (Pty) Ltd ("G and E Global") has applied to the Department of Mineral and Petroleum Resources (DMPR) for a Mining Right (MR) and associated Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence Application (WULA) over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ in the Mahikeng Magisterial District, North West Province.

The proposed mining project entails the extraction of Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore over an area of approximately 3927 hectares situated approximately 11.5 km southeast of Mahikeng within the Ngaka Modiri Molema District Municipality. The Mining Right application was accepted by the DMPR on 06 May 2026. The applicant was subsequently notified of the acceptance on 12 May 2026.

The project area is located approximately 11.5 km southeast of Mafikeng on a portion of Part 4 of the Colga 132 farm JO. The assessment forms part of the environmental and water resource planning process required to support the mining permit and associated regulatory authorisations. Due to the proximity of the site to the Polfonteinspruit and Molopo River and associated alluvial systems, there is a need to evaluate the potential impact of flooding on the mining permit and mining right operations. A site visit was conducted on 28th July 2026 to assess the condition of water bodies in and around the project area.

1.1 Project description

The proposed mining operation will utilise an opencast mining method due to the shallow nature of the Colga mineral deposit. The most significant impact on mining cost is the stripping ratio. The Colga deposit is shallow and therefore will not require extensive waste stripping. This will keep fuel and maintenance costs per carat significantly lower than deep-level mining operations. Although the opencast mining method is highly mechanised, it remains cost effective because production is reached early and production volumes are high. The mining operation will utilise a progressive rehabilitation approach through roll-over mining practices, where waste material from the active mining pit is backfilled directly into previously mined-out pits. This approach reduces haulage distances, fuel consumption and final mine closure costs while allowing concurrent rehabilitation.

1.1.1 Mineral processing flow

- Sizing:

Raw gravel will be fed into a vibrating grizzly. Material greater than 40 mm, regarded as waste material, will be discarded immediately to optimise fuel efficiency.

- Liberation:

Material smaller than 40 mm will be fed into a rotary scrubber. This process is critical to clean and liberate diamonds by removing calcium and clay coatings that may hinder recovery.

- Pan Separation Process:

The washed gravel will be fed into a 14-foot diamond pan. A central shaft rotates triangular tines through a slurry of water and fine sand. Lighter waste material, such as quartz and sand is discharged via a central weir while heavier minerals, including diamonds and garnet indicators, migrate to the outer wall.

- Tailings Management:

Tailings and waste material will be dewatered using dewatering screens before being backfilled into mined-out areas to facilitate concurrent rehabilitation.

1.1.2 Proposed mining infrastructure

- A 1-hectare mineral processing plant at each mining section, including a slimes dam;
- A central processing plant;
- Slime dams;
- Water abstraction infrastructure, including transfer pipelines from borehole areas;
- Ablution facilities;
- Septic conservancy tanks at each mining section for wastewater collection and storage;
- Parking areas;
- Water storage tanks and dams;
- Diesel storage tanks and fuel trailers;
- Generators and associated power cables;
- Workshop facilities;
- Laydown areas;
- Topsoil stockpiles;
- Tailings and waste dumps;
- Office (mobiles);
- Kitchen facilities (mobiles); and
- Labour quarters (mobiles).
- Final infrastructure layouts and positions will be confirmed during the Environmental
- Impact Assessment Phase following completion of specialist investigations and
- engineering design inputs.

1.1.3 Legislative requirements

The proposed project requires:

- A Mining Right in terms of Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);

- Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A Waste Management Licence in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008); and
- A Water Use Licence Application in terms of the National Water Act, 1998 (Act No. 36 of 1998), where applicable.
- The project triggers activities listed under Listing Notices 1, 2 and 3 of the NEMA EIA Regulations, requiring a full Scoping and Environmental Impact Assessment process.

2. SITE DESCRIPTION

2.1 Locality

The project area is located approximately 11.5 km southeast of Mafikeng on a portion of Part 4 of the Colga 132 farm JO. The property is surrounded by several rural settlements, including Welverdiend, Schoongezicht, Bethhel, Springbokpan, and Slurry, indicating a predominantly agricultural and rural land-use setting. A number of seasonal drainage lines and rivers traverse the surrounding landscape, with one drainage feature crossing the southern portion of the mining right, highlighting the need to consider surface water management during mining activities. The locality map also shows that the project is well connected to existing transport infrastructure while remaining outside the main urban area of Mahikeng, making it suitable for mining operations with relatively good logistical access.

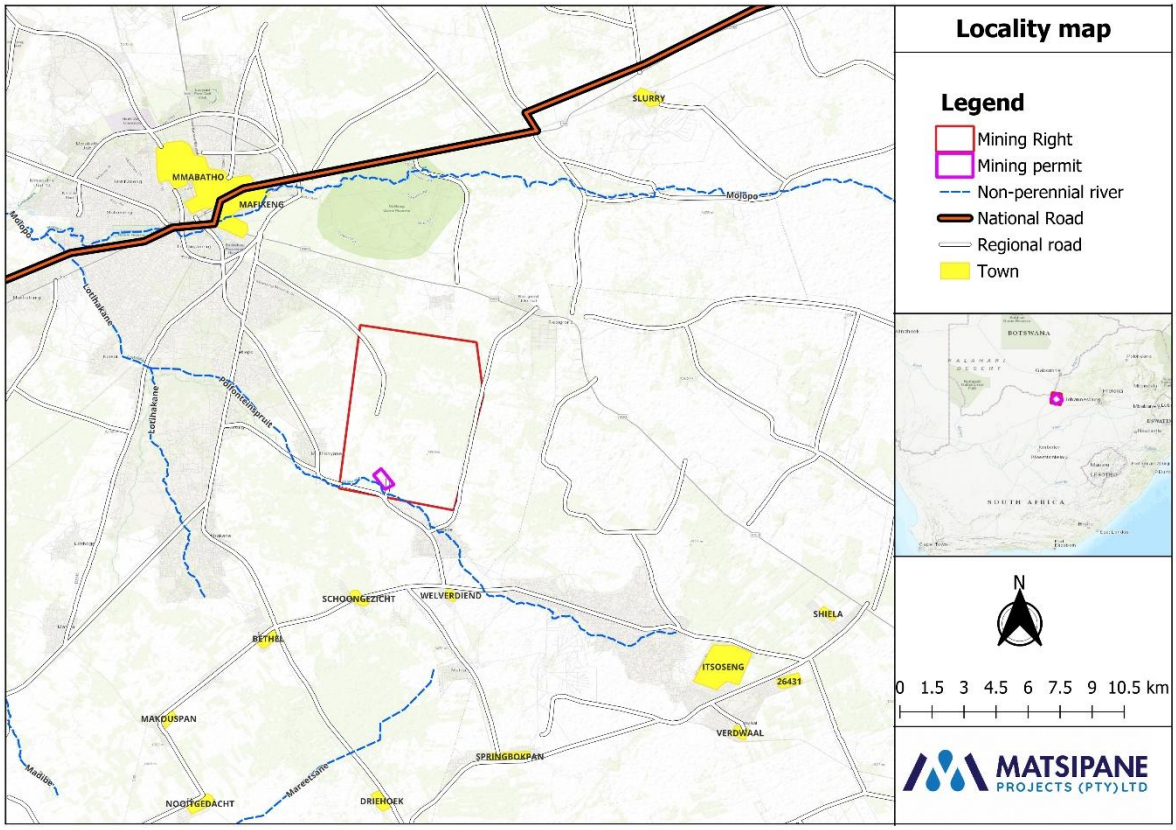


Figure 1: Locality map

2.2 Topography

The project area is characterised by gently undulating to moderately sloping terrain, with elevations ranging from approximately 1305 mamsl along the western drainage corridors to about 1395 mamsl across the mining right, increasing further to over 1470 mamsl toward the eastern part of the study area. The mining right is therefore located on an elevated plateau, with a gradual regional rise in elevation from west to east.

The contour pattern indicates that the land surface generally slopes from the east and southeast towards the west and northwest, directing surface runoff towards the Potfonteinspruit, which flows along the southern boundary of the mining right before joining the Lotlhakane River further downstream. The relatively wide spacing of the contours within the mining right suggests gentle gradients, whereas the closer contour spacing to the east reflects steeper terrain associated with elevated hills or ridges.

The topography exerts a strong influence on the local drainage system, with rainfall runoff naturally concentrating within the ephemeral drainage channels during storm events. Owing to the moderate relief and absence of deeply incised valleys within the mining right, the area is not expected to experience significant topographic constraints for mining development. However, appropriate stormwater management, erosion control measures, and protection of

the Potfonteinspruit drainage channel will be essential to minimise sediment transport and preserve downstream water quality during mining operations. (Figure 2)

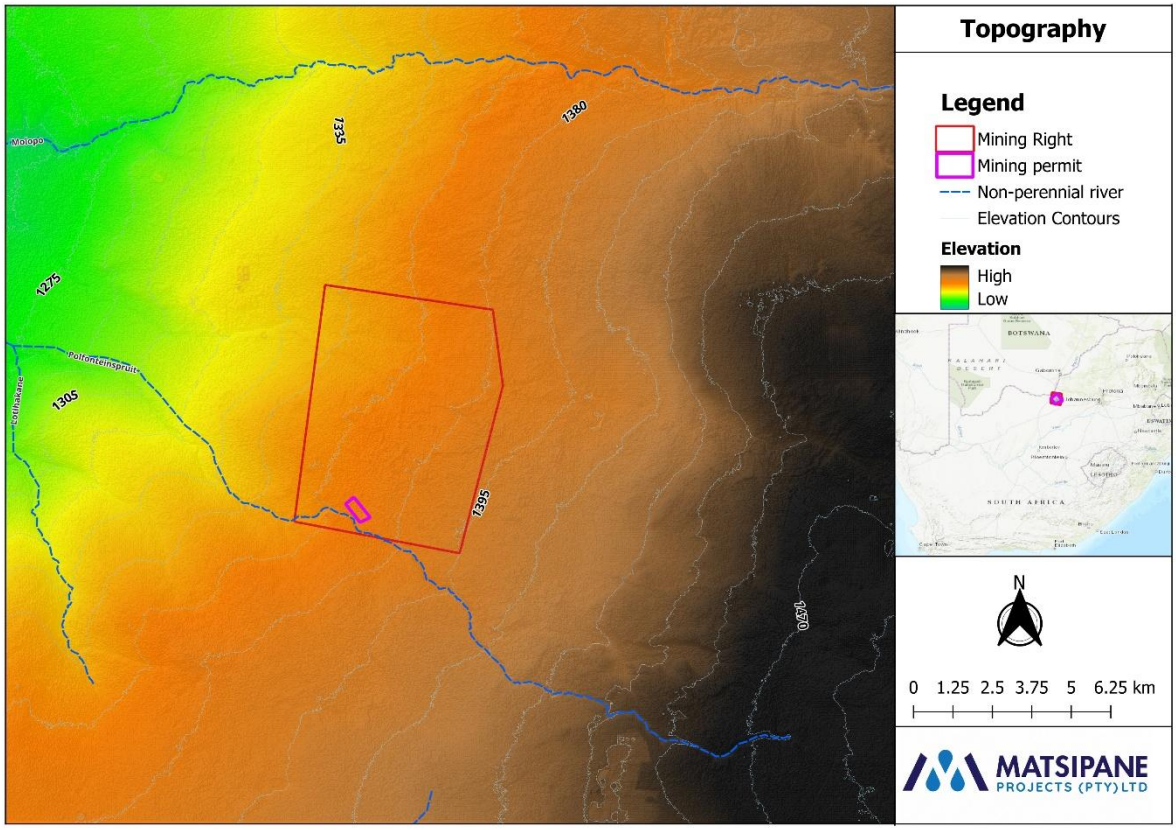


Figure 2: Topographic map

2.3 Hydrology and drainage

The project area is located within the Crocodile (West) and Marico Water Management Area (WMA) and falls predominantly within the D41A Quaternary Catchment, with adjacent catchments including D41B, C31A, C31B, C31C, C31D, A31C, and A31D. The regional drainage network is controlled by the Molopo River, a perennial river situated north of the project area, which forms one of the principal drainage features within the WMA. The Lotlhakane River and Potfonteinspruit are the main tributaries influencing local surface water flow, while several non-perennial streams traverse the surrounding landscape, conveying runoff primarily during and immediately after rainfall events.

The mining right is intersected along its southern boundary by Potfonteinspruit, an ephemeral drainage channel that ultimately contributes flow to the Lotlhakane River, which in turn drains into the Molopo River. Surface runoff across the site is therefore generally directed northwards and north-westwards through this interconnected drainage system. Due to the semi-arid climate of the region, streamflow in the local drainage channels is highly seasonal, with most channels remaining dry for much of the year and flowing only following significant rainfall events.

Consequently, the drainage system is dominated by episodic runoff rather than sustained baseflow, making stormwater management and erosion control important considerations for the proposed mining activities to prevent sediment transport and protect downstream water resources. (Figure 3)

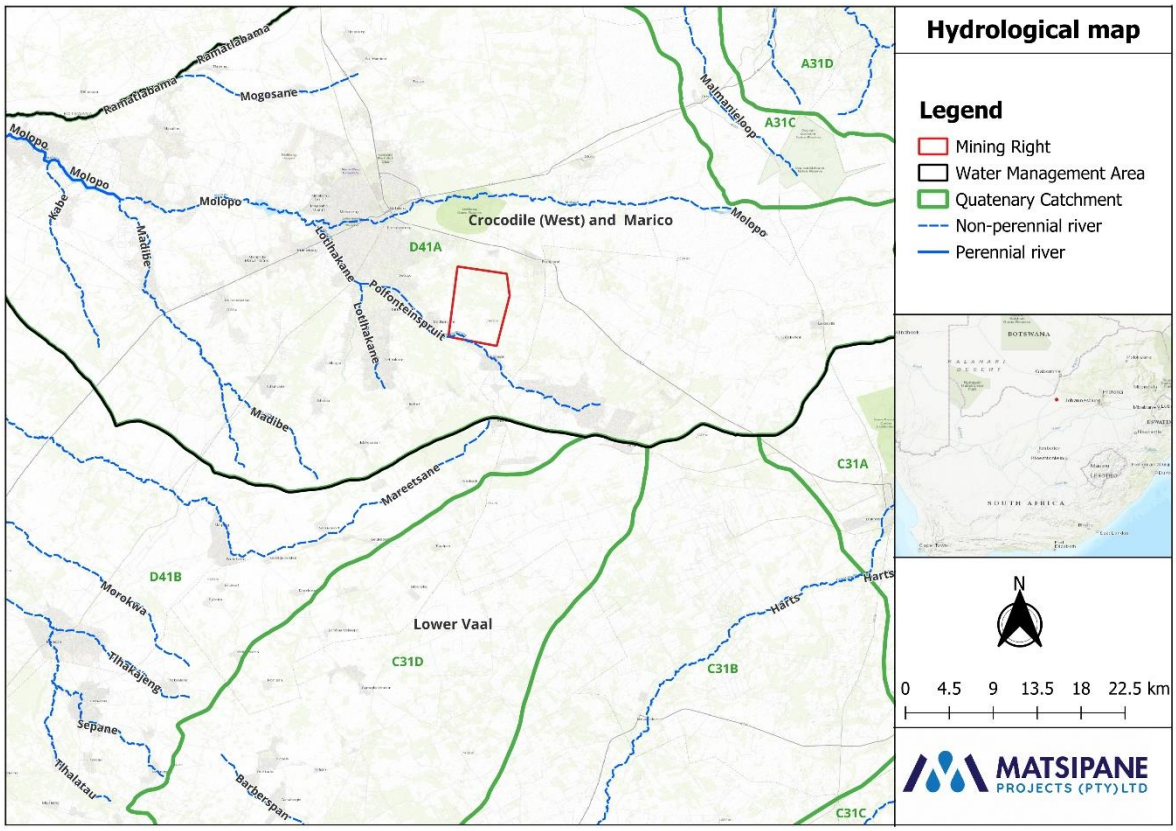


Figure 3: Drainage map

2.4 General geology

The project area is situated within the Transvaal Supergroup of the Kaapvaal Craton, a region characterized by sedimentary and volcano-sedimentary rocks of Proterozoic age that host significant manganese and iron ore mineralisation. Based on the geological map, the mining right is located predominantly on the Allanridge Formation, while the surrounding area comprises the Kalahari Group, Malmani Subgroup, Black Reef Formation, Dominion Group, and localized Quaternary deposits.

The Allanridge Formation, which underlies most of the mining right, consists mainly of volcanic rocks, including basaltic and andesitic lavas, with intercalated volcaniclastic units. These rocks generally exhibit low primary porosity but may develop secondary permeability through weathering, jointing, and fracturing. To the north, the area is overlain by unconsolidated sediments of the Kalahari Group, comprising sands, silts, gravels, and calcrete that blanket much of the regional landscape. Along the southern portion of the project area, Quaternary

alluvial deposits occur adjacent to the drainage channels and consist of unconsolidated sand, silt, and gravel derived from recent fluvial processes.

East and southeast of the mining right, the Malmani Subgroup is exposed. This unit comprises thick successions of dolomite and limestone and is well known for the development of karst features, solution cavities, and productive groundwater aquifers. The Black Reef Formation, occurring locally south and southwest of the project area, consists predominantly of quartzite sandstones and conglomerates that mark the basal unit of the Transvaal Supergroup. Small outcrops of the older Dominion Group, composed mainly of volcanic rocks and associated sedimentary units, are present to the north of the project area.

Overall, the geology of the area reflects the transition between the unconsolidated Kalahari cover and the underlying Proterozoic bedrock of the Transvaal Supergroup. This geological framework controls the occurrence of mineral resources, groundwater movement, and weathering processes within and around the mining right, with groundwater expected to occur primarily within weathered and fractured bedrock and, locally, within the unconsolidated alluvial deposits associated with drainage channels.

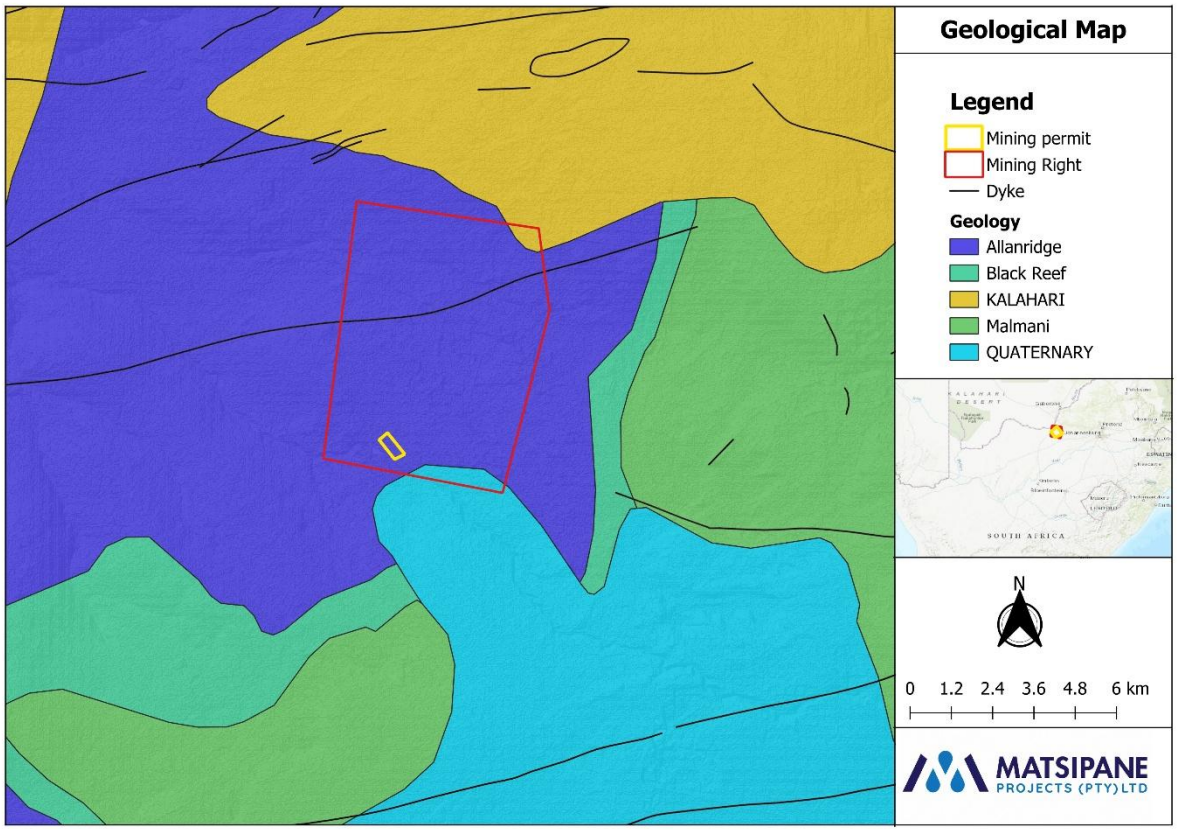


Figure 4: Geological map

2.5 Lithology

The lithological map indicates that the mining right is underlain predominantly by andesite, which forms the principal bedrock across the project area. Andesite is a fine-grained

intermediate volcanic rock with generally low primary porosity and permeability; however, groundwater occurrence is typically associated with secondary structures such as weathered zones, joints, fractures, and faults. The extensive andesitic bedrock provides the primary host rock for the proposed mining activities.

To the north of the mining right, the andesite is overlain by unconsolidated sand deposits associated with the Kalahari Group. These aeolian sands are generally loose to moderately compact, highly permeable, and capable of storing limited quantities of shallow groundwater where sufficient saturation occurs. Along the southern portion of the project area and adjacent drainage channels, sedimentary deposits occur, consisting mainly of unconsolidated to semi-consolidated alluvial materials such as sand, silt, gravel, and clay deposited by fluvial processes.

Further to the east and southwest of the mining right, quartzite units are present. Quartzite is a hard, well-cemented metamorphic rock with negligible primary porosity, although groundwater may occur within fractures and weathered zones. To the east, dolomite forms a significant lithological unit. The dolomite is characterized by dissolution features, fractures, and karst development, making it one of the most productive regional aquifers due to its high secondary permeability.

Overall, the lithological succession reflects a transition from volcanic andesitic bedrock within the mining right to unconsolidated Kalahari sands, alluvial sediments, quarzitic ridges, and karstic dolomite in the surrounding region. From a hydrogeological perspective, groundwater potential within the mining right is expected to be controlled primarily by the degree of weathering and fracturing within the andesite, while the highest groundwater yields in the surrounding area are likely to occur within the fractured and solution-enhanced dolomite aquifers.

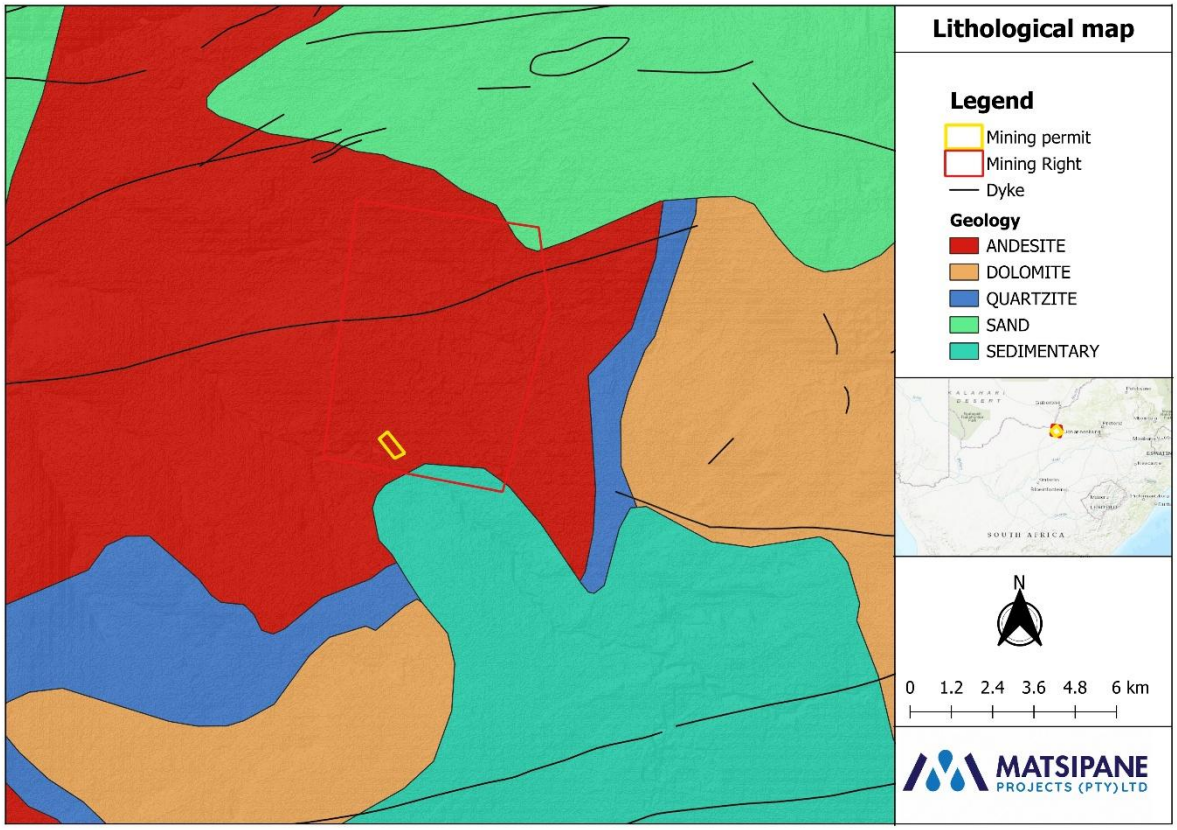


Figure 5: Lithological map

2.6 Climate

The project area is located within the semi-arid climatic region of the North West Province, characterised by hot summers, cool to mild winters, and highly seasonal rainfall. The climate is typical of the western interior of South Africa, where rainfall is concentrated during the summer months (October to March), while winters (May to August) are generally dry with low humidity and little or no precipitation. The area experiences high evaporation rates throughout the year, often exceeding annual rainfall, resulting in a persistent moisture deficit and limited natural recharge to groundwater systems.

Mean annual rainfall in the project area ranges between 450 and 550 mm, with most precipitation occurring as short-duration, high-intensity convective thunderstorms during the summer months. These rainfall events generate rapid surface runoff into the ephemeral drainage channels, including the Potfonteinspruit and its associated tributaries, while prolonged dry periods dominate for the remainder of the year. The rainfall pattern contributes to episodic streamflow and limited sustained baseflow within local watercourses.

Temperatures are characterised by hot summers, with average daily maximum temperatures ranging from 30°C to 35°C and occasionally exceeding 38°C during heatwave conditions. Winters are generally mild during the day, with maximum temperatures of 18–24°C, while minimum temperatures may fall below 5°C, and occasional frost may occur during June and

July. The combination of high summer temperatures and low relative humidity results in potential evaporation rates exceeding 1800–2000 mm per annum, substantially greater than the annual precipitation.

2.7 Design Rainfall

Design rainfall depths for the area were calculated using the Design Rainfall software for South Africa (Smithers & Schulze, 2002). The design rainfall depths for the 1:20-year, 1:50-year and 1:100-year return periods can be seen in Table 1. These rainfall depths were used as input in calculating storm peak flows using deterministic methods such as the Rational Method, Empirical Method (Midgley and Pitman (MIPI), and Standard Design Floods (SDF) . The calculated peak flows were then used in HEC-RAS to develop 1:20, 1:50 and 1:100-year storm event models(Table 1).

Table 1:Design Rainfall Depth

DURATION	2 YR	5 YR	10 YR	20 YR	50 YR	100 YR
5 MIN	8	12	15	18	22	26
10 MIN	12	18	22	26	32	38
15 MIN	15	22	27	32	40	47
30 MIN	22	32	40	48	60	70
1 HR	28	40	50	60	75	90
2 HR	35	50	65	80	100	115
3 HR	42	60	75	90	115	135
6 HR	55	75	95	115	140	165
12 HR	70	95	120	145	175	205
24 HR	85	110	135	165	200	230

3. FLOODLINE INVESTIGATIONS

3.1 Methodology and Software

Floodline delineation for the study area was undertaken using an integrated hydrological and hydraulic modelling approach in accordance with GN704. Catchment characteristics and stream networks were derived using HEC-HMS, while hydraulic analysis was performed using HEC-RAS in a one-dimensional steady flow configuration to simulate flood behaviour. Terrain data was obtained from the Copernicus Global DEM, and all spatial processing, terrain analysis, and floodline mapping were conducted in QGIS. Design flood events corresponding to the 1:20, 1:50, and 1:100 year return periods were simulated, and resulting water surface elevations were exported to the GIS environment to delineate flood extents.

3.2 Roughness Coefficients

Hydraulic resistance within the river channel and adjacent floodplain was represented using Manning's roughness coefficients (n-values) in HEC-RAS. These coefficients account for energy

losses due to surface roughness, vegetation, channel irregularities, and obstructions, and are critical in controlling flow velocity and water surface elevations during simulation

Table 2: Manning's n friction coefficients

	River	Reach	River Station	Frctn (n/K)	n #1	n #2	n #3
1	Molopo	River	29922	n	0.01	0.001	0.00769
2	Molopo	River	28108	n	0.001	0.0001	0.000769
3	Molopo	River	26160	n	0.05	0.005	0.0385
4	Molopo	River	22534	n	0.002	0.0002	0.00154
5	Molopo	River	18478	n	0.1	0.01	0.0769
6	Molopo	River	15274	n	0.5	0.05	0.384615
7	Molopo	River	12721	n	0.34	0.034	0.261539
8	Molopo	River	10588	n	0.007	0.0007	0.00538
9	Molopo	River	7984	n	1	0.1	0.769231
10	Molopo	River	5250	n	0.006	0.0006	0.00462
11	Molopo	Molopo_DS	501	n	0.023	0.56	0.556
12	Molopo	Molopo_DS	222	n	0.05	0.005	0.0385
13	Molopo	Molopo_DS	87	n	0.023	0.012	0.023
14	Polfonteinspruit	Reach	26949	n	0.002	0.0002	0.00154
15	Polfonteinspruit	Reach	25055	n	0.1	0.01	0.0769
16	Polfonteinspruit	Reach	21696	n	0.5	0.05	0.384615
17	Polfonteinspruit	Reach	19078	n	0.34	0.034	0.261539
18	Polfonteinspruit	Reach	15774	n	0.007	0.0007	0.00538
19	Polfonteinspruit	Reach	12145	n	0.22	0.1	0.769231
20	Polfonteinspruit	Reach	8154	n	0.002	0.0002	0.00154
21	Polfonteinspruit	Reach	4871	n	0.1	0.01	0.0769
22	Polfonteinspruit	Reach	2682	n	0.5	0.05	0.384615
23	Polfonteinspruit	Reach	1279	n	0.34	0.034	0.261539

3.3 Peak Flow Calculations

Peak flow estimation for the catchment was undertaken using HEC-HMS, where the Soil Conservation Service (SCS) Unit Hydrograph method was applied to simulate the rainfall-runoff response. This method enables the transformation of excess rainfall into a runoff hydrograph by incorporating catchment characteristics such as land use, soil properties, and antecedent moisture conditions through the Curve Number (CN) approach. The model was configured using appropriate design rainfall inputs and time of concentration parameters to generate peak discharges for the selected return periods.

The rational formula (Equation 1) was selected also for since the subbasins are all less than 15 square kilometres. The basis of the relationship was the law of conservation of mass and the hypothesis was that the flow rate was directly proportional to the size of the contributing area and the rainfall intensity.

$$\boldsymbol{Q = \frac{CIA}{3.6}} \qquad \text{Equation 1}$$

Where:

	Q	is the peak flow (m3/s)
	C	is the run-off coefficient
	I	is the average rainfall intensity over the catchment (mm/hour)
	A	is the effective area of the catchment (km2)
	3.6	is the conversion factor

The rational formula's application was based on the following assumptions: -

- The rainfall has a uniform areal distribution across the total contributing catchment
- The rainfall has a uniform temporal distribution for at least duration equal to the time of concentration(Tc).
- The peak discharge occurs when the total catchment contributes to the flow at the exit, which occurs at the end of the critical storm duration, or the time of concentration(Tc).
- The run-off coefficient remains constant throughout the duration of the storm
- The return period of the peak flow, T, is the same as that of the rainfall intensity.

3.4 Run-off Coefficients

There is no objective theoretical method for determining the run-off coefficient of a catchment (SANRAL, 2013) and as a result the subjective elements of experience and engineering judgement play a very important role in the determination of the run-off coefficient. The

SANRAL Drainage manual was used to show how Table 6 can be used to calculate the run-off coefficient in this investigation.

Table 3: Run-off coefficients

Rural (C1)					Urban (C2)	
Component	Classification	Mean annual rainfall (mm)			Use	Factor
		< 600	600 - 900	> 900		
Surface Slope (Cs)	Vleis and Pans (<3%)	0.01	0.03	0.05	Lawns • Sandy, Flat (<2%) • Sandy, steep (>7%) • Heavy soil, flat (<2%) • Heavy soil, steep (<7%) Residential Area • Houses • Flats Industry • Light Industry • Heavy Industry Business • City Centre • Suburban • Streets • Maximum Flood	 0.05 – 0.10 0.15 – 0.20 0.13 – 0.17 0.25 – 0.35 0.30 – 0.50 0.50 – 0.70 0.50 – 0.80 0.60 – 0.90 0.70 – 0.95 0.50 – 0.70 0.70 – 0.95 1.00

3.5 Hydraulic results

The hydraulic modelling results demonstrate a significant increase in flood magnitude between the 1:50-year (500 m³/s) and 1:100-year (2,000 m³/s) flood events, with corresponding

increases in water surface elevations, flow areas, flood widths, and flow velocities along the river reach. Water surface elevations increase by approximately 0.7–1.5 m between the two design events, indicating greater inundation of the floodplain during the 1:100-year flood. The Energy Grade (E.G.) elevations consistently remain above the water surface elevations, confirming stable hydraulic conditions throughout the modelled reach.

Flow velocities during the 1:50-year flood range from approximately 1.15 to 4.48 m/s, while the 1:100-year flood produces slightly higher velocities of 2.47 to 4.63 m/s. The highest velocity occurs at River Station 29922, where the confined channel geometry accelerates flow. Conversely, the lowest velocity is observed at River Station 15274, where the wide floodplain allows floodwaters to spread laterally, reducing flow energy. These results indicate that erosion potential is greatest within the confined upstream reaches, whereas sediment deposition is more likely within the broader downstream floodplain sections.

The hydraulic geometry also changes substantially between the two flood scenarios. Cross-sectional flow areas increase from approximately 152–576 m² during the 1:50-year event to between 454 and 1,307 m² during the 1:100-year event. Similarly, floodplain widths expand considerably, reaching a maximum width of approximately 894 m at River Station 10588 during the 1:100-year event. These increases confirm that the additional discharge is accommodated primarily through floodplain expansion rather than by increases in water depth alone.

The Froude numbers indicate that flow conditions are predominantly subcritical ($Fr < 1$) along most of the river system, reflecting relatively tranquil flow controlled by downstream hydraulic conditions. However, localized sections exhibit critical to supercritical flow, particularly at River Station 12721, where the Froude number reaches 6.91 during the 1:50-year event and decreases to 1.24 during the 1:100-year event. This behaviour suggests a hydraulic constriction or steep channel gradient capable of producing rapid, high-energy flow and localised erosion. Additional near-critical conditions occur at River Stations 29922 and 28108, where Froude numbers exceed unity, indicating transitional flow conditions.

Overall, the hydraulic analysis shows that although the 1:100-year flood produces substantially greater inundation extents and floodplain storage than the 1:50-year event, the river system remains hydraulically stable over most of its length. The principal hydraulic hazards are associated with localized high-velocity reaches and channel constrictions, where erosion, bank instability, and scour are likely to occur during major flood events. These findings support the flood hazard maps, which show that flooding is largely confined to the natural river corridors, while confirming that infrastructure and mining activities should be located outside the mapped floodplain and appropriate buffers maintained along the river to minimise flood risk and protect the integrity of the watercourse.

Table 4: Hydraulic model results

REACH	RIVER STA	PROFILE	Q TOTAL	MIN CH EL	W.S. ELEV	CRIT W.S.	E.G. ELEV	E.G. SLOPE	VEL CHNL	FLOW AREA	TOP WIDTH	FROUDE # CHL
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
RIVER	29922	1:50-year	500	1396.05	1397.42	1397.42	1397.98	0.000047	4.48	356.25	359.79	1.97
RIVER	29922	1:100-year	2000	1396.05	1398.86	1398.86	1399.65	0.000018	4.63	1113.74	733.41	1.37
RIVER	28108	1:50-year	500	1386.23	1387.53	1387.53	1387.91	0	3.12	414.92	539.91	1.12
RIVER	28108	1:100-year	2000	1386.23	1388.56	1388.56	1389.23	0	4.21	1037.15	716.07	1.31
RIVER	26160	1:50-year	500	1375.36	1377.05	1377.05	1377.4	0.000264	2.63	212.07	417.3	0.98
RIVER	26160	1:100-year	2000	1375.36	1378.05	1378.05	1378.79	0.000198	3.97	954.55	828.3	0.98
RIVER	22534	1:50-year	500	1355.09	1356.32	1356.32	1356.62	0	2.41	224.12	437.9	1
RIVER	22534	1:100-year	2000	1355.09	1357.19	1357.19	1357.85	0	3.67	805.9	785.2	0.99
RIVER	18478	1:50-year	500	1328.68	1330.11	1330.11	1330.52	0.000971	2.84	232.52	402.17	0.97
RIVER	18478	1:100-year	2000	1328.68	1331.4	1331.4	1332.14	0.000753	4	991.78	726.71	0.96

RIVER	15274	1:50-year	500	1303.6	1306.09	1305.22	1306.16	0.002132	1.15	576.29	624	0.31
RIVER	15274	1:100-year	2000	1303.6	1307.19		1307.49	0.004519	2.47	1306.7	687.5	0.5
RIVER	12721	1:50-year	500	1285.11	1285.19	1285.19	1285.75	1.712103	3.84	152	306.75	6.91
RIVER	12721	1:100-year	2000	1285.11	1286.88	1286.88	1287.64	0.016287	4.28	1002.91	708.56	1.24
RIVER	10588	1:50-year	500	1268.32	1269.61	1269.61	1269.87	0.000006	2.24	223	436.03	1
RIVER	10588	1:100-year	2000	1268.32	1270.35	1270.35	1270.83	0.000005	3.07	700.43	893.61	0.99
RIVER	7984	1:50-year	500	1251.55	1253.5	1253.5	1254	0.099102	3.11	160.6	163.25	1
RIVER	7984	1:100-year	2000	1251.55	1254.86	1254.86	1255.71	0.080895	4.09	518.4	367.58	0.99
RIVER	5250	1:50-year	500	1236.46	1237.8	1237.8	1238.29	0.000004	3.08	162.32	167.95	1
RIVER	5250	1:100-year	2000	1236.46	1239.27	1239.27	1240.26	0.000003	4.41	454.04	235	1.01

4. FLOOD ZONE MAPPING

4.1 1:50-Year storm event

The 1:50-year flood map indicates that flood-prone areas are largely confined to the existing river corridors located along the northern and southern boundaries of the mining right. The inundation zones generally follow the natural floodplain and remain relatively narrow, with flood depths ranging from 0.0 m to approximately 8.45 m in the deepest sections of the river channels. The majority of the mining right lies outside the mapped 1:50-year flood extent, indicating a relatively low flood risk across the proposed mining footprint. However, the southern boundary of the mining right is intersected by the 1:50-year floodline where the river traverses the site, and the proposed mining permit area is located immediately adjacent to this flood-prone zone. Consequently, infrastructure or mining activities within this area may be susceptible to periodic inundation during major flood events. Appropriate buffer zones, stormwater diversion structures, and flood protection measures should therefore be incorporated into the mine design to minimise flood-related risks and prevent impacts on adjacent watercourses.

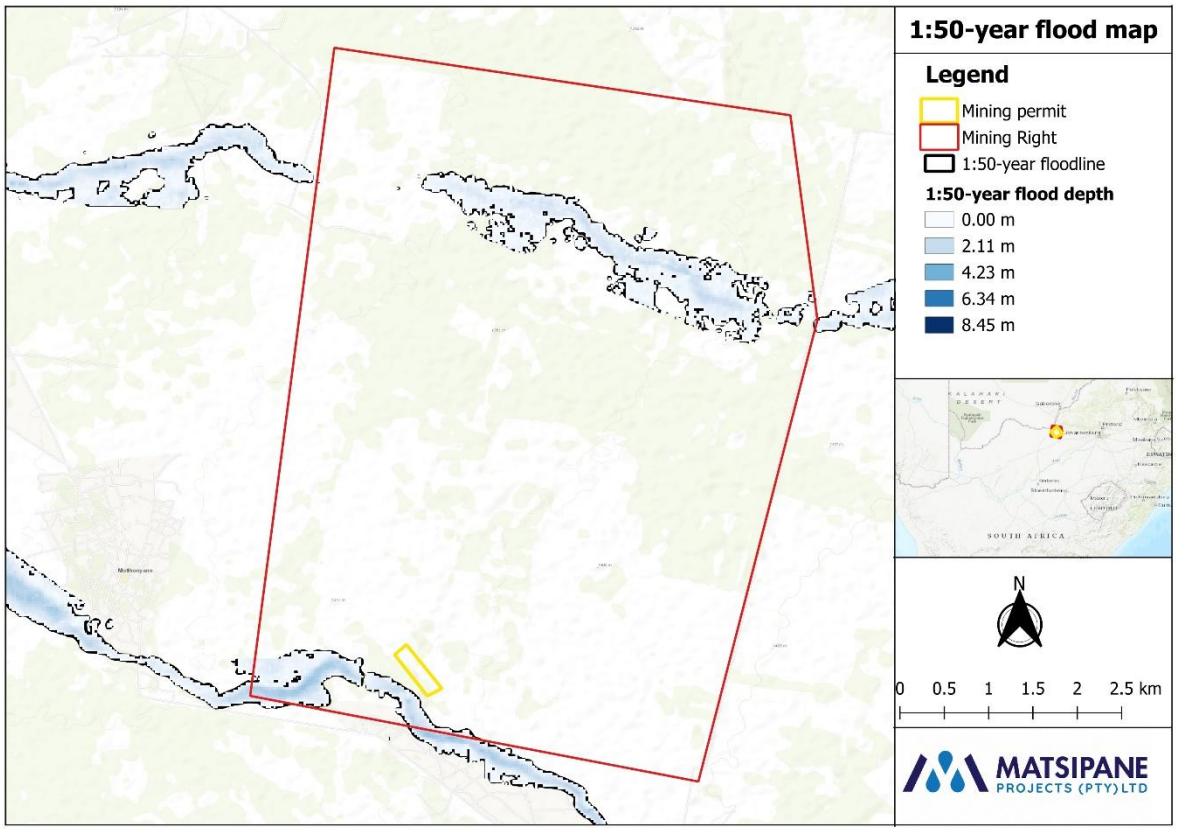


Figure 6: 1:50-Year flood map

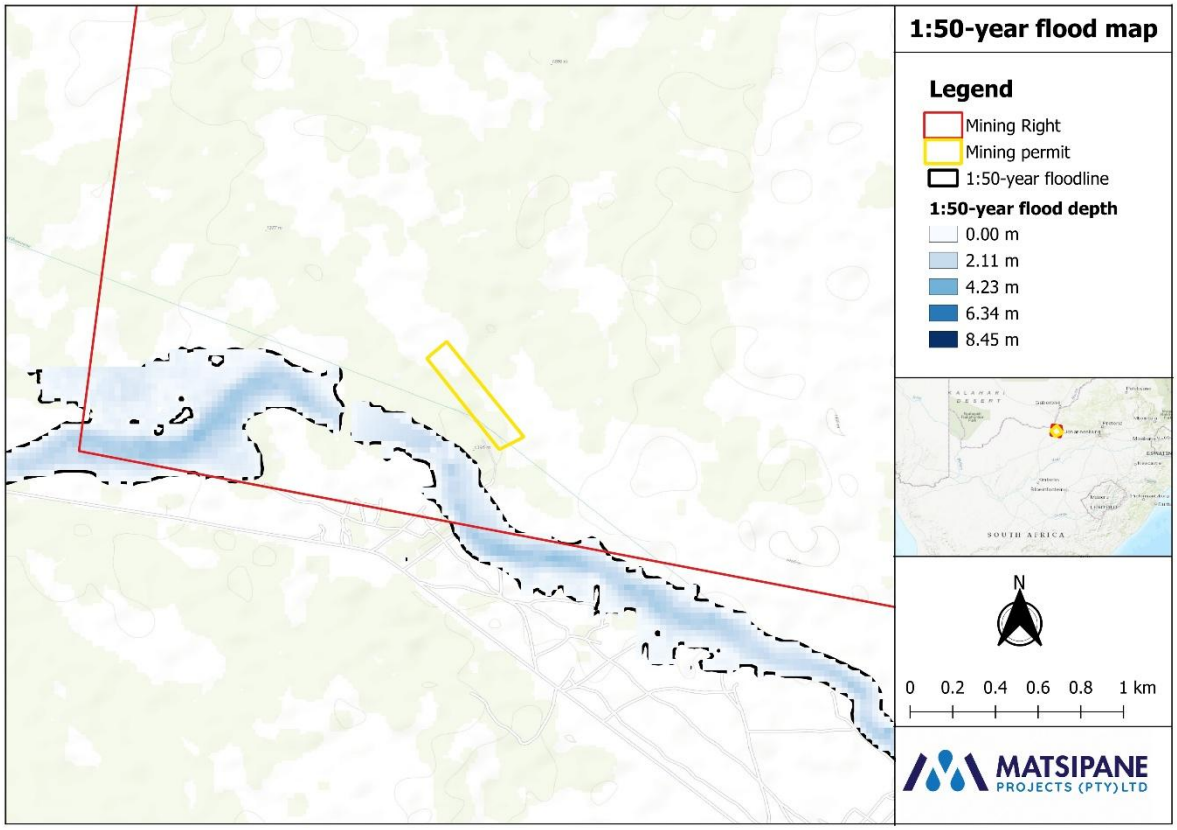


Figure 7: 1:50-year flood map zoomed for mining permit

4.21:100-year storm event

The 1:100-year flood map represents a more extreme flood event with a lower probability of occurrence but a greater spatial extent. Compared to the 1:50-year scenario, the floodplain expands laterally along both the northern and southern river systems, with maximum flood depths increasing to approximately 9.79 m within the main river channels. Despite this increased inundation extent, the majority of the mining right remains outside the mapped 1:100-year floodplain, confirming that the central and northern portions of the project area are situated on relatively elevated ground. The southern boundary, however, experiences a wider floodplain than under the 1:50-year scenario, and the proposed mining permit area remains partially within or immediately adjacent to the inundation zone. This indicates that while the overall mining right is at relatively low flood risk, developments located close to the southern drainage channel could be affected during extreme rainfall events. The 1:100-year floodline should therefore be regarded as the minimum development setback for permanent infrastructure, with flood management measures-including diversion channels, erosion protection, and adequate stormwater conveyance systems-implemented to ensure operational safety and protect downstream water resources.

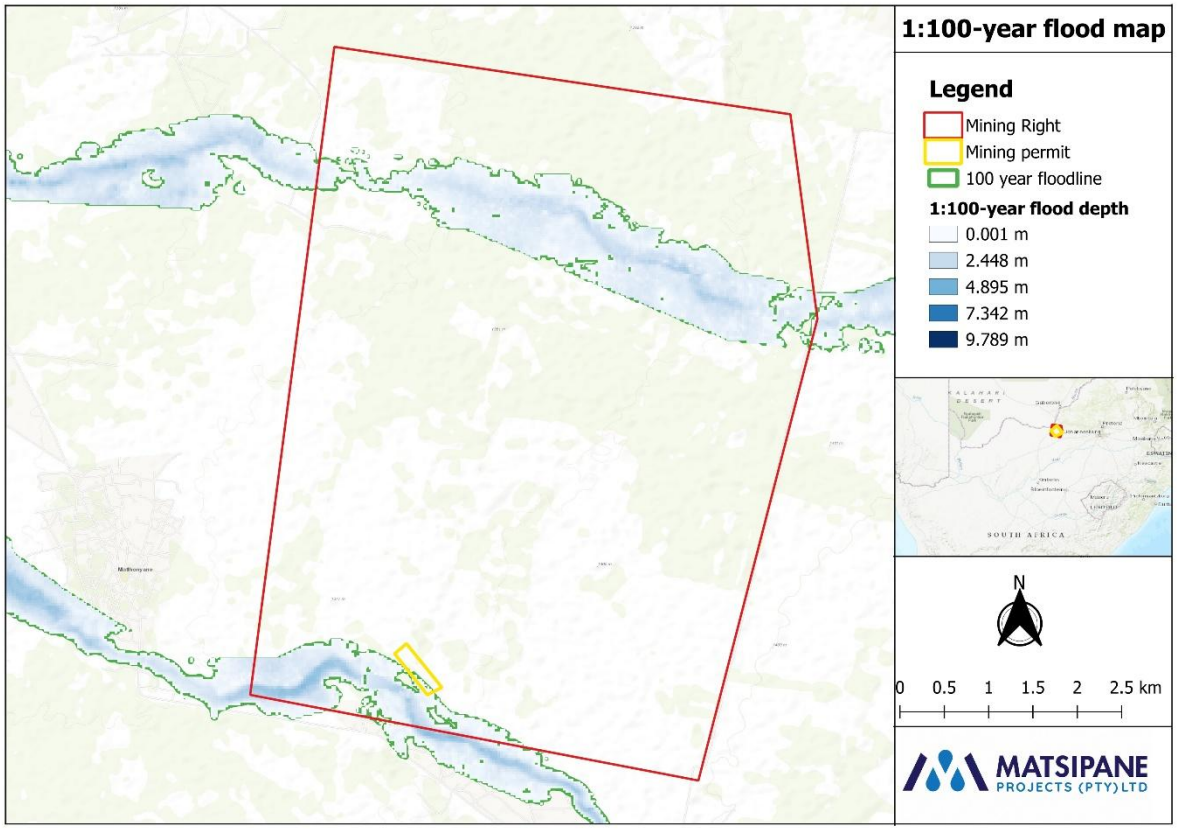


Figure 8: 1:100-year flood map

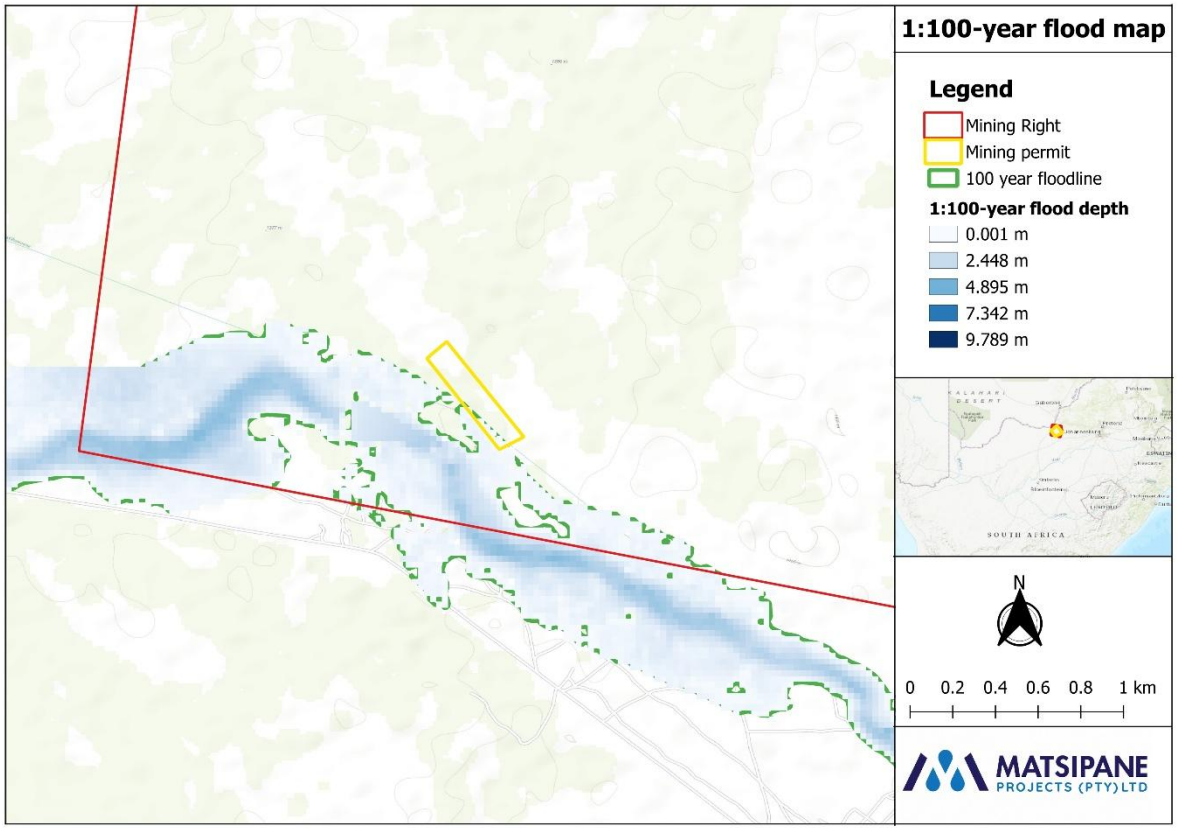


Figure 9: 1:100-year flood map zoomed for mining permit

5. RISK ASSESSMENT

Table 5: Risk assessment

FLOOD EVENT	FLOOD CHARACTERISTICS	EXTENT OF INUNDATION	IMPACTS ON MINING ACTIVITIES	IMPACT SEVERITY	MINING IMPLICATIONS	MITIGATION MEASURES
1:50-YEAR FLOOD	Peak discharge ~500 m3/s; velocities 1.15-4.48 m/s; depths up to 8.45 m.	Flooding mainly confined to river corridors; southern boundary affected.	Local flooding of access roads, erosion, sediment transport, disruption near drainage.	**Moderate**	Mining feasible outside floodplain with buffers.	Maintain buffer zones; avoid permanent infrastructure in floodplain; stormwater diversion; erosion and sediment control; inspect drainage after storms.
1:100-YEAR FLOOD	Peak discharge ~2,000 m3/s; velocities 2.47-4.63 m/s; depths up to 9.79 m.	Floodplain expands; southern boundary and permit area at greater risk.	Potential inundation of infrastructure, bank erosion, scour, operational disruption.	**High**	Avoid permanent infrastructure within floodplain.	Use 1:100-year floodline as setback; design culverts for extreme flows; stabilise banks; emergency flood response; routine monitoring.

6 ASSUMPTIONS AND LIMITATIONS

6.1 Assumptions

- The topographical data used in the flood modelling accurately represents the existing ground conditions within the study area.
- The hydraulic characteristics of the Molopo and Polfontentspruit and associated floodplain remain unchanged from those represented in the model.
- The rainfall and flood estimation methods adopted are representative of the catchment's hydrological response.
- Hydraulic model parameters, including channel roughness coefficients, are representative of actual site conditions.
- No significant future land-use changes or upstream developments will alter flood behaviour within the study area.

6.2 Limitations

- The accuracy of the floodline is dependent on the quality and resolution of the available topographical and hydrological data.
- Hydraulic modelling provides an estimate of flood behaviour and cannot predict flood extents with absolute certainty.
- Future climate variability and extreme rainfall events may result in flood conditions that differ from those modelled.
- River channel migration, sediment deposition, and erosion may alter floodplain conditions over time, affecting future flood extents.

7. CONCLUSION

The floodline investigation demonstrates that the proposed alluvial diamond mining project on Farm Colga 132 JQ is suitable for development from a flood risk perspective. Hydraulic modelling confirms that flood hazards are predominantly confined to the natural river channels and associated floodplains, with most of the proposed mining right remaining outside the 1:50-year and 1:100-year flood extents. Although the southern portion of the site is susceptible to inundation during major storm events, the risk can be effectively managed through appropriate mine planning and engineering controls.

The assessment further indicates that the 1:100-year flood event produces significantly greater flood depths, wider inundation extents, and higher flow velocities than the 1:50-year event, thereby increasing the potential for erosion, channel instability, and sediment transport. Consequently, permanent infrastructure, processing facilities, fuel storage areas, stockpiles, and other critical infrastructure should be located outside the delineated 1:100-year floodline, which should be adopted as the minimum development setback.

Provided that the recommended mitigation measures, including stormwater management, erosion protection, maintenance of riparian buffer zones, flood monitoring, and progressive rehabilitation, are implemented throughout the life of the mine, the identified flood risks are considered acceptable and manageable. The findings of this study therefore support the proposed mining development and provide a robust technical basis for the Mining Right Application, Environmental Authorisation, Waste Management Licence, and Water Use Licence Application while promoting the protection of downstream water resources and sustainable environmental management.

Recommendations

Based on the findings of the floodline assessment and hydraulic modelling, the following recommendations are proposed to minimise flood risk and ensure environmentally responsible mining operations:

- Maintain Development Setbacks: Permanent infrastructure, including offices, workshops, fuel storage facilities, processing areas, and waste storage areas, should be located outside the 1:100-year floodline. The delineated 1:100-year flood extent should be adopted as the minimum development setback for all permanent infrastructure.
- Protect Natural Watercourses: No mining activities should encroach into the active river channels or their associated floodplains unless specifically authorised. Existing drainage channels and riparian vegetation should be preserved to maintain natural flood conveyance and reduce erosion.
- Implement Stormwater Management: A comprehensive stormwater management system should be developed in accordance with the Best Practice Guidelines for Water Resource Protection in the South African Mining Industry. Clean and dirty water systems should be separated to prevent contamination of natural watercourses during rainfall events.
- Control Erosion and Sedimentation: Erosion protection measures, including diversion berms, energy dissipators, silt traps, sediment retention ponds, and stabilisation of disturbed slopes, should be installed to minimise sediment transport into surrounding watercourses during high-flow events.
- Design Hydraulic Structures for Extreme Events: Culverts, crossings, stormwater channels, and other drainage infrastructure should be designed to safely convey at least the 1:100-year flood event without causing upstream flooding or downstream erosion.
- Restrict Stockpiles and Hazardous Materials: Overburden stockpiles, ore stockpiles, fuel storage areas, chemical storage facilities, and waste management areas should be located outside the mapped floodplain to prevent material wash-off and pollution during flood events.

- Establish Buffer Zones: Appropriate buffer zones should be maintained along the Potfonteinspruit and other drainage features to protect aquatic ecosystems, reduce bank erosion, and preserve natural floodplain functions.
- Implement Flood Monitoring and Emergency Preparedness: A flood monitoring and emergency response plan should be developed to provide early warning during extreme rainfall events. Mining activities within low-lying areas should be suspended when significant flooding is forecast.
- Undertake Routine Inspection and Maintenance: Stormwater infrastructure, culverts, drainage channels, and erosion protection structures should be inspected regularly, particularly before and after the rainy season, to ensure they remain functional and free of sediment or debris.
- Progressive Rehabilitation: Areas disturbed by mining should be progressively rehabilitated through re-contouring, topsoil replacement, and revegetation to restore natural drainage patterns, reduce runoff velocities, and minimise long-term erosion and sedimentation.
- Periodic Review of Flood Risk: The floodline assessment should be reviewed if there are significant changes to the mine layout, catchment characteristics, drainage infrastructure, or land use within the surrounding catchment, to ensure that flood management measures remain appropriate throughout the life of the mining operation.

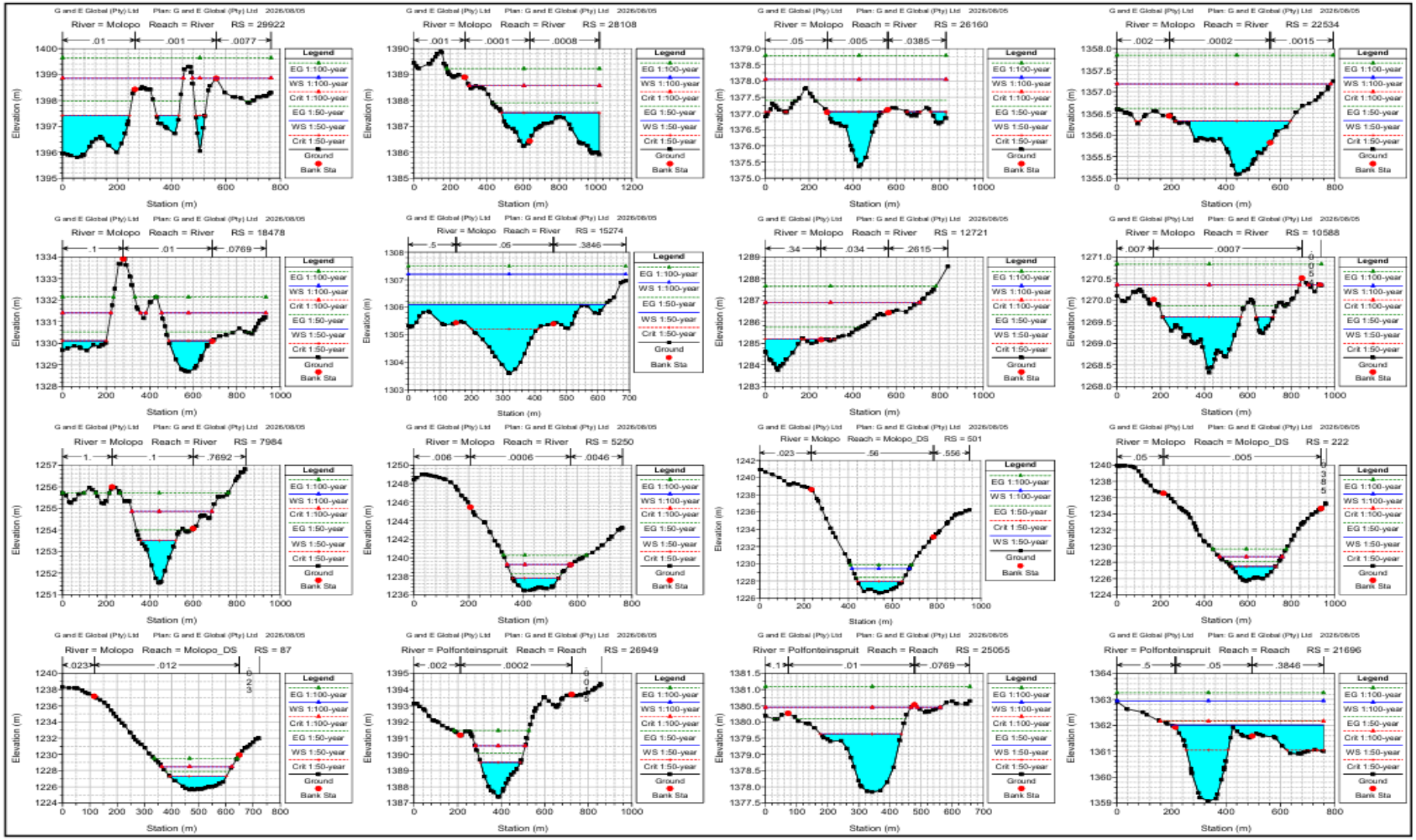
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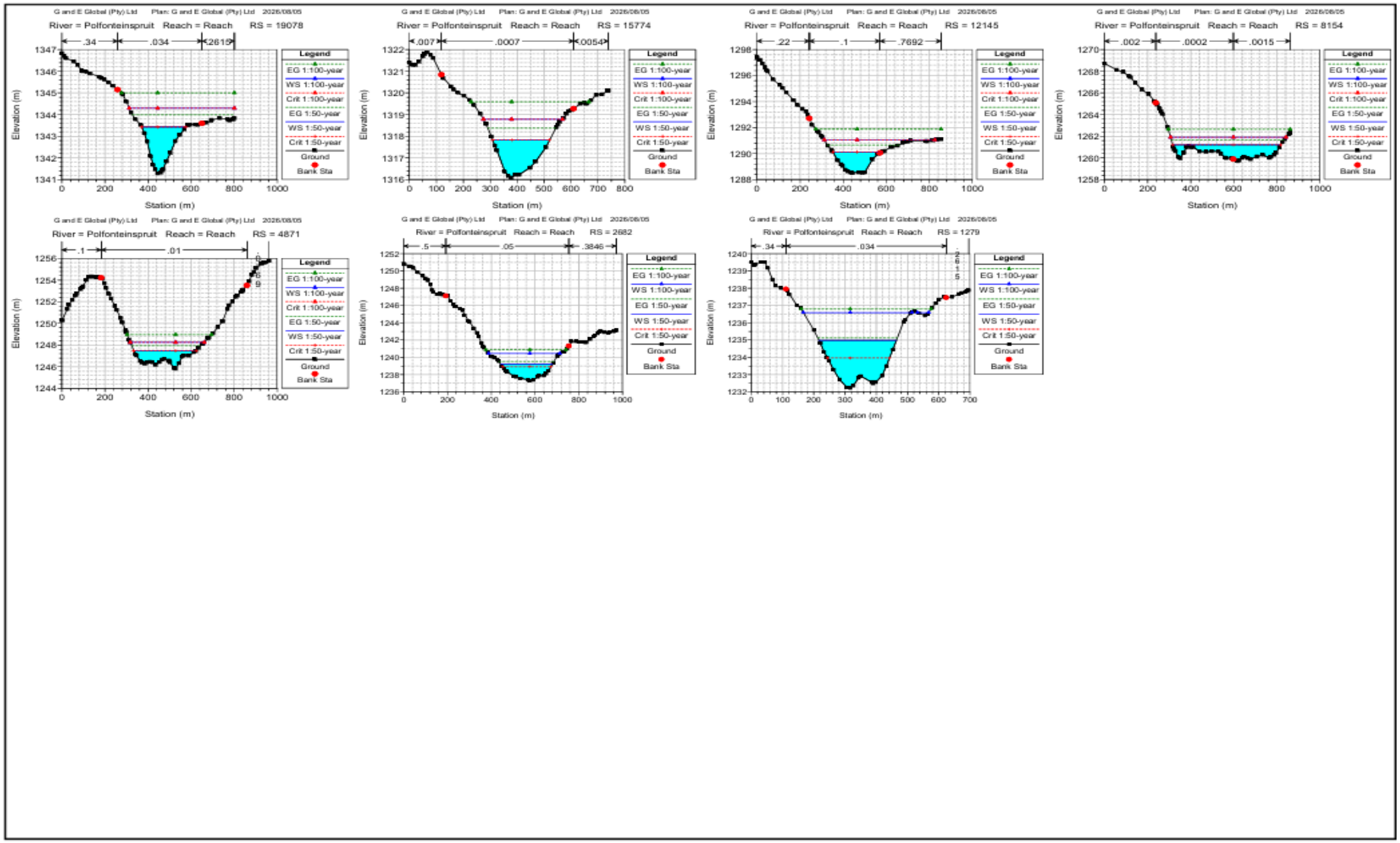
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APPENDIX A: RIVER CROSS SECTIONS

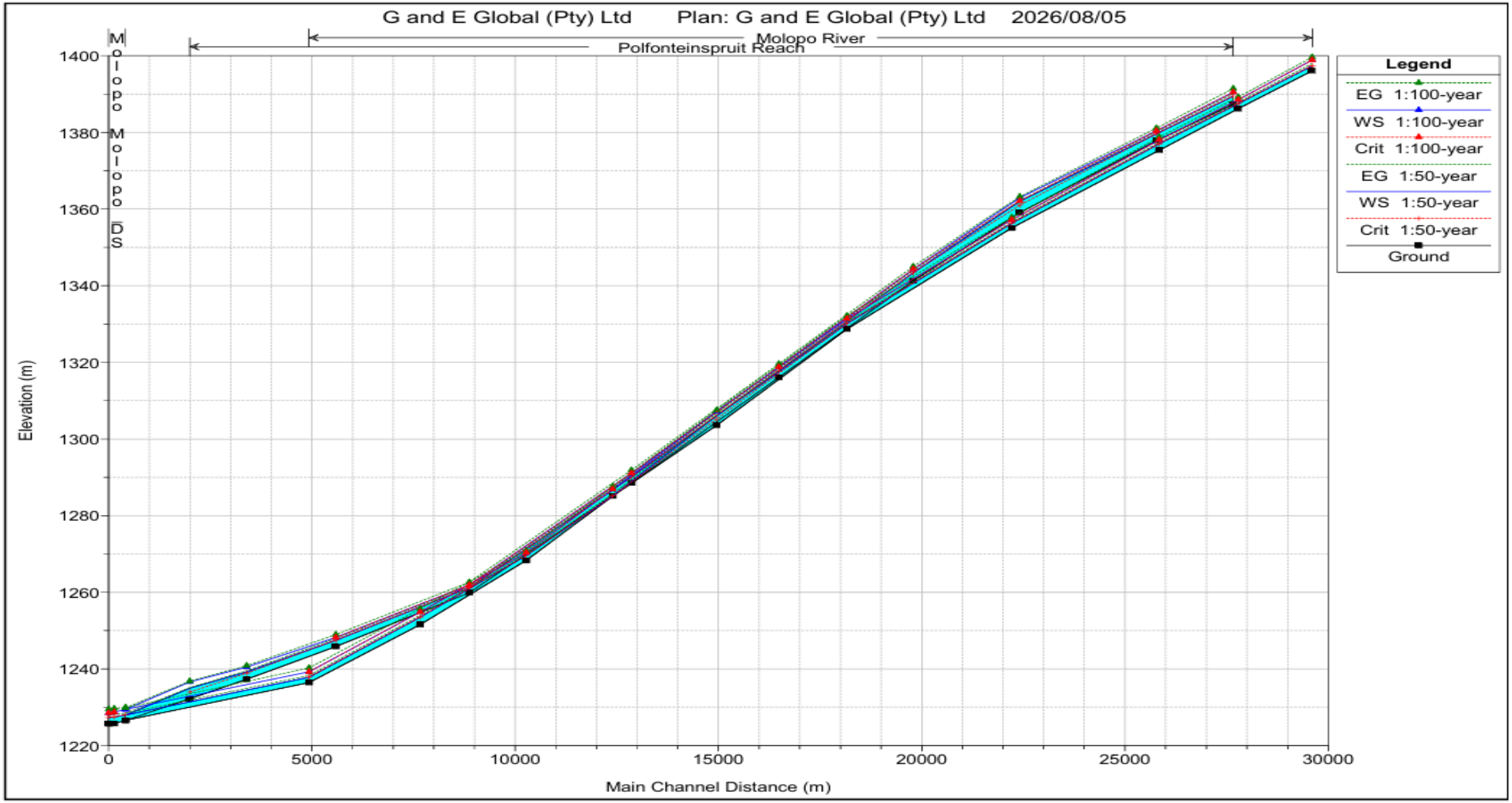


MATSIPANE PROJECTS (PTY) LTD



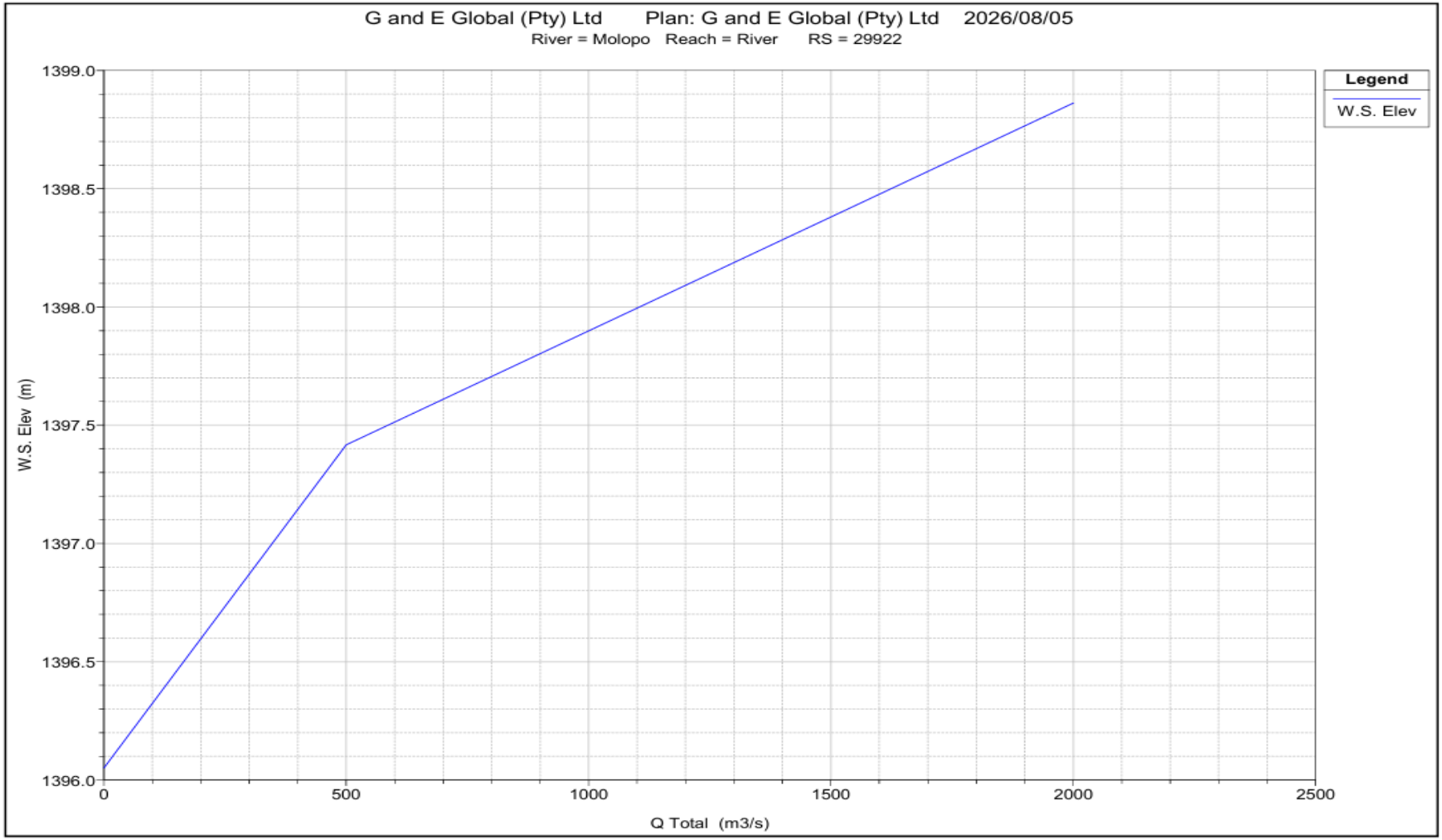
MATSIPANE PROJECTS (PTY) LTD

APPENDIX B: PROFILE PLOT

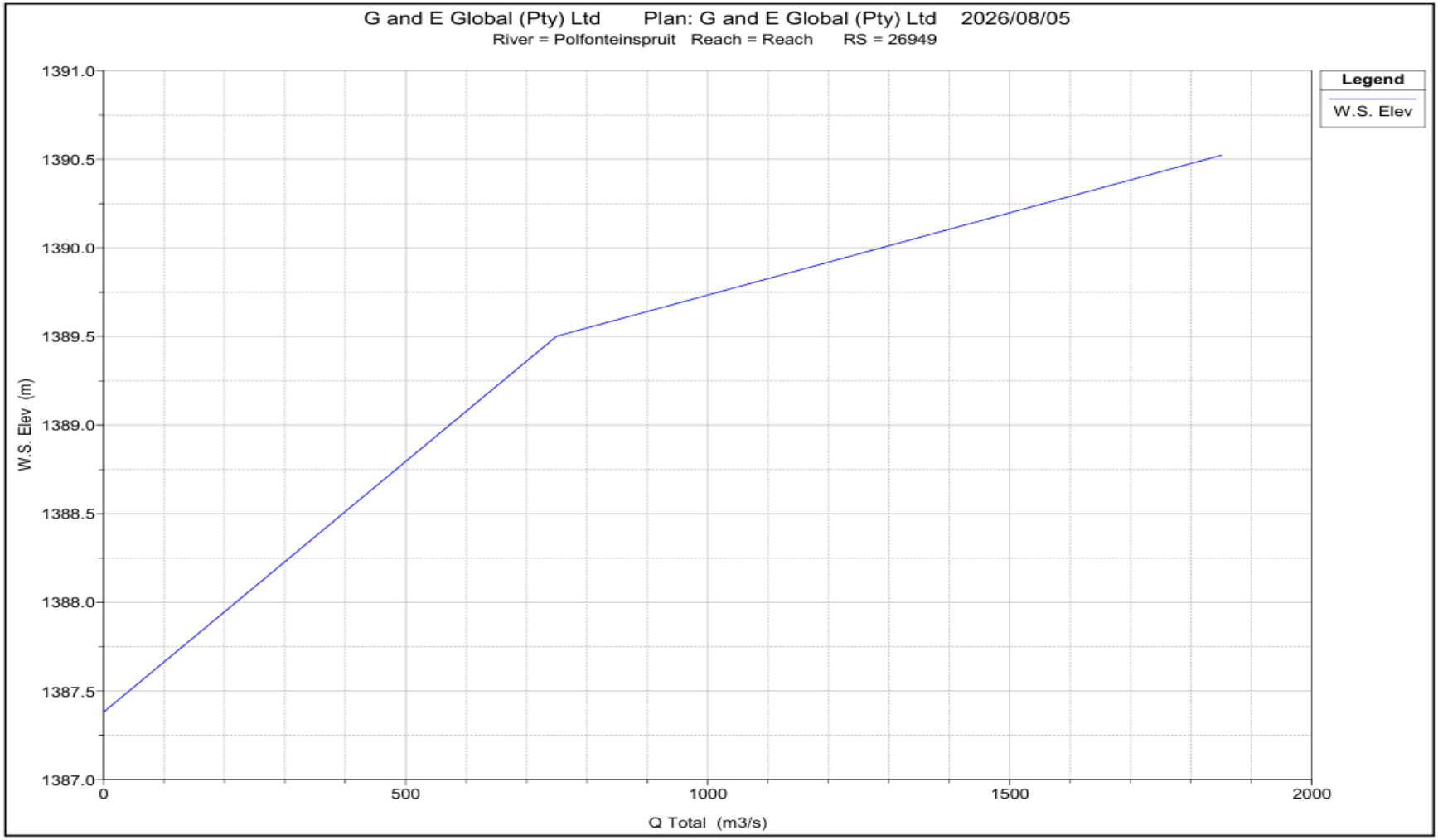


MATSIPANE PROJECTS (PTY) LTD

APPENDIX C: RATING CURVES



MATSIPANE PROJECTS (PTY) LTD


G and E Global (Pty) Ltd Plan: G and E Global (Pty) Ltd 2026/08/05
River = Polfonteinspruit Reach = Reach RS = 26949
Legend
W.S. Elev
W.S. Elev (m)
1391.0
1390.5
1390.0
1389.5
1389.0
1388.5
1388.0
1387.5
1387.0
0
500
1000
1500
2000
Q Total (m3/s)

HYDROLOGICAL ASSESSMENT REPORT FOR THE PROPOSED DIAMOND, DIAMOND (ALLUVIAL), DIAMOND (KIMBERLITE), AGGREGATE, LEAD, MANGANESE ORE, LIMESTONE, SAND AND GOLD ORE MINING PROJECT NEAR MAHIKENG, NORTHWEST PROVINCE.

PREPARED BY:

Matsipane Projects (Pty) Ltd

PREPARED FOR:

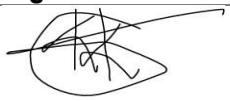
Namacwa Mining and Project (Pty) Ltd

AUGUST 2026

SPECIALIST DECLARATION

I, Khiba Katleho (BSc.Hons Geohydrology, UFS), declare that I:

- Consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the study and compiling this report, I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being a member of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings, and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant.
- I have expertise and experience in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, regulations and all other applicable legislation.
- I realize that a false declaration is an offense in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Verification	Capacity	Signature	Date
Author	K Khiba: BSc (Hons) Geohydrology;		August 2026
Reviewer	R Ramathieledza: MSc Geohydrology		August 2026

EXECUTIVE SUMMARY

This Hydrogeological Assessment was undertaken by Matsipane Projects (Pty) Ltd to support the proposed Mining Right, Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence Application (WULA) for the proposed alluvial diamond mining project on the Farm Colga 132 JQ, located approximately 11.5 km southeast of Mahikeng, North West Province. The assessment provides a baseline understanding of the hydrogeological conditions within the project area and evaluates the potential groundwater-related risks associated with the proposed opencast mining operation.

The desktop hydrogeological assessment indicates that the proposed mining area is underlain predominantly by a low-yield intergranular and fractured aquifer with expected borehole yields of 0.1–0.5 L/s and relatively low groundwater transmissivity. Groundwater occurs at depths of approximately 16–24 m below ground level, suggesting that shallow mining activities are unlikely to intersect the water table during the initial stages of mining. The aquifer is classified as having low intrinsic vulnerability (DRASTIC Class 1), although more productive and environmentally sensitive karst aquifers occur to the east and south of the mining right.

Groundwater quality within the mining right is characterised by electrical conductivity values between 70 and 300 mS/m and an average Total Dissolved Solids (TDS) concentration of approximately 635 ppm, indicating moderately mineralised but freshwater conditions typical of fractured-rock aquifers in semi-arid environments.

The groundwater risk assessment identified that the principal risks are associated with slimes dams, tailings facilities, diesel storage, workshops, wastewater management, and groundwater abstraction, while the opencast mining method itself presents a relatively low hydrogeological risk due to the shallow nature of the deposit and the planned progressive rehabilitation programme. With the implementation of appropriate engineering controls, pollution prevention measures, stormwater management, and a comprehensive groundwater monitoring programme, the residual groundwater risk can be reduced to low to medium, indicating that the proposed mining development is hydrogeologically acceptable.

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1. INTRODUCTION

Matsipane Projects (Pty) Ltd was contracted by NDI Geological Consulting (Pty) Ltd to conduct a baseline hydrological assessment for the proposed alluvial diamond mining on behalf of G and E Global . G and E Global (Pty) Ltd ("G and E Global") has applied to the Department of Mineral and Petroleum Resources (DMPR) for a Mining Right (MR) and associated Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence Application (WULA) over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ in the Mahikeng Magisterial District, North West Province.

The proposed mining project entails the extraction of Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore over an area of approximately 3927 hectares situated approximately 11.5 km southeast of Mahikeng within the Ngaka Modiri Molema District Municipality. The Mining Right application was accepted by the DMPR on 06 May 2026. The applicant was subsequently notified of the acceptance on 12 May 2026.

The project area is located approximately 11.5 km southeast of Mafikeng on a portion of Part 4 of the Colga 132 farm JO. The assessment forms part of the environmental and water resource planning process required to support the mining permit and associated regulatory authorisations. Due to the proximity of the site to the Polfonteinspruit and Molopo River and associated alluvial systems, there is a need to evaluate the potential impact of flooding on the mining permit and mining right operations. A site visit was conducted on 28th July 2026 to assess the condition of water bodies in and around the project area. 2 old boreholes that were not operated were identified, they were both blocked.

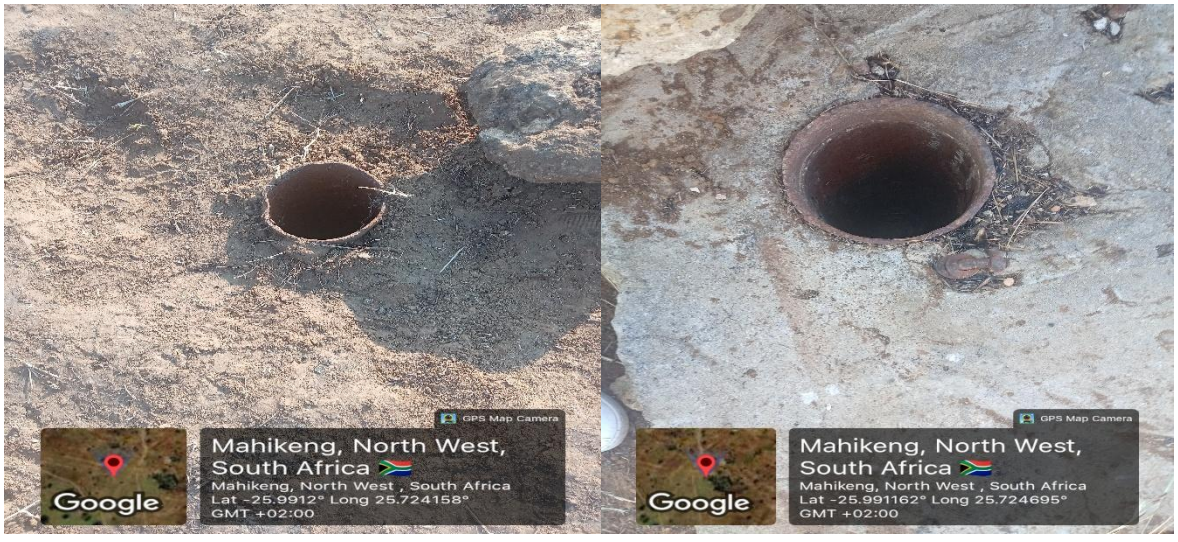


Figure 1: Boreholes identified during a site visit

1.1 Project description

The proposed mining operation will utilise an opencast mining method due to the shallow nature of the Colga mineral deposit. The most significant impact on mining cost is the stripping ratio. The Colga deposit is shallow and therefore will not require extensive waste stripping. This will keep fuel and maintenance costs per carat significantly lower than deep-level mining operations. Although the opencast mining method is highly mechanised, it remains cost effective because production is reached early and production volumes are high. The mining operation will utilise a progressive rehabilitation approach through roll-over mining practices, where waste material from the active mining pit is backfilled directly into previously mined-out pits. This approach reduces haulage distances, fuel consumption and final mine closure costs while allowing concurrent rehabilitation.

1.1.1 Mineral processing flow

- Sizing:

Raw gravel will be fed into a vibrating grizzly. Material greater than 40 mm, regarded as waste material, will be discarded immediately to optimise fuel efficiency.

- Liberation:

Material smaller than 40 mm will be fed into a rotary scrubber. This process is critical to clean and liberate diamonds by removing calcium and clay coatings that may hinder recovery.

- Pan Separation Process:

The washed gravel will be fed into a 14-foot diamond pan. A central shaft rotates triangular tines through a slurry of water and fine sand. Lighter waste material, such as quartz and sand is discharged via a central weir while heavier minerals, including diamonds and garnet indicators, migrate to the outer wall.

- Tailings Management:

Tailings and waste material will be dewatered using dewatering screens before being backfilled into mined-out areas to facilitate concurrent rehabilitation.

1.1.2 Proposed mining infrastructure

- A 1-hectare mineral processing plant at each mining section, including a slimes dam;
- A central processing plant;
- Slime dams;
- Water abstraction infrastructure, including transfer pipelines from borehole areas;
- Ablution facilities;
- Septic conservancy tanks at each mining section for wastewater collection and storage;
- Parking areas;
- Water storage tanks and dams;

- Diesel storage tanks and fuel trailers;
- Generators and associated power cables;
- Workshop facilities;
- Laydown areas;
- Topsoil stockpiles;
- Tailings and waste dumps;
- Office (mobiles);
- Kitchen facilities (mobiles); and
- Labour quarters (mobiles).
- Final infrastructure layouts and positions will be confirmed during the Environmental
- Impact Assessment Phase following completion of specialist investigations and
- engineering design inputs.

1.1.3 Legislative requirements

The proposed project requires:

- A Mining Right in terms of Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
- Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A Waste Management Licence in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008); and
- A Water Use Licence Application in terms of the National Water Act, 1998 (Act No. 36 of 1998), where applicable.
- The project triggers activities listed under Listing Notices 1, 2 and 3 of the NEMA EIA Regulations, requiring a full Scoping and Environmental Impact Assessment process.

2. SITE DESCRIPTION

2.1 Locality

The project area is located approximately 11.5 km southeast of Mafikeng on a portion of Part 4 of the Colga 132 farm JO. The property is surrounded by several rural settlements, including Welverdiend, Schoongezicht, Bethhel, Springbokpan, and Slurry, indicating a predominantly agricultural and rural land-use setting. A number of seasonal drainage lines and rivers traverse the surrounding landscape, with one drainage feature crossing the southern portion of the mining right, highlighting the need to consider surface water management during mining activities. The locality map also shows that the project is well connected to existing transport infrastructure while remaining outside the main urban area of Mahikeng, making it suitable for mining operations with relatively good logistical access.

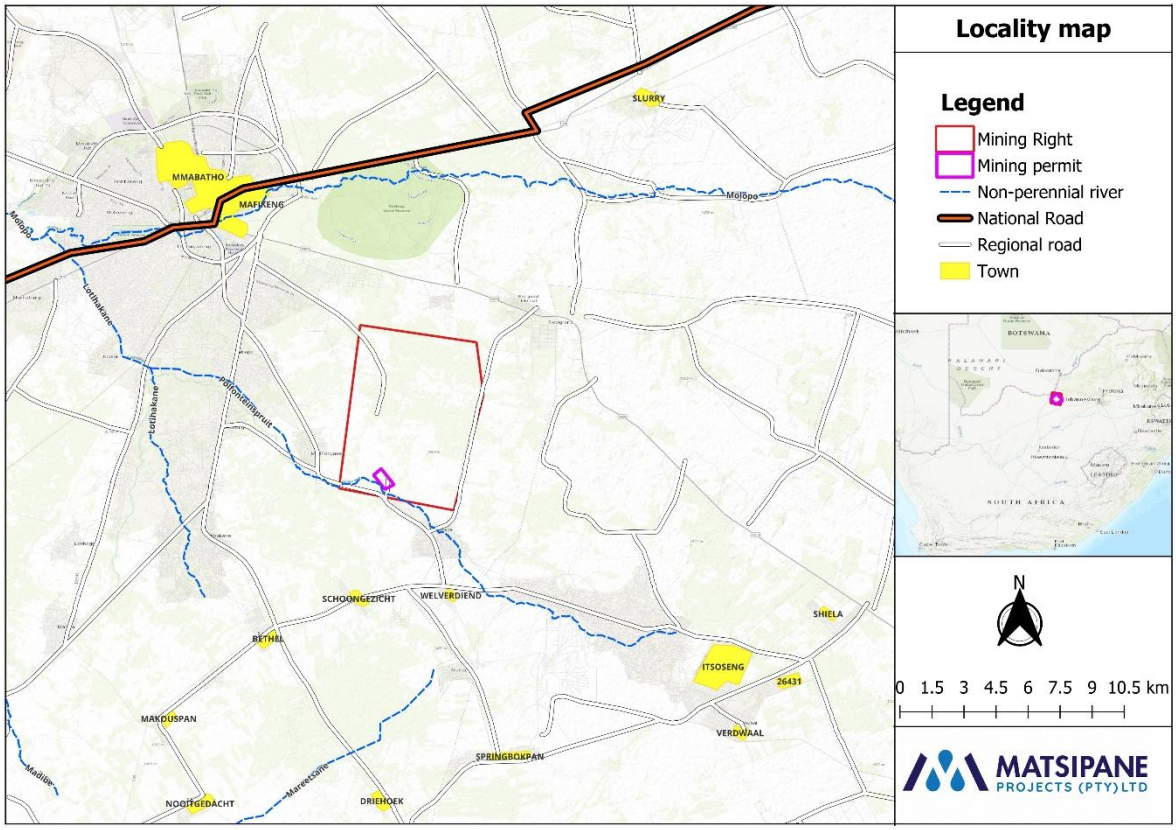


Figure 2: Locality map

2.2 Topography

The project area is characterised by gently undulating to moderately sloping terrain, with elevations ranging from approximately 1305 mamsl along the western drainage corridors to about 1395 mamsl across the mining right, increasing further to over 1470 mamsl toward the eastern part of the study area. The mining right is therefore located on an elevated plateau, with a gradual regional rise in elevation from west to east.

The contour pattern indicates that the land surface generally slopes from the east and southeast towards the west and northwest, directing surface runoff towards the Potfonteinspruit, which flows along the southern boundary of the mining right before joining the Lotlhakane River further downstream. The relatively wide spacing of the contours within the mining right suggests gentle gradients, whereas the closer contour spacing to the east reflects steeper terrain associated with elevated hills or ridges.

The topography exerts a strong influence on the local drainage system, with rainfall runoff naturally concentrating within the ephemeral drainage channels during storm events. Owing to the moderate relief and absence of deeply incised valleys within the mining right, the area is not expected to experience significant topographic constraints for mining development. However, appropriate stormwater management, erosion control measures, and protection of

the Potfonteinspruit drainage channel will be essential to minimise sediment transport and preserve downstream water quality during mining operations. (Figure 3)

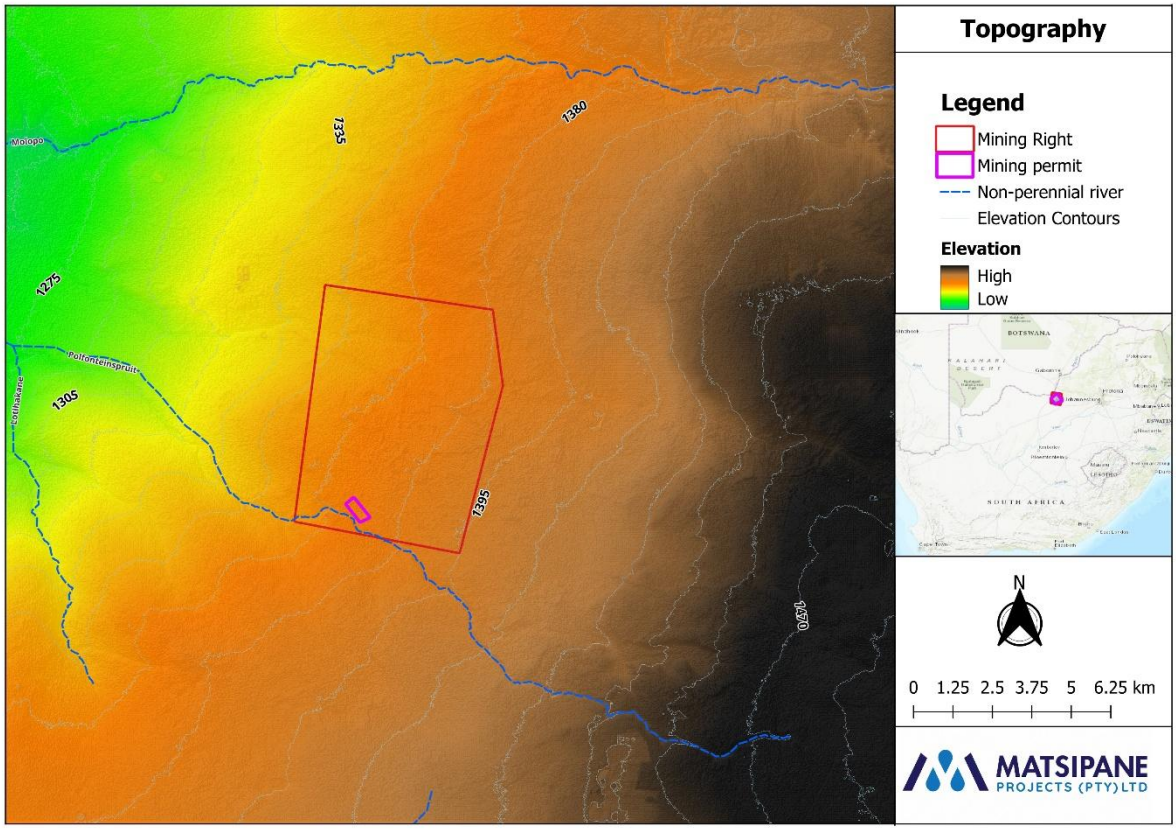


Figure 3: Topographic map

2.3 Hydrology and drainage

The project area is located within the Crocodile (West) and Marico Water Management Area (WMA) and falls predominantly within the D41A Quaternary Catchment, with adjacent catchments including D41B, C31A, C31B, C31C, C31D, A31C, and A31D. The regional drainage network is controlled by the Molopo River, a perennial river situated north of the project area, which forms one of the principal drainage features within the WMA. The Lotlhakane River and Potfonteinspruit are the main tributaries influencing local surface water flow, while several non-perennial streams traverse the surrounding landscape, conveying runoff primarily during and immediately after rainfall events.

The mining right is intersected along its southern boundary by Potfonteinspruit, an ephemeral drainage channel that ultimately contributes flow to the Lotlhakane River, which in turn drains into the Molopo River. Surface runoff across the site is therefore generally directed northwards and northwestwards through this interconnected drainage system. Due to the semi-arid climate of the region, streamflow in the local drainage channels is highly seasonal, with most channels remaining dry for much of the year and flowing only following significant rainfall events.

Consequently, the drainage system is dominated by episodic runoff rather than sustained baseflow, making stormwater management and erosion control important considerations for the proposed mining activities to prevent sediment transport and protect downstream water resources. (Figure 4)

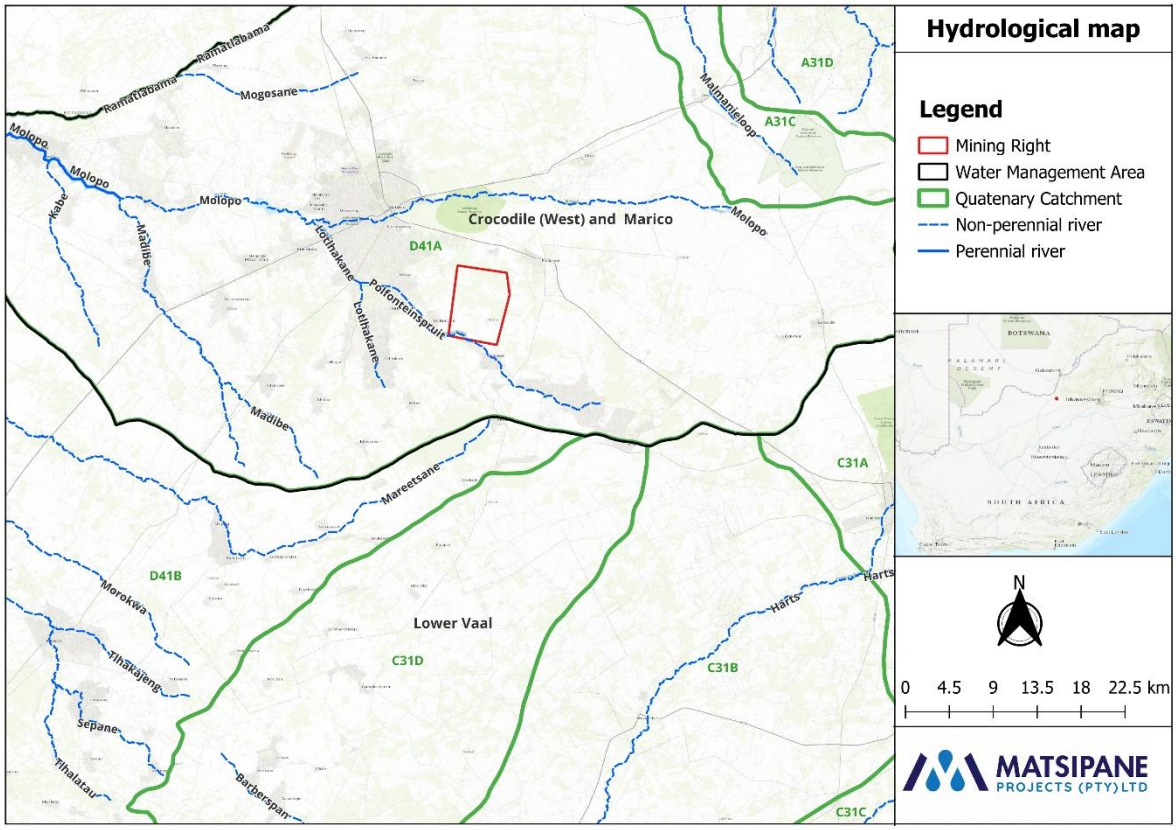


Figure 4: Drainage map

2.4 General geology

The project area is situated within the Transvaal Supergroup of the Kaapvaal Craton, a region characterized by sedimentary and volcano-sedimentary rocks of Proterozoic age that host significant manganese and iron ore mineralisation. Based on the geological map, the mining right is located predominantly on the Allanridge Formation, while the surrounding area comprises the Kalahari Group, Malmani Subgroup, Black Reef Formation, Dominion Group, and localized Quaternary deposits.

The Allanridge Formation, which underlies most of the mining right, consists mainly of volcanic rocks, including basaltic and andesitic lavas, with intercalated volcaniclastic units. These rocks generally exhibit low primary porosity but may develop secondary permeability through weathering, jointing, and fracturing. To the north, the area is overlain by unconsolidated sediments of the Kalahari Group, comprising sands, silts, gravels, and calcrete that blanket much of the regional landscape. Along the southern portion of the project area, Quaternary

alluvial deposits occur adjacent to the drainage channels and consist of unconsolidated sand, silt, and gravel derived from recent fluvial processes.

East and southeast of the mining right, the Malmani Subgroup is exposed. This unit comprises thick successions of dolomite and limestone and is well known for the development of karst features, solution cavities, and productive groundwater aquifers. The Black Reef Formation, occurring locally south and southwest of the project area, consists predominantly of quartzitic sandstones and conglomerates that mark the basal unit of the Transvaal Supergroup. Small outcrops of the older Dominion Group, composed mainly of volcanic rocks and associated sedimentary units, are present to the north of the project area.

Overall, the geology of the area reflects the transition between the unconsolidated Kalahari cover and the underlying Proterozoic bedrock of the Transvaal Supergroup. This geological framework controls the occurrence of mineral resources, groundwater movement, and weathering processes within and around the mining right, with groundwater expected to occur primarily within weathered and fractured bedrock and, locally, within the unconsolidated alluvial deposits associated with drainage channels.

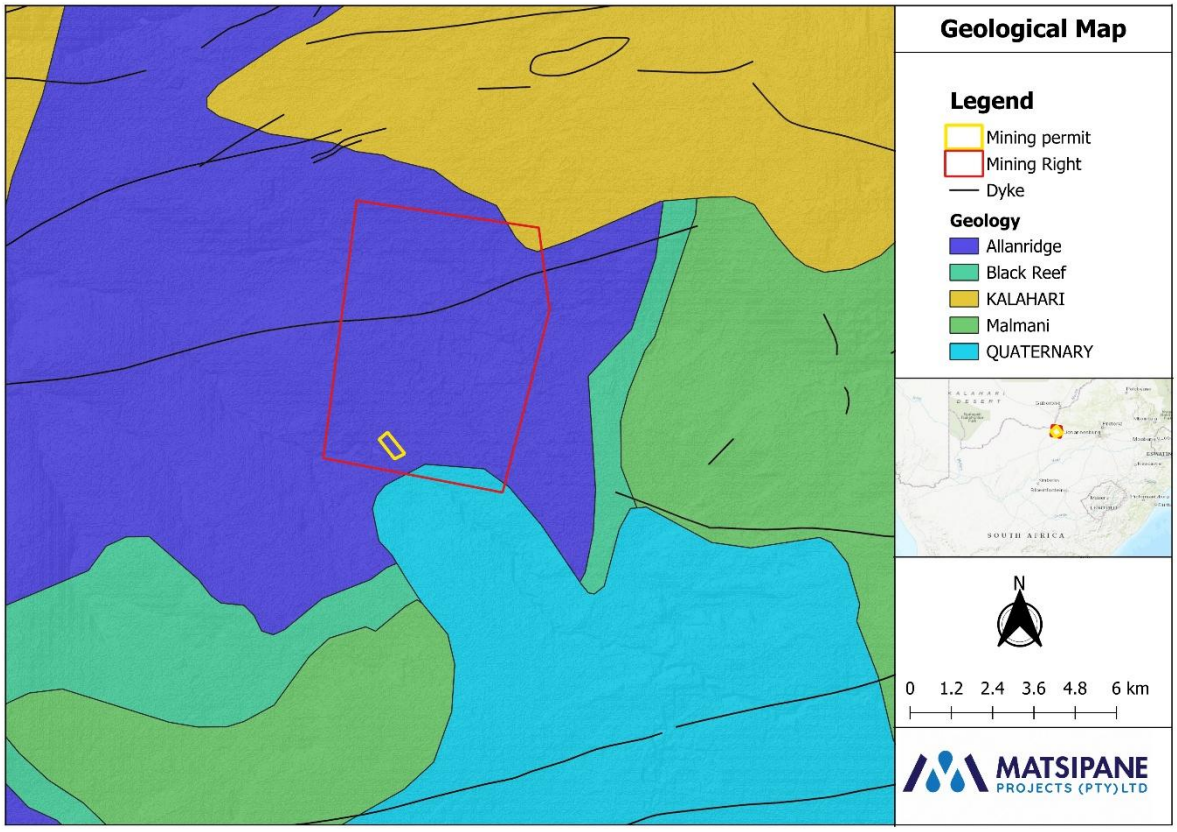


Figure 5: Geological map

2.5 Lithology

The lithological map indicates that the mining right is underlain predominantly by andesite, which forms the principal bedrock across the project area. Andesite is a fine-grained

intermediate volcanic rock with generally low primary porosity and permeability; however, groundwater occurrence is typically associated with secondary structures such as weathered zones, joints, fractures, and faults. The extensive andesitic bedrock provides the primary host rock for the proposed mining activities.

To the north of the mining right, the andesite is overlain by unconsolidated sand deposits associated with the Kalahari Group. These aeolian sands are generally loose to moderately compact, highly permeable, and capable of storing limited quantities of shallow groundwater where sufficient saturation occurs. Along the southern portion of the project area and adjacent drainage channels, sedimentary deposits occur, consisting mainly of unconsolidated to semi-consolidated alluvial materials such as sand, silt, gravel, and clay deposited by fluvial processes.

Further to the east and southwest of the mining right, quartzite units are present. Quartzite is a hard, well-cemented metamorphic rock with negligible primary porosity, although groundwater may occur within fractures and weathered zones. To the east, dolomite forms a significant lithological unit. The dolomite is characterized by dissolution features, fractures, and karst development, making it one of the most productive regional aquifers due to its high secondary permeability.

Overall, the lithological succession reflects a transition from volcanic andesitic bedrock within the mining right to unconsolidated Kalahari sands, alluvial sediments, quartzitic ridges, and karstic dolomite in the surrounding region. From a hydrogeological perspective, groundwater potential within the mining right is expected to be controlled primarily by the degree of weathering and fracturing within the andesite, while the highest groundwater yields in the surrounding area are likely to occur within the fractured and solution-enhanced dolomite aquifers.

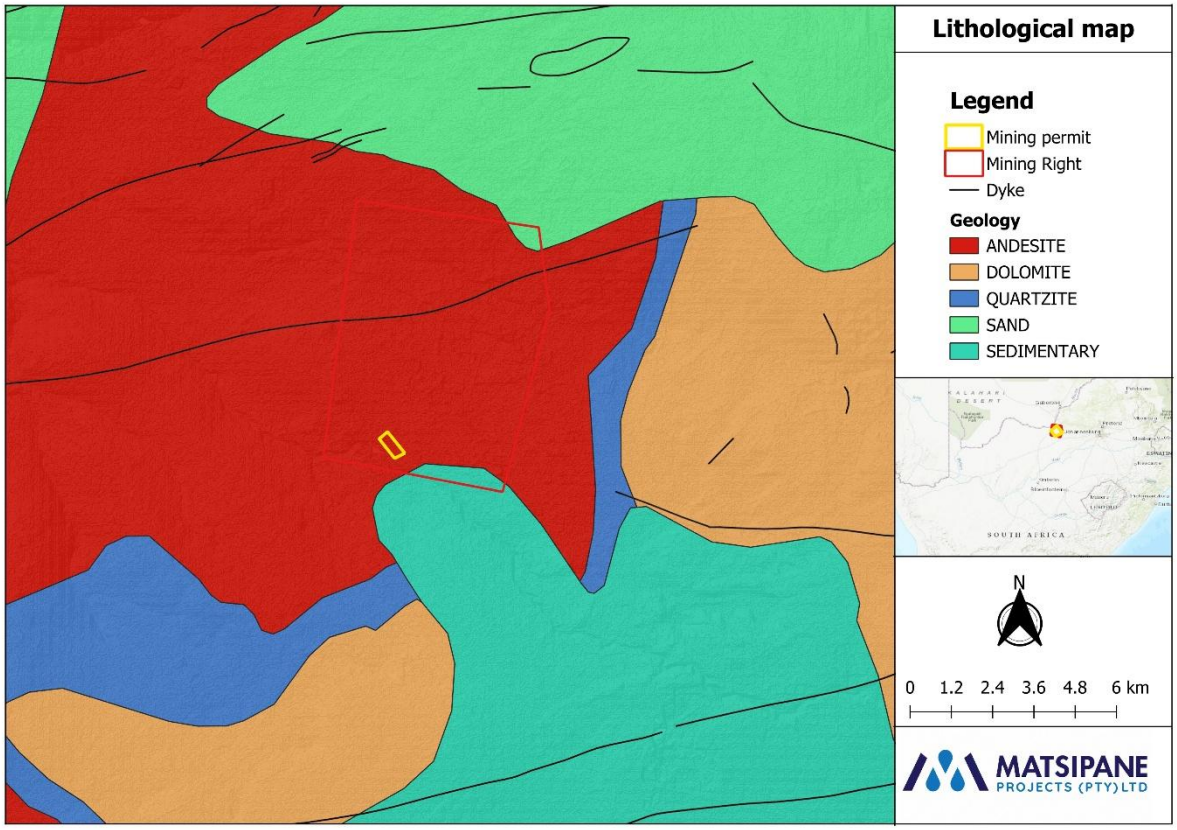


Figure 6: Lithological map

2.6 Climate

The project area is located within the semi-arid climatic region of the North West Province, characterised by hot summers, cool to mild winters, and highly seasonal rainfall. The climate is typical of the western interior of South Africa, where rainfall is concentrated during the summer months (October to March), while winters (May to August) are generally dry with low humidity and little or no precipitation. The area experiences high evaporation rates throughout the year, often exceeding annual rainfall, resulting in a persistent moisture deficit and limited natural recharge to groundwater systems.

Mean annual rainfall in the project area ranges between 450 and 550 mm, with most precipitation occurring as short-duration, high-intensity convective thunderstorms during the summer months. These rainfall events generate rapid surface runoff into the ephemeral drainage channels, including the Potfonteinspruit and its associated tributaries, while prolonged dry periods dominate for the remainder of the year. The rainfall pattern contributes to episodic streamflow and limited sustained baseflow within local watercourses.

Temperatures are characterised by hot summers, with average daily maximum temperatures ranging from 30°C to 35°C and occasionally exceeding 38°C during heatwave conditions. Winters are generally mild during the day, with maximum temperatures of 18–24°C, while minimum temperatures may fall below 5°C, and occasional frost may occur during June and

July. The combination of high summer temperatures and low relative humidity results in potential evaporation rates exceeding 1800–2000 mm per annum, substantially greater than the annual precipitation.

3. DESKTOP GROUNDWATER RESOURCES ASSESSMENT

3.1 General Hydrogeology

The hydrogeological map indicates that the proposed mining permit area is situated predominantly within an intergranular and fractured aquifer with an estimated borehole yield of 0.1–0.5 L/s. This aquifer type is characterised by groundwater occurrence within the weathered regolith and secondary fractures in the underlying bedrock. Consequently, groundwater availability within the permit area is expected to be generally low to moderate, with borehole productivity controlled primarily by the degree of weathering and fracture connectivity rather than primary rock porosity.

The map further indicates that the mining permit is located within a hydrogeological unit having a transmissivity of approximately 25 m²/day, which reflects relatively low groundwater transmissivity. This suggests that groundwater movement through the aquifer is limited and that the aquifer has a modest capacity to transmit water. As a result, groundwater abstraction is unlikely to sustain high pumping rates without significant drawdown, and groundwater recharge is expected to be relatively slow.

A dyke traverses the hydrogeological unit in a generally east-west orientation north of the mining permit. Such geological structures can significantly influence groundwater flow by either acting as hydraulic barriers that restrict groundwater movement or as preferential flow paths where fractured. In this case, the dyke may compartmentalise the aquifer and locally influence groundwater levels and flow directions across the site. Hydrogeological investigations should therefore consider its potential impact when designing monitoring programmes or evaluating groundwater abstraction.

To the east of the mining permit, the hydrogeological conditions improve markedly, with aquifers exhibiting higher transmissivities (approximately 5,000 m²/day) and greater groundwater potential. These areas are likely associated with more productive geological formations capable of sustaining higher borehole yields. However, these favourable groundwater conditions lie outside the proposed mining permit and are therefore unlikely to be directly affected by mining activities.

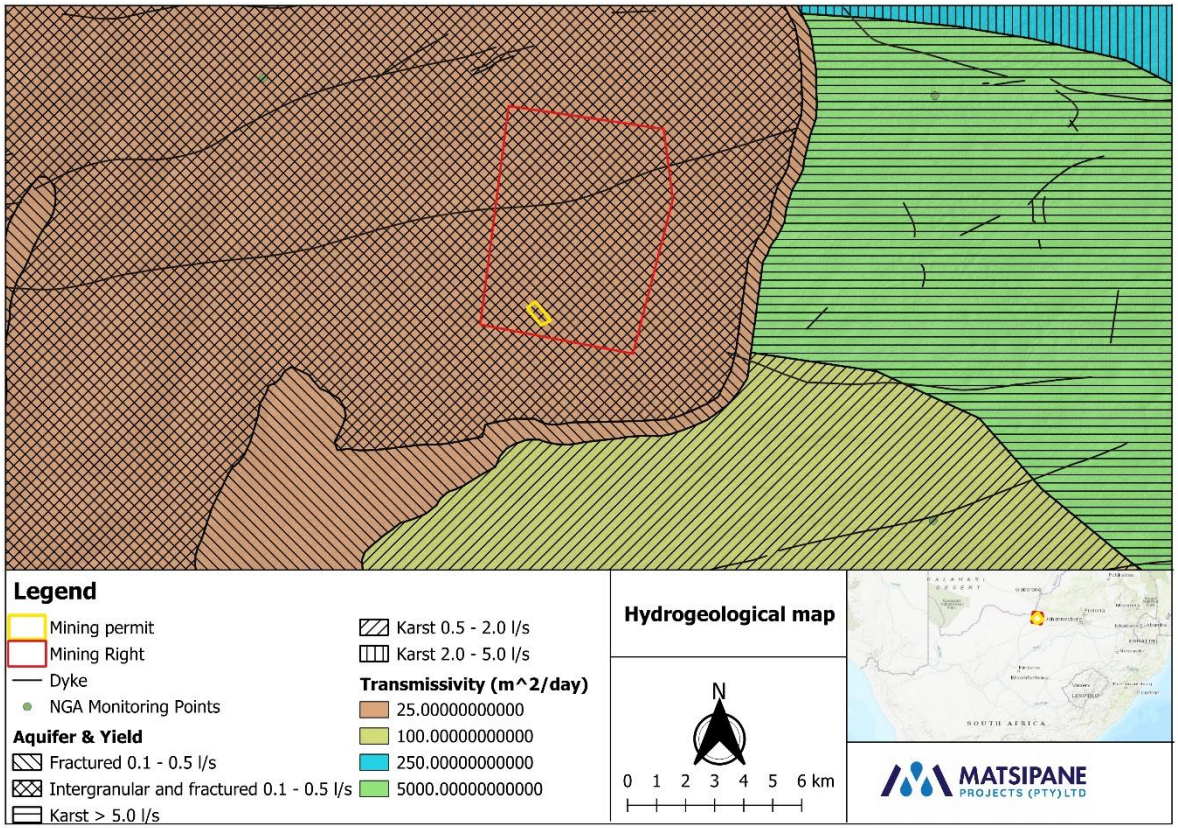


Figure 7: Hydrogeological map

3.2 Aquifer Vulnerability

The aquifer vulnerability map shows the spatial distribution of groundwater vulnerability within and surrounding the proposed mining right by combining aquifer characteristics, groundwater yield, structural geology (dykes), and the DRASTIC vulnerability classification. The map indicates that groundwater vulnerability varies considerably across the project area, reflecting changes in geology, aquifer type, and structural controls.

The proposed mining right is located predominantly within an area classified as very low to low aquifer vulnerability (DRASTIC Class 1.0), represented by the dark purple colour. This suggests that the underlying aquifer has a relatively high natural capacity to attenuate contaminants before they reach the groundwater system. Consequently, the risk of widespread groundwater contamination from mining activities is comparatively low over much of the mining right, provided that appropriate environmental management measures are implemented.

However, the mining permit is situated close to the boundary between low and moderate vulnerability zones. To the east and south of the mining right, vulnerability increases into moderate (Classes 1.89–2.11) and high vulnerability (Class 3.0) areas, represented by light green and dark red colours. These areas are hydraulically more sensitive because they are associated with higher groundwater permeability and more productive aquifers, allowing contaminants to migrate more rapidly if released.

The aquifer yield layer indicates that the project area is underlain by a combination of fractured-rock aquifers (0.1–0.5 L/s) and intergranular-fractured aquifers, while the surrounding eastern areas include karst aquifers capable of yielding 2–5 L/s and locally greater than 5 L/s. Karst aquifers possess well-developed fractures and dissolution channels that facilitate rapid groundwater flow, making them inherently more vulnerable to contamination than the lower-yield fractured aquifers underlying most of the mining right.

The mapped dykes are important hydrogeological structures that influence groundwater movement. Depending on their degree of weathering and fracturing, they may either impede groundwater flow by acting as hydraulic barriers or enhance groundwater movement where fractured. Their presence suggests that groundwater flow within the study area is structurally controlled rather than occurring uniformly across the landscape.

Although several National Groundwater Archive (NGA) monitoring points are located within the surrounding higher-yield aquifers, relatively few occur inside the proposed mining footprint. This indicates that groundwater monitoring should be strengthened, particularly towards the eastern and southern portions of the mining right where aquifer vulnerability increases.

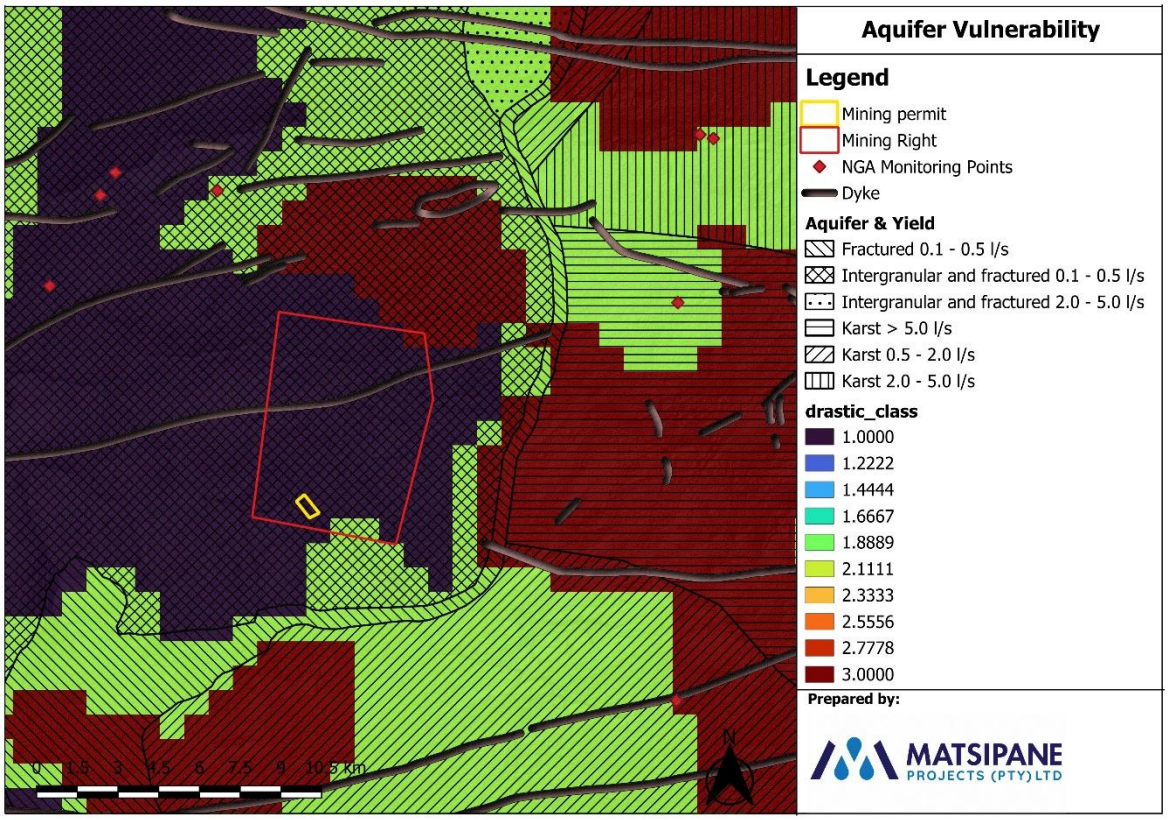


Figure 8: Groundwater Vulnerability map

3.3 Groundwater levels

The groundwater level map indicates that groundwater across the study area occurs at moderately shallow to moderate depths, ranging from 13.6 to 24 m below ground level (mbgl).

Two groundwater level zones are identified, with the 16.4–24 mbgl interval dominating the study area, while a smaller 13.6–16.4 mbgl zone is confined to the southwestern portion of the map.

The proposed mining right is located entirely within the 16.4–24 mbgl groundwater level zone, indicating that the water table beneath the project area is generally encountered between approximately 16 and 24 m below the ground surface. This suggests that groundwater is relatively deep compared to the southwestern part of the study area and that the initial stages of mining are unlikely to intersect the groundwater table unless excavations extend beyond these depths.

The shallower groundwater level zone (13.6–16.4 mbgl) occurs outside the proposed mining right, suggesting localized areas of higher groundwater availability or lower topographic elevation. As groundwater generally flows from areas of higher hydraulic head to lower hydraulic head, these shallower groundwater areas may represent local groundwater discharge zones or areas where recharge conditions differ from those within the mining right.

Overall, the groundwater level distribution indicates stable and relatively deep groundwater conditions beneath the proposed mining area. The depth to groundwater reduces the likelihood of significant groundwater inflows during shallow mining operations; however, if mining progresses below approximately 16–24 m, groundwater interception and localized dewatering may become necessary. Routine groundwater level monitoring should therefore be undertaken throughout the life of the mine to detect any changes in groundwater levels resulting from mining activities or seasonal climatic variations.

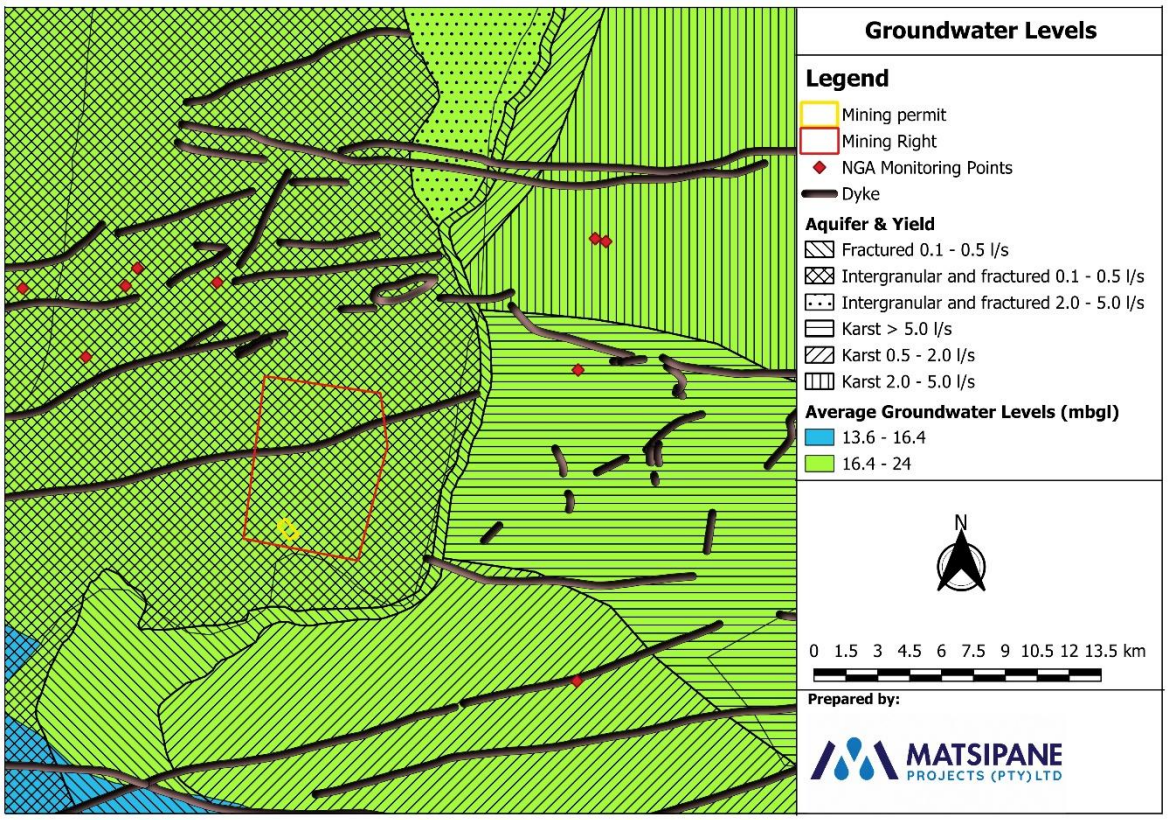


Figure 9: Groundwater level map

3.4 Aquifer classification and protection

The aquifer classification indicates that the study area comprises a combination of fractured-rock, intergranular-fractured, and karst aquifer systems with varying groundwater yields and degrees of vulnerability. The proposed mining right is located predominantly within a low-yield fractured aquifer, with expected borehole yields of 0.1–0.5 L/s, indicating that groundwater occurrence is primarily controlled by secondary porosity associated with fractures, joints, and weathered zones. These aquifers generally have limited storage capacity and relatively low groundwater transmissivity compared to regional karst systems.

Surrounding the mining right, particularly towards the eastern and southern portions of the study area, the hydrogeological conditions transition into intergranular-fractured aquifers and karst aquifers with moderate to high groundwater yields ranging from 2.0–5.0 L/s and locally exceeding 5.0 L/s. These karst aquifers are associated with fractured and solution-enhanced dolomitic formations that exhibit high secondary permeability, allowing rapid groundwater movement and increased groundwater abstraction potential. Consequently, these aquifers are considerably more sensitive to contamination than the fractured aquifers underlying most of the mining footprint.

The aquifer vulnerability assessment further indicates that the proposed mining right is situated mainly within a low groundwater vulnerability zone (DRASTIC Class 1), suggesting that the

natural geological materials provide a degree of protection against contaminant migration. However, vulnerability increases towards the eastern and southern boundaries where moderate to high vulnerability zones coincide with the more productive karst aquifers. These areas represent the most environmentally sensitive groundwater receptors within the project area and therefore require enhanced protection during mining operations.

3.5 Aquifer Protection

Although the proposed mining area is underlain predominantly by low-yield fractured aquifers with relatively low intrinsic vulnerability, groundwater protection remains essential throughout the life of the mine. Mining activities should be planned to prevent contamination of both the local fractured aquifer and the adjacent high-yield karst aquifers.

The following groundwater protection measures are recommended:

- Maintain clean and dirty water separation in accordance with GN704 and the Best Practice Guidelines for Water Resource Protection in the South African Mining Industry.
- Store fuels, hydrocarbons, chemicals, and hazardous materials within bunded, impermeable containment areas.
- Construct process water ponds, slimes dams, and pollution control facilities with appropriate lining systems to prevent seepage.
- Implement spill prevention and emergency response procedures for all hazardous substances.
- Minimise disturbance within drainage channels and maintain appropriate buffer zones around surface water features.
- Establish a groundwater monitoring programme using strategically located monitoring boreholes, particularly along the eastern and southern boundaries where aquifer vulnerability is greatest.
- Conduct routine groundwater quality monitoring for key indicators such as pH, EC, TDS, sulphate, nitrate, major ions, and metals to detect any changes attributable to mining activities.
- Progressively rehabilitate disturbed areas to reduce infiltration of contaminated runoff and minimise long-term groundwater impacts.

3.5 Groundwater quality

The water quality map presents the regional distribution of groundwater electrical conductivity (EC) and Total Dissolved Solids (TDS) within and surrounding the proposed mining right. These parameters provide an indication of groundwater salinity and overall water quality. Lower EC and TDS values generally reflect fresher groundwater, whereas higher values indicate increased

mineralisation resulting from prolonged water-rock interaction, evaporative concentration, or dissolution of naturally occurring minerals.

The proposed mining right is situated predominantly within a groundwater quality zone characterised by electrical conductivity ranging between 70 and 300 mS/m, with a mean TDS of approximately 635 ppm. This indicates that groundwater within the mining right is moderately mineralised but remains within the freshwater classification (TDS <1,000 mg/L). The observed groundwater chemistry is therefore considered typical of fractured-rock aquifers in semi-arid environments, where groundwater residence time and weathering contribute to moderate dissolved salt concentrations.

To the east of the mining right, groundwater quality improves slightly, with mean TDS values of approximately 337–476 ppm, indicating lower mineralisation and fresher groundwater conditions. In contrast, areas to the south exhibit intermediate TDS values (480–558 ppm), reflecting moderate groundwater mineralisation. These spatial variations suggest that groundwater quality is influenced by lithology, groundwater flow paths, residence time, and structural geological features.

Several dykes traverse the study area and are likely to influence groundwater flow and water quality. These structures may compartmentalise the aquifer, restrict groundwater movement, or locally enhance flow where fractured. Consequently, they can create distinct groundwater quality zones by limiting hydraulic connectivity between different portions of the aquifer.

The distribution of National Groundwater Archive (NGA) monitoring points across the study area provides useful reference locations for assessing baseline groundwater quality. However, relatively few monitoring points occur within the proposed mining footprint, indicating that additional monitoring boreholes would improve the ability to detect any future changes in groundwater quality resulting from mining activities.

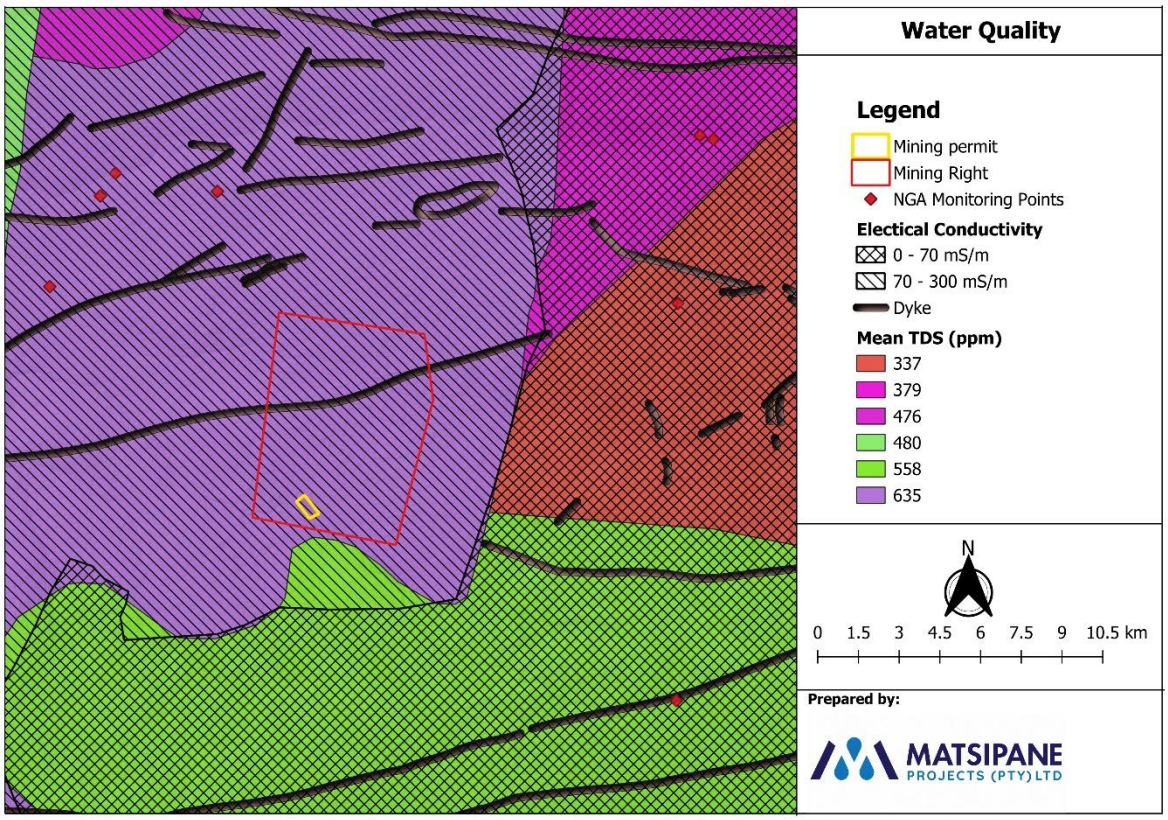


Figure 10: Groundwater quality

4. RISK ASSESSMENT

The proposed Colga mining project is expected to pose an overall Medium groundwater risk, with the highest risks associated with slimes dams, diesel storage, workshops, and tailings management, owing to their potential to release contaminants into the subsurface. Risks associated with the mining method itself are relatively low because the deposit is shallow, opencast mining will involve limited stripping, and progressive rehabilitation through roll-over mining will minimise the duration of land disturbance. If best-practice engineering controls, pollution prevention measures, and a comprehensive groundwater monitoring programme are implemented, the residual groundwater risk can be reduced to Low to Medium over the life of the mine.

Table 1: Groundwater risk assessment

Project Activity / Infrastructure	**Potential Groundwater Risk**	**Source of Impact**	**Likelihood**	**Consequence**	**Risk Rating**	**Mitigation Measures**
Opencast mining excavation	Groundwater interception and pit inflows	Excavation below groundwater level	Low	Moderate	Low	Monitor groundwater levels; controlled dewatering if required.
Roll-over mining/backfilling	Groundwater contamination from backfill	Infiltration through backfilled waste	Unlikely	Moderate	Low	Use inert backfill and rehabilitate progressively.
Vibrating grizzly	Hydrocarbon contamination	Fuel/lubricant leaks	Possible	Moderate	Medium	Maintain equipment and provide spill kits.
Rotary scrubber	Contaminated process water	Process water generation	Likely	Moderate	Medium	Recycle process water in a closed circuit.
Diamond pan separation	Process water seepage	Water losses	Possible	Moderate	Medium	Impermeable processing floors and water recovery.
Slimes dams	Groundwater contamination	Tailings seepage	Possible	Major	High	HDPE liners, leak detection and monitoring.
Tailings backfilling	Leachate migration	Residual moisture	Possible	Moderate	Medium	Adequate dewatering before backfilling.
Water abstraction	Groundwater level decline	Continuous pumping	Possible	Moderate	Medium	Pump within licensed limits and monitor.
Transfer pipelines	Groundwater contamination	Pipeline leaks	Unlikely	Moderate	Low	Routine inspections and repairs.
Septic conservancy tanks	Sewage contamination	Leakage/overflow	Unlikely	Major	Medium	Sealed tanks and licensed disposal.
Water storage tanks	Seepage	Tank leakage	Unlikely	Moderate	Low	Impermeable liners and inspections.

Diesel storage	Hydrocarbon contamination	Fuel spills	Possible	Major	High	Bunded storage and spill response.
Workshops	Oil and grease contamination	Maintenance	Possible	Major	High	Concrete floors and oil-water separators.
Generators	Diesel/lubricant leaks	Equipment	Possible	Moderate	Medium	Routine inspection and maintenance.
Waste rock stockpiles	Sediment infiltration	Rainfall runoff	Possible	Moderate	Medium	Drainage controls and rehabilitation.
Tailings/waste dumps	Seepage	Rainfall infiltration	Possible	Major	High	Engineered drainage and seepage control.
Laydown/parking	Hydrocarbon contamination	Vehicle leaks	Possible	Moderate	Medium	Hardstands and spill management.
Overall operation	Cumulative groundwater impacts	Combined activities	Possible	Major	High	Groundwater monitoring and adaptive management.

5. CONCLUSION AND RECOMMENDATIONS

The hydrogeological assessment demonstrates that the proposed alluvial diamond mining project is situated within a low-yield fractured and intergranular aquifer characterised by relatively deep groundwater levels, low transmissivity, and low intrinsic vulnerability. These hydrogeological conditions indicate that groundwater resources beneath the mining right are naturally afforded a moderate degree of protection and that significant groundwater inflows into the planned opencast excavations are unlikely during the early stages of mining.

Although the groundwater resource is considered to have relatively low vulnerability, mining-related infrastructure—including slimes dams, process water facilities, workshops, diesel storage areas, and tailings disposal facilities—has the potential to adversely affect groundwater quality if not appropriately designed and managed. The incorporation of progressive rehabilitation and roll-over mining practices will minimise the extent and duration of land disturbance, thereby reducing the long-term environmental footprint of the operation.

Overall, the proposed mining development is considered hydrogeologically feasible. Provided that groundwater protection measures, pollution prevention strategies, and routine groundwater monitoring are implemented throughout the operational and closure phases, the proposed project is unlikely to result in significant long-term adverse impacts on groundwater resources. The study therefore supports the proposed development from a groundwater perspective, subject to compliance with the conditions of the Water Use Licence and Environmental Management Programme (EMPr).

Recommendations

To minimise groundwater impacts and ensure sustainable water resource management throughout the life of the mine, the following recommendations are made:

- Establish a groundwater monitoring network consisting of strategically located monitoring boreholes upgradient and downgradient of the mining and processing areas, with particular focus on the eastern and southern boundaries where aquifer vulnerability is higher.
- Monitor groundwater levels quarterly and groundwater quality biannually for key parameters including pH, EC, TDS, major ions, sulphate, nitrate, hydrocarbons, and trace metals to detect any mining-related changes.
- Construct slimes dams, pollution control dams, and process water ponds with engineered impermeable liners and seepage collection systems to prevent groundwater contamination.

- Store fuels, diesel, lubricants, and hazardous chemicals within bunded, impermeable containment facilities and implement comprehensive spill prevention and emergency response procedures.
- Operate groundwater abstraction boreholes within licensed abstraction limits and periodically review abstraction rates based on groundwater monitoring results to avoid excessive drawdown.
- Implement effective clean- and dirty-water separation systems, stormwater management infrastructure, and erosion control measures to prevent contaminated runoff from entering drainage channels and infiltrating the groundwater system.
- Continue the planned progressive rehabilitation programme by backfilling mined-out areas with appropriately managed inert material and stabilising disturbed land to minimise long-term groundwater and surface water impacts.
- Review the groundwater management programme regularly throughout the operational, closure, and post-closure phases to ensure compliance with the Water Use Licence conditions and to enable adaptive management should groundwater conditions change.

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PHASE I ARCHAEOLOGICAL AND CULTURAL HERITAGE IMPACT ASSESSMENT SPECIALIST REPORT FOR THE PROPOSED DIAMOND, DIAMOND (ALLUVIAL), DIAMOND (KIMBERLITE), AGGREGATE, LEAD, MANGANESE ORE, LIMESTONE, SAND AND GOLD ORE MINING PERMIT AND MINING RIGHT APPLICATION ON VARIOUS PORTIONS OF THE FARM COLGA 132 JQ WITHIN THE MAHIKENG LOCAL MUNICIPALITY OF NGAKA MODIRI MOLEMA DISTICT IN THE NORTHWEST PROVINCE



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AUGUST 2026

ABILITY TO CONDUCT THE PROJECT

Alvord Nhundu is a professional archaeologist. He completed his Bachelor of Science with honours degree in archaeology with the University of the Witwatersrand (Wits) and Masters in Archaeology with the University of Pretoria (UP). His research interest lies in old and new world archaeology, palaeoenvironmental and climatology, archaeological theory, Later Stone Age, rock art, hunter-gatherers, hunter-gatherer interactions, several aspects of Southern African Iron Age and Indigenous archaeologies. Alvord is an accredited Cultural Resource Management (CRM) member of the Association of Southern African Professional Archaeologists (ASAPA No.338) with Field Director status in Iron Age and Stone Age, and Field Supervisor status in Grave Relocation and Rock Art. He is also affiliated to Society of South Africanist Archaeologists (SAfA) and the International Council of Archaeozoology (ICAZ). He has been practising CRM for more than 10 years and has completed over 100 Archaeological Impact Assessments (AIA) for developmental projects in the Limpopo, Mpumalanga, North-West, Eastern Cape, Free State, Northern Cape and KwaZulu Natal provinces of South Africa. The projects include establishment and upgrade of power substations, road construction, development of malls, housing developments, establishment and expansion of mines. He has also conducted the relocation of graves. His detailed CV is available on request.

INDEPENDENCE

I, Alvord Nhundu, declare that:

- I act as an independent specialist;
- I am conducting work relating to the proposed mining development in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required experience in conducting the specialist report and I will comply with legislation, regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the details and particulars furnished by me in this declaration are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the regulations and is punishable in terms of section 24F of the NEMA.



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EXECUTIVE SUMMARY

Introduction

Ruins Archaeo- Heritage Consulting (Pty) Ltd was retained by Ndi Geological Consulting Services (Pty) Ltd to conduct an Archaeological and Cultural Heritage Impact Assessment study for the proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore Mining Permit and Mining Right Application on various portions of the farm Colga 132 JQ within the Mahikeng Local Municipality of Ngaka Modiri Molema District in the Northwest Province. As prescribed by SAHRA and stipulated by the legislation, an HIA is a pre-requisite for such a development. The main purpose of the study was to identify and document the archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed mining development. To reach a defensible recommendation, both a desktop study and a field survey were conducted. The desktop study was undertaken through the South African Heritage Resources Information System (SAHRIS) for previous Archaeological Impact Assessments conducted in the region of the proposed development, and also for research that has been carried out in the wider area over recent years. The field survey was conducted to validate any assumptions made during the desktop study. The Heritage Impact Assessment was undertaken in terms of Section 38 (8) of the National Heritage Resources Act (Act No. 25 of 1999).

Methods

To understand the archaeology of the area, a background study was undertaken, and relevant institutions were consulted. These studies entail the view of archaeological and heritage impact assessment studies that have been conducted in and around the proposed area through SAHRIS. The author conducted the field survey on the **29th of July 2026.** The area of land for the proposed development was investigated on foot for any traces of material culture.

Restrictions and constraints

The site is disturbed by previous and current land use activities and is an active rural settlement. As with any survey, archaeological materials may be under the surface and therefore unidentifiable to the surveyor until they are exposed once mining begins. As a result, should any archaeological/ or grave site be observed during the mining phase, a heritage specialist monitoring the development must immediately be notified.

Results

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining permit and mining right application did not reveal any significant archaeological material within the footprint of the proposed development. The probability of identifying significant archaeological artefacts was affected by dense vegetation cover in some sections of the site. The study notes that structures and buildings associated with previous farming activities exist within the study area, however, the study could not verify the ages of the structures or if they are older than sixty years and do trigger Section 34 of the NHRA Act 25 of 1999. The assessment also did not identify any burial sites and graves within the area proposed for mining, therefore the study does not trigger Section 36 of the NHRA Act 25 of 1999. The study further notes that the probability of discovering unmarked graves and burial sites within the study area is probable and the developer is urged to be careful and heedful of that. It is important to note that the project site is heavily disturbed as evidenced by the previous and on-going activities, however, it is important to note that the possibility of chance findings is ever present.

Recommendations

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. SAHRA may approve the project as planned with special commendations to implement the recommendations here in made:

1. It is recommended that SAHRA/NWPHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements;

2. It is recommended that SAHRA/ NWPHRA make a decision in terms of Section 38 (4) of the NHRA to approve the proposed mining development;

3. A phase two study should be commissioned to verify the ages of the identified structures in the event that the structures are in the direct path/footprint of the proposed development;

4. The study did not identify any graves and burial sites, however, they may exist within the proposed development area, should they be encountered during mining activities, the developer is urged that in terms of Section 36 of the NHRA Act, burial sites must be protected from proposed mining activities and any accidental damage;

5. Mining workers must be inducted about potential impacts of proposed mining activities on heritage sites and how these impacts can be minimised without compromising the project schedule;

6. The Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and communicated to the SAHRA through the proposed project development Archaeologist. This form of extended community involvement would pre-empty any potential disruption that may arise from previous unknown cultural heritage matters that may have escaped the attention of the study; and

7. From a heritage perspective supported by the findings of this study, the project is supported. However, mining activities should be approved under the observation that the dimensions do not extend beyond the area considered in this report.

Conclusions

A thorough background study and survey of the proposed development was conducted in line with SAHRA guidelines. As per the recommendations above, the project may proceed subject to adherence of the above recommendations.

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ACRONYMS AND ABBREVIATIONS

AIA	Archaeological Impact Assessment
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
LIA	Late Iron Age
MIA	Middle Iron Age
EIA	Early Iron Age
HMP	Heritage Management Plan
LSA	Late Stone Age
MSA	Middle Stone Age
ESA	Early Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
NWPHRA	Provincial Heritage Resources Authority - North West
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

The following terms used in this Archaeology are defined in the National Heritage Resources Act [NHRA], Act Nr. 25 of 1999, South African Heritage Resources Agency [SAHRA] Policies as well as the Australia ICOMOS Charter *(Burra Charter)*:

Archaeological Material: remains resulting from human activities, which are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures.

Artefact: Any movable object that has been used, modified or manufactured by humans.

Conservation: All the processes of looking after a site/heritage place or landscape including maintenance, preservation, restoration, reconstruction and adaptation.

Cultural Heritage Resources: refers to physical cultural properties such as archaeological sites, palaeolontological sites, historic and prehistorical places, buildings, structures and material remains, cultural sites such as places of rituals, burial sites or graves and their associated materials, geological or natural features of cultural importance or scientific significance. This include intangible resources such religion practices, ritual ceremonies, oral histories, memories indigenous knowledge.

Cultural landscape: "the combined works of nature and man" and demonstrate "the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both internal and external".

Cultural Resources Management (CRM): the conservation of cultural heritage resources, management, and sustainable utilization and present for present and for the future generations

Cultural Significance: is the aesthetic, historical, scientific and social value for past, present and future generations.

Chance Finds: means Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified

during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Compatible use: means a use, which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Expansion: means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Grave: A place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

Heritage impact assessment (HIA): Refers to the process of identifying, predicting and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law, and which may significantly affect the cultural and natural heritage resources. The HIA includes recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Historic Material: remains resulting from human activities, which are younger than 100 years, but no longer in use, including artifacts, human remains and artificial features and structures.

Impact: the positive or negative effects on human well-being and / or on the environment.

***In situ* material:** means material culture and surrounding deposits in their original location and context, for instance archaeological remains that have not been disturbed.

Interested and affected parties Individuals: communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

Interpretation: means all the ways of presenting the cultural significance of a place.

Late Iron Age: this period is associated with the development of complex societies and state systems in southern Africa.

Material culture means buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Place: means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Palaeontology: The study of fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and of any site which contains such fossilised remains or trace.

Protected area: means those protected areas contemplated in section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers.

Public participation process: A process of involving the public in order to identify issues and concerns and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Setting: means the area around a place, which may include the visual catchment.

Significance: can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, physical cultural, social and economic).

Site: a spatial cluster of artifacts, structures, organic and environmental remains, as residues of past human activity.

1 INTRODUCTION

At the request of Ndi Geological Consulting Services (Pty) Ltd, Ruins Archaeo- Heritage Consulting (Pty) Ltd conducted a Phase I Archaeological and Heritage Impact Assessment Study for the proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore Mining Permit and Mining Right Application on various portions of the farm Colga 132 JQ within the Mahikeng Local Municipality of Ngaka Modiri Molema District in the Northwest Province. The survey was conducted in accordance with the SAHRA Minimum Standards for the Archaeology and Paleontology Study. The minimum standards clearly specify the required contents of the report of this nature. The study aims to identify and document archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed development, these will in turn assist the developer in ensuring proper conservation measures in line with the National Heritage Resources Act, 1999 (Act 25 of 1999).

2 SITES LOCATION AND DESCRIPTION

G and E Global (Pty) Ltd ("G and E Global") has applied to the Department of Mineral and Petroleum Resources (DMPR) for a Mining Right (MR) and associated Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence Application (WULA) over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ in the Mahikeng Magisterial District, North West Province.

The proposed mining project entails the extraction of Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore over an area of approximately 3927 hectares situated approximately 11.5 km southeast of Mahikeng within the Ngaka Modiri Molema District Municipality.

The proposed mining operation will utilise an opencast mining method due to the shallow nature of the Colga mineral deposit. The most significant impact on mining cost is the stripping ratio. The Colga deposit is shallow and therefore will not require extensive waste stripping. This will keep fuel and maintenance costs per carat significantly lower than deep-level mining operations. Although the opencast mining method is highly mechanised, it remains cost effective because production is reached early and production volumes are high. The mining operation will utilise a progressive rehabilitation approach through roll-over mining practices, where waste material from the active mining pit is backfilled directly into previously mined-out pits. This approach reduces haulage distances, fuel consumption and final mine closure costs while allowing concurrent rehabilitation

MINERAL PROCESSING FLOW

a. Sizing:

Raw gravel will be fed into a vibrating grizzly. Material greater than 40 mm, regarded as waste material, will be discarded immediately to optimise fuel efficiency.

b. Liberation:

Material smaller than 40 mm will be fed into a rotary scrubber. This process is critical to clean and liberate diamonds by removing calcium and clay coatings that may hinder recovery.

c. Pan Separation Process:

The washed gravel will be fed into a 14-foot diamond pan. A central shaft rotates triangular tines through a slurry of water and fine sand. Lighter waste material, such as quartz and sand

is discharged via a central weir while heavier minerals, including diamonds and garnet indicators, migrate to the outer wall.

d. Tailings Management:

Tailings and waste material will be dewatered using dewatering screens before being backfilled into mined-out areas to facilitate concurrent rehabilitation.

PROPOSED MINING INFRASTRUCTURE

The proposed mining infrastructure may include:

- A 1-hectare mineral processing plant at each mining section, including a slimes dam;
- A central processing plant;
- Slime dams;
- Water abstraction infrastructure, including transfer pipelines from borehole areas;
- Ablution facilities;
- Septic conservancy tanks at each mining section for wastewater collection and storage;
- Parking areas;
- Water storage tanks and dams;
- Diesel storage tanks and fuel trailers;
- Generators and associated power cables;
- Workshop facilities;
- Laydown areas;
- Topsoil stockpiles;
- Tailings and waste dumps;
- Office (mobiles);
- Kitchen facilities (mobiles); and
- Labour quarters (mobiles).

Final infrastructure layouts and positions will be confirmed during the Environmental Impact Assessment Phase following completion of specialist investigations and engineering design inputs.

Table 1: Summary of project location details.

Province	North West
District Municipality	Ngaka Modiri Molema
Local Municipality	Mahikeng
Affected farms	Farm Colga 132 JQ,
Proposed development	Mining Permit and Mining Right Application
DMRP Ref	NW 30/5/1/3/2/1/10535 MP and NW30/5/1/2/2/10274MR

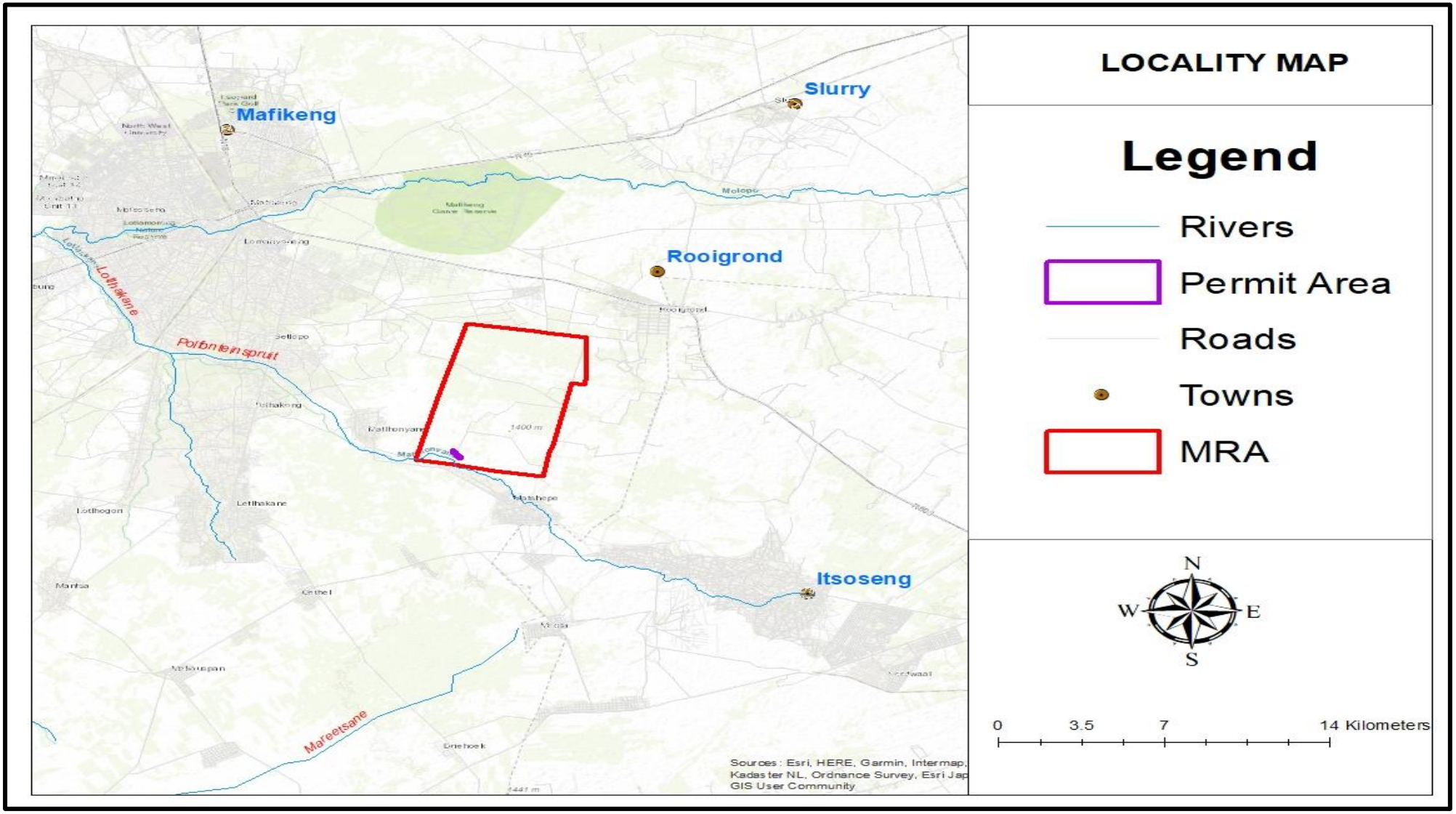


Figure 1: Locality map of the study area (Ndi 2026).

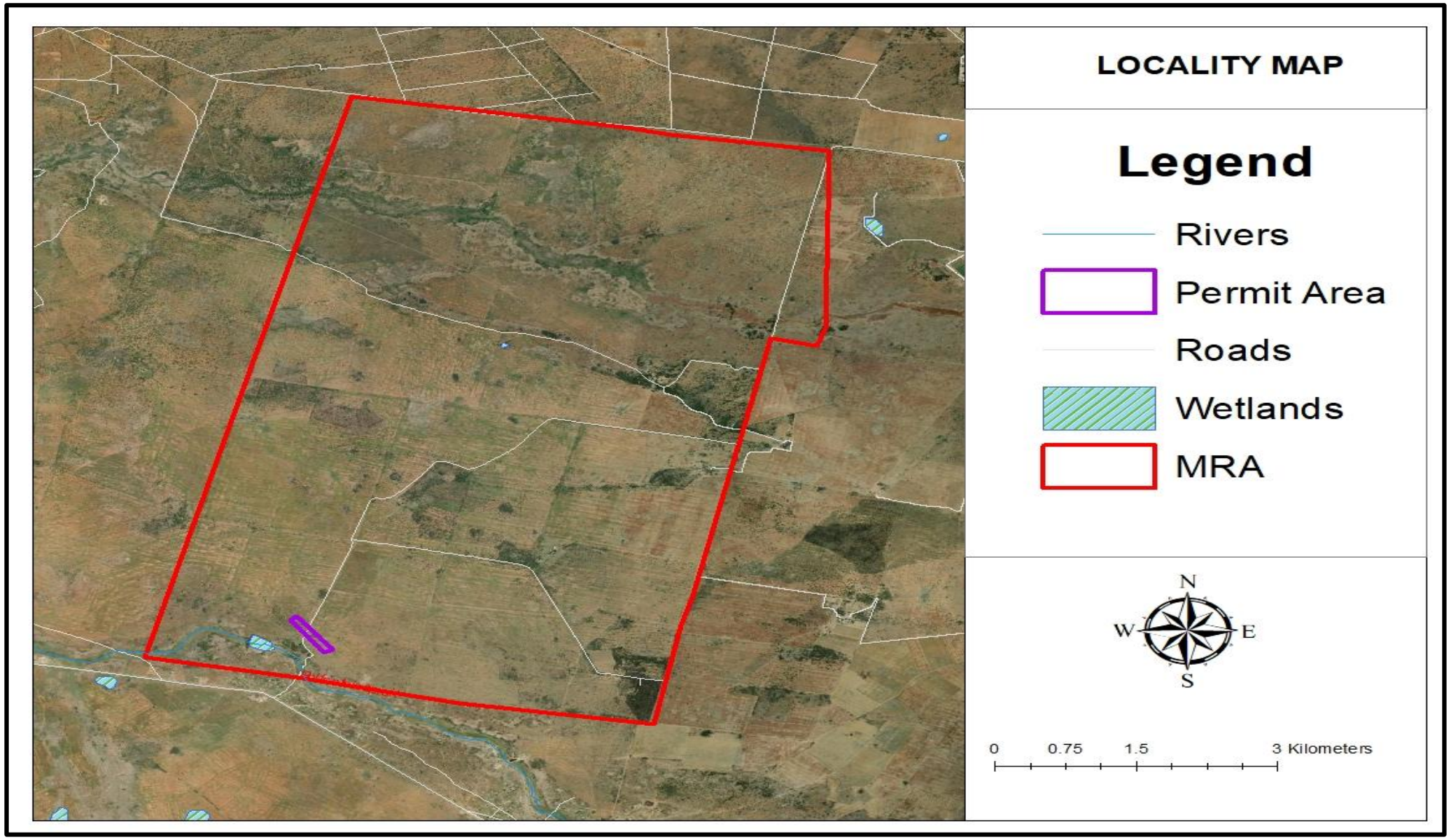


Figure 2: Google Earth Image of the site proposed for the development (Author 2026).

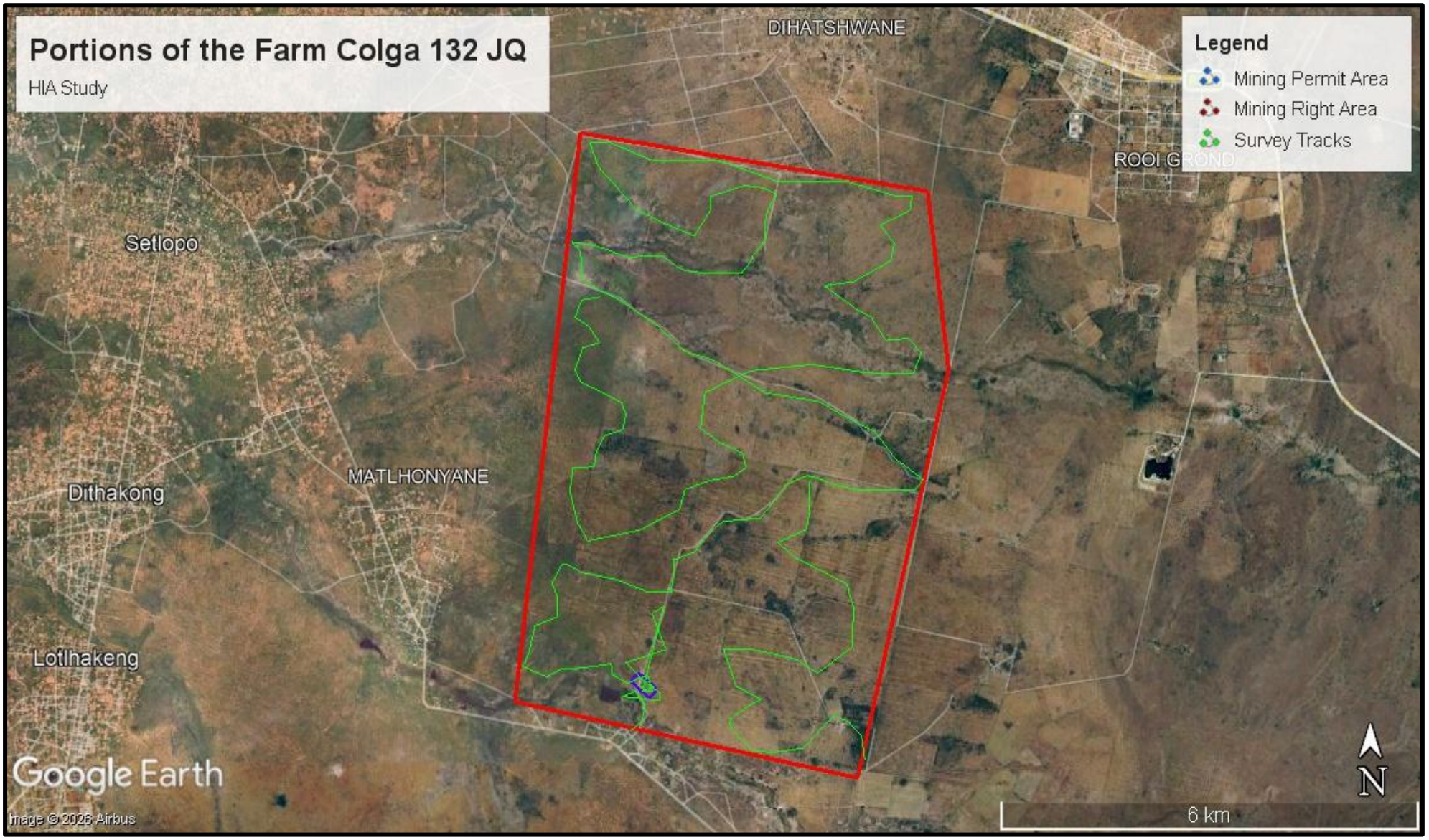


Figure 3: Survey Tracks within the site proposed for the development (Author 2026).



Figure 4: Historical satellite image (1969) of the study area, note the red polygon (NGIGEOPORTAL 2026).

PHOTOGRAPHS OF THE STUDY AREA



Figure 5: General view of the site proposed for the development.



Figure 6: Showing evidence of veld fires in the study area.



Figure 7: Showing sections of the project area is not on pristine ground, note the excavations.



Figure 8: Showing the nature of vegetation within the study area.



Figure 9: View of a section of the study area.



Figure 10: View of burnt grass within the area proposed for the development.



Figure 11: View of the study area.



Figure 12: View of existing water storage structure within the proposed development site.

3 PURPOSE OF THE CULTURAL HERITAGE STUDY

The purpose of this Archaeological and Cultural Heritage study was to entirely identify and document archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed development, these will in turn assist the developer in ensuring proper conservation measures in line with the National Heritage Resources Act, 1999 (Act 25 of 1999). Impact assessments highlight many issues facing sites in terms of their management, conservation, monitoring and maintenance, and the environment in and around the site. Therefore, this study involves the following:

- Identification and recording of heritage resources that may be affected by the proposed mining development; and
- Providing recommendations on how best to appropriately safeguard the identified heritage sites. Mitigation is an important aspect of any development on areas where heritage sites can be identified.

4 METHODOLOGY AND APPROACH

The methods utilised in this study are informed by the 2012 SAHRA Policy Guidelines for impact assessment. To achieve the purpose and objectives, different sources were used, this includes;

I. Literature review

Relevant literature was consulted through the SAHRIS website, with an intention to review previous Cultural Heritage Impact Assessments conducted in and around the area of the proposed development. Various archaeological, historical sources and recently published and unpublished books were used to aid this study.

II. Field survey

The field survey was undertaken by the author in collaboration with other specialists on **29 July 2026.** The survey made use of a vehicle to get to site, and the site was surveyed on foot. The survey covered the entire servitude of the proposed development.

III. Public Participation

A public participation will be undertaken by the project EAP to gather the issues and concerns of interested and affected parties (IAPs) and Authorities, including community leaders. The process consists of contacting the IAPs, having a public meeting with the stakeholders and informing and engaging with them on the project proposal. The issues raised will be incorporated in the EIA/EMP where relevant and outcome of heritage issues will be forwarded to the Author.

IV. Documentation

In line with the appropriate legislation, the site was documented by taking photographs using a camera 10.1 mega pixel Sony Cybershort Digital Camera and plotting of finds using a Garmin etrex Venture HC.

V. Restriction and assumption

Underground heritage may not be represented on the surface making the identification difficult. This serves as considerable limitation. Should any cultural material be identified when the development begins, a specialist must be consulted to examine the finds. The study had limited access to survey the entire development area

5 APPLICABLE HERITAGE LEGISLATION

Several legislations provide the legal basis for the protection and preservation of both cultural and natural resources. These include the National Environment Management Act (No. 107 of 1998); Tourism Act, 2014 (Act No.3 of 2014); Cultural Institution Act (No. 119 of 1998), and the National Heritage Resources Act (Act 25 of 1999). Section 38 (1) of the National Heritage Resources Act requires that where relevant, an Impact Assessment is undertaken in case where a listed activity is triggered. Such activities include:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50 m in length; and
(c) any development or other activity which will change the character of an area of land, or water -
(i) exceeding 5 000 m² in extent;
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage Resources Authority;
(d) the re-zoning of a site exceeding 10 000 m2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Section 3 of the National Heritage Resources Act (25 of 1999) lists a wide range of national resources protected under the act as they are deemed to be national estate. When conducting Heritage Impact Assessment (HIA) the following heritage resources have to be identified:

(a) Places, buildings structures and equipment of cultural significance
(b) Places to which oral traditions are attached or which are associated with living heritage
(c) Historical settlements and townscapes
(d) Landscapes and natural features of cultural significance
(e) Geological sites of scientific or cultural importance
(f) Archaeological and paleontological sites
(g) Graves and burial grounds including-
- *(i) ancestral graves*
- *(ii) royal graves and graves of traditional leaders*
- *(iii) graves of victims of conflict*
- *(iv) graves of individuals designated by the Minister by notice in the Gazette*
- *(v) historical graves and cemeteries; and*

(vi) other human remains which are not covered by in terms of the Human Tissue Act,1983 (Act No. 65 of 1983)

(h) Sites of significance relating to the history of slavery in South Africa

(i) moveable objects, including -

(i) objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens

(ii) objects to which oral traditions are attached or which are associated with living heritage

(iii) ethnographic art and objects

(iv) military objects

(v) objects of decorative or fine art

(vi) objects of scientific or technological interest; and

(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

Section 3 of the National Heritage Resources Act (No. 25 of 1999) also distinguishes nine criteria for places and objects to qualify as 'part of the national estate if they have cultural significance or other special value …' These criteria are the following:

(a) Its importance in the community, or pattern of South Africa's history

(b) Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage

(c) Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage

(d) Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects

(e) Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group

(f) Its importance in demonstrating a high degree of creative or technical achievement at particular period

(g) Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

(h) Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and

(i) Sites of significance relating to the history of slavery in South Africa.

Other sections of the Act with a direct relevance to the AIA are the following:

Section 27 (18) *No person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site*

Section 34(1) *No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.*

Section 35(4) *No person may, without a permit issued by the responsible heritage resources authority:*

- *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite*

Section 36 (3) *No person may, without a permit issued by SAHRA or a provincial heritage resources authority:*

- *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside formal cemetery administered by a local authority; or*
- *bring onto or use at a burial ground or grave any excavation equipment, or any equipment which assists in detection or recovery of metals.*

6 ARCHAEOLOGY AND HISTORY OF THE AREA

The archaeology of southern Africa is broadly divided into Stone Age, Iron Age and the Historical Period, and South Africa fits well into this periodisation.

6.1 The Stone Age

The Stone Age is the period in history of human evolution when lithic material was mainly used to make tools (Robins et al. 1998). In South Africa, in line with the picture in southern Africa, the period is divided into three phases. It is important to note that these dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Lombard et al 2012: 125 is as follows

Earlier Stone Age (ESA) 2 million-150 000 years ago

Middle Stone Age (MSA) 150 000-30 000 years ago.

Later Stone Age (LSA) 40 000-1840 A.D

There is no record of Stone Age sites in the project area and its immediate surroundings. Stone Age lithic scatters occur near water courses and some were exposed due to diamond mining in the wider area of study suggesting that the landscape was used since the Earlier Stone Age. Earlier Stone Age occurrences have been recorded at Barberspan (Caruana et al. 2020). Later Stone Age occurrences have been documented at rock shelters such as Jubilee and Holkrans which are about 200 km east of the study area, as well rock art occurring at Driekuil and Gestoptefontein (Wadley 1989; Bradfield & Sadr 2011).

6.2 The Iron Age

The Iron Age is the period in human history when metal was mainly used to produce tools. The primary technology used by the Bantu people was the 'Iron hoe', hence the advent of the Iron Age to designate the period which these groups expanded throughout southern Africa (Huffman 2000, 2007). In South Africa, the period is divided into two separate phases namely Early Iron Age (EIA) 200-1000A.D and Late Iron Age (LIA) 1000-1850A.D. Huffman (2007:361), however, indicates that a Middle Iron Age must be included although some feel that the Middle Iron Age should be restricted to the Limpopo. His dates which now seem to be widely accepted in South Africa are:

Early Iron Age (EIA) 250-900 A.D

Middle Iron Age (MIA) 900-1300 A.D

Late Iron Age (LIA) 1300-1840 A.D

The earliest Early Iron Age farmers who moved in the Northwest region settled at Boederstroom (Mason 1981). Early Iron Age farmers delayed to occupy the North West region because of unfavourable climatic conditions. The earliest Iron Age farmers to move into the North West region were Tswana speakers such as the BaRolong probabaly from the 18th Century onwards (Huffman 2007).

In terms of the LIA, the North Western region is rich in cultural materials which include the sites of Olifantspoort and Madikwe of the Urewe tradition dating to AD 1500-1700 (Huffman 2007). Other LIA sites in the study region date to AD 1650-1840, and these include Uikmost, Rooiberg and Buispoort facies of the Urewe stream (Huffman 2007). The study region has also a rich ancient metallurgy; it is endowed with ancient copper mines that date back to the pre-colonial period in the Dwarsberg. The presence of copper ore, slag and tuyeres is a clear testimony to prehistoric copper production (Huffman 2007). The LIA Tswana communities indirectly engaged with the Indian Ocean Trade exporting ivory and getting consumables such as cloth and glass beads in exchange. The trading point was Delagoa. This brought the Tswana people in touch with the Indo-Asian and first Europeans that is Portuguese. It was the arrival of the Dutch and the English traders that opened up the Delagoa Bay to more trading with an international flare marking the beginning of historical period in the region (Huffman 2007).

6.3 Historical Period

The Historical period dates from 1600. It deals with the infiltration, settlement, spread and domineering of European influence in southern Africa. Its segments are; Dutch settlement in the Western Cape, the troubled times of Zululand (Mfeqane/Difaqane), Voortrekkers, early missions and the diamond rush. This period also witnessed or saw the compilation of early maps by missionaries, explorers and military personnel. During the early 19th Century, the Mafikeng region was occupied by the Hurutshe group of Tswana people. During the Difaqane, these people moved further to the west into what is today Botswana (Huffman 2007). The Voortrekkers moved into the North West region in the 1836s (Bergh 1999). On 17 January 1831, the Battle of Mosega between the Voortrekkers and Mzilikazi took place, just south of Zeerust. Mafikeng was inhabited by farmers between 1841 and 1850.

6.4 Brief history of Mahikeng

During a dispute between two BaRolong chiefs in 1881, Boers and other independent adventurers were recruited by the two Chiefs. They were rewarded with a farm each. The new settlers established the Independent Republic of Goosen with Rooigrond as capital 15 km to

the south east of the study area. The capital was fist called Vrywilligersrust and later Heliopolis. Both the Republics of Stellalalnd (near Vryburg and Goosen were disabled by a British expeditionary force in 1885, and incorporated into Bechunaland. The British commander, Sir Charles Warren laid out a new town on a place which the Tswana called Mafikeng 'the place of stones' or 'the place of rocks' (Raper 2014: 290). Members of the Bechuanaland border police were stationed at this place to maintain order amongst the various ethnic groups who gradually developed into a stable community.

The town's name was gradually corrupted into an English version of Mafikeng, namely Mafiking, Mafikeng later became the administrative capital of the Bechuanaland Protectorate. Mafikeng was besieged for 217 days (October 1899- May 1901). The British garrisoned the town and with the help of the BaRolong and Fingoes fought against the Boers. The British also took up various positions around the town, and like Boers created forts, layers and bulwarks. Sol Plaatjie because of his linguistic talent, he became the intermediary between the British forces under Colonel RSS Banden-Powell and the BaRolong population of some 5000 who lived near the town (http://www.angloboerwwar.com/boer-war)

Mafikeng remained the seat of the British administration of the Bechuanaland Protectorate until 1965, when the Republic of Bophuthatswana gained its independence. Gaborone became the capital of the new state. For more than 70 years, the buildings were only used by the British. Mafikeng's original name was restored in 1980, when the town was incorporated into the newly founded Bophuthatswana homeland. Upon the dawn of democracy, Mmabatho (mother of nations), a new capital was developed at the veld next to Mafikeng (https://www.info.co.za/content)

7 PREVIOUS HERITAGE IMPACT STUDIES

There are a number of Cultural Resources Management (CRM) studies that have been carried out within the project area. These studies show the nature of heritage of the study area. It should be noted that these reports are generally from within 20 km of the study area, but some studies outside the 20km zone have only been included here to provide a significant contribution to the assessment. Previous studies in the assessment area recorded burial sites and old buildings, and one yielded a low-density scatter of stone tools.

Below is a table of summary for the studies as well as findings for the assessment carried out in the study area and its immediate surroundings.

Table 2: A summary table of previous heritage studies conducted in the locality and vicinity of the project area:

Author/Year	Local Municipality	Farm name (s)	Findings
Van der Walt (2022)	Mafikeng	Elandsfontein 34	Low density scatter of Middle Stone Age tools
Rossouw (2021)	Mafikeng	A number of farms	A large cemetery found outside the demarcated zone.
Mlilo (2021)	Mafikeng	Molopo 302	No heritage resources in the project area, only historical buildings in urban locations such as Ventersdorp, Litchenburg and Mafikeng
Mlilo (2018)	Mafikeng	Wildfontein Rietvallei Kareeboshbult Bushanvalle Goedgevonden Hartbeestlaagte 146 Houtkop Slypsteen	No heritage resources of significance.
Coetzee (2018)	Mafikeng	Rietvlei 102 JQ	Kilns older than 60 years and the other one less than 60 years.
Beater (2018)	Mafikeng	Various portions	Burial sites Old buildings
Pistorius (2011)	Mafikeng	Welverdiend 4510	No heritage resources.
Vollenhoven & Pelser (2008)	Mafikeng		Circular concrete floor of a rondavel type building.

8 DEGREE OF SIGNIFICANCE

Assessment of significance is important in this study as it provides rating of the impact prompted by the proposed development on heritage resources. The assessment of significance gives mitigation measures to limit the effects of the impact that could result as the cause of the development on heritage resources.

Table 3: Grading systems for the identified heritage resources in terms of the NHRA **(**Act 25 of 1999).

Level	Significance	Possible action
National (Grade I)	Site of National Value	Nominated to be declared by SAHRA
Provincial (Grade II)	Site of Provincial Value	Nominated to be declared by PHRA
Local Grade (IIIA)	Site of High Value Locally	Retained as heritage
Local Grade (IIIB)	Site of High Value Locally	Mitigated and part retained as heritage
General Protected Area A	Site of High to Medium	Mitigation necessary before destruction
General Protected Area B	Medium Value	Recording before destruction
General Protected Area C	Low Value	No action required before destruction

9 SURVEY FINDINGS

9.1 Archaeological

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining development did not reveal any significant Archaeological material. This was partly due to the dense vegetation cover which reduced the visibility of archaeological material

9.2 Historical Buildings and Structures

The study noted that the proposed development is within an area that is heavily disturbed by previous agricultural and ongoing rural settlement activities, the study notes that structures associated with the agricultural activities are scattered across the study area. The study could not verify the exact ages of the structures.



Figure 13: View of existing water storage structure within the proposed development site.



Figure 14: View of existing structure within the proposed development site.

9.3 Burial sites and Graves

Human remains and burial sites are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Archaeological and historical burials are usually identified when they are exposed through erosion and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials. The study did not identify any graves within the study area.

9.4 Palaeontotological sensitivity

The SAHRIS Palaeo Maps show that the proposed development site as High (Yellow) to Moderate (Green) palaeontological sensitivity. A palaeontological desktop study may be required.

9.5 Public Monuments and Memorials

No Public Monuments or Memorials exist in the study area.

10 Impact Assessment Statement

An impact can be defined as any change in the physical-chemical, biological, cultural, and/or socio-economic environmental system that can be attributed to human activities related to the project site under study for meeting a project need a quantitative impact assessment will be conducted for the project. The method to be used makes use of the basic risk assessment approach of deriving an expression for risk from the product of likelihood (probability) and consequences.

10.1 Pre Mining/Mining phase Impacts

Table 4**:** Loss of heritage during the mining phase.

	Loss of Heritage					
Phase		**Mining/ Excavation**				
Criteria		**Details / Discussion**				
Description of impact	• Destruction of archaeological remains during clearance. • Destruction of historical structures during construction and mining • Stumping of archaeological remains by movement of heavy mining vehicles.					
Mitigation required	• Use existing tracks and roads within the development area • Phase two study to verify ages of structures conduct a Section 34 Permit Application • Use chance find procedure to manage accidental finds					
Parameters	***Magnitude***	***Spatial scale (Extent)***	***Reversibility***	***Duration***	***Probability***	***Significance***
Without-Mitigation	Medium (4)	Local (3)	Irreversible (5)	Long-term (4)	Probable (4)	Moderate to high (64)
With-Mitigation	Very Low (2)	Local (3)	Completely reversible (1)	Short-term (2)	Possible (4)	Moderate to low (32)

10.2 Decommissioning /closure phase Impacts

No direct loss of heritage resources is expected during this phase of the project. However, indirect impacts may occur during movement of vehicles.

Table 5: Loss of heritage during decommissioning/closure phase.

	Loss of heritage					
Phase		**Decommissioning (Removal infrastructure and equipment)**				
Criteria		**Details / Discussion**				
Description of impact	• Destruction of archaeological remains during clearance. • Destruction of historical structures during decommission exercise • Stumping of archaeological remains by movement of heavy mining vehicles.					
Mitigation required	• Use existing tracks and roads within the development area • Use chance find procedure to manage accidental finds • Phase two study to verify ages of structures and conduct a Section 34 Permit Application					
Parameters	***Magnitude***	***Spatial scale (Extent)***	***Reversibility***	***Duration***	***Probability***	***Significance***
Without-Mitigation	Medium (4)	Local (3)	Irreversible (5)	Long-term (4)	Probable (4)	Moderate to high (64)
With-Mitigation	Very Low (2)	Local (3)	Completely reversible (1)	Short-term (2)	Possile (4)	Moderate to low (32)

Table 6: Anticipated Impact Rating

The status of the impact		
Status		**Description**
Positive:		a benefit to the holistic environment
Negative:		a cost to the holistic environment
Neutral:		no cost or benefit
The duration of the impact		
Score	Duration	Description
1	Short term	Immediate/ short term (less than 3 months)
2	Medium term	Construction or decommissioning period
3	Long term	For the life of the operation
5	Permanent	Permanent
The extent of the impact		
Score	Extent	Description
1	Footprint	Within the site boundary
2	Site	Affects immediate surrounding areas
3	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
4	Regional	Extends to almost entire province or larger region
5	National	Affects the country.
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
1	Zero	Natural and/or social functions and/or processes remain unaltered.
2	Very Low	Natural and/or social functions and/or processes are negligibly altered.
3	Low	Natural and/or social functions and/or processes are slightly altered and are reversible with time.
4	Moderate	Natural and/or social functions and/or processes are notably altered and are reversible with rehabilitation.
5	High	Natural and/or social functions and/or processes are permanently altered.
The probability of the impact		
Score	Rating	Description
1	Unlikely	The chance of this impact occurring is zero (0%).
2	Possible	May occur. The chances of this impact occurring is defined as 25%.
3	Probable	Likely to occur. The chances of this impact occurring is defined as 50%.
4	Highly Probable	The chances of this impact occurring is defined as 75%.
5	Definite	Will certainly occur. The chance of this impact occurring is defined as 100%.
The Consequence		= Magnitude (5) + Extent (5) + Duration (4) + Reversibility (5).
The Significance		= Consequence x Probability. 16×4=64

Table 7: Key and guidance to impact rating

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

11 RECOMMENDATIONS AND CONCLUSIONS

At the request of Ndi Geological Consulting Services (Pty) Ltd, Ruins Archaeo- Heritage Consulting (Pty) Ltd conducted a Phase I Archaeological and Heritage Impact Assessment Study for the proposed Diamond, Diamond (Alluvial), Diamond (Kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore Mining Permit and Mining Right Application on various portions of the farm Colga 132 JQ within the Mahikeng Local Municipality of Ngaka Modiri Molema District in the Northwest Province. Desktop research revealed that the project area would have been rich in Stone Age artefacts, but none were found during the field survey. The potential for chance finds, remains and the applicant and contractors are urged to lookout for chance finds during mining. The procedure for reporting chance finds has clearly been laid out and if this report is adopted by SAHRA, then there are no archaeological reasons why the proposed mining development cannot be approved.

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. SAHRA may approve the project as planned with special commendations to implement the recommendations here in made:

1. It is recommended that SAHRA/NWPHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements;

2. It is recommended that SAHRA/ NWPHRA make a decision in terms of Section 38 (4) of the NHRA to approve the proposed mining development;

3. A phase two study should be commissioned to verify the ages of the identified structures in the event that the structures are in the direct path/footprint of development;

4. The study did not identify any graves and burial sites, however, they may exist within the proposed development area, should they be encountered during mining activities, the developer is urged that in terms of Section 36 of the NHRA Act, burial sites must be protected from proposed mining activities and any accidental damage;

5. Mining workers must be inducted about potential impacts of proposed mining activities on heritage sites and how these impacts can be minimised without compromising the project schedule;

6. The Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and communicated to the SAHRA through the proposed project development Archaeologist. This form of extended community involvement would pre-empty any potential disruption that may arise from previous unknown cultural heritage matters that may have escaped the attention of the study; and

7. From a heritage perspective supported by the findings of this study, the project is supported. However, mining activities should be approved under the observation that the dimensions do not extend beyond the area considered in this report.

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13 APPENDIX 1: SITE SIGNIFICANCE

The following guidelines for determining site *significance* were developed by SAHRA in 2003. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

(a) Historic value

- Is it important in the community, or pattern of history?
- Does it have strong or special association with the life or work of a person, group or organization of importance in history?
- Does it have significance relating to the history of slavery?

(b) Aesthetic value

- Is it important in exhibiting particular aesthetic characteristics valued by a community or cultural group?

(c) Scientific value

- Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage?
- Is it important in demonstrating a high degree of creative or technical achievement at a particular period?

(d) Social value

- Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?

(e) Rarity

- Does it possess uncommon, rare or endangered aspects of natural or cultural heritage?

(f) Representivity

- Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects?
- What is the importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class?
- Is it important in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality?

14 APPENDIX 2: CHANCE FIND PROCEDURE

The following procedure is to be executed in the event that archaeological material is discovered:

- All construction/clearance activities in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the find site.
- Briefly note the type of archaeological materials you think you have encountered, and their location, including, if possible, the depth below surface of the find
- Report your discovery to your supervisor or if they are unavailable, report to the project ECO who will provide further instructions.
- If the supervisor is not available, notify the Environmental Control Officer immediately. The Environmental Control Officer will then report the find to the Site Manager who will promptly notify the project archaeologist and SAHRA.
- Delineate the discovered find/ feature/ site and provide 25m buffer zone from all sides of the find.
- Record the find GPS location, if able.
- All remains are to be stabilised in situ.
- Secure the area to prevent any damage or loss of removable objects.
- Photograph the exposed materials, preferably with a scale (a yellow plastic field binder will suffice).
- The project archaeologist will undertake the inspection process in accordance with all project health and safety protocols under direction of the Health and Safety Officer.
- Finds rescue strategy: All investigation of archaeological soils will be undertaken by hand, all finds, remains and samples will be kept and submitted to a Museum as required by the heritage legislation. In the event that any artefacts need to be conserved, the relevant permit will be sought from the SAHRA.
- An on-site office and finds storage area will be provided, allowing storage of any artefacts or other archaeological material recovered during the monitoring process.
- In the case of human remains, in addition to the above, the SAHRA Burial Ground Unit will be contacted and the guidelines for the treatment of human remains will be adhered to. If skeletal remains are identified, an archaeological will be available to examine the remains.
- The project archaeologist will complete a report on the findings as part of the permit application process.
- Once authorisation has been given by SAHRA, the Applicant will be informed when construction activities can resume.

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TERRESTRIAL ECOLOGICAL REPORT

THE PROPOSED MINING PERMIT AND MINING RIGHT APPLICATION FOR PROPOSED DIAMOND, DIAMOND (ALUVIAL), DIAMOND (KIMBERLITE), AGGREGATE, LEAD, MANGANESE ORE, LIMESTONE, SAND AND GOLD ORE PORTIONS 1-10 AND PORTION 12 AND THE REMAINING EXTENT OF THE FARM COLGA 132 JQ IN THE MAHIKENG MAGISTERIAL DISTRICT, NORTH WEST PROVINCE

PREPARED FOR:

Ndi Geological Consulting Services

PREPARED BY:

Naledzani Environmental Services

DATE:

05 August 2026

PROPRIETARY INFORMATION

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Prepared by :	*Mpho Ramalivhana*
Date Issued :	*04 August 2026*

DECLARATION OF INDEPENDENCE

I, Mpho Ramalivhana, declare that I:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in professional capacity.
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being a member of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant.
- I have expertise and experience in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- This document and all information contained herein is and will remain the intellectual property of Naledzani Environmental Services and the specialist investigator responsible for conducting the study. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigator.
- I will comply with the Act, regulations and all other applicable legislation.
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.



Mpho Ramalivhana Pri Sci. Nat (Hons. Bot.; SAAB; SACNASP)

SPECIALIST INFORMATION

Mpho Ramalivhana of Naledzani Environmental Services holds an Honours Degree in Botany from the University of Limpopo (Turfloop Campus) and has 15 years' professional experience in biodiversity assessment, wetland assessment and delineation and aquatic assessment including management. He is a registered member for South African Council for Natural Scientist Professions and Environmental Assessment Practitioner Association of South Africa.

ABBREVIATIONS

BGIS	Biodiversity Geographic Information System (from SANBI)
BODATSA	Botanical Database of Southern Africa
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Programme
EN	Endangered
ESA	Ecological support area
IBA	Important Bird Area
LC	Least Concern
mm	Millimetres
NEMA	National Environmental Management Act (No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (No. 10 of 2004)
NFA	National Forest Act 1998 (Act No. 84 of 1998)
NT	Near Threatened
ONA	Other Natural Area
PA	Protected Area
PRECIS	Pretoria Computerised Information System
QDGC	Quarter Degree Grid Cell
SABAP	Southern African Bird Atlas Project
SAFAP	Southern African Frog Atlas Project
SANBI	South African National Biodiversity Institute
SARCA	Southern African Reptile Conservation Assessment
SFSD	Strategic Framework for Sustainable Development
VM	Virtual Museum
VU	Vulnerable

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1. INTRODUCTION

G and E Global (Pty) Ltdhas applied for an environmental authorisation in respect of the mining permit and mining right applications for Diamond, Diamond (alluvial), Diamond (kimberlite), Aggregate, Lead, Manganese Ore, Limestone, Sand and Gold Ore over Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ in the Mahikeng Magisterial District, North West Province. As part of the EIA process, Naledzani Environmental Services cc (herein after referred to as 'NES') was therefore appointed to conduct to conduct the biodiversity impact assessment for the proposed prospecting right application. The purpose of the study is to identify and assess all the possible impacts that may arise from the implementation of the proposed project development and to find the most effective way of enhancing environmental benefits and mitigating potential impacts to encourage sustainable development of the area.

1.1 Terms of reference

The terms of reference for this investigation are limited to a terrestrial biodiversity assessment with the following objectives:

- To assess the proposed development to determine the general ecological state of the proposed project area;
- To survey and delineate environmentally sensitive areas;
- To assess the proposed development in terms of faunal and floral taxa including the potential for species to occur;
- To provide mapping of the environmentally sensitive and critical areas with respect to the proposed development;
- To assess and identify the potential impacts that may arise from the proposed project on the fauna and flora taxa;
- To provide mitigation measures to prevent and/or mitigate identified environmental impacts that may occur due to the proposed project; and
- The provision of an assessment report, indicate findings, recommendations and maps indicating sensitivities and/or no-go areas.

2. REGULATORY AND LEGISLATIVE OVERVIEW

A summary of the relevant portions of the acts that govern the activities and potential impacts to the environment associated with the development are listed below. It should be noted that these acts are only related to biodiversity studies.

Table 1: Acts and regulations relating to the project

Legislation/Policy	Description
United Nations, 1992, The Convention on Biological Diversity.	The purpose of the Convention on Biological Diversity is to conserve the variability among living organisms, at all levels (including diversity between species, within species and of ecosystems). Primary objectives include (i) conserving biological diversity, (ii) using biological diversity in a sustainable manner and (iii) sharing the benefits of biological diversity fairly and equitably.

The Constitution of the Republic of South Africa Act No. 108 of 1996	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socioeconomic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided.
Strategic Framework for Sustainable Development in South Africa	The development of a broad framework for sustainable development was initiated to provide an overarching and guiding National Sustainable Development Strategy. The Strategic Framework for Sustainable Development (SFSD) in South Africa (September 2006) is a goal orientated policy framework aimed at meeting the Millennium Development Goals. Biodiversity has been identified as one of the key crosscutting trends in the SFSD. The lack of sustainable practices in managing natural resources, climate change effects, loss of habitat and poor land management practices were raised as the main threats to biodiversity.
National Environmental Management Act 107 of 1998 and the associated Environmental Impact Assessment (EIA) Regulations	The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact
National Environmental Management: Biodiversity Act No 10 of 2004	The objectives of this act are (within the framework of NEMA) to provide for: • The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity; • The use of indigenous biological resources in a sustainable manner;

	• The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources; • To give effect to ratify international agreements relating to biodiversity which are binding to the Republic; • To provide for cooperative governance in biodiversity management and conservation; and • To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act. This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas is not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources. Furthermore, a person may not carry out a restricted activity involving either: a) A specimen of a listed threatened or protected species; b) Specimens of an alien species; or c) A specimen of a listed invasive species without a permit.
Government Notice 864 Alien and Invasive Species Regulations as published in the Government Gazette 40166 of 2016 as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)	NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to: • Prevent the unauthorized introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur, • Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and • Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats. Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act no 10 of 2004) as: (a) A species that is not an indigenous species; or

	(b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention. Categories according to NEMBA (Alien and Invasive Species Regulations, 2017): • Category 1a: Invasive species that require compulsory control; • Category 1b: Invasive species that require control by means of an invasive species management programme; • Category 2: Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and • Category 3: Ornamentally used plants that may no longer be planted.
National Forest Act 84 of 1998 (as amended in September 2011)	Principles to guide decisions affecting forestry resources applicable to land development management are contained in the following principle: **Principle 3** (3) The principles are that: (a) natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits; (b) a minimum area of each woodland type should be conserved, and forests must be developed and managed to i. conserve biological diversity, ecosystems and habitats; ii. sustain the potential yield of their economic, social and environmental benefits. This section of the Act alludes to the fact that the conservation status of all vegetation types needs to be considered when any development is taking place to ensure that the adequate conservation of all vegetation types is ensured. **Principle 6** (6) Criteria and indicators may include but are not limited to, those for determining the level of maintenance and development of: i. forest resources,

	ii. biological diversity in forests, iii. the health and vitality of forests, iv. the productive functions of forests, v. the protective and environmental functions of forests; and vi. the social functions of forests.
The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)	Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998).
National Environmental Management: Protected Areas Act 57 of 2003	This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It also seeks to provide for the sustainable utilization of protected areas and to promote participation of local communities in the management of protected areas.
National Water Act and Riparian Areas	Riparian habitat is afforded protection under the National Water Act in a number of ways. Firstly, reference in the National Water Act to a watercourse includes its banks, on which riparian habitat is encountered. Riparian areas are thus afforded the same degree of protection as the river beds and channels alongside which they occur. Riparian habitat is also important in the context of resource quality objectives that are a critical part of the Act. In terms of Section 13(1) of the Act resource quality objectives must be determined for every significant water resource, and are a central part of data type specifications relating to national monitoring systems and national information systems as determined in Section 137(2) and Section 139(2) of the Act respectively. Resource quality is important in the context of riparian habitat as resource quality as defined in the Act means the quality of all aspects of a water resource and includes the character and condition of the riparian habitat. In terms of Section 26(4) of the Act, the need for the conservation and protection of riparian habitat must be taken into account in the determination and promulgation of regulations under the Act.
Mining and Biodiversity Guideline	The Mining and Biodiversity Guideline, 2013 (the Guideline) was developed by the Department of Mineral Resources, Department of Mineral Resources, Chamber of Mines, South African

	National Biodiversity Institute and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability (i.e. in the name of sustainable development). The Guideline is envisioned as a tool to "foster a strong relationship between biodiversity and mining which will eventually translate into best practice within the mining sector." In identifying biodiversity priority areas which have different levels of risk against mining, the Guideline categorises biodiversity priority areas into 4 classes with the following levels of risk for mining attached to them: 1. Legally protected areas, where mining is prohibited 2. Ares of highest biodiversity importance, which are at the highest risk for mining 3. Areas of high biodiversity importance, which are at a high risk for mining Areas of moderate biodiversity importance, which are at a moderate risk for mining
The North West Biodiversity Sector Plan 2025	A Biodiversity Sector Plan (BSP) is a tool that guides and informs land use and resource-use planning and decision-making by a full range of sectors whose policies, programmes and decisions impact on biodiversity, to preserve long-term functioning and health of National or regional priority areas known as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). It is therefore the official reference document for biodiversity priorities that need to be considered in all land-use planning and decision-making processes. The purpose of the Biodiversity Sector Plan is to provide a map of the priority biodiversity areas and develop associated land use management guidelines in order to reduce further loss or degradation to biodiversity priority areas and ecological support areas. The overarching objectives of a Biodiversity Sector Plan are therefore to: 1. Identify the minimum spatial requirements, based on set targets, needed to maintain a living landscape that continues to support all aspects of biodiversity and retain essential ecological infrastructure. 2. 2. Serve as the primary source of biodiversity information for land use planning and decision-making, such as Environmental Impact Assessment and Authorisations. 3. Inform conservation and restoration action in key biodiversity areas. For the NW BSP 2025, more specifically, it is aimed to: - Integrate up-to-date spatial biodiversity data. - Re-assess Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

	- Incorporate climate resilience, ecosystem services, and landscape connectivity. - Identify new or modified biodiversity priorities. - Support municipalities and land use planners with revised BSP guidelines that more closely align with NEMA and SPLUMA. Identify priority sites for Protected Area Expansion
Protocol for Terrestrial Biodiversity Assessment (GN 320 of 2020)	Sets minimum requirements for specialist assessments and reporting on terrestrial biodiversity. The primary aim of the Protocol for Terrestrial Biodiversity Assessment (GN 320 of 2020) is to provide standardized criteria for the assessment and reporting of environmental impacts on terrestrial biodiversity during activities requiring Environmental Authorisation. It explicitly replaces Appendix 6 of the EIA Regulations.
North West Biodiversity Management Act, 2016 (Act 4 of 2016)	The primary legislation governing environmental management in the North West province is the North West Biodiversity Management Act, 2016 (Act 4 of 2016). This provincial act functions alongside national mandates, specifically the National Environmental Management Act (NEMA), to conserve provincial ecosystems and regulate the sustainable use of biological resources. The North West Biodiversity Management Act governs species protection, translocation, damage-causing animals, and the management of invasive or alien species within the province
North West Parks and Tourism Board Act, 2022 (Act No. 2 of 2022)	Implements authority for conservation management in the province, by focusing on conservation and sustainable use of biodiversity, including flora, fauna, and aquatic ecosystems. Promotes and manage protected areas and ecotourism, and regulates permitting systems for activities involving wildlife and plants, and Trade in endangered species, aligned with international agreements such as CITES.

3. LIMITATIONS AND ASSUMPTION

The following limitations should be noted for the study:

- This study has not assessed any temporal trends for the respective seasons due to project time constraints inherent with Environmental Authorisation application processes, such long-term research is seldom feasible, and information contained within this report is based on a single field survey conducted during a dry season (29th to 30th July 2026);
- All species included in the plant species list (Appendix A) were observed and recorded in the study area;
- Any comments or observations made in this regard are based on observations, literature review, the expert knowledge and relevant professional experience of the specialist; and

- Despite these limitations, a comprehensive study was conducted, in conjunction with the detailed results from the surveys, and as such there is a high confidence in the information provided.

4. DESCRIPTION OF THE ENVIRONMENT

4.1. Project Location

The proposed project (MP and MR) is situated on portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 and the Remaining Extent of the Farm Colga 132 JQ in the Mahikeng Magisterial District, North West Province. The site is approximately 3927 hectares situated approximately 11.5 km southeast of Mahikeng town. See figures 1 to 3 below.



Figure 1: View of the site

4.2. Climatic conditions

Mahikeng (Mafikeng) has a typical semi-arid tropical Savannah climate with summer mean annual rainfall of 571 mm. The mean maximum monthly temperature in summer season was 29.6°C in March and 27°C in April, while the mean minimum temperature was 15.4°C in March and 12.5°C in April. The average maximum monthly temperature in the winter season ranged from 20.7°C (July) to 25.2°C (May), whereas the average minimum temperature was between 3.3°C (July) and 7°C (May) (Cimate-data.org, 2026).

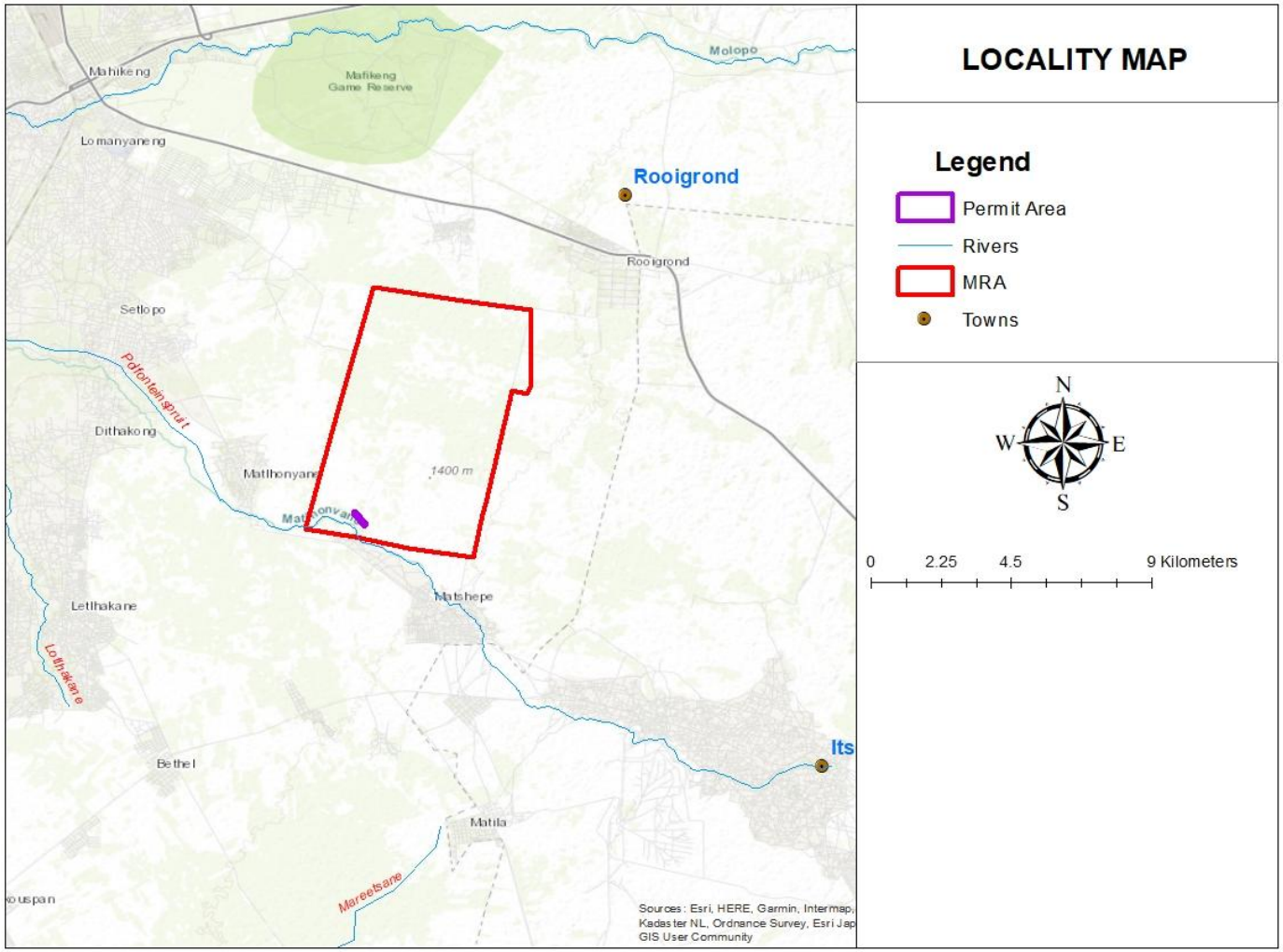


Figure 2: Site locality map

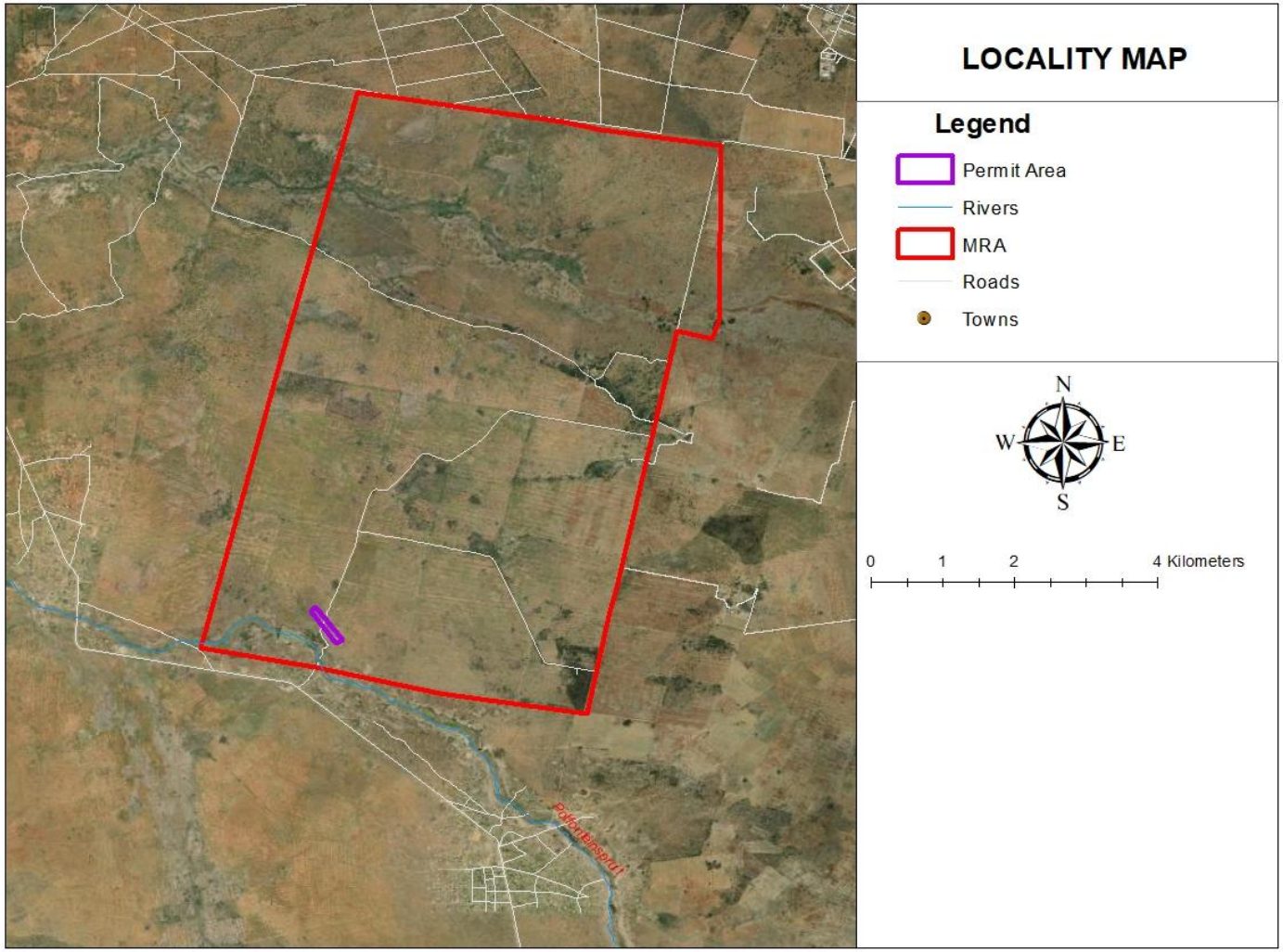


Figure 3: Google view of the proposed site

4.3. Land-use

The project area included various agricultural holdings (current and previously cultivated land) and mining area (Previous unrehabilitated area). Much of the vacant land was being used for grazing. Some portions of the vacant land were historically cultivated, while some areas were planted for pasture (Maize). The agricultural holdings included several alien invasive species, buildings and pasture.

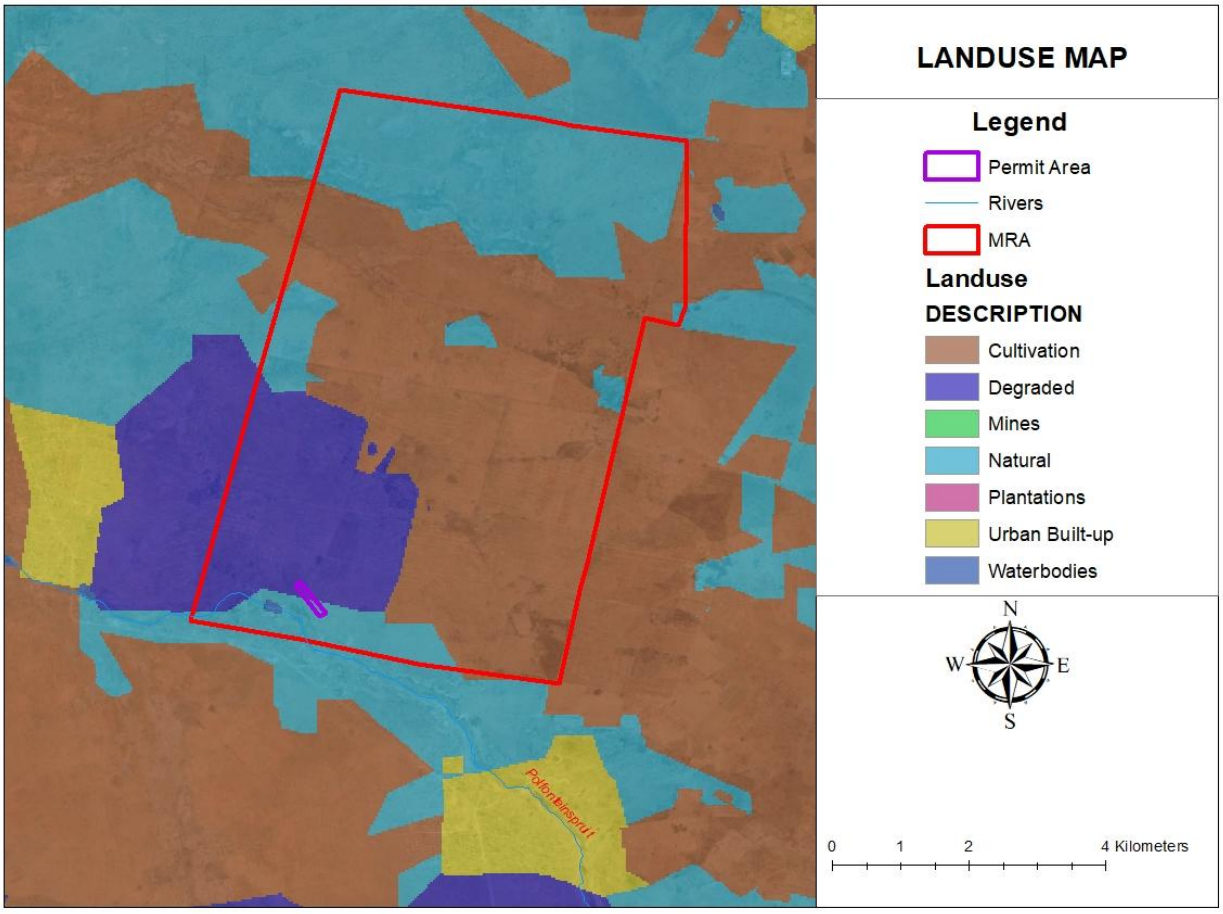


Figure 4: Land use map for the site



Figure 5: Unrehabilitated areas



Figure 6: Secondary grassland indicating previously cultivation

4.4. Vegetation

4.5. Biome type

Mucina and Rutherford (2006) described the project application area as falling within the Dry Highveld Grassland biome. The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu Natal and the Eastern Cape. This biome (also known locally as Grassveld) is dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

There are two categories of grass plants: sweet grasses have lower fibre content, maintain their nutrients in the leaves in winter and are therefore palatable to stock. Sour grasses have higher fibre content and tend to withdraw their nutrients from the leaves during winter so that they are unpalatable to stock. At higher rainfall and on more acidic soils, sour grasses prevail, with 625 mm per year taken as the level at which unpalatable grasses predominate. C4 grasses dominate throughout the biome, except at the highest altitudes where C3 grasses become prominent.

The Grassland Biome is the cornerstone of the maize crop, and many grassland types have been converted to this crop. Sorghum, wheat and sunflowers are also farmed on a smaller scale. Urbanization is a major additional influence on the loss of natural areas - the Witwatersrand is centred in this biome. The Grassland Biome is considered to have an extremely high biodiversity, second only to the Fynbos Biome. Rare plants are often found in the grasslands, especially in the escarpment area. These rare species are often endangered, comprising mainly endemic geophytes or dicotyledonous herbaceous plants. Very few grasses are rare or endangered. The scenic splendour of the escarpment region attracts many tourists (Mucina and Rutherford, 2006).

4.6. Broad-Scale vegetation patterns

According to the new vegetation classification on BGIS (2012), the proposed site is located at the ***Klerksdorp Thornveld (Gh 13)*** and ***Western Highveld Sandy Grassland (Gh 14)***.

A. Klerksdorp Thornveld

The **Klerksdorp Thornveld** (Gh 13) occurs in two patches, one in the Wolmaransstad, Ottosdal and Haarteesfontein and the other from Botsolano Game Park to the Madibogo. The dominating plant species include *Acacia karroo, A. caffra, Celtis Africana, Acacia hebeclada, Gymnosporia senegalensis* with low shrubs such as *Asparagus laricinus, A suaveolens, Felicia muricata.* The grass layer is dominated by *Aristida congesta, Cynodon, dactylon, Eragrostis*

lehmanniana, Themenda triandra, Panicum coloratum, Sporobolus fimbriatus and Microchloa caffra. This vegetation is regarded as **Vulnerable** and only about 2.5% is conserved in the Mafikeng Game Reserve, Botsolano Game Park and Faan Meintjes Nature Reserve.

B. Roodeberg bushveld

The **Western Highveld Sandy Bushveld** (Gh 14) is distributed in the North West province, from the Mafikeng to the Schweizer-Reneke in the south and from Broedersput and kamel in the west to Lichtenburg and Ottosdal in the east. The most important taxa on this vegetation unit include *Anthepora pubscens, Aristida congesta, A. diffusa, Cymbopogon pospischilii, Cynodon dactylon, Eragrostis lehamanniana, Themenda triandra.* The herb layer is dominated by species such as *Gazania krebsiana, Stachys spathulata, Barleria macrostegia,* and *Dicoma anomala.* Mucina and Rutherford have categorised this vegetation as ***Endangered***. Only a small section of the corridor crosses this vegetation unit.



Figure 7: View of the vegetation on site



Figure 8: View of the regenerating secondary grassland

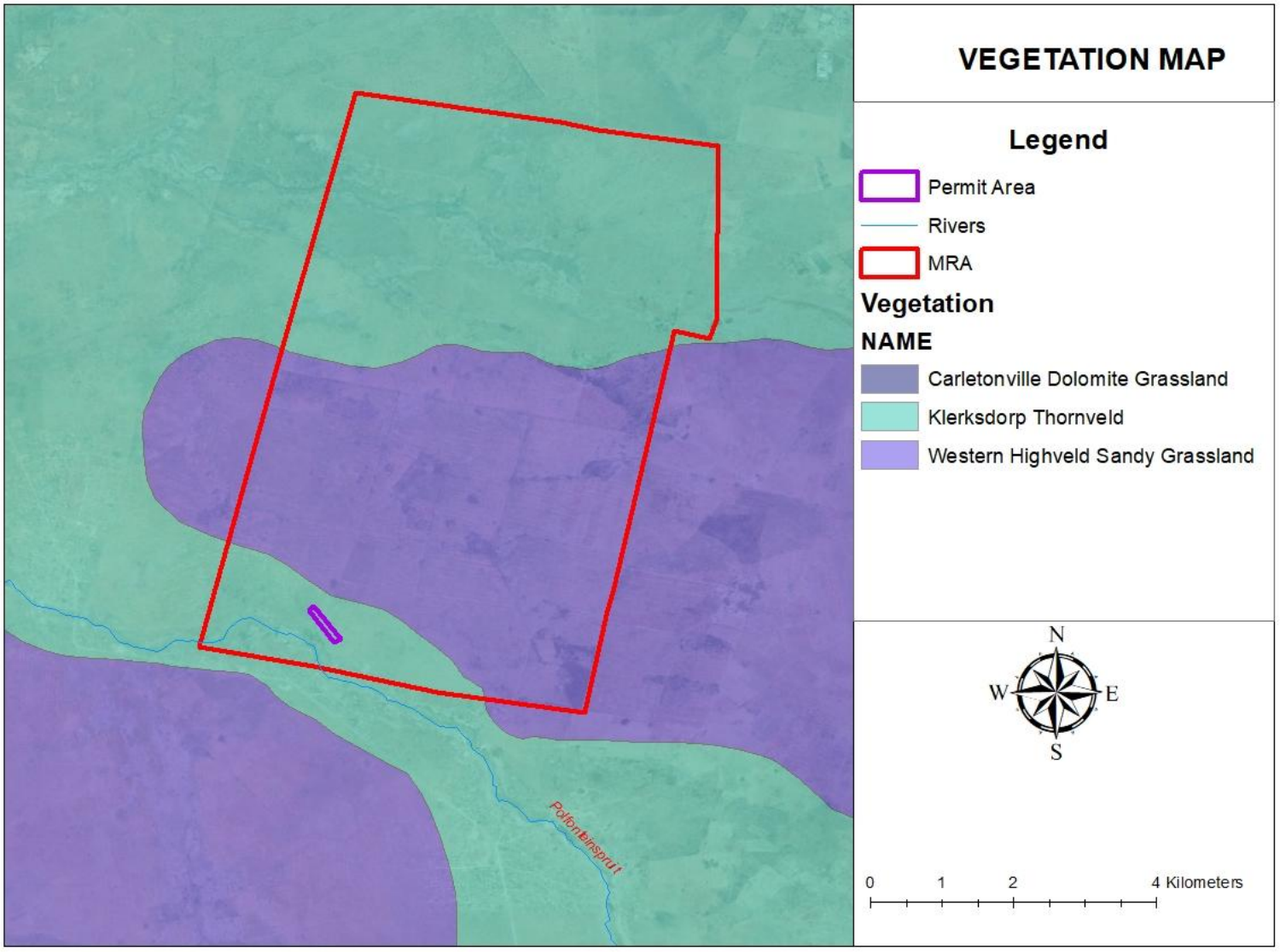


Figure 9: Broad vegetation map for the site

4.7. Terrestrial threatened ecosystem

The South African National Biodiversity Institute (SANBI), in conjunction with the Department of Environmental Affairs (DEA), released a draft report in 2009 entitled "Threatened Ecosystems in South Africa: Descriptions and Maps", to provide background information on the List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was to present a detailed description of each of South Africa's ecosystems and to determine their status using a credible and practical set of criteria. The following criteria were used in determining the status of threatened ecosystems:

- Irreversible loss of natural habitat;
- Ecosystem degradation and loss of integrity;
- Limited extent and imminent threat;
- Threatened plant species associations;
- Threatened animal species associations; and
- Priority areas for meeting explicit biodiversity targets as defined in a systematic conservation plan.

In terms of section 52 (1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), a new national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2012 (Government Notice 1002 (Driver *et. al.*, 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; *Critically Endangered* (CR), *Endangered* (EN), *Vulnerable* (VU), or *Protected*. The purpose of categorizing these ecosystems is to prioritize conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems. It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina *et al.,* 2006).

The revised list identified 120 threatened terrestrial ecosystem types (51 Critically Endangered, 55 Endangered, and 14 Vulnerable) The proposed site is located within the Vulnerable e*cosystem* (***Klerksdorp Thornveld***) as well as an endangered ecosystem (***Western Highveld Sandy Bushveld***). However, the Red List of Ecosystems (RLE) remnant ecosystem spatial dataset indicates that no remnant areas of the Rand Highveld Grassland ecosystem as well as the

Klerksdorp Thornveld, occur within the mining area. This suggests that the mining area (Mining Permit as well as Mining Right) deviation does not affect the remaining extent of this threatened ecosystems.

4.8. Description of the Critical Biodiversity Areas

Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sector's inputs into multi-sectoral planning and decision-making tools. The guideline for bioregional plans defines three basic CBA categories based on three high-level land management objectives.

Table 2: A framework for linking spatial planning categories (CBAs) to land-use planning and decision-making guidelines based on a set of high-level land biodiversity management objectives

CBA category	Land Management Objective
PA & CBA 1	**Natural landscapes**: • Ecosystems and species fully intact and undisturbed • These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost, then targets will not be met. • These are landscapes that are at or past their limits of acceptable change.
CBA 2	**Near-natural landscapes**: • Ecosystems and species largely intact and undisturbed. • Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. • These are landscapes that are approaching but have not passed their limits of acceptable change.
Ecological Support Areas (ESA)	**Functional landscapes**: • Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. • Individual species or other biodiversity indicators may be severely disturbed or reduced.

CBA category	Land Management Objective
	• These are areas with low irreplaceability with respect to biodiversity pattern targets only.
Other Natural Areas (ONA) and Transformed	**Production landscapes**: manage land to optimize sustainable utilization of natural resources.

The North West Biodiversity Sector Plan assigns the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species. Thus, if these areas are not maintained in a natural or near-natural state, then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

- Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017).

- Other Natural Areas (ONAs) consist of all those areas in a good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

According to the North West Biodiversity Sector Plan the mining right site is located within a Critical Biodiversity Area, Ecological Support Area 1 as well as Other Natural Area, whereas the entire Mining Permit area is regarded as not classified

The best land management objectives for ***CBA 2*** are to maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process:

- Ecosystems and species fully or largely intact and undisturbed.
- These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost, then targets will not be met.
- These are biodiversity features that are at, or beyond, their limits of acceptable change

The best land management objectives for ***ESA*** are to maintain in at least a semi-natural state as ecologically functional landscapes that retain basic natural attributes:

- Ecosystem still in a natural, near-natural state or semi-natural state, and has not been previously developed.
- Ecosystems moderately to significantly disturbed but still able to maintain basic functionality.
- Individual species or other biodiversity indicators may be severely disturbed or reduced.
- These are areas with low irreplaceability with respect to biodiversity pattern targets only.

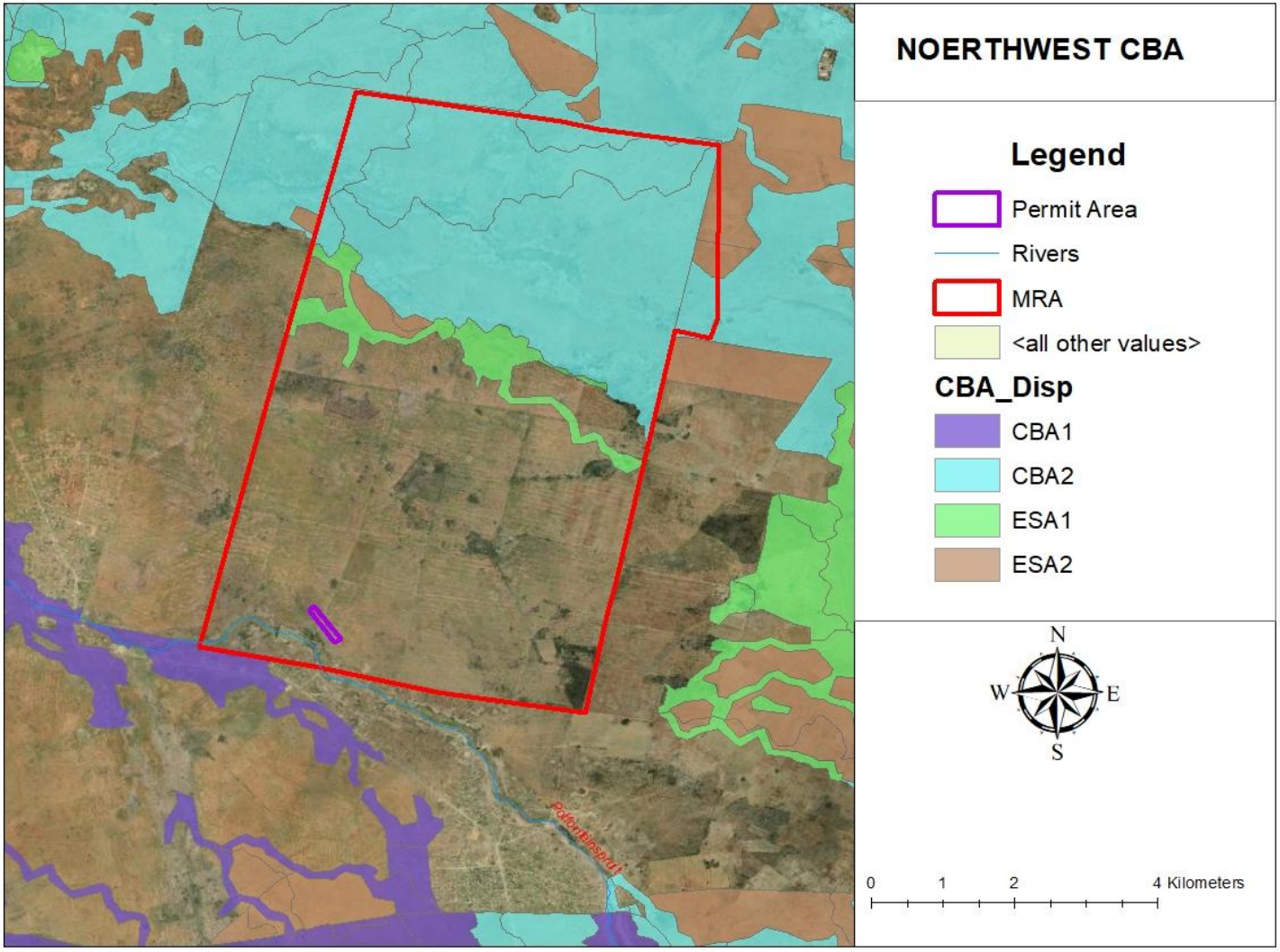


Figure 10: Sensitivity map of the site in terms of the North West Biodiversity Sector Plan

5. METHODOLOGY AND REPORTING

The information provided in this terrestrial biodiversity report is based mainly on the observations that were made during the field survey and a review of the available reports that contain known and predicted biodiversity information regarding the project application area. A wide range of spatial data sets were interrogated, and relevant information was extracted for the project application area. A basic ecological sensitivity analysis was performed to identify areas of special interest or concern. The various approaches used and aspects considered are detailed below:

5.1. General

A desktop survey utilising aerial images and photography was undertaken to assemble background information regarding the different features and vegetation type present within the proposed project footprint including the buffer area. The site was assessed on the 29th to 30th July 2026 to ensure that the true floristic and faunal reflection of the project application area is recorded.

5.2. Vegetation

The PRECIS list of plants recorded in the quarter degree grid square within which the project application lies were obtained from SANBI. This list was consulted to verify the record of occurrence of the plant species seen on the site. A desk-top study of the habitats of the red-listed and orange-listed species known to occur in the area was done prior to site assessment. Visual assessment was used to assess the abundance of floral and faunal species. The vegetation types of Mucina & Rutherford (2006) were also used as reference, but where necessary communities are named according to the recommendations for a standardized South African syntaxonomic nomenclature system (Brown, L.R., Du Preez, P.J., Bezuidenhout, H., Bredenkamp, G.J., Mostert, T.H.C., and Collins, N.B. 2013). By combining the available literature with the survey results, stratification of vegetation communities was possible.

5.3. Fauna survey

Most mammals and reptiles are either very secretive, nocturnal, hibernate (reptiles), migrate (birds) or prefer specific habitat so sampling and identification was limited.

5.4. Mammals

Records of all mammal species recorded in the four quarter degree grid squares were obtained from the Virtual Museum (VM) website of the Animal Demographic Unit of University of Cape Town prior to the site visits. The site assessment was conducted for mammal species diversity by direct and indirect methods using mammal sightings, burrows, holes and verified by mammal book (Skinner and Chimimba, 2005). No trapping was conducted during the field survey.

5.5. Methodology Adapted in Assessing the Impacts

The significance of the impacts will be assessed considering the following descriptors:

Table 3: Impact Assessment Table

Nature of the impact		
Positive	+	Impact will be beneficial to the environment (a benefit).
Negative	-	Impact will not be beneficial to the environment (a cost).
Neutral	0	Where a negative impact is offset by a positive impact, or mitigation measures, to have no overall effect.

Magnitude		
Minor	2	Negligible effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been altered significantly, and have little to no conservation importance (negligible sensitivity*).
Low	4	Minimal effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been largely modified, and / or have a low conservation importance (low sensitivity*).
Moderate	6	Notable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been moderately modified, and have a medium conservation importance (medium sensitivity*).
High	8	Considerable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been slightly modified and have a high conservation importance (high sensitivity*).
Very high	10	Severe effects on biophysical or social functions / processes. Includes areas / environmental aspects which have not previously been impacted upon and are pristine, thus of very high conservation importance (very high sensitivity*).
Extent		
Site only	1	Effect limited to the site and its immediate surroundings.
Local	2	Effect limited to within 3-5 km of the site.
Regional	3	Activity will have an impact on a regional scale.

National	4	Activity will have an impact on a national scale.
International	5	Activity will have an impact on an international scale.
Duration		
Immediate	1	Effect occurs periodically throughout the life of the activity.
Short term	2	Effect lasts for a period 0 to 5 years.
Medium term	3	Effect continues for a period between 5 and 15 years.
Long term	4	Effect will cease after the operational life of the activity either because of natural process or by human intervention.
Permanent	5	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability of occurrence		
Improbable	1	Less than 30% chance of occurrence.
Low	2	Between 30 and 50% chance of occurrence.
Medium	3	Between 50 and 70% chance of occurrence.
High	4	Greater than 70% chance of occurrence.
Definite	5	Will occur, or where applicable has occurred, regardless or in spite of any mitigation measures.

Once the impact criteria have been ranked for each impact, the significance of the impacts will be calculated using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The significance of the heritage impact is therefore calculated by multiplying the severity rating with the probability rating. The maximum value that can be reached through this impact evaluation process is 100 SP (points). The significance for each impact is rated as High (SP≥60), Medium (SP = 31-60) and Low (SP<30) significance as shown in the Table 4 below.

Table 4: Definition of significance rating

Significance of predicted NEGATIVE impacts		
Low	0-30	Where the impact will have a relatively small effect on the environment and will require minimum or no mitigation and as such have a limited influence on the decision
Medium	31-60	Where the impact can have an influence on the environment and should be mitigated and as such could have an influence on the decision unless it is mitigated.
High	61-100	Where the impact will definitely have an influence on the environment and must be mitigated, where possible. This impact will influence the decision regardless of any possible mitigation. +
Significance of predicted POSITIVE impacts		
Low	0-30	Where the impact will have a relatively small positive effect on the environment.
Medium	31-60	Where the positive impact will counteract an existing negative impact and result in an overall neutral effect on the environment.

High	61-100	Where the positive impact will improve the environment relative to baseline conditions.

6. FINDINGS OF THE ASSESSMENT

6.1. Nationally Protected Trees

The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of several indigenous trees. This national list of protected trees was developed through the application of objective scientific criteria which was supported by a computerised scoring system.

Criteria for listing the trees as protected included:

- The rarity of the species;
- Importance of the species in the maintenance of an ecosystem, also known as keystone species;
- The utilization pressure on a species;
- Cultural or spiritual value (including landscaping) of the species; and
- The degree to which a species is already protected under provincial legislation.

Based on the site survey, no protected or redlisted plant species was recorded on site (MRA and MP).

6.2. Vegetation

The field survey showed that the vegetation on site is the secondary grasslands develop where the original, primary (undisturbed) grassland vegetation was removed (e.g. by cultivation). After such disturbances cease, pioneer grassland species colonise the disturbed areas leading to a secondary grassland state with a lower species diversity as opposed to the primary (climax) state prior to any disturbances. In the absence of any further disturbances, continuous succession should theoretically lead to the development of the original climax (or primary) state of the grassland. However, primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore.

The grasses recorded on site *Digitaria eriantha, Eragrostis plana*, *Hyparrhenia hirta*, *Eragrostis lehmanniana, Cynodon dactylon, Melinis repens, Themenda triandra, Panicum coloratum, Sporobolus africanus, Andropogon eucomus, Urochloa panicoides, Agrostis lachnantha, Andropogon eucomus, Chloris virgata, Cynodon dactylon, Eragrostis plana, Hemarthria altissima, Imperata cylindrica, Ischaemum fasciculatum, Miscanthus junceus, Paspalum distichum,*

Andropogon appendiculatus, Brachiaria marlothii, Echinochloa holubii, Eragrostis obtus, Setaria verticillata and Panicum maximum.

Due to the severe and long-term soil disturbances, it is unlikely that secondary grassland will revert to primary grassland. It is doubtful that geophytes or plants of conservation concern survived the cultivation, except in areas around wetlands where the soil was too wet to plough.



Figure 11: Secondary grassland

The site is dominated is mainly dominated by shrubs and trees such as *Vachellia toritlis, Vachellia karoo, Diospyros lycoides, Grewia occidentalis, Ziziphus mucronata, Searsia lancea and Vachellia hebeclada. Other species include Aloe Zebrina, Prosopis glandulosa, Asparagus densiflorus, Asparagus laricinus, Melia azedarach, Vachellia nigrescens, Celtis Africana, Gymnosporia buxifolia, Searsia pyroides, Eucalyptus globulus, Tarchonanthus camphoratus, Ziziphus mucronata* were recorded on site.



Figure 12: One of the dominating short trees (Searsia lancea) on site



Figure 13: Vachellia's on site



Figure 14: Tarchonanthus camphoratus with Searsia lancea at the back

The herb layer consisted of *Argemone ochroleuca, Datura stramonium, Asparagus laricinus, Lippia javanica, Persicaria lapathifolia, cylindropuntia imbricata*, *Gomphocarpus physocarpus,* Cleome *maculata, Comelina africana var krebsiana, Felicia muricata, Opuntia stricta, Campuloclinium macrocephalum, Opuntia ficus-indica, Indigofera zeyheri and Hermannia depressa*

6.3. Alien invasive plants

Declared weeds and invaders have the tendency to dominate or replace the herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these transformers be eradicated and controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species (Henderson, 2001).

According to the published Alien and Invasive Species regulations in terms of section 97(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) four categories of problem plants are identified as:

- **Category 1a** plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned.
- **Category 1b** plants are widespread invasive species controlled by a management programme.
- **Category 2** plants are invasive species controlled by area. Can be grown under permit conditions in demarcated areas. All breeding, growing, moving, and selling are banned without a permit.
- **Category 3** plants are ornamental and other species that are permitted on a property but may no longer be planted or sold.

Numerous alien plant species were recorded in the study area at the time of the survey; most notably the extensive invasions by species such as *Acacia mearnsii al*so have the potential to form dense stands. Table 5 lists the alien species as well as the various NEMBA categories for the alien species recorded during the survey.

Table 5: Alien species recorded in the study area

Scientific name	Common name	NEMBA Category
Argemone americana	American poppy	1b
Solanum mariantanum	Bug weed	1b
Agave sisalana	Sisal	2
Opuntia Stricta	Sour prickly pear	1a
Opuntia ficus-indica	Prickly pear	1a
Eucalyptus globulus	Tasmanian blue gum	2
Gomphocarpus physocarpus	Baloon plant	LC
Campuloclinium macrocephalum	Pom-pom	1b
Riccinus communis	Castor oil	1a
Xanthium strumarium	Rough cocklebur / hlaba-hlabane	1b

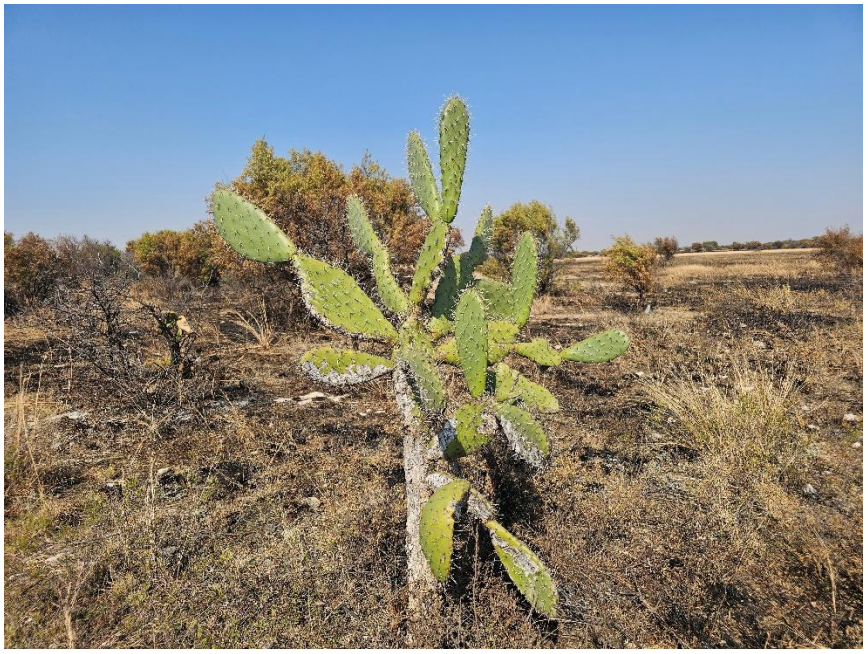


Figure 15: Opuntia ficus indica



Figure 16: Argemone americana

6.4. Faunal Communities

This faunal survey focused mainly on mammals, and birds of the study area. The survey focused on the current status of threatened animal species occurring, or likely to occur within the study area, describing the available and sensitive habitats. Faunal data was supplemented by previous surveys conducted in similar habitats, literature investigations, and historic data. Different habitats were explored to identify any sensitive or endangered species. Mammal names are as used by Stuart & Stuart (1998) & Skinner & Chimimba (2005), and bird names by Hockey et al. (2005).

6.4.1. Mammals

The site provides suitable habitat for a number of mammals, which include Giraffe, zebra, Leopard, cheetah, Brown and spotted hyena, Kudu, eland, waterbuck, gemsbok, red hartebeest, impala, mountain reedbuck, bushbuck, klipspringer, steenbok, Caracal, African wildcat, civet and common duiker. The probability of these mammals occurring on site is medium to low but these animals are known to occur with the Maleboho Nature Reserve that is bordering the site. The absence of these mammals is due to the hunting that takes place within the project area.

Other animals known to occur on site include Bushpig, Warthog, Porcupines, honey badgers, banded mongooses, and vervet monkeys.

6.4.2. Avi-fauna

Birds can be viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of the ecosystem. Bird communities and ecological condition are linked to land cover, as the land cover changes so do the types of birds in the area. The project area has the propensity to harbour Red Data Bird Species however none were observed during the field surveys.

Desktop assessment (SABAP 2) showed that a total of 205 bird species has been confirmed within the 2 QDGC. Many avifaunal species are adaptable as they are habitat generalists and can therefore accommodate a certain degree of habitat degradation and transformation (Harrison *et al*., 1997). Other species are extremely habitat specific and have to rely on certain habitat units for breeding, hunting or foraging and roosting. It is the survival of these species that become threatened as they cannot adapt to changes to the habitat. Habitat-specific species are sensitive to environmental change, with destruction of habitat being the leading cause of species decline worldwide (Barnes, 2000).

It is widely accepted that vegetation structure, rather than the actual plant species, influences bird species' distribution and abundance (Harrison *et al*., 1997). Therefore, the vegetation description used in the Bird Atlas does not focus on

lists of plant species, but rather on factors which are relevant to bird distribution. A list of birds on the QDGC is attached as appendix B.

7. TERRESTRIAL BIODIVERSITY SITE SENSITIVITY VERIFICATION

This Terrestrial Biodiversity site sensitivity verification relates to the Screening Tool Report completed for the site as well as the site survey conducted.

Table 6: Screening Tool Report Sensitivities

Environmental Theme	DFFE Screening tool sensitivity	Applicable protocol	Specialist sensitivity verification
Terrestrial Animal Species Theme	Low	Terrestrial Animal Species Specialist Assessment	Low
Terrestrial Plant Species Theme	Low	Terrestrial Plant Species Specialist Assessment	Low
Terrestrial Biodiversity Theme	Very high	Terrestrial Biodiversity Specialist Assessment	Medium

7.1. Terrestrial Animal Species

The Animal Species Theme for site is assigned as Low sensitivity by the DFFE Screening Tool due to the potential occurrence of avifaunal Species of Conservation Concern (SCCs). However, the terrestrial animal species assessment confirmed an overall low sensitivity based on the potential hunting on site. The site does provide suitable habitat for small mammals such such rabbits and antelopes.

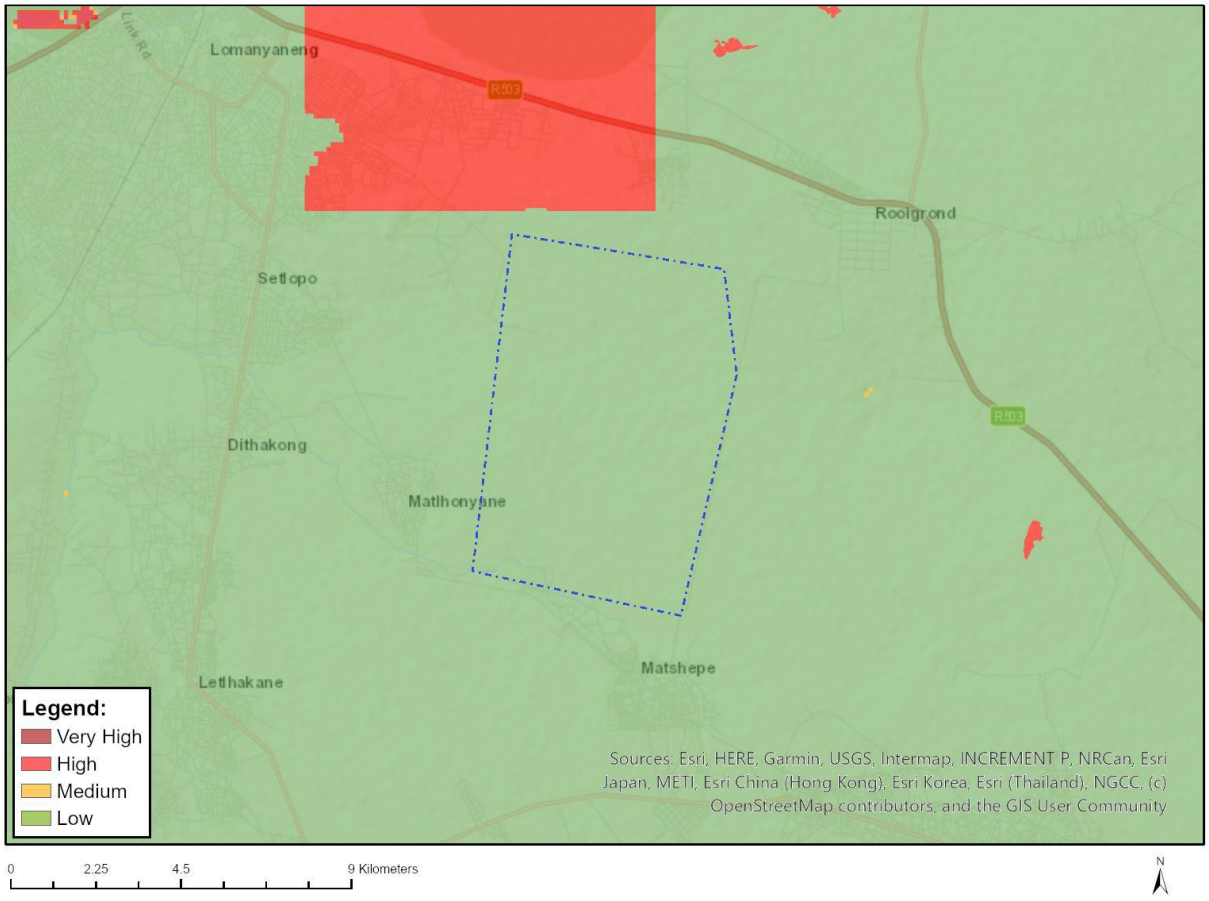


Figure 17: DEFF Screening Tool Results - animal biodiversity theme

7.2. Terrestrial Plant Species

The sensitivity of the site based on the Terrestrial Plant Species theme is considered low for the site since no protected plant species or red listed plants were recorded during desktop. The site investigation confirmed that there are no protected plants on site as the site was once previously cultivated as well as mined

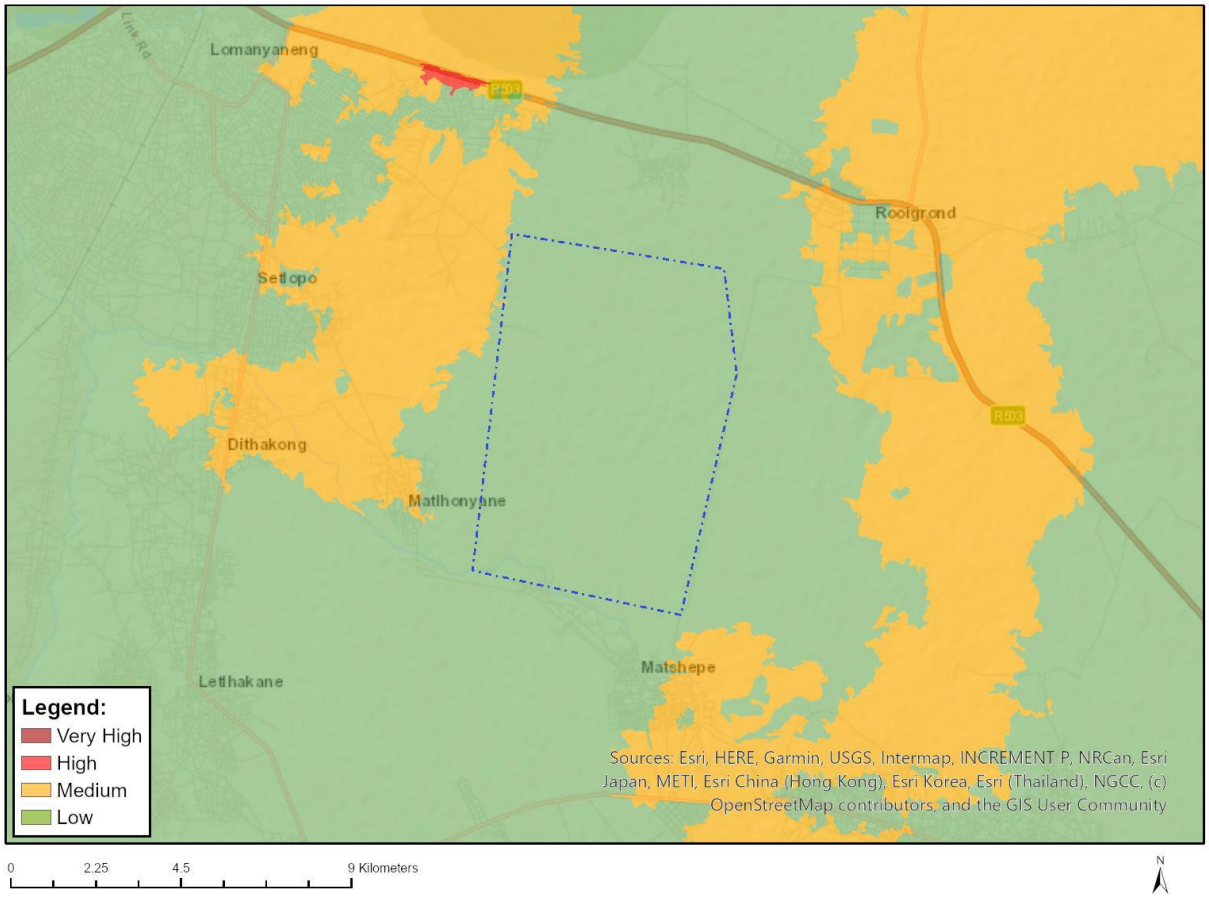


Figure 18: DFFE Screening Tool Results - Plant biodiversity theme

7.3. Terrestrial Biodiversity

The DFFE Environmental Screening Tool assigns the study area a Very High Terrestrial Biodiversity sensitivity due to the presence of Critical Biodiversity Areas (CBA 2) areas identified under the National Protected Area Expansion Strategy (NPAES). The field survey confirmed that the site is situated within the areas mapped as CBAs. Based on the findings of the field assessment, supported by available baseline information, the Site Sensitivity Verification classified the site is regarded Very High because:

- Proximity of National Protected Area and
- CBA are.
- Western Highveld Sandy Grassland regarded as endangered.

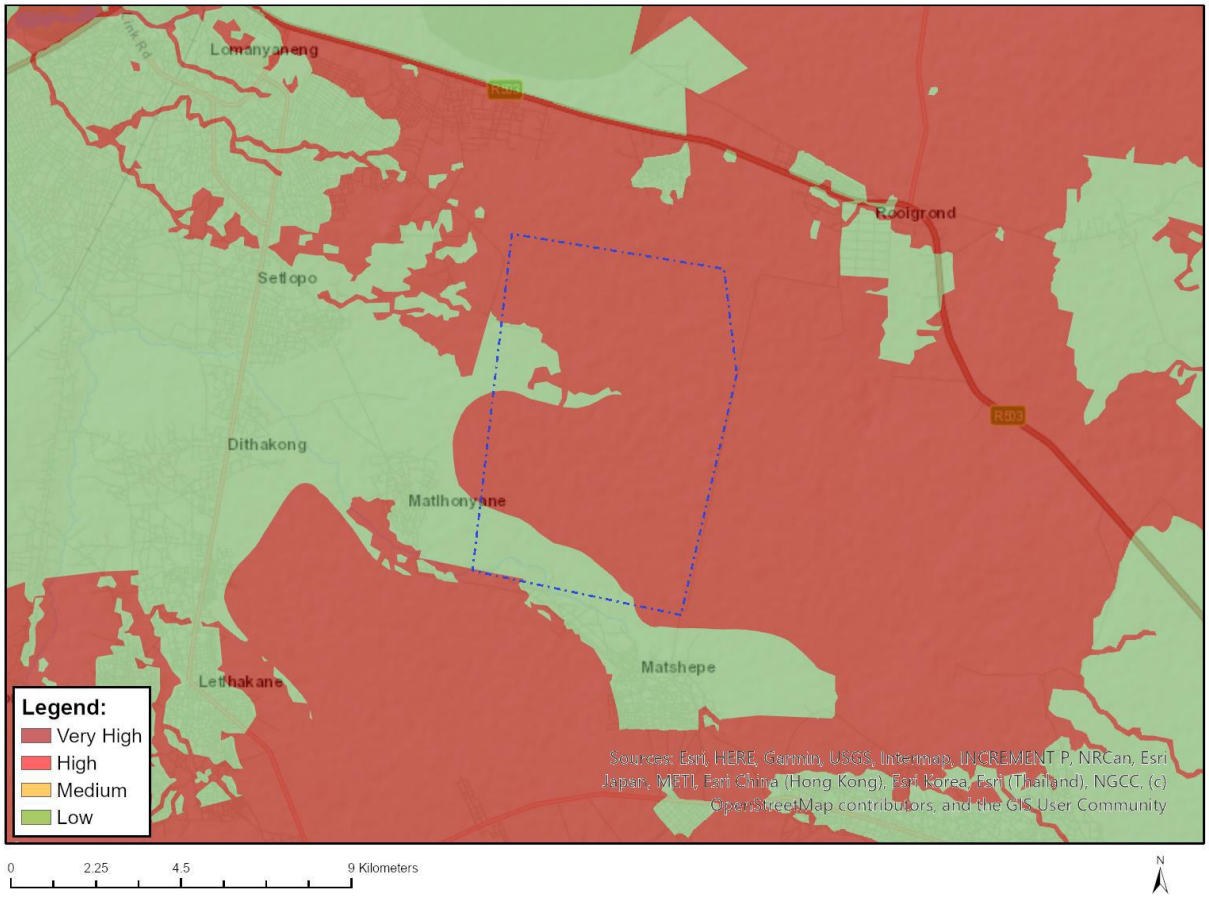


Figure 19: DFFE Screening Tool Results - Terrestrial biodiversity theme

8. DISCUSSION AND IMPACT ASSESSMENT

8.1. Assessment and significance criteria

The assessment criteria used in the assessment are described below and are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as from Brownlie (2005).

For each impact the following are described:

- **Nature of the impact**. A description of positive or negative effect of the project on the affected environment, or vice versa. The description includes who or what would be affected, and how.
- **Extent of the impact**. This includes assessing the spatial scale of the impact using the following scale:

- **On-site** – impacts that are limited to the site boundaries.
- **Local** – impacts that affect an area in a radius of 5km around the site.
- **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem.
- **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.
- **Trans-boundary/International** – impacts that affect internationally important resources such as areas protected by international conventions.

- **Duration of the impact**. The lifespan of the impact is assessed as follows:
  - **Temporary** – impacts are predicted to be of short duration and intermittent/occasional.
  - **Short-term** – impacts that are predicted to last only for the duration of the construction period.
  - **Long-term** – impacts that will continue for the life of the Project, but ceases when the Project stops operating.
  - **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.

Certain impacts can also be discontinuous or intermittent (where the impact may only occur during specific climatic conditions or during a particular season of the year).

Intensity or magnitude of the impact: The intensity or severity of the impact would be indicated as either

- **Negligible** – the impact on the environment is not detectable.
- **Low** – the impact affects the environment in such a way that natural functions and processes are not affected.
- **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way.
- **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.

Potential for impact on irreplaceable resources: This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonization from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for

those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.

Probability of occurrence: The likelihood of the impact actually occurring would be indicated as either Improbable (the possibility of the impact materializing is very low as a result of design or historic experience), Probable (there is a distinct possibility that the impact will occur), Highly probable (it is most likely that the impact will occur), or Definite (the impact will occur regardless of the implementation of any prevention measures).

- **Significance of the impact**. Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to following significance criteria:
- **No significance**: the impacts do not influence the proposed development and/or environment in anyway.
- **Low/Minor significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

The following table is used to determine significance based on the likelihood and magnitude of the assessed impact:

	Likelihood	**Unlikely**	**Likely**	**Definite**
Magnitude	Negligible	Negligible	Negligible	Minor
	Negligible	Negligible	Minor	Minor
	Minor	Minor	Moderate	Moderate
	Moderate	Moderate	Major	Major

Confidence: The level of confidence in predicting the impact can be described as:

- **low**, where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem, or inadequate information;
- **medium**, where there is a moderate level of confidence in the prediction;
- or **high**, where the impact can be predicted with a high level of confidence.

Cumulative Impact

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Mitigation

The objective of mitigation is to firstly avoid and minimize impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on vegetation and animal habitats and to maximize re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

In order to ensure that impacts are avoided as far as possible and to implement effective mitigation at the site, the following mitigation hierarchy is used to prioritize mitigation actions:

- **Avoidance**: Avoiding or reducing at source is essentially 'designing' the project so that a feature causing an impact is designed out (e.g. a waste stream is eliminated) or altered (e.g. reduced waste volume). Often called minimization (most preferred)
- **Reduction**: impact is reduced in magnitude and/or significance
- **Abate on Site**: This involves adding something to the basic design to abate the impact - pollution controls fall within this category. Often called 'end-of-pipe'.
- **Rectification**: impact is mitigated after it has occurred e.g. rehabilitation of areas disturbed by construction
- **Compensation**: providing a substitute resource for a resource that has been lost because of the project (e.g. "conservation offsets")
- **No action** (least preferred)

8.2. Impact/Risk Assessment: Design and Construction Phase

Impact	Stage	Nature	Magnitude	Extent	Duration	Probability	Significance before mitigation	Significance after mitigation
Removal of the natural vegetation	Construction/mining	Negative	High (8)	Site only (1)	Long term (4)	Definite (5)	Moderate to high (65)	Low to moderate
Disturbance to animals on site	Construction/mining	Negative	Moderate (6)	Local (2)	Long term (4)	High (4)	Moderate (48)	Low
Increased soil erosion, increase in silt loads and sedimentation	Construction/mining	Negative	Moderate (6)	Regional (3)	Long term (4)	High (4)	Moderate (52)	Low
Establishment and spread of declared weeds	Construction and Mining	Negative	High (8)	Site only (1)	Long term (4)	Definite (5)	High (75)	Low to moderate
Pollution due to oil and fuel spills, erosion, and ablution facilities.	Construction and mining	Negative	High (8)	Regional (3)	Long term (4)	High (4)	High (60)	Low
Pollution due to construction waste (such as cement paper, steel and rubble)	Construction/mining	Negative	High (8)	Local (2)	Medium Term (3)	Medium (4)	Moderate (52)	Low to moderate

Impact on soil and water courses	mining	Negative	Very High (10)	Local (2)	Long Term (4)	Definite (4)	High(80)	Moderate

8.3. Mitigation: Design and Construction Phase

8.3.1. Mitigation from the Floristic Perspective

Avoid:

- Direct destructive impact on the riparian zone, aim to maintain an ecological buffer area around the riparian zone:
    - It would be advisable to designate the ecological buffer area and the riparian area as public open space to enable regular maintenance of vegetation, but also to prevent excessive degradation by creating public awareness of its conservation and potential health benefits (White et al., 2019) by facilitating recreational use, e.g. walking, running, in this area;
    - All rescued plants should be bagged translocated to a suit area, preferably planted closer to where they were removed. Replanting should only occur in springs or early summer (September to November), once the first rains have fallen, in order to facilitate establishment;
    - Ensure stormwater drainage and management is adequate and not diverted into the riparian zone (Walsh et al., 2005; 2016);
- Any direct impacts on any surrounding or remaining area with primary vegetation or any riparian habitats (except the clearing of alien invasive species):
    - Position any parking bays, temporary load-off areas or turning areas in sites that are already disturbed or dominated by alien invasive plants, however – where areas are dominated by alien invasive plants, ensure these are cleared before-hand to avoid distributing reproductive material by e.g. wheels of heavy machinery or clothing of staff;
    - Construct a permanent barrier to disable vehicle and machinery access to more sensitive riparian habitats;
- Prior to any new groundworks:
    - Conduct a walk-through survey during the peak growing season – between December and March – to establish which, how many and where Protected and Threatened plant species occur, and record the relevant GPS positions of such occurrences;
    - Protected geophytes and succulents must all be relocated to a pre-defined suitable area prior to groundworks, preferably during the end of the growing season (April-May), ensuring the necessary relocation permits from the relevant authorities are in place;

- Geophytes and succulents that cannot be relocated directly into a remaining open area where they will not be disturbed again, should be relocated to other suitable area(s) as recommended by the responsible authorities.

Minimise damage to or degradation of remaining open spaces:

- Restrict all movement of vehicles and heavy machinery to permissible areas, these being designated road surface areas, turning points, parking bays or other operational areas:
  - No off-road driving beyond designated areas may be allowed;
- Parking areas of heavy machinery should be regularly inspected for oil spills and covered with an impermeable or absorbent layer or pans (with the necessary storm water control) if oil and fuel spillages are highly likely to occur;
- Prevent spillage of hydrocarbons, possible construction materials and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMP;
- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.

Rehabilitate remaining open spaces:

- As part of rehabilitation of the remaining open spaces, all stockpiled materials must be entirely removed, and the area landscaped to merge into the surroundings;
- Rehabilitate and revegetate all areas that will not be modified or sealed as soon as practically possible;
- Regularly monitor the establishment of alien invasive species on and around the open spaces as part of the municipal alien control plan, and remove when detected during these monitoring periods, whenever possible before flowers or other regenerative material can be produced;
- Regularly remove litter that may have accumulated from open spaces.

8.3.2. Mitigation from the Faunal Perspective

Avoid:

- Direct destructive impacts on the sensitive faunal habitats such as the riparian zone and outcrop bushveld habitats. This can be achieved by:
  - The establishment and implementation of ecological buffer zones and open space systems. These act as important wildlife corridors and mist be incorporated into the final approved layout;

- Position any parking bays, temporary load-off areas or turning areas in sites that are already disturbed and have an associated low ecological sensitivity. Optimal sites would be those close to existing disturbances in order to localise impacts;
- Construct a permanent barrier to disable vehicle and machinery access to more sensitive faunal habitats; Do not disturb nests, breeding sites or young ones. Do not attempt to kill or capture snakes unless directly threatening the safety of employees.
- Dogs or other pets are not allowed to the worksite as they are threats to the natural wild animal

- Minimise damage to or degradation of remaining open spaces:
  - A low speed limit should be enforced on site to reduce wild animal-vehicle collisions
  - No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.
  - Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harms remaining faunal species.
  - Hunting weapons are prohibited on site.
  - Contract employees must be educated about the value of wild animals and the importance of their conservation.
  - The ECO must conduct regular site inspections of removing any snares or traps that have been erected.
  - Employees and contractors should be made aware of the presence of, and rules regarding, flora and fauna through suitable induction training and on-site signage.
  - Any faunal species located on the site during the construction phase, which cannot relocate themselves (e.g. fossorial species), must be moved to a more suitable location. This should be undertaken by a suitable qualified ecologist/faunal specialist;

- Prior to any new groundworks:
  - The implementation of an environmental awareness programme for all construction personnel. This must focus on biodiversity issues pertaining to the degradation of sensitive habitats, collection of fauna and ensuring that no wildlife is harmed unnecessarily.

8.3.3. Mitigation from a Soils and Watercourses Perspective

Avoid:

- The maintenance of the recommended 50m buffer from the edge of the riparian zone will reduce impacts to the watercourses. It is further recommended that an aquatic assessment is undertaken to determine the final buffer width for the protection of these water resources;
- No stockpiling of any materials may take place within or directly adjacent to any of the watercourses or riparian zones;
- Erosion control measures must be implemented in areas sensitive to erosion such as near water supply points, edges of slopes, etc. These measures include but are not limited to - sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which must be used in the protection of slopes;
- Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place;
- All waste generated during construction is to be disposed of as per an Environmental Management Programme (EMP) and the washing of containers, wheelbarrows, spades, picks or any other equipment that has been contaminated with cement or chemicals, within the watercourses must be strictly prohibited.

Minimise damage to or degradation of remaining open spaces:

- Vegetation clearing must be undertaken only in the areas to be affected and must not extend outside of the development footprint;
- There shall be no mining of soil/sand required for construction purposes from the banks of the watercourses. Soil must be brought in, if needed, for construction purposes. This soil must also be stockpiled away from any of the riparian zone edge and any other sensitive areas. These must be demarcated;
- Attenuation of stormwater from the development site is important to reduce the velocity of runoff into the wetland systems;
- No release of any substance i.e. cements or oil that could be toxic to fauna or faunal habitats; Wet cement and/ or concrete must not be allowed to enter any of the watercourses and riparian zone;
- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed, and the affected area rehabilitated immediately. Consult with an ecologist/aquatic specialist if spills occur;
- Portable toilets must be placed outside of the 1:100-year flood line of the watercourses.

Rehabilitate remaining open spaces:

- Disturbed sites must be rehabilitated as soon as construction in an area is complete or near complete;
- The implementation, rehabilitation and maintenance of the 50m will lower risks to each of the watercourse systems. The buffers must be planted with a thick basal cover of indigenous graminoids to help reduce the velocity of water coming from the development and entering the watercourses. This will also aid in the filtering out of sediment and other pollutants from the stormwater.

8.3.4. Alien invader management

- The best mitigation measure for alien and invasive species is the early detection and eradication of these species which will be ensured with the use of a monitoring programme.
- An alien invasive management programme should be developed and implemented to control alien invasive species

8.3.5. Waste management

- Proper ablution facilities on site must be provided.
- Constant rehabilitation of erosion problems.
- Proper storage facilities of construction materials.
- Waste management is very important. Proper storage and removal strategy must be in place.
- Proper Standard Operating Procedures in place regulating refuelling and other potential polluting activities.
- Must have rehabilitation strategy as part of EMP such as a clean-up plan/strategy if spills occur and proper facilities (ablution) to ensure no sewerage spills into drainage lines and streams.
- Use a licensed waste contractor to dispose of any waste generated on site
- Do not bury wastes on-site

9. INVASIVE ALIEN PLANT MANAGEMENT

9.1. Purpose of the Invasive Alien Management Plan

The purpose of the invasive alien management plan is:

- to ensure that alien plants do not become established on site;
- to ensure that alien plant species do not become dominant in all or parts of the landscape;
- to implement a monitoring programme to detect the presence of alien plant species as well as to monitor the success of the alien management plan.

9.2. Responsible persons

Effective management of alien plant species during the construction and operational phases of the project will be dependent on a number of project personnel. These are listed below:

The Developer

This refers to the project proponent. They will be responsible for the following:

- Ensure that the requirements set out in this management plan are adhered to and implemented;
- Allocate the responsibilities assigned to the Environmental Control Officer (ECO) to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this management plan as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

The Environmental Control Officer (ECO)

The ECO is responsible for monitoring and verifying the implementation of the management plan during the construction phases of the project. To effectively implement the management plan, the ECO must be aware of the findings, mitigation measures and conclusions of the Final EIA Report, the Environmental Authorisation, and this management plan.

The Contractor

The contractor, being any directly appointed company or individual undertaking the implementation of works, will be responsible for complying with the management plan at all times during the construction phase.

9.3. Current invasive alien species on sites

The current along the proposed project area has been covered under **Section 6.3** of this report. The proposed construction will likely introduce disturbance into this landscape that may promote conditions that will lead to the introduction and/or spread of invasive alien species.

9.4. Control Guidelines

9.5. Prevention

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas. Prevention could also include measures such as washing the working parts and wheels of earth-moving equipment prior to it being brought onto site, visual walk-through surveys every three months.

9.6. Early identification and eradication

Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are spotted an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

9.7. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control.

9.8. Alien invasive control methods

There are various means of managing invasive alien plants. These include mechanical, chemical and biological control.

9.9. Mechanical control

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion. For the current project, hand-pulling or manual removal using hand tools (in this case cut stumping) will be the most appropriate methods since there are no existing dense stands of invasive alien plants.

9.10. Chemical control

Chemical control should only be used as a last resort, since it is hazardous for natural vegetation. It should not be necessary if regular monitoring is undertaken, which should be effective for controlling invasive alien plants. Chemical control involves the use of registered herbicides to kill the target weed. Managers and herbicide operators must have a basic understanding of how herbicides function. The use of inappropriate herbicides and the incorrect use of the appropriate herbicides are wasteful, expensive practices and often do more harm than good, especially when working close to watercourses. Some herbicides can quickly contaminate fresh water and/or be transported downstream where they may remain active in the ecosystem.

Contractors using herbicides are required to have a permit according to Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). Herbicides are either classified as selective or non-selective. Selective herbicides are usually specific to a particular group of plants, e.g. those specified for use on broad leaf plants, but should not kill narrow-leaf plants such as grasses. Non-selective herbicides can kill any plant that they come into contact with and are therefore not suitable for use in areas where indigenous vegetation is present.

Chemical application techniques include foliar (leaf) application, stem applications (basal stem, total frill, stem injections) and stump applications (cut stump, total stump, scrape and paint).

9.11. Biological control

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero, and the population is effectively sterilized. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

9.12. Alien invasive Plant management plan

The following management actions are aimed at reducing soil disturbance during the construction and operational phases of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

Action	Frequency
The ECO is to provide permission prior to any vegetation being cleared for development	Daily
Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be prepared immediately afterwards.	Weekly
Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these products are of such a nature that breaks down on contact with the soil. Residual herbicides should not be used	Weekly
Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site.	Weekly
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.)	Weekly

Alien vegetation regrowth on areas disturbed by construction must be controlled throughout the entire site	Monthly
The alien plant removal and control method guidelines should adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website and also http://invasives.org.za/	Monthly
Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
Where areas of natural vegetation have been disturbed by construction activities, revegetation with indigenous, locally occurring species should take place where the natural vegetation is slow to recover or where repeated invasion has taken place following disturbance.	Biannually, but revegetation should take place at the start of the rainy season

10. CONCLUSION AND RECOMMENDATIONS

From the desktop assessment it seems that half of the site is still in natural state while the other half has been disturbed through cultivation. The proposed area for the prospecting is regarded as having a conservation value of High due to the dominance presence of protected trees as well as the proximity to the National Protected Area. It is therefore important that the placement of the prospecting sites including structures is done with these sensitive areas in mind and as per the composite map on appendix A, the placement of the holes must be outside the area with the remaining natural area. The placement of drilling sites must take into account the area contains protected and red listed plants.

It is then advised that drilling prospecting may continue provided that the mitigation measures as suggested can be implemented, then the overall impact of the development components would be of low overall significance and it is unlikely that the development would result in an overall net loss of biodiversity or long-term degradation of the receiving environment as the area to be drilled is smaller in terms of vegetation removal.

Other mitigation measures include:

- All alien invasive, weeds and potential invasive plants generated by the development will have to be entirely cleared after prospecting;
- Based on general environmental guidelines for protected areas in South Africa, a standard buffer zone often recommended around protected areas is approximately 5 km. This zone, often referred to as an Eco-Sensitive Zone, acts as a transition area to regulate activities and protect the core, biodiversity-rich areas of the reserve, therefore a 5km buffer from Malebogo (Blouberg) Nature Reserve must be maintained;
- 100 meters' buffer has also been provided to protect all NFEPA with the project application area;
- An ongoing monitoring program will be necessary to control and/or eradicate newly emerging invasive;
- Newly cleared soils will have to be revegetated and stabilised as soon as construction has been completed; and;
- Soils are prone to erosion and need to be stabilised by a permanent grass or suitable indigenous vegetation layer

Careful consideration must be afforded each of the mitigation measures provided in this report. If environmental authorisation is issued for this project, proven ecological (or environmental) controls and mitigation measures must be entrenched in the management framework. It is clear from the regional ecological overview, as well as the baseline data collected to date that parts of project area are in a pristine condition and has only been minimally altered both historically and presently.

11. REFERENCES

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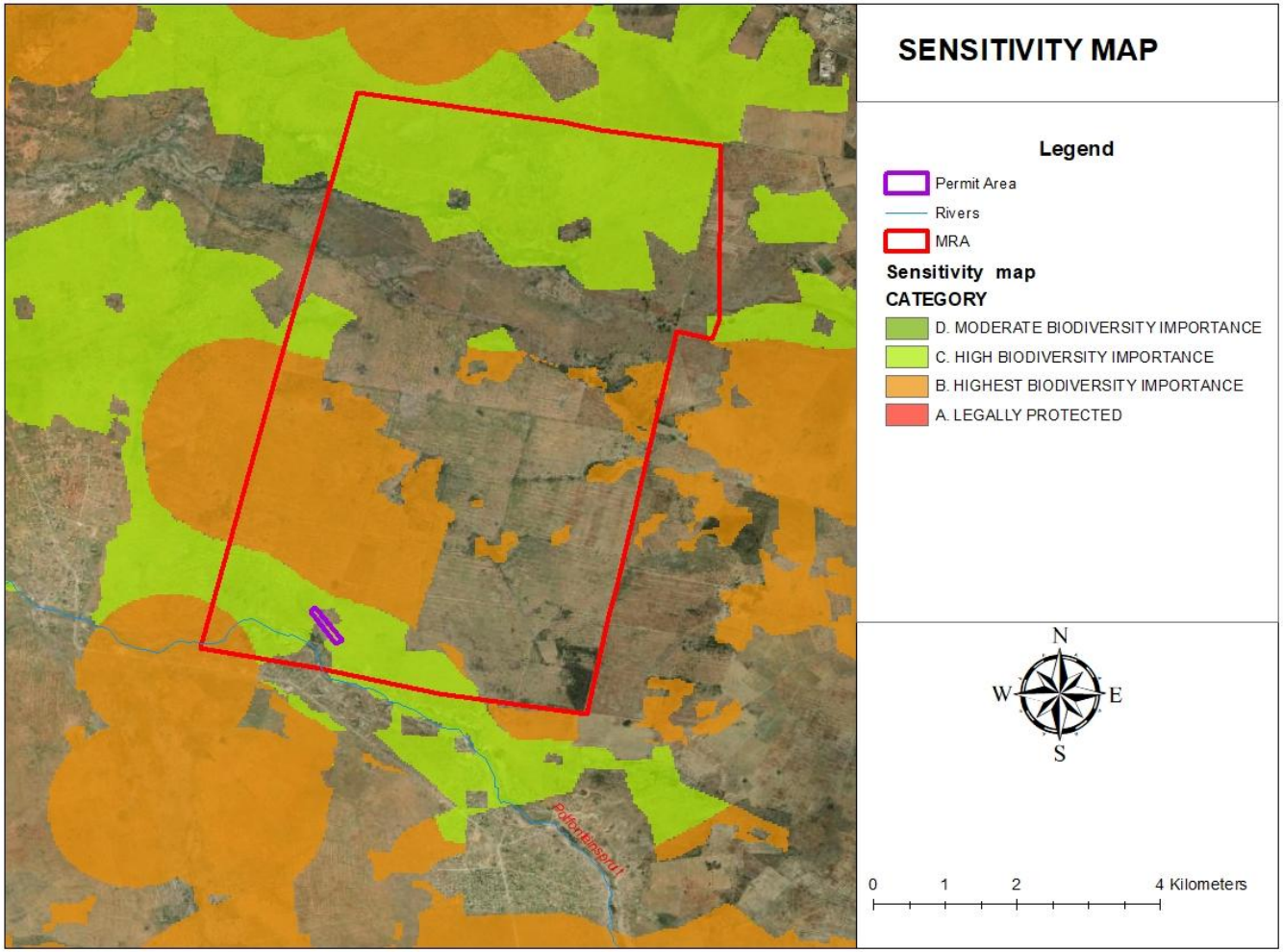
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APPENDIX A: COMPOSITE MAP



APPENDIX B: PLANT SPECIES LIST RECORDED

Achyranthes aspera

Aristida congesta

Aristida congesta

Boscia albitrunca

Boscia albitrunca

Chloris virgata

Combretum apiculatum

Combretum imberbe

Combretum imberbe

Commelina benghalensis

Commiphora mollis

Corbichonia decumbens

Cymbopogon nardus

Dichrostachys cinerea

Digitaria eriantha

Enneapogon cenchroides

Enteropogon macrostachys

Eragrostis lehmanniana

Eragrostis pallens

Eragrostis rigidior

Eragrostis trichophora

Euclea crispa

Euphorbia tirucalli

Grewia flava

Grewia occidentalis

Hibiscus micranthus

Ischaemum afrum

Kyphocarpa angustifolia

Lippia javanica

Panicum coloratum

Panicum maximum

Peltophorum africanum

Rhus lancea

Rhus leptodictya

rochloa mosambicensis

Schmidtia pappophoroides

Sclerocarya birrea

Seddera capensis

Setaria verticillata

Sida cordifolia

Spirostachys Africana

Spirostachys Africana

Stipagrostis uniplumis

Tephrosia purpurea

Terminalia sericea

Vachellia burkei

Vachellia erubescens

Vachellia flecki

Vachellia karoo

Vachellia nigrescens

Vachellia nilotica

Vachellia robusta

Ziziphus mucronata

APPENDIX C: LIST OF BIRDS SPECIES LIKELY TO INHABIT THE AFFECTED QDGC'S

Common species	Genus	Species
Bokmakierie	*Telophorus*	*zeylonus*
Brubru	*Nilaus*	*afer*
Hamerkop	*Scopus*	*umbretta*
Neddicky	*Cisticola*	*fulvicapilla*
Quailfinch	*Ortygospiza*	*atricollis*
Bar-throated	*Apalis*	*thoracica*
Pied	*Recurvirostra*	*avosetta*
Arrow-marked	*Turdoides*	*jardineii*
Acacia Pied	*Tricholaema*	*leucomelas*
Black-collared	*Lybius*	*torquatus*
Crested	*Trachyphonus*	*vaillantii*
Chinspot	*Batis*	*molitor*
Pririt	*Batis*	*pririt*

Common species	Genus	Species
European	*Merops*	*apiaster*
Little	*Merops*	*pusillus*
Southern Red	*Euplectes*	*orix*
Yellow-crowned	*Euplectes*	*afer*
African Red-eyed	*Pycnonotus*	*nigricans*
Cinnamon-breasted	*Emberiza*	*tahapisi*
Golden-breasted	*Emberiza*	*flaviventris*
Orange-breasted	*Chlorophoneus*	*sulfureopectus*
Common	*Buteo*	*buteo*
Jackal	*Buteo*	*rufofuscus*
Black-throated	*Crithagra*	*atrogularis*
Yellow	*Crithagra*	*flaviventris*
Ant-eating	*Myrmecocichla*	*formicivora*
Familiar	*Oenanthe*	*familiaris*

Common species	Genus	Species
Cloud	*Cisticola*	*textrix*
Desert	*Cisticola*	*aridulus*
Levaillant's	*Cisticola*	*tinniens*
Rattling	*Cisticola*	*chiniana*
Wailing	*Cisticola*	*lais*
Zitting	*Cisticola*	*juncidis*
Red-knobbed	*Fulica*	*cristata*
Reed	*Microcarbo*	*africanus*
White-breasted	*Phalacrocorax*	*lucidus*
Burchell's	*Centropus*	*burchellii*
Black	*Zapornia*	*flavirostra*
Long-billed	*Sylvietta*	*rufescens*
Pied	*Corvus*	*albus*
Diederik	*Chrysococcyx*	*caprius*

Common species	Genus	Species
Jacobin	*Clamator*	*jacobinus*
Klaas's	*Chrysococcyx*	*klaas*
Red-chested	*Cuculus*	*solitarius*
Black	*Campephaga*	*flava*
African	*Anhinga*	*rufa*
Cape Turtle	*Streptopelia*	*capicola*
Laughing	*Spilopelia*	*senegalensis*
Namaqua	*Oena*	*capensis*
Red-eyed	*Streptopelia*	*semitorquata*
Rock	*Columba*	*livia*
African Black	*Anas*	*sparsa*
Fulvous Whistling	*Dendrocygna*	*bicolor*
White-faced Whistling	*Dendrocygna*	*viduata*
Yellow-billed	*Anas*	*undulata*

Common species	Genus	Species
Brown Snake	*Circaetus*	*cinereus*
Great	*Ardea*	*alba*
Intermediate	*Ardea*	*intermedia*
Little	*Egretta*	*garzetta*
Western Cattle	*Bubulcus*	*ibis*
Yellow-bellied	*Eremomela*	*icteropygialis*
Amur	*Falco*	*amurensis*
Cut-throat	*Amadina*	*fasciata*
Red-headed	*Amadina*	*erythrocephala*
Jameson's	*Lagonosticta*	*rhodopareia*
Red-billed	*Lagonosticta*	*senegala*
Southern	*Lanius*	*collaris*
Red-chested	*Sarothrura*	*rufa*
African Paradise	*Terpsiphone*	*viridis*

Common species	Genus	Species
Fairy	*Stenostira*	*scita*
Fiscal	*Melaenornis*	*silens*
Spotted	*Muscicapa*	*striata*
Orange River	*Scleroptila*	*gutturalis*
Domestic	*Anser*	*anser*
Egyptian	*Alopochen*	*aegyptiaca*
Spur-winged	*Plectropterus*	*gambensis*
Great Crested	*Podiceps*	*cristatus*
Little	*Tachybaptus*	*ruficollis*
Common	*Tringa*	*nebularia*
Helmeted	*Numida*	*meleagris*
Grey-headed	*Chroicocephalus*	*cirrocephalus*
Black-headed	*Ardea*	*melanocephala*
Grey	*Ardea*	*cinerea*

Common species	Genus	Species
Purple	*Ardea*	*purpurea*
Squacco	*Ardeola*	*ralloides*
Greater	*Indicator*	*indicator*
Lesser	*Indicator*	*minor*
African	*Upupa*	*africana*
African Grey	*Lophoceros*	*nasutus*
African Sacred	*Threskiornis*	*aethiopicus*
Glossy	*Plegadis*	*falcinellus*
Hadada	*Bostrychia*	*hagedash*
Dusky	*Vidua*	*funerea*
Purple	*Vidua*	*purpurascens*
Greater	*Falco*	*rupicoloides*
Lesser	*Falco*	*naumanni*
Brown-hooded	*Halcyon*	*albiventris*

Common species	Genus	Species
Pied	*Ceryle*	*rudis*
Black-winged	*Elanus*	*caeruleus*
Northern Black	*Afrotis*	*afraoides*
Blacksmith	*Vanellus*	*armatus*
Crowned	*Vanellus*	*coronatus*
Eastern Clapper	*Mirafra*	*fasciolata*
Red-capped	*Calandrella*	*cinerea*
Rufous-naped	*Mirafra*	*africana*
Sabota	*Calendulauda*	*sabota*
Spike-heeled	*Chersomanes*	*albofasciata*
Cape	*Macronyx*	*capensis*
Banded	*Riparia*	*cincta*
Brown-throated	*Riparia*	*paludicola*
Common	*Gallinula*	*chloropus*

Common species	Genus	Species
Red-faced	*Urocolius*	*indicus*
Speckled	*Colius*	*striatus*
White-backed	*Colius*	*colius*
Common	*Acridotheres*	*tristis*
Black-headed	*Oriolus*	*larvatus*
Common	*Struthio*	*camelus*
Western Barn	*Tyto*	*alba*
Indian	*Pavo*	*cristatus*
Speckled	*Columba*	*guinea*
African	*Anthus*	*cinnamomeus*
Buffy	*Anthus*	*vaalensis*
Plain-backed	*Anthus*	*leucophrys*
Kittlitz's	*Charadrius*	*pecuarius*
Three-banded	*Charadrius*	*tricollaris*

Common species	Genus	Species
Southern	*Netta*	*erythrophthalma*
Black-chested	*Prinia*	*flavicans*
Black-backed	*Dryoscopus*	*cubla*
Green-winged	*Pytilia*	*melba*
Red-billed	*Quelea*	*quelea*
African	*Rallus*	*caerulescens*
Cape	*Cossypha*	*caffra*
White-throated	*Cossypha*	*humeralis*
Marsh	*Tringa*	*stagnatilis*
Wood	*Tringa*	*glareola*
Common	*Rhinopomastus*	*cyanomelas*
Kalahari	*Cercotrichas*	*paena*
Streaky-headed	*Crithagra*	*gularis*
South African	*Tadorna*	*cana*

Common species	Genus	Species
Cape	*Spatula*	*smithii*
Crimson-breasted	*Laniarius*	*atrococcineus*
Lesser Grey	*Lanius*	*minor*
Red-backed	*Lanius*	*collurio*
African	*Gallinago*	*nigripennis*
Cape	*Passer*	*melanurus*
House	*Passer*	*domesticus*
Southern Grey-headed	*Passer*	*diffusus*
Yellow-throated Bush	*Gymnoris*	*superciliaris*
White-browed	*Plocepasser*	*mahali*
African	*Platalea*	*alba*
Natal	*Pternistis*	*natalensis*
Swainson's	*Pternistis*	*swainsonii*
Cape	*Lamprotornis*	*nitens*

Common species	Genus	Species
Pied	*Lamprotornis*	*bicolor*
Violet-backed	*Cinnyricinclus*	*leucogaster*
Wattled	*Creatophora*	*cinerea*
Black-winged	*Himantopus*	*himantopus*
Little	*Calidris*	*minuta*
African	*Saxicola*	*torquatus*
White-bellied	*Cinnyris*	*talatala*
Barn	*Hirundo*	*rustica*
Greater Striped	*Cecropis*	*cucullata*
Red-breasted	*Cecropis*	*semirufa*
South African Cliff	*Petrochelidon*	*spilodera*
White-throated	*Hirundo*	*albigularis*
African	*Porphyrio*	*madagascariensis*
African Palm	*Cypsiurus*	*parvus*

Common species	Genus	Species
Little	*Apus*	*affinis*
White-rumped	*Apus*	*caffer*
Brown-crowned	*Tchagra*	*australis*
Red-billed	*Anas*	*erythrorhyncha*
Whiskered	*Chlidonias*	*hybrida*
White-winged	*Chlidonias*	*leucopterus*
Karoo	*Turdus*	*smithi*
Ashy	*Melaniparus*	*cinerascens*
Cape	*Motacilla*	*capensis*
African Reed (Old, Use Common Reed Warbler)	*Acrocephalus*	*baeticatus*
Chestnut-vented	*Curruca*	*subcoerulea*
Great Reed	*Acrocephalus*	*arundinaceus*
Lesser Swamp	*Acrocephalus*	*gracilirostris*
Little Rush	*Bradypterus*	*baboecala*

Common species	Genus	Species
Marsh	*Acrocephalus*	*palustris*
Willow	*Phylloscopus*	*trochilus*
Black-faced	*Brunhilda*	*erythronotos*
Blue	*Uraeginthus*	*angolensis*
Common	*Estrilda*	*astrild*
Violet-eared	*Granatina*	*granatina*
Scaly-feathered	*Sporopipes*	*squamifrons*
Southern Masked	*Ploceus*	*velatus*
Capped	*Oenanthe*	*pileata*
Cape	*Zosterops*	*virens*
Orange River	*Zosterops*	*pallidus*
Common	*Curruca*	*communis*
Long-tailed Paradise	*Vidua*	*paradisaea*
Pin-tailed	*Vidua*	*macroura*

Common species	Genus	Species
Shaft-tailed	*Vidua*	*regia*
Long-tailed	*Euplectes*	*progne*
Red-collared	*Euplectes*	*ardens*
White-winged	*Euplectes*	*albonotatus*
Green	*Phoeniculus*	*purpureus*
Cardinal	*Dendropicos*	*fuscescens*
Golden-tailed	*Campethera*	*abingoni*