Application for a Prospecting Right and Associated Environmental Authorisation for the Proposed Prospecting of Iron and Manganese Ore on Farms Bute 299, Gosport 298 and Deal 301 in the Joe Morolong Local Municipality, within the John Taolo Gaetsewe District Municipality, Northern Cape Province

Draft Basic Assessment Report

DMR Reference Number: NC30/5/1/1/2/13219 PR

Report Prepared for

Sunstone Mining (Pty) Ltd

Report Prepared by

GEOLOGICAL CONSULTING SERVICES PTY (LTD)

September 2022

Title:	*Draft Basic Assessment and Environmental Management Programme (BAR/EMPr) Report for the Proposed Prospecting of Iron and Manganese Ore on Farms Bute 299, Gosport 298 and Deal 301 in the Joe Morolong Local Municipality, within the John Taolo Gaetsewe District Municipality, Northern Cape Province*
Status of report:	*Draft Report*
First Issue:	*September 2022*
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Environmental Assessment Practitioner	*Ndivhudzannyi Mofokeng*
Applicant	*Sunstone Mining(Pty)* *61 Toms Place Eagle,* *Canyon Golf Estate* *Honeydew,* *2170*

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DMR Ref: NC30/5/1/1/2/13219 PR

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: Sunstone Mining (Pty) Ltd

TEL NO: 083 449 8157

FAX NO:

POSTAL ADDRESS: 61 Toms Place Eagle, Canyon Golf Estate Honeydew, 2170

PHYSICAL ADDRESS: 61 Toms Place Eagle, Canyon Golf Estate Honeydew, 2170

FILE REFERENCE NUMBER SAMRAD: NC30/5/1/1/2/13219 PR

1 IMPORTANT NOTICE

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

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

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

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

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

2 Objective of the basic assessment process

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

a. determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b. identify the alternatives considered, including the activity, location, and technology alternatives;
c. describe the need and desirability of the proposed alternatives,
d. through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage , and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

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

    (ii) the degree to which these impacts—

        (aa) can be reversed;

        (bb) may cause irreplaceable loss of resources; and

        (cc) can be managed, avoided, or mitigated;

e. (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

    (i) identify and motivate a preferred site, activity, and technology alternative;

    (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and

    (iii) identify residual risks that need to be managed and monitored.

General Project Overview

Sunstone Mining (Pty) Ltd (Sunstone) appointed Ndi Geological Consulting Services-(Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed Manganese (Mn) and Iron (Fe) ore prospecting located on Farms Bute 299, Gosport 298 and Deal 301 in the Joe Morolong Local Municipality, within the John Taolo Gaetsewe District Municipality, Northern Cape Province.

The proposed prospecting project will cover an area of 13 829.4687 hectares and approximately 30 km southwest of Pomfret and 172 km northwest of Vryburg in the Northern Cape Province.

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

The Department of Forestry, Fisheries, and the Environment (DFFE) has identified the need for the alignment of environmental authorisations and has promulgated a single environmental management system under NEMA whereby the DMR has become the competent authority for the authorisation of mining-related projects under the NEMA Environmental Impact Assessment (EIA) Regulations. This will result in simultaneous decisions in terms of NEMA, the National Environmental Management Waste Act (Act No. 59 of 2008) (NEM:WA) and other environmental management Acts.

Since the proposed prospecting 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.

Before the Mn and Fe ore mining operation can be planned and built, several tests and surveys must be conducted to ensure that the project is economically viable, technically feasible, and environmentally sound. The proposed prospecting project will consist of non-invasive and invasive (drilling sampling) activities. On surface, invasive methods include drilling sampling of 30 boreholes. Non-invasive methods will include analytical desktop studies, aerial photograph interpretation, satellite interpretation, and decision-making on the viability of the project.

The total duration of the prospecting and evaluation activities is planned for two (2) years, including rehabilitation.

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

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

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

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

Stakeholders are therefore invited to participate in the public review period of the Draft Basic Assessment Report (Draft BAR) from 16 September 2022 to 17 October 2022 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 stakeholders on the Draft BAR.

The updated Final BAR will be submitted to the competent authority (DMR) and other commenting authorities for review once the comments from the stakeholders have been incorporated into the Draft BAR. The DMR will consider the findings in consultation with various authorities and make a decision whether environmental authorisation should be granted for the proposed prospecting 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 6-2
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	Section 8

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
	how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	
Appendix 1: 3 (1) (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 9
Appendix 1: 3 (1) (g)	A motivation for the preferred site, activity, and technology alternative.	Section 10
Appendix 1: 3 (1) (h)	A full description of the process followed to reach the proposed preferred activity, site, and location within the site, including-	Section 11
	Details of all alternatives considered;	Section 11.1
	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 11.2
	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 11.5
	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 12
	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated.	Section 13
	The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 14
	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects;	Section 15
	The possible mitigation measures that could be applied and level of residual risk;	Table 13-1, Table 13-2, and Table 13-3
	The outcome of the site selection matrix;	N/A
	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;	Section 17
	A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 18

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Basic Assessment Reports	Section
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
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

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

Table 2-2: Requirements of Appendix 4 of GNR 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 12-15
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;	Section 31

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EMPr	Section where addressed in the EMPr
	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;	
Appendix 4 (e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 31
Appendix 4 (f)	a description of proposed impact management actions, identifying the way the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to: 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

This Draft Basic Assessment Report (Draft BAR) will be available for comment for a period of 30 days from 16 September 2022 to 17 October 2022. Copies of the Draft BAR been 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&AP's are requested to provide comments and information on the following aspects of the proposed project:

1. Information on how I&AP's 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

17 OCTOBER 2022

Please submit comments to the EAP:

Ndivhudzannyi Mofokeng
Ndi Geological Consulting Services (Pty) Ltd
38 Ophelia Street
Kimberley, 8301
Cell: 082 760 8420
Tel: 053 842 0687
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atshidzaho@gmail.com
ndi@ndigeoservices.co.za

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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
DEFF:	Department of Environment, Forestry and Fisheries
DM:	District Municipality
DMR:	Department of Mineral Resources
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
EAP:	Economic Active Population
EAP:	Environmental Assessment Practitioner
ECO:	Environmental Control Officer
EHS:	Environmental Health and Safety
EIA:	Environmental Impact Assessment
EMF:	Environmental Management Framework
EMPr:	Environmental Management Programme
ESA:	Ecological Support Area
GA:	Generally Authorised
GIS:	Geographic Information Systems
GNR:	Government Notice Regulation
GNR:	Government Notice Regulation
GSSA:	Geological Society of South Africa
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plans
JMLM:	Joe Morolong Local Municipality
LM:	Local Municipality
LUDS:	Land Use Development System
MPRDA:	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
NEM:BA:	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
NEM:WA:	National Environmental Management Waste Act (Act No. 59 of 2008)
NEMA:	National Environmental Management Act (Act No. 107 of 1998)
NFEPA:	National Freshwater Ecosystem Priority Areas

NGA:	National Groundwater Archive
NHRA:	National Heritage Resources Act, 1999 (Act 25 of 1999)
NWA:	National Water Act, 1998 (Act 36 of 1998)
PM:	Particulate Matter
PRA:	Prospecting Right Area
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
WUL:	Water Use Licence

3 Project background

Sunstone Mining (Pty) Ltd (Sunstone) appointed Ndi Geological Consulting Services-(Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to facilitate the environmental authorisation process for its proposed Manganese (Mn) and Iron (Fe) ore prospecting located on Farms Bute 299, Gosport 298, and Deal 301 in the Joe Morolong Local Municipality, within the John Taolo Gaetsewe District Municipality, Northern Cape Province.

The proposed prospecting project will cover an area of 13 829.4687 hectares and approximately 30 km southwest of Pomfret and 172 km northwest of Vryburg in the Northern Cape Province.

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

The Department of Forestry, Fisheries and the Environment, (DFFE) has identified the need for the alignment of environmental authorisations and has promulgated a single environmental management system under NEMA whereby the DMR has become the competent authority for the authorisation of mining-related projects under the NEMA Environmental Impact Assessment (EIA) Regulations. This will result in simultaneous decisions in terms of NEMA, the National Environmental Management Waste Act (Act No. 59 of 2008) (NEM:WA) and other environmental management Acts.

Since the proposed prospecting 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.

Before the Mn and Fe ore operations can be planned and built, several tests and surveys must be conducted to ensure that the project is economically viable, technically feasible, and environmentally sound. The proposed prospecting project will be both invasive non-invasive. A standard phased approach will be employed in carrying out the prospecting activities. Each prospecting activity will be undertaken on a scheduled timeline, with some activities being run concurrently, while others sequentially. Specific milestones will be determined and used as a basis for decisions regarding further activities related to the PWP.

The total duration of the prospecting and evaluation activities is planned for two (2) years, including rehabilitation.

Most of the rehabilitation will be conducted in tandem with the prospecting activities, with the final rehabilitation being undertaken once the prospecting activities have been completed at a site and before the drilling team leaves the site.

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

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

the Stakeholders and I&APs is to provide the competent authority with the necessary information in order for them to make informed decisions.

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

Stakeholders are therefore invited to participate in the public review period of the Draft Basic Assessment Report (Draft BAR) from 16 September 2022 to 17 October 2022 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 stakeholders on the Draft BAR.

The updated Final BAR will be submitted to the competent authority (DMR) and other commenting authorities for review once the comments from the stakeholders have been incorporated into the Draft BAR. The DMR will consider the findings in consultation with various authorities and make a decision whether an EA should be granted for the proposed prospecting 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 DMR.

This document serves as the draft Basic Assessment Report (Draft 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 prospecting of Mn and Fe ore on Farms Bute 299, Gosport 298, and Deal 301. The cumulative impacts of the proposed development will also be identified and evaluated;
- Identify and evaluate potential management and mitigation measures that will reduce the possible negative impacts of the proposed development and enhance the positive impacts;
- Compile monitoring, management, mitigation, and training needs in the EMPr; and
- Provide the decision-making authorities with sufficient and accurate information in order to make a sound decision on the proposed development and set conditions that must be adhered to.

All activities that trigger activities listed in Listing Notices 1 and 3 require that a Basic Assessment (BA) process be followed. The BA process will entail:

- Submission of the EA Application to the DMR. The application was submitted to the DMR 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 stakeholder 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.

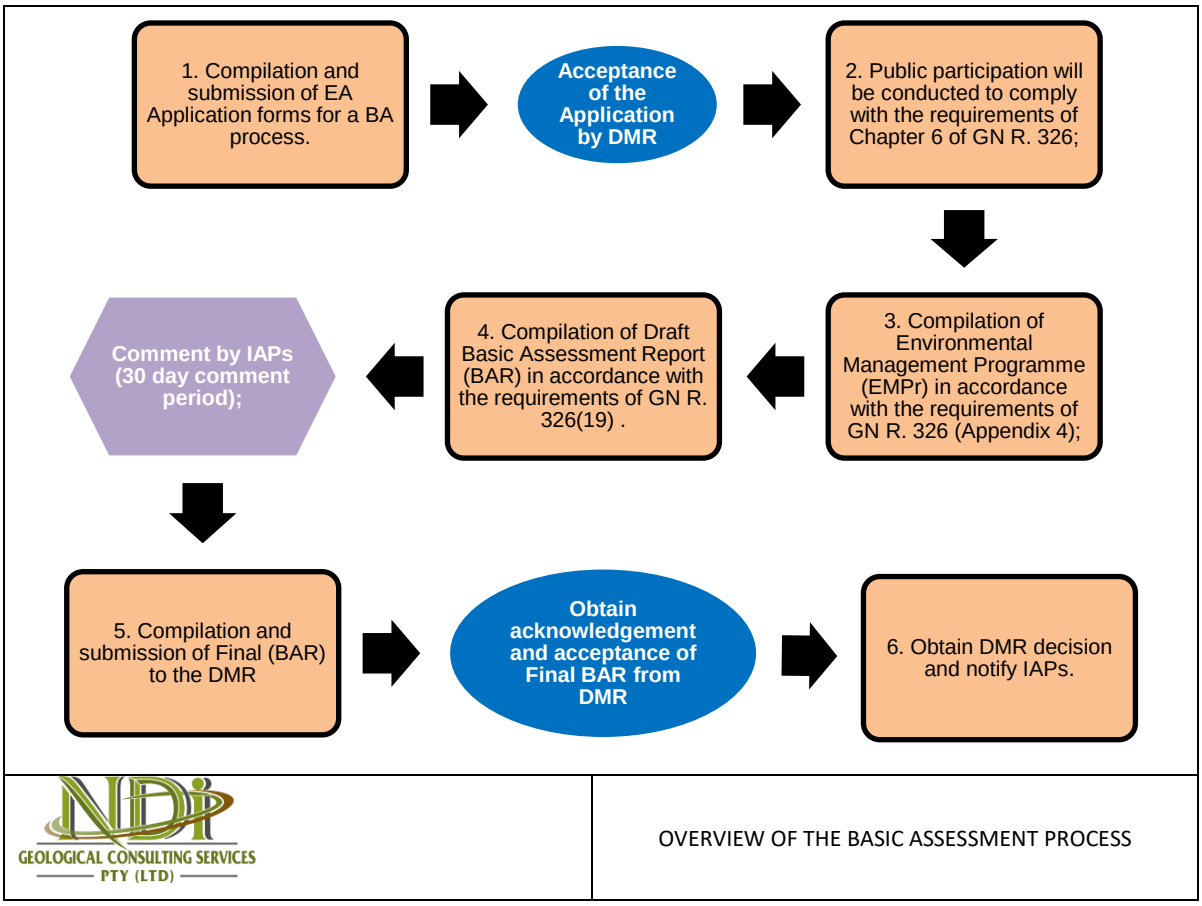

Figure 4-1: Overview the Basic Assessment Process

5 Contact Person and Correspondence Address

Ndi Geological Consulting Services (Pty) Ltd has been appointed by Sunstone as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary EA process and associated stakeholder 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 past experience

The EAP, Mrs Ndivhudzannyi is a registered EAP (EAPASA Reg Number 2020/1554) with a BSc (Hons) Earth Sciences in Mining and Environmental Geology. She has close to 11 years' experience in the exploration and open cast work in the mining industry. She has proven leadership skills from supervising exploration rigs (Reverse Circulation and percussion drilling). She has proven working experience in field exploration and mapping, borehole logging, borehole sampling, sample preparation for laboratory analysis, handling of GPS, supervisory duties within the field, geological report and progress report writing, including Prospecting Work Programmes and Environmental Management Plans, handling the Department of Mineral Resources (DMR) documents in general.

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

6 Project Location

6.1 Property Description

The proposed prospecting o Fe and Mn ore on Farms Bute 299, Gosport 298, and Deal 301 in the Joe Morolong Local Municipality, within the John Taolo Gaetsewe District Municipality, Northern Cape Province. The description of the affected properties is provided in Table 6-1 and map showing the affected property is provided in Figure 6-1.

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

Farm Name:	Farms Gosport 298, Bute 299, and Deal 301
Coordinates	26.1540922ºS, 23.2541228ºE
Application area (Ha)	13 829.4687ha
Magisterial district:	John Taolo Gaetsewe District Municipality
Distance and direction from nearest town	The proposed prospecting area is located approximately 30 km southwest of Pomfret and 172 km northwest of Vryburg in the Northern Cape Province.
21-digit Surveyor General Code for each farm portion	

Portion	**Farm**	**SG Digits**
Portion 0	Gosport 298	C08100000000029800000
Portion 0	Bute 299	C08100000000029900000
Portion 0	Deal 301	C08100000000030100000

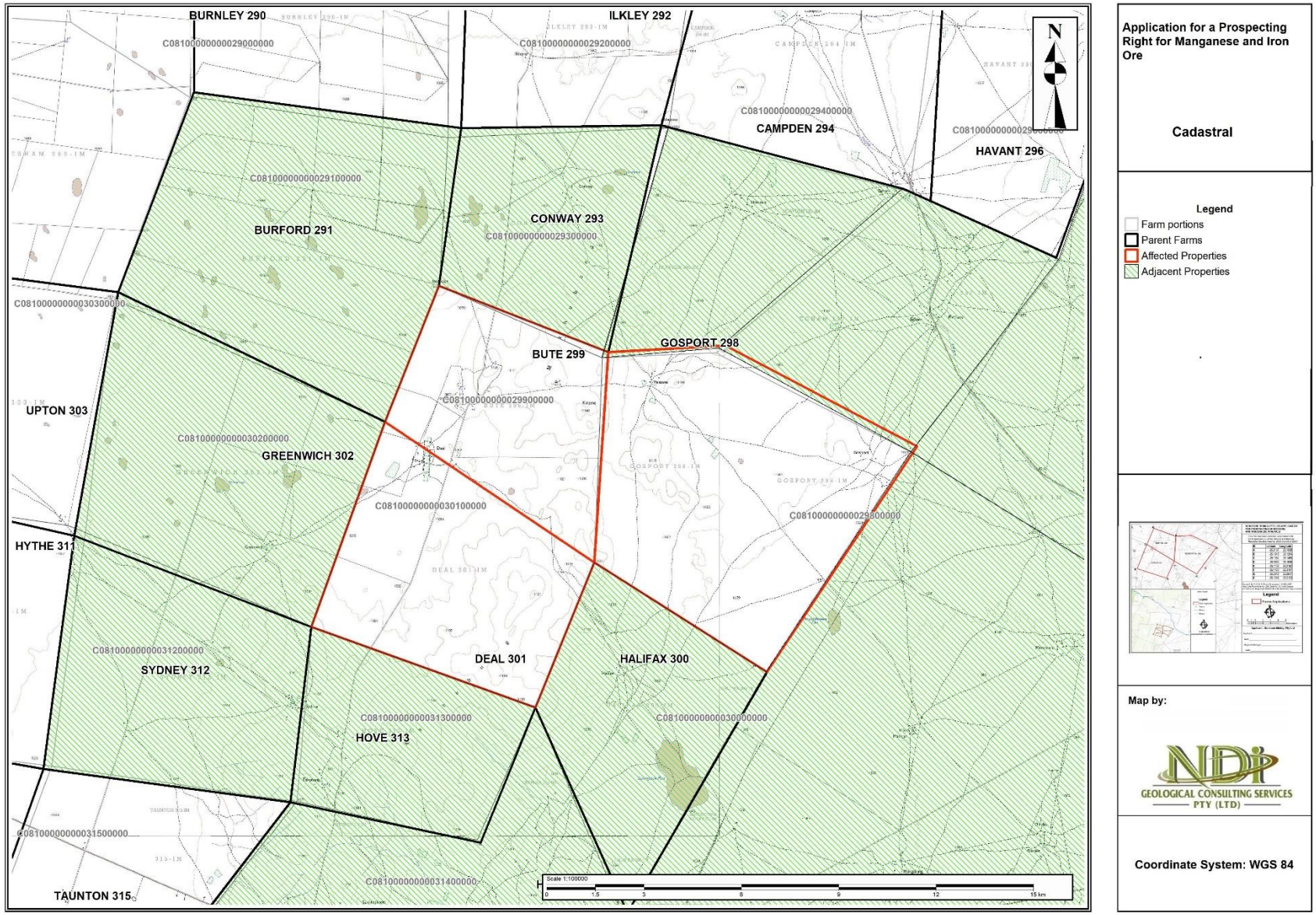

Figure 6-1: Cadastral Map

6.2 Locality map

The proposed prospecting area is located approximately 30 km southwest of Pomfret and 172 km northwest of Vryburg in the Northern Cape Province.

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

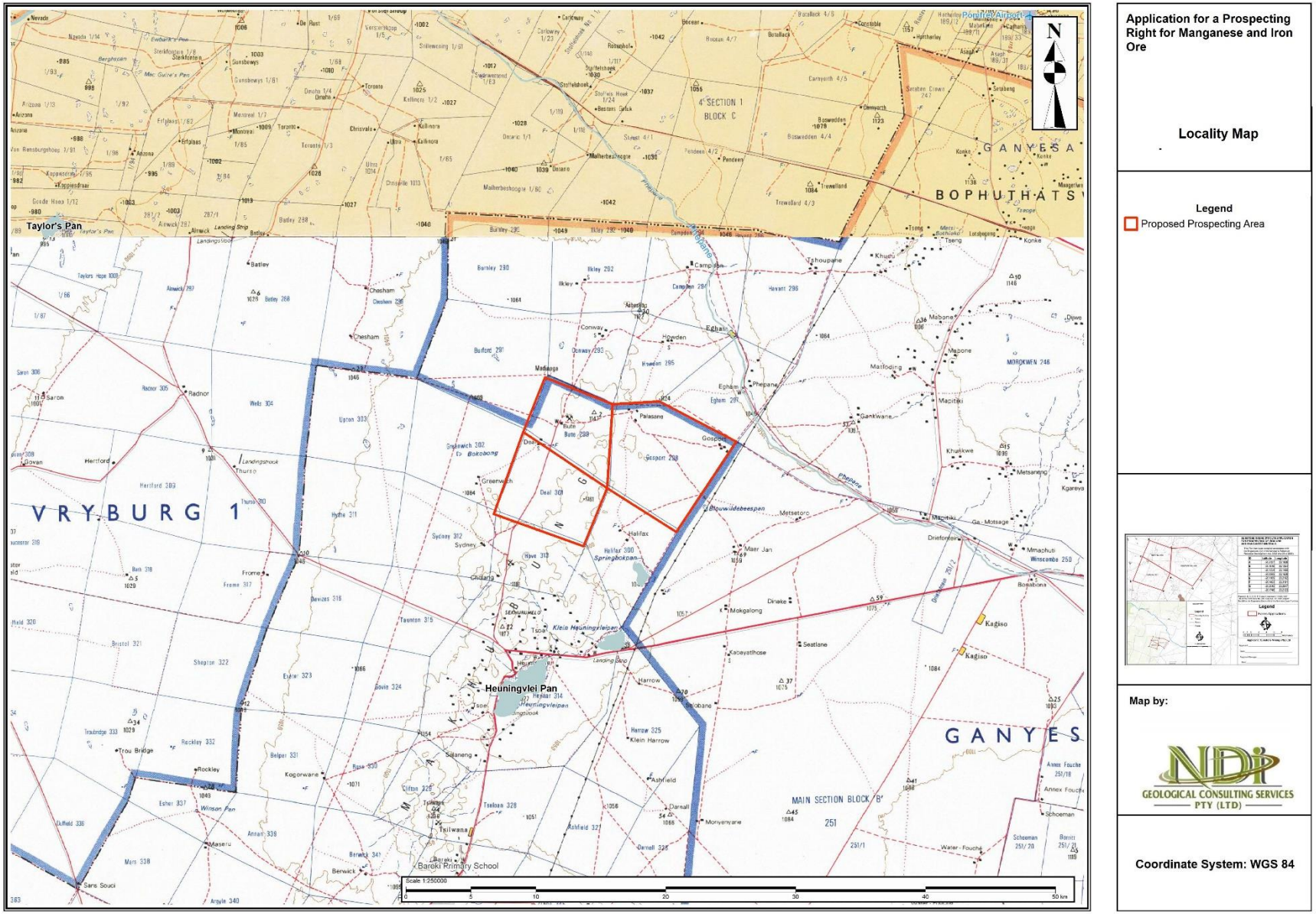

Figure 6-2: Locality Map

7 Description of the Scope of the Proposed Overall Activity

7.1 Overview

This prospecting will consist of non-invasive and invasive (drilling sampling) activities. The review of available information that exists over the area of interest will be undertaken by means of conducting a literature review from satellite images and other available information.

To outline the way the iron ore and manganese potential resources and distribution will be determined, a prospecting work program with scheduled time frames has detailed all the steps to be followed. This will be done using both invasive and non-invasive prospecting methods. A feasibility study of the project will also be undertaken to determine project's financially and technically viability.

A desktop study where historical data will be extrapolated with that of the new proposed prospecting area, will form the initial part of the prospecting work programme. This will be followed by geological mapping, where a geologist will physically visit the area in order to determine the physical components of the environment. The desktop and mapping exercises constitute phase 1 of the prospecting activities.

The success of Phase 1 will institute Phase 2, which is drilling. Phase one will have yielded results that will determine the exact locations of drillholes. Accuracy of results are vital in this phase and so good record-keeping along with effective security is important. Geological interpretation and exploration data analysis will be conducted through means of statistical analysis and geostatistical analysis. A block model of the resource will be developed after a resource classification is completed. An estimated iron ore and manganese grade and size will be assigned to a block. Then each block will be assigned a resource class. Phase 3 will be a suitable level of feasibility study. The model will be useful in determining aspects of the ore body that may significantly impact mining, processing, the environment, or economic feasibility of the mineral. In general, the feasibility of mining the mineral when all factors are considered.

The succeeding phase together with the method in which it should be carried out, will be determined by the success of the previous one

7.2 Phase 1

7.2.1 Desktop study (6 Months)

Available historic prospecting data with regard to the previous explorers will be scrutinised in order to compile a working plan. This is data such as historical geological borehole information, geological maps, Landsat, Aerial Photographs, geophysical surveys (Airborne, Ground Penetrating Radar, Imaging Laser Altimetry), which will be analysed and compiled.

7.2.2 Geological mapping (6 Months)

Geological mapping of areas of interest identified during a desktop study will be mapped. The aim is to visit all the targets with the proposed mineralisation identified in the desktop study in order to map the physical characteristics of the lithologies hosting it and to their exact locations. A geological map and a progress report will be produced from this exercise.

7.3 Phase 2: Drilling (6 Months)

Drilling will be conducted under the supervision of an experienced geologist, conducted along best practice guidelines.

The prospecting drilling campaign will be aimed at defining the extent of mineralisation and will demonstrate geological continuity of the mineralized zone across the entire application area. The proposed prospecting project will consist of invasive (drilling sampling) activities. On surface, invasive methods include 25 Reverse Circulation (RC) boreholes and five (5) core (diamond) drillholes, that is a total of 30 boreholes.

7.3.1 RC Drilling

During RC drilling, chip samples are collected at every meter. A riffle splitter is used to homogenise the samples. These samples will be split into 2 parts, one part will be used for logging where it will be washed and placed into a chip tray for logging and record keeping. The other portion will be appropriately labelled and dispatched to an accredited laboratory. Logging will be done by a qualified geologist who will record the lithology. Apart from ore resources calculations the drilling information will be used to construct ore thickness, overburden thickness and basement elevation contour plans. It is anticipated that 25 boreholes at a depth of 100m each will be drilled.

7.3.2 Core Drilling

Should delineation and initial evaluation of the deposit indicate a sufficient quantity and grade to warrant further evaluation, an appropriate core sampling program will be undertaken in order to establish grade and confirm its viability for mining. Core drilling, also referred to as diamond drilling will be undertaken during this phase.

Drilling is done by means of the wireline core recovery method, which entails a drill rig machine operating on at the collar position where the diamond core gets retrieved from the drill hole. During core drilling a roughly cylindrical piece of subsurface material is removed and brought to the surface for analysis. Core will be cut into three pieces where one quarter will be dispatched to a registered laboratory for assaying, the other quarter will be saved for record keeping while the other will be for petrological studies. Five (5) diamond core boreholes will be drilled to a depth of 100m each.

Table 7-1: Project Phases and Requirements

Phase	Activity (What are the activities that are planned to achieve optimal prospecting)	Skill(s) required (Refers to the competent personnel that will be employed to achieve the required results)	Timeframe (In months) for the activity)	Outcome (What is the expected deliverable, e.g. Geological report, analytical results, feasibility study, etc.)	Timeframe for outcome (Deadline for the expected outcome to be delivered)	What technical expert will sign off on the outcome? (e.g. geologist, mining engineer, surveyor, economist, etc)
1	***Non-Invasive***					
	Setup	Contractors	1 month	Prospecting ready		Mining Engineer
	Non-Invasive					
	Desktop Study including a Literature Survey of remotely sensed data and other available historic data	Qualified geologist	5 months	Geological Report	Month 12	Geologist
	Geological mapping	Qualified geologists	6 months	Detailed progress report and a geological map.		Geologist
2	***invasive***					
	Drilling	Qualified geologists	6 months	Drill chips and core	Month 18	Senior geologists
	Logging and sampling			Geological log and assay results		
3	***Non-Invasive***					
	3D geological model and resource estimation	Qualified geologists	6 months	Geological model and resource estimate	Month 24	Resource Geologist Principal Geologist
	Feasibility study			An appraisal of the feasibility of the project		

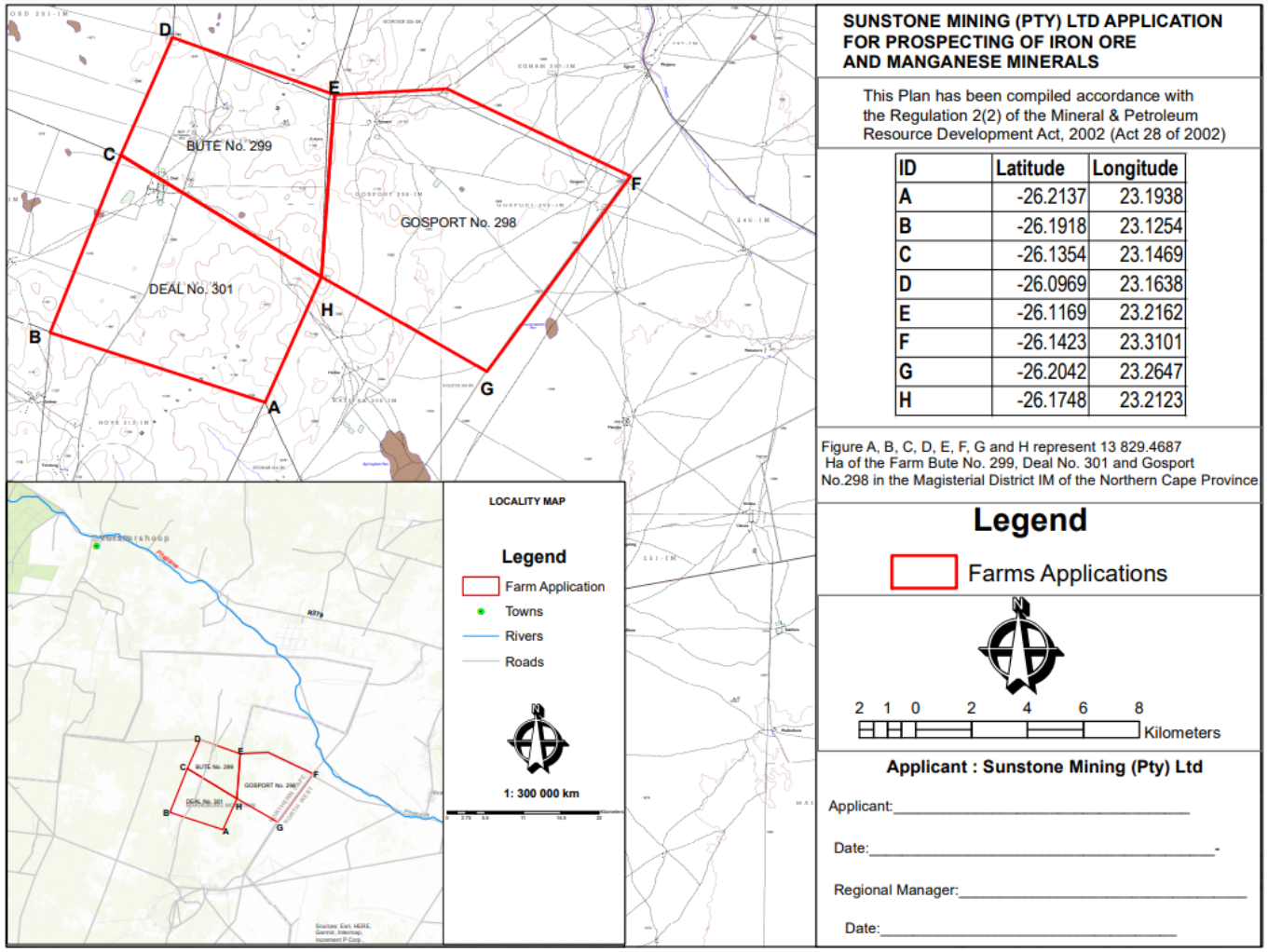

Figure 7-1: Layout Plan showing the location and area of the Prospecting Rights Area

7.4 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 and 2021 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.

Table 7-2 provides a summary of the identified NEMA listed activities that will be triggered by the prospecting project.

Table 7-2: Applicable Activities

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **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 prospecting right in terms of section 16 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, required to exercise the prospecting right.	13829.4687ha	X	GNR 983 (20) Listing Notice 1: Basic Assessment (Activities requiring an environmental authorization subject to a Basic Assessment) – as amended 7 April 2017 & 11 June 2021	[redacted]
25 RC and 5 diamond core drillholes	0.30ha	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	<0.1ha .	X	GNR 983 (27) GNR 985 (12 g (ii). as amended 7 April 2017 & 11 June 2021	

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **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)**
Ablution facility	0.02 ha	X	GNR 983 (25) GNR 985 (12 g (ii)	
Topsoil Stockpile	<0.01 ha	X	GNR 983 (27) GNR 985 (12 g (ii)	
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 (b) where the entire road falls within an urban area; or	<0.3 ha	X	GNR 983 (24, 27) GNR 985 (4 g (ii) (ee) (gg)) GNR 985 (12 g (ii) as amended 7 April 2017 & 11 June 2021	

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **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)**
(c) which is 1 kilometre or shorter				
Vehicle parking area	<0.02ha	X	GNR 983 (27) GNR 985 (12 g (ii)	
The closure of existing facilities, structures, or infrastructure, for- (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014 (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014 (iii) …; (iv) Any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or (v) any activity regardless the time the activity was	13829.4687ha	X	GNR 983 (31) as amended 7 April 2017 & 11 June 2021	

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **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)**
commenced with, where such activity; (a) is similarly listed to an activity in (i)(ii) or (iii) above; and (b) is still in operation or development is still in progress; excluding where- (aa) …; (bb) the closure is covered by part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) as decommissioning, in which the National Environmental Management: Waste Act, 2008 applies; or (cc) such closure forms part of a mining application, in which case the requirements of the Financial Provisioning Regulations apply.				

7.5 Activities to be undertaken

7.5.1 Prospecting

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

7.5.2 Establishment of Temporary Access Roads

Temporary access roads will be established for use during the prospecting activities.

7.5.3 Power

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

7.5.4 Water Supply

Water supply will either be from abstraction of groundwater or water will be brought onto site and trucked to the identified drill sites. This will be confirmed with the DWS.

7.5.5 Ablution Facilities

Sewage waste will be generated from the campsite and drilling sites. Portable chemical toilets will be used for the management of sewage waste generated on site.

7.5.6 Temporary Site Office Area

A temporary site office area will be erected at the drill sites.

7.5.7 Accommodation

No accommodation for staff and workers will be provided on-site. Workers will be transported to and from the prospecting site on a daily basis. Night security staff will be employed once equipment has been established on-site.

8 Policy and legislative context

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

Table 8-1: Applicable legislation, policies, and guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) (As amended)	Application for Prospecting in terms of Section 16	The application was submitted to the DMR and was formally accepted on 22 August 2022.
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 or not any permits will be required.
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	This Basic Assessment Report (BAR) and Environmental Management Plan (EMP)	The application was submitted to the DMR and formally accepted on 22 August 2022. The BAR and EMPr will be submitted to the DMR once finalised and have been subjected to a public participation process as required by Chapter 6 of the NEMA.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA)	The possibility of the presence of protected flora	The EMPr will regulate the applicant to apply for tree removal permits prior to removal of any sensitive and/or protected species.
National Water Act, 1998 (Act 36 of 1998) (NWA)	Soil Sampling and drilling site establishment 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). The South African National Biodiversity Institute (SANBI) National Wetlands database shows that there are wetlands in the prospecting area. Therefore, a Section 21 (c) and (i) WUA will be required for the prospecting activities. Should any abstraction of water be required, a Section 21 (a) WUA will also be required.
Municipal Integrated Development Plans (IDPs)	Land Claims	One of the key issues identified by the IDPs is to facilitate the land claims.

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

9 Need and Desirability

The mining industry is of great importance to the South African economy. According to the DMR, South Africa hosts about 75 percent of the world's identified manganese resources. Over 90 percent of these reserves are found in the Kalahari Manganese Fields (KMF) located in the Northern Cape. Manganese (Mn) is the 4th most used metal globally in terms of tonnage after iron, aluminium and copper and it is the 12th most abundant element in the earth crust. However, the country has predominantly ranked second in the world's manganese ore production, contributing less than 20 percent per year, attributed by lack of capacity developments in the country's manganese industry .These conditions led to the country missing out on the commodity boom cycle between 2001 and 2007, which was mainly due to the rapid growth in the Chinese steel industry and other developing economies. Steel is said to be the key driver in the world's economy and during the past 10 years, the production of manganese ore and its alloys has been in tandem with that of global steel as over 90 percent of manganese consumed goes into steel making. Approximately 2-2.5 tons of manganese ore is consumed in order to produce 1 ton of manganese alloys. The apparent consumption of manganese is estimated at an average of 10 kg per ton of steel produced. The amount varies significantly from region to region with the differences related to the steel production process, the quality of raw materials used, such as iron ore grades and types of steel products produced.

Manganese ore is a key element in carbon steel production, while electrolytic manganese dioxide is an important ingredient in lithium-ion batteries for EVs and other applications, as well as alkaline and zinc-manganese batteries. Data by Research and Market and the Observatory of Economic Complexity placed South Africa as the world's largest producer and exporter of manganese ore in 2019, accounting for 30% of global production and almost 50% of global exports. In that year, South Africa exported approximately R3.297 billion in manganese ore (StatsSA, 2021). In 2021, South Africa's production of iron ore amounted to an estimated 61 million metric tons. South Africa is one of the world's largest producers of iron ore. As of 2021, South Africa was the ninth-largest iron ore producing country in the world R 9.409 billion ((StatsSA, 2021).

Opportunities that exist within mining are as follows:

- Constant demand on the market for commodities;
- Establishment of a permanent working group between the municipality and the mine managers responsible from developing local economic development initiatives;
- Encourage local SMME's and entrepreneurs to take advantage of procurement;
- Develop a database of available labour and skills to encourage the employment of local people;
- Provide skills training and support programmes; and
- Instigate mining procurement opportunities in consultation with the mines, develop a database of such opportunities and ensure that this information is made available to local businesses and communities.

Exploration on the mining right area has proven that there is Iron ore present within old mine workings and in outcrops. Exploration targets were generated by means of surface geological mapping. The prospecting undertaken found that the property has manganese resources estimated to 50 million tons as well as iron ore resources estimated to1 373 075 tons.

The markets for each product are as follows:

- Iron: According to Anglo American, out of all the metals that make modern life possible, steel is the most widely used – and iron ore is its main ingredient. Higher Iron ore grades are needed in improving Auto markets, Construction, and other demanding types of specialised

infrastructure. This is a prime reason for the great demand from maturing economies such as in China, Japan, and Europe, and now increasingly in the Middle East and India. Export sales to China accounted for 61% of the Company's total exports. Exports to the rest of Asia remained at around 19% of the total, while Europe is 12%. Iron ore is also used in medicine, cosmetics, engineering, construction, paint, and a whole range of other products we use in our daily lives. And technology is demanding increasingly sophisticated forms of steel.

- Manganese: Steel is not only made of iron but also made of manganese. Although the amount of manganese used to make a ton of steel is small, it is just as essential as iron to produce this fundamental building block of modern industrial societies. Put in simplest terms—one can't make steel without manganese. Domestic consumption of manganese is about 500,000 metric tons each year, predominantly by the steel industry. The United States is totally reliant on imports for this amount of manganese. Manganese is a common ferrous metal with atomic weight of 25 and the chemical symbol Mn. It constitutes roughly 0.1 percent of the Earth's crust, making it the 12th most abundant element. Its early uses were limited largely to pigments and oxidants in chemical processes and experiments, but the significance of manganese to human societies exploded with the development of modern steelmaking technology in the 1860s. Because manganese is essential and irreplaceable in steelmaking and its global mining industry is dominated by just a few nations, it is considered one of the most critical mineral commodities for the United States.

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

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

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

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

Sunstone expects that substantial benefits from the project will accrue to the immediate project area, the sub-region, and the province of the Northern Cape. This prospecting activity has a potential to decrease unemployment rates in proposed areas and surroundings. This prospecting activity will also bring revenue into the local municipality and the province which will in turn boost the economy of the country.

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

A process that ensures consultation with Interested and Affected Parties (I&APs) for the project is being undertaken. The stakeholder engagement process is being conducted is a way to provide all interested and affected parties with an opportunity to comment on the project, with several platforms

that allow public commenting opportunities to be offered to the I&APs. All issues raised by the interested and affected parties will be recorded and addressed in the BAR and EMPr.

10 Motivation

10.1 Preferred Site

The proposed project site is preferred due to its location where the Fe and Mn ore occurs. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering.

According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault.

The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

10.2 Technologies

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

In terms of the proposed technologies, these have been chosen based on long term proven success in prospecting. The prospecting activities proposed in the Prospecting Works Programme are dependent on the preceding phase (desktop studies), therefore no alternatives have been indicated. All infrastructure will be temporary and/or mobile.

10.3 Design/Layout

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

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

The invasive prospecting phase will be dependent of the results of the preceding phase. The location and extent of the drilling sites and soil sampling cannot be determined at this stage; therefore, comprehensive mapping of the specific prospecting activity site could not be undertaken at this stage. For the purposes of this report, the overall prospecting site is presented in Figure 7 2 and location of the drilling boreholes presented in Figure 7 1.

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

11.1 Details of the Development Footprint Alternative Considered

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

The proposed prospecting area is located in an area where Mn and Fe Ore occurs widely spread. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering.

According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault.

The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

11.1.2 The type of activity to be undertaken

The application is for prospecting rights and no alternatives were considered. The activity will be conducted in phases as described in Section 7 of this report. The prospecting phase of the Prospecting Works Programme will be dependent on the findings of Phase 1 of the process.

11.1.3 The design or layout of the activity

The location of the infrastructure will be determined based on the location of the prospecting activities, which will only be determined during Phase 1 of the Prospecting Works Programme, as well as the confirmation of the presence of sensitive environmental attributes such as wetlands, watercourses, protected flora, and graves. All infrastructure will be temporary and/or mobile (Refer to Section 7.7 of this report).

11.1.4 The technology to be used in the activity

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

11.1.5 The operational aspects of the activity

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

The activities will commence with Phase 1, during which desktop studies will be conducted. After the desktop studies, geological mapping will be undertaken. This phase will also include planning for the drilling survey.

Phases 2 and 3 will entail the invasive prospecting drilling campaign .

11.1.6 The option of not implementing the activity

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

11.2 Details of the Public Participation Process Followed

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

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

The stakeholder engagement process will be conducted in terms of NEMA, which provides clear guidelines for stakeholder engagement during an EIA as summarised in Table 11-1.

Table 11-1: NEMA Stakeholder Guidelines

NEMA Section	Applicability to Stakeholder 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 stakeholder 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 in order to give effect to Section (2)(4)(f), (o) and 24 (1A)(C) of the NEMA.

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

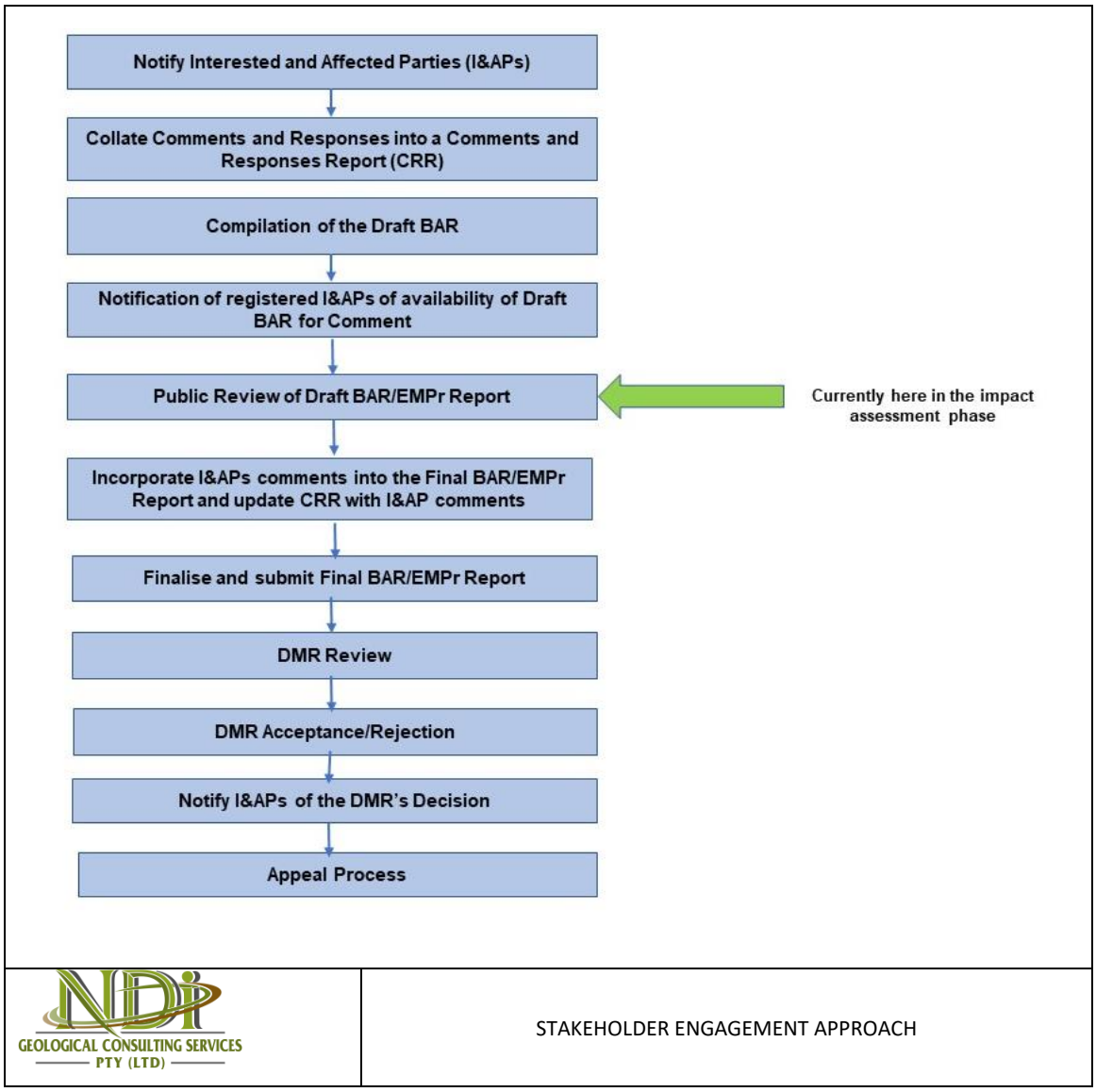

Figure 11-1: Summary of the Stakeholder Engagement Process followed

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

- DWS – Regional Office;
- SAHRA – Provincial;
- Joe Morolong Local Municipality;
- John Taolo Gaetsewe District Municipality; and
- Northern Cape Department of Nature Conservation (DENC)).

All stakeholder engagement documents have been included in Appendix 4.

11.2.1 Stakeholder Identification Interested and Affected Parties

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

The I&APs register will be maintained for the duration of the study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs 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
Bute 299	Portion 0	C08100000000029900000
Gosport 298	Portion 0	C08100000000029800000
Deal 301	Portion 0	C08100000000030100000

Table 11-3 provides a list of the adjacent farms and farm portions.

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

Farm	Portions	21 Digit Survey General Code
Morokwen 246 IM	Remainder	T0IM00000000024600000
Howden 295 IM	Remainder	T0IM00000000029500000
Egham 297 IM	Remainder	T0IM00000000029700000
Main Section Block B 251 IM	Remainder	T0IM00000000025100000
Hove 313	Remainder	C08100000000031300000
Sydney 312	Remainder	C08100000000031200000
Conway 293	Remainder	C08100000000029300000
Burford 291	Remainder	C08100000000029100000
Greenwich 302	Remainder	C08100000000030200000
300	Remainder	C08100000000030000000
Heunar 314	Remainder	C08100000000031400000

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

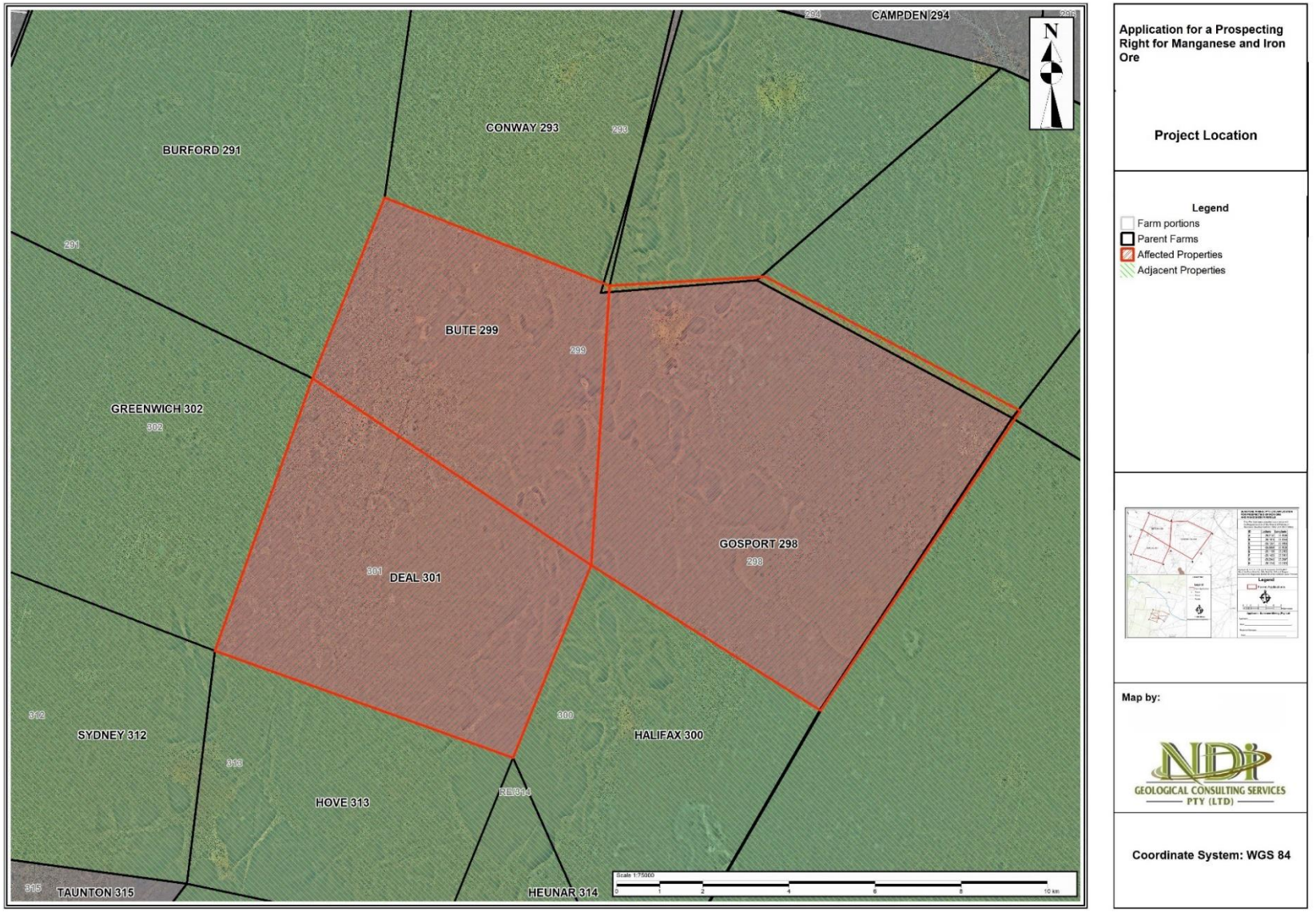

Figure 11-2: Affected and Adjacent Properties

11.2.2 Project Announcement

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

- Distribution of Notification Letters: Notification letters were sent to identified I&AP's in January 2021, informing them of the proposed project.
- Site Notice Placements: Sites notice boards (Size A2: 600 mm X 420 mm) notifying stakeholders and I&AP's of the proposed prospecting were placed at conspicuous places in the project area.Newspaper Advertisements: Newspaper advertisements notifying stakeholders about the proposed project and the opportunity to participate in the EIA process were placed in the newspapers.

11.3 Public Review of the Draft Basic Assessment Report

The Draft BAR was compiled in terms of the requirements of GNR 326. All comments received during the announcement phase of the stakeholder engagement process will be incorporated into Draft BAR and collated into a Comments and Responses Report (CRR) which will form 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 between 16 September 2022 and 17 October 2022 at the venues listed in Table 11-4.

Table 11-4: List of places the Draft BAR will be places for public review

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

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

11.4 Stakeholder Consultation Meeting

Where required, a stakeholder consultation meeting will be held. The purpose of the meeting will be to discuss the proposed prospecting project as well as the findings from the impact assessment process. Stakeholders will be provided with an opportunity to raise queries and/or objections to the proposed project.

11.5 Summary of Issues Raised by I&APs

There are no comments that have been received from the stakeholders during the project notification process. Table 11-5 will be updated to provide a summary of the comments received following the newspaper adverts, site notices, written notification of the project and the Draft BAR review period.

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**	**Consultation Status (Consensus dispute, not finalised, etc)**
AFFECTED PARTIES					
Landowner/s					
Lawful occupier/s of the land					
Landowners or lawful occupiers on adjacent properties					
Municipal councillor					
Municipality					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA					
Communities					
Dept. Land Affairs					
Traditional Leaders					
Dept. Environmental Affairs					
Other Competent Authorities affected					

No comments received to date

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**	**Consultation Status (Consensus dispute, not finalised, etc)**
OTHER AFFECTED PARTIES				
INTERESTED PARTIES				

12 Environmental Attributes Associated with the Alternatives

12.1 Baseline Environment

12.1.1 Geographical

The proposed project area is situated in the Joe Morolong Local Municipality (JMLM)'s area of jurisdiction, within the John Taolo Gaetsewe District Municipality, Northern Cape Province.

12.1.2 Topography

The topography is undulating, with elevation ranging between 1 120 and 1 180 mamsl as shown in Figure 12-1.

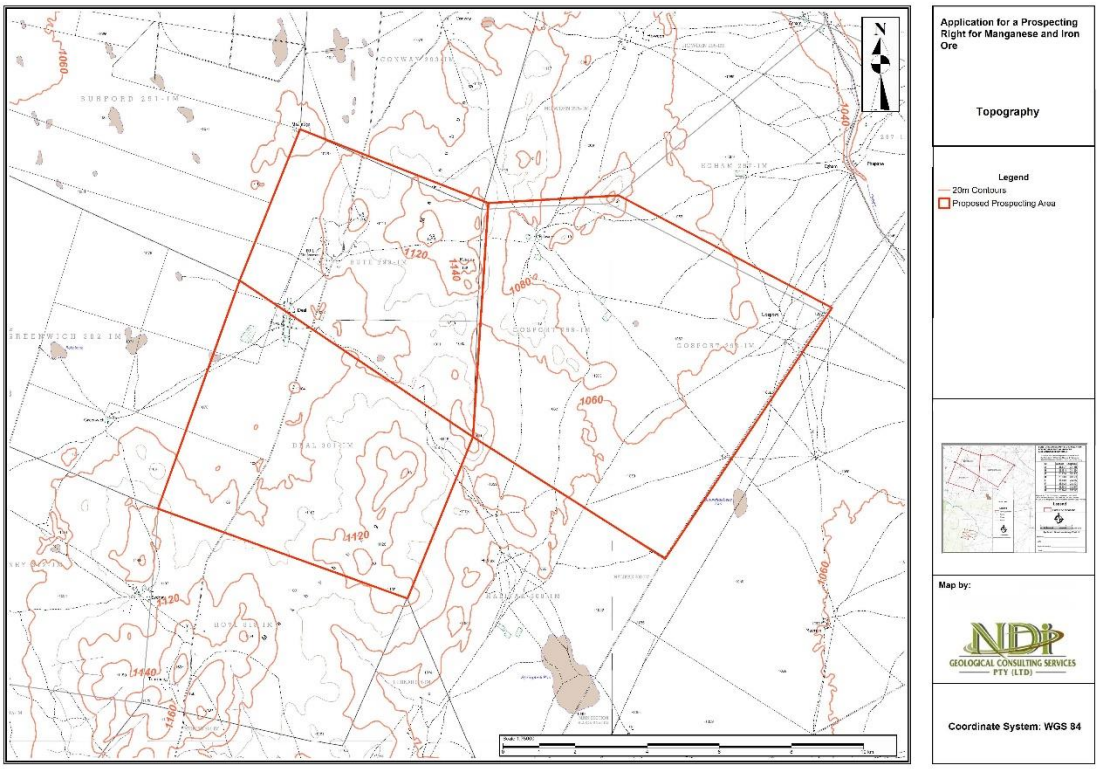

Figure 12-1: Topography

12.1.3 Climate

The Kalahari region has consistent temperatures with summer and early autumn rainfall. Winters are very dry. The wettest part appears in the east with a Mean Annual Precipitation (MAP) of 500mm/annum and driest in the west with 120 mm/annum. The MAP for the whole Ecozone is 250 mm/annum. The region is classified as an arid zone with desert climate. The following specific parameters are applicable.

Table 12-1: Climatic information

Climate						
Rainfall		**Evaporation**	**Temperature**			
Month	**Monthly mm**	**Monthly mm**	**Max °C**	**Min °C**	**Mean °C**	**Heat units**
January	63	270	33.7	18.5	26.1	499.1

Climate						
Rainfall		**Evaporation**	**Temperature**			
Month	**Monthly mm**	**Monthly mm**	**Max °C**	**Min °C**	**Mean °C**	**Heat units**
February	60	284	32.4	17.9	25.1	422.8
March	79	294	29.7	15.8	22.7	393.7
April	33	277	25.7	11	18.8	264
May	21	210	23.2	6.1	14.6	142.6
June	08	193	20.6	2.3	11.4	33
July	00	144	20.4	2	11.2	37.2
August	03	115	23.1	4	13.6	111.6
September	06	91	23.6	8.7	17.4	222
October	16	106	29.7	12.5	21.1	344.1
November	30	154	31.7	15.2	23.4	402
December	43	213	33.0	17.4	25.2	471
Total/Mean	**62**	**2351**	**27.2**	**10.95**	**19.2**	

12.1.4 Air Quality

In accordance with Section 15(2) of the NEM:AQA, the Northern Cape Department of Environment and Nature Conservation developed an Air Quality Management Plan (AQMP). The following information was obtained from the AQMP for the Northern Cape: Air Quality Baseline Assessment Report developed by uMoya-NILU (Final, December 2017).

The Northern Cape is generally hot and dry. Maximum summer temperatures often exceed 40°C. During winter, the average daytime temperatures are mild and night-time temperatures may drop below 0°C. There are four climatic zones in the Northern Cape: hot desert, cold semi-arid, cold desert and hot semi- arid. Hotazel (the closest town to the project area) is classed as a cold semi-arid area. Rainfall data from the South African Weather Stations (SAWS), Winton and Milner Stations, indicate an MAR between 330 mm and 361 mm. Due to the semi-arid nature of the area evaporation levels exceed annual rainfall. Wind direction near Hotazel is predominantly from the northeast.

The main sources of air pollution in the Northern Cape are biomass burning and mining, followed by industry and motor vehicles. Biomass burning is a major contributor of carbon monoxide (CO) whereas mining contributes particulate matter (PM_{10}, $PM_{2.5}$) and total suspended particles (TSP). Long range atmospheric transport of air pollutants from the industrialised Highveld and biomass burning in southern and central Africa may influence ambient air quality over parts of the Northern Cape. Emissions within the Northern Cape in 2015 are summarised in Table 12-2.

Table 12-2: Estimated emissions (tons/annum) during 2015 in the Northern Cape (uMoya-NILU, 2017)

	PM_{10}	**$PM_{2.5}$**	**TSP**	**SO_2**	**NO_X**	**CO**	**VOC**
Industrial sources	1452		133	289	333	79	24
Mining	32248	22315	61453				
Residential fuels	42			2	6	315	
Biomass burning			15978	695	3917	115525	
Motor vehicles	517			253	6574	15433	3067
Airports				3	11	9988	158
Total	**34259**	**22315**	**77564**	**1242**	**10841**	**141340**	**3249**

Site-specific air quality and emissions data is not available for the PR area, however, baseline conditions are expected to be reflective of those experienced at the provincial level due to similar sources, drivers and landscapes.

12.1.5 Geology

The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering.

According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault.

The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

The geology of the farms that make up the application area is banded ironstone with bands of amphibolite and lenses of flat pebble conglomerate; crocidolite and tuff of the Kuruman Member of the Asbesberge Formation in the Griekwastad of the Griqualand West Sequence. Another thick band of brown jaspilite and crocidolite with alternating layers of shale and limestone layers on top also show along the western part of the property. The two band are trending on a north-south direction and generally at 10° to the west. Some dolomite interbedded chert and quartzite in the basal portion to the east of the property are observed. Sand and limestone make up the majority of the application area. The geology of the study area is shown in Figure 12-2.

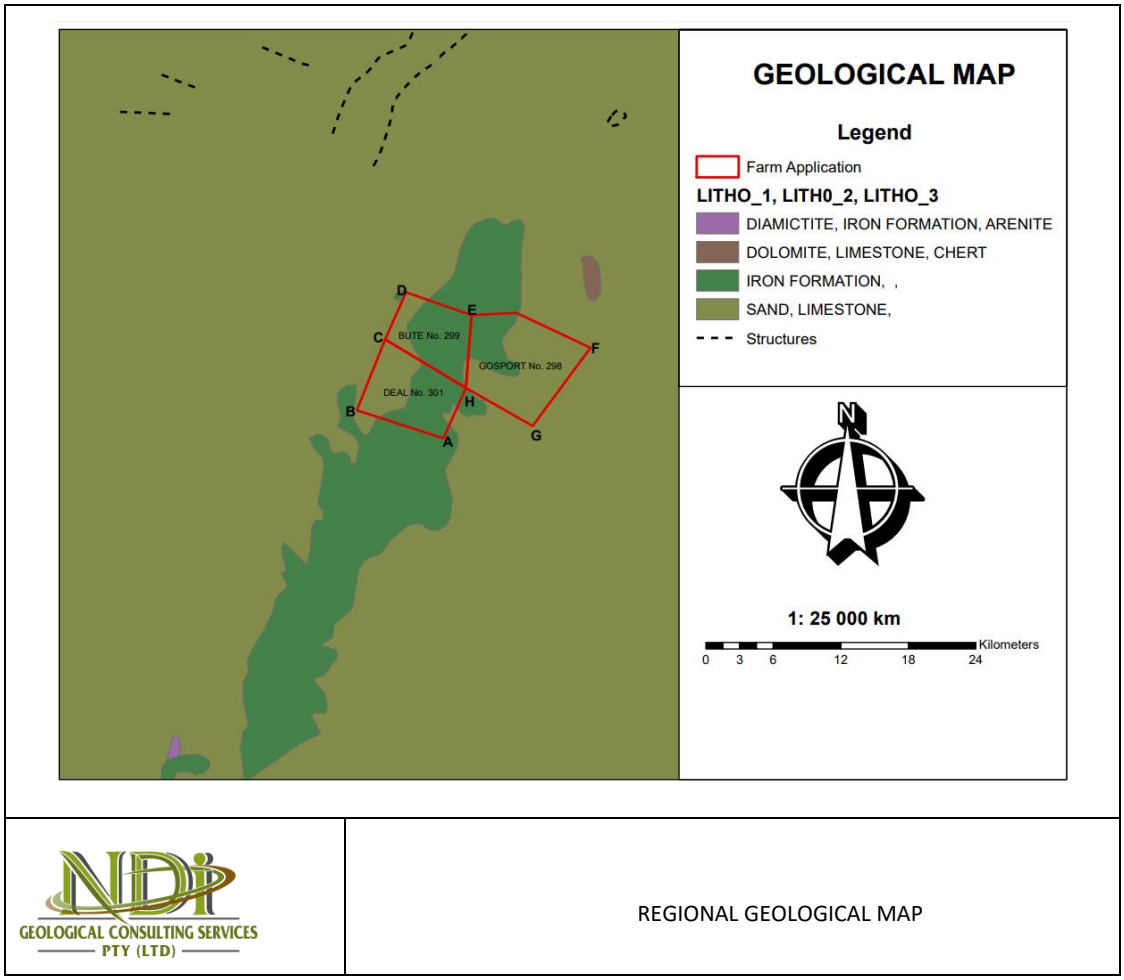

Figure 12-2: Geological Map of the Proposed Prospecting Area.

12.1.6 Heritage Resources

There are no UNESCO World Heritage Sites in the vicinity of the project area. The climatic conditions (semi-arid to arid) of the Northern Cape are ideal for the exposure of fresh, unweathered rocks at surface and fossils related to them. The Northern Cape spans a wide range of geology.

On a regional scale, the project area is located on the relatively young Kalahari Group. Rock types of the Kalahari include fluvial gravels, sands, lacustrine and pan mud rocks, evaporites, aeolian sands, pedocretes. Due to the arid conditions, which began approximately 15 million years ago (Miocene Epoch), the region only has sparse fossilised areas, and these areas are usually ancient pans, lakes, and river systems. Late Cretaceous to Paleogene fluvial and lacustrine sediments towards the base of the succession contain such fossils, but these fossils are rarely exposed. Arid-adapted fossils include land snails, ostrich eggs, plant root casts as well as pockets of lake sediments with molluscs, diatoms, and freshwater stromatolites. The palaeontological significance of the Kalahari Group is low, in terms of a recommended action for projects in the region, however any fossil finds should be reported.

From a cultural perspective, occupation of the region took place during the Early Stone Age and centres in the areas where there are hills. Later Stone Age sites are less obvious but occur in the larger region, with Cape Coastal pottery in the period 100 BC to AD 1900.

Tswana-speaking people were the earliest that settled in the region to the north and west of Kuruman. With the annexation of the Tswana areas by the British in 1885, a number of reserves were set up for people to stay in. In 1895 the Tswana-speakers rose up in resistance to

the British authority as represented by the government of the Cape Colony, their land was taken away, divided up into farms and given out to white farmers to settle on.

Early explorers, hunters, traders, and missionaries travelled through the area on their way to Kuruman on what became known as “Missionary Road”.

It is expected that the final layout of the prospecting infrastructure will be in such a way as to avoid impacting on areas with cultural and archaeological significance and importance including graves and graveyards are located within the PRA area.

12.1.7 Water Resources

The project is located within quaternary catchments, which include D41F and D41H (located within the Lower Vaal Water Management Area(WMA) (Figure 12-3**Error! Reference source not found.**).

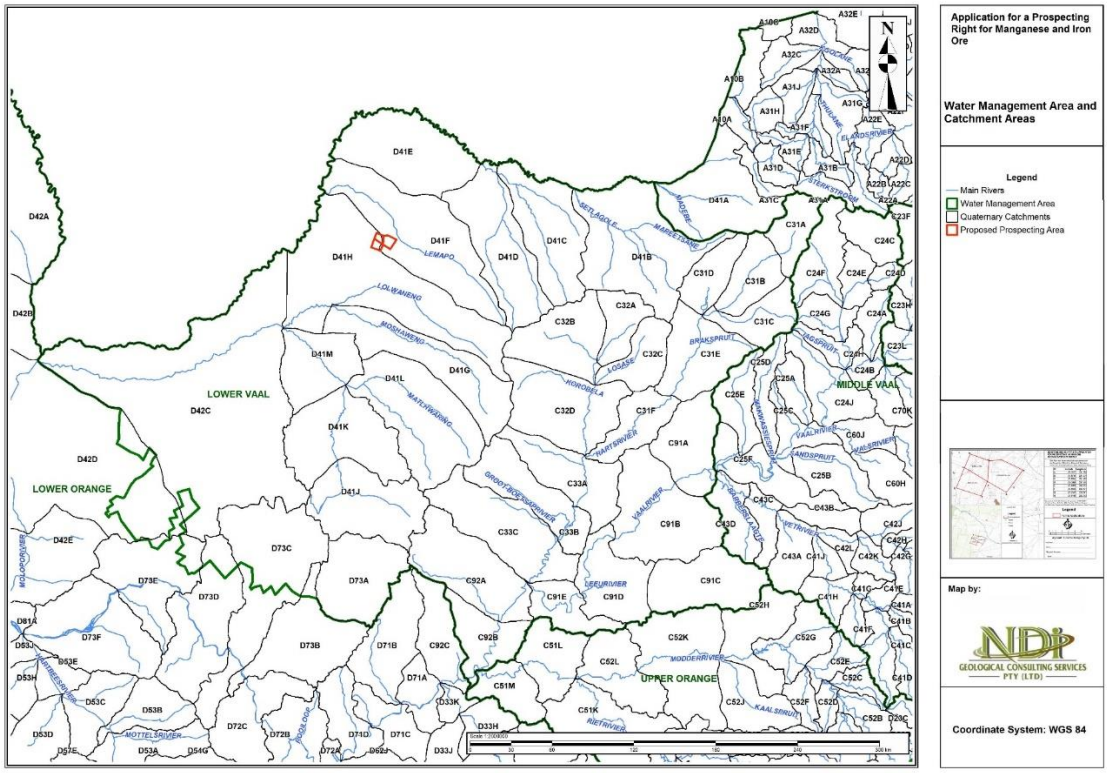

Figure 12-3: Water Management Areas and Quaternary Catchment Areas

There are no rivers or drainage lines that traverse the project area (Figure 12-4). There is a river located to the north and northeast side of the area.

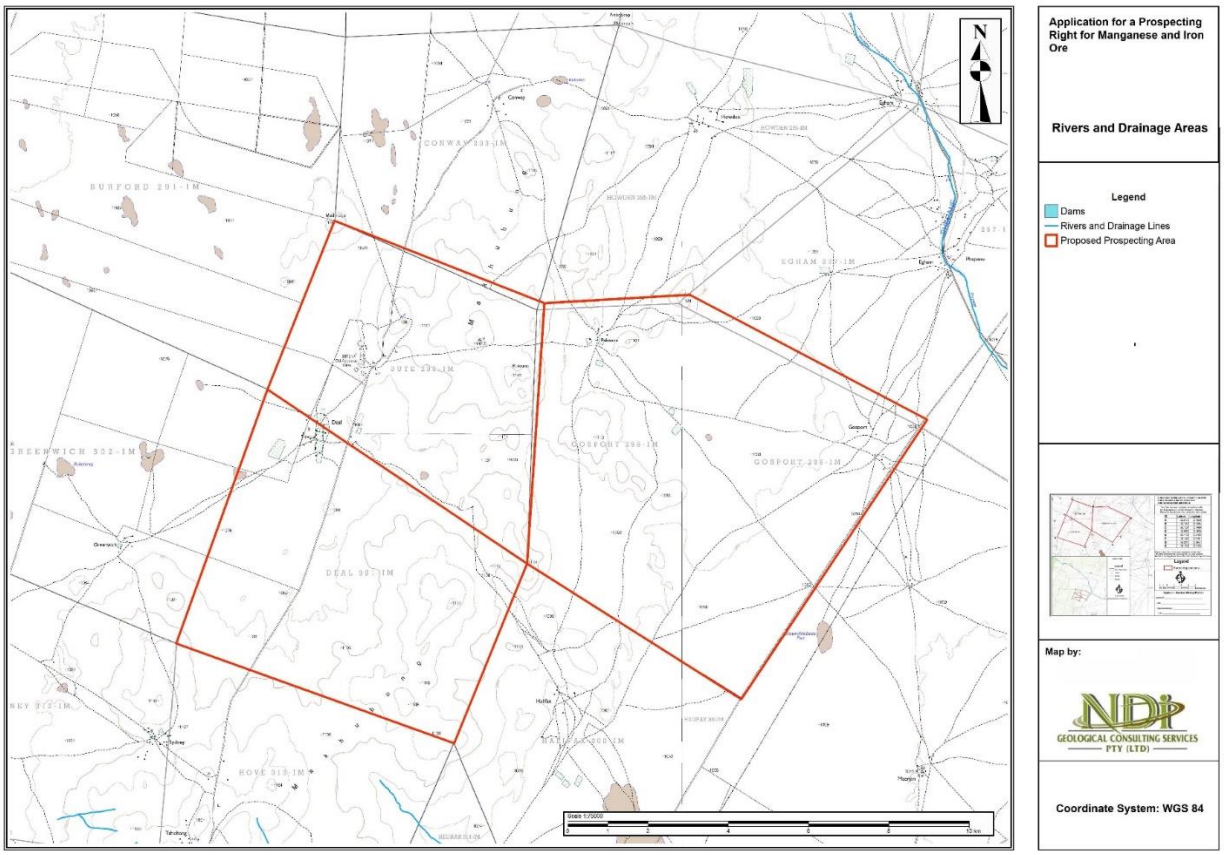

Figure 12-4: Rivers, Streams, and Drainage Lines

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

12.1.8 Wetlands

The SANBI data shows that there are depression wetlands occurring on the study area as shown by Figure 12-5.

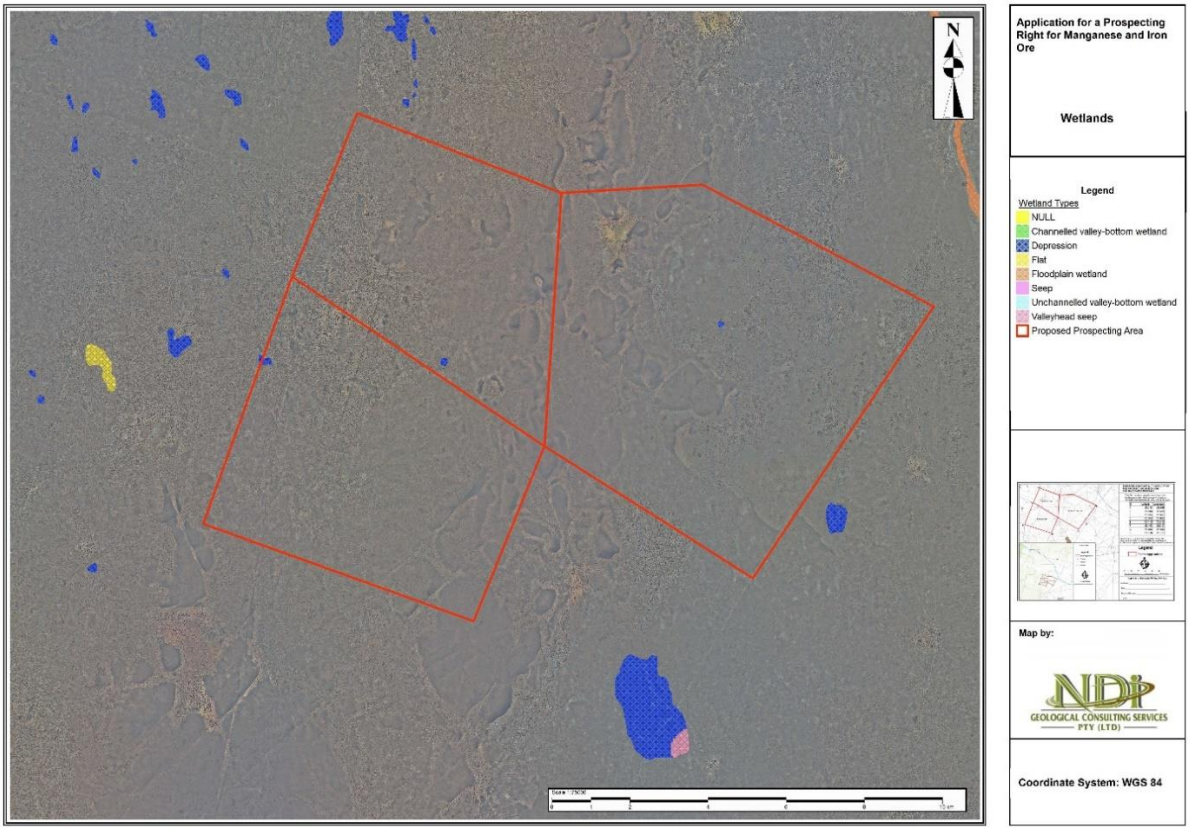

Figure 12-5: Wetland Types

The wetlands are classified as AB ((percentage natural landcover ->75%) (Figure 12-6).

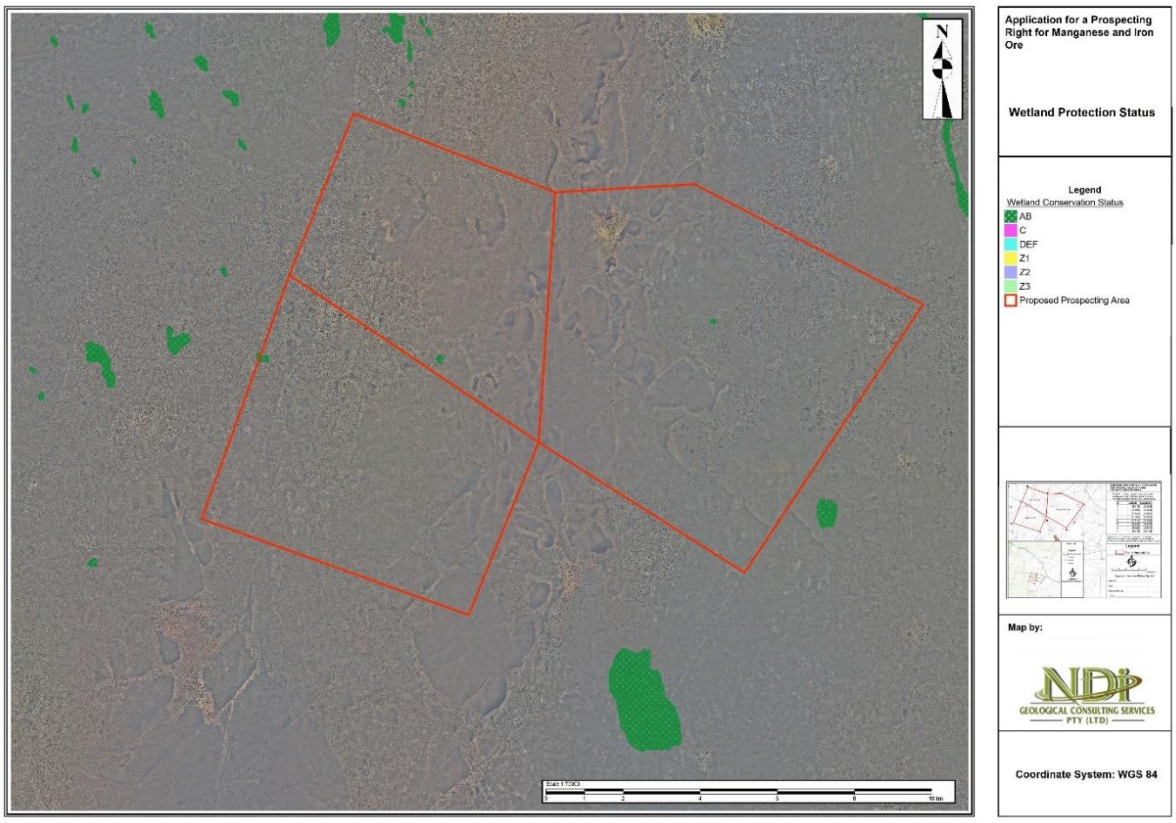

Figure 12-6: Wetland Status

12.1.9 Groundwater

Aquifer Characterisation

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

The aquifer is classified as a Minor aquifer region (which is a moderately-yielding aquifer system of variable water quality), except for areas around Koppies where the aquifer is classified as a poor aquifer region which is a low to negligible yielding aquifer system of moderate to poor water quality;

Aquifer Vulnerability is classified as moderate (vulnerable to some pollutants, but only when continuously discharged or leached); and

Aquifer Susceptibility is classified as Medium 4 (minor aquifer region, with moderate vulnerability)

The Groundwater Harvest Potential Map of South Africa published by the Department of Water Affairs (Baron et al, 1998) classifies the area as having a harvest potential of 6 000 to 10 000 m^3/km^2/annum, defined as the maximum volume of groundwater that may annually be abstracted per square kilometre per annum without depleting the aquifers.

Groundwater Yield

The DWS National Groundwater Archive (NGA) shows that a section of the area is located in an area with groundwater yield between 0.5 and 2.0l/s and that the aquifer is fractured, a section is within a fracture aquifer with a groundwater yield of between 0.0 and 0.1l/s and another section in an area with groundwater yield between 0.5 and 2.0l/s with an karst aquifer (Figure 12-7).

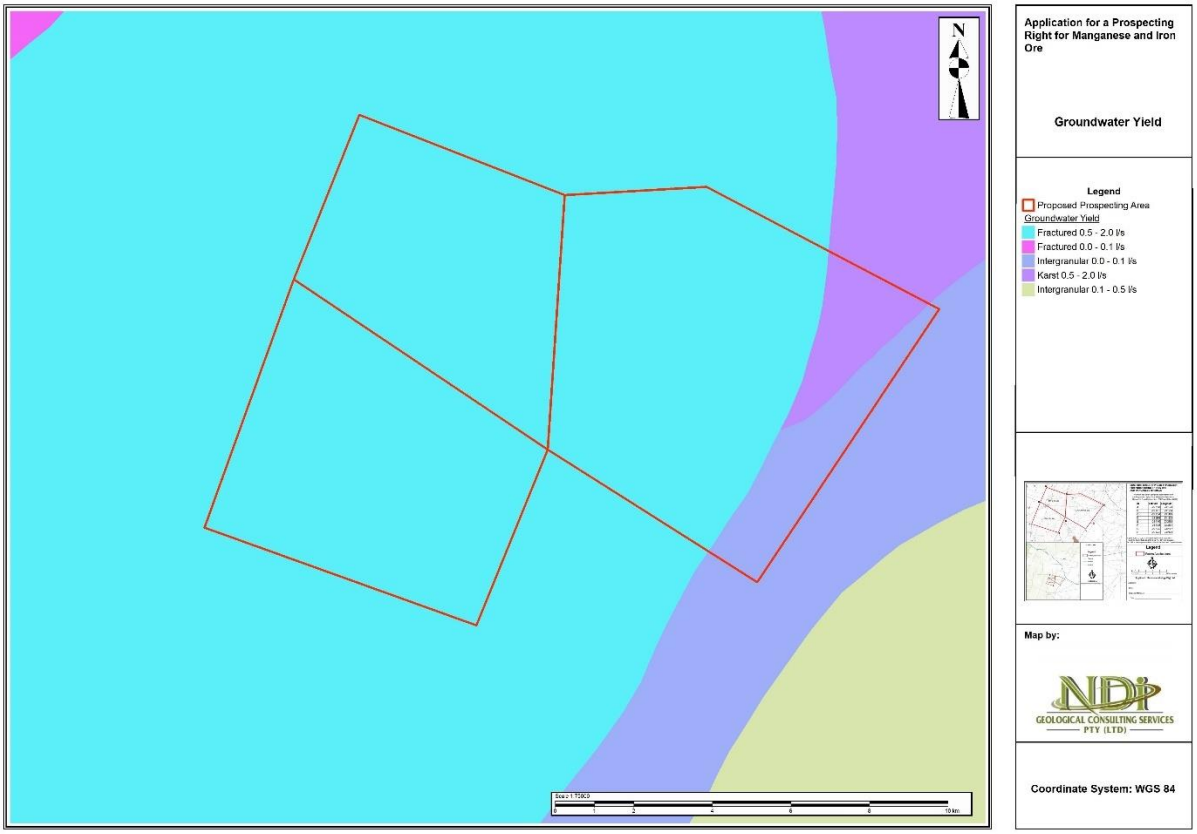

Figure 12-7: Groundwater Yield

Groundwater Quality

There is a large amount of groundwater data available for the Lower Vaal WMA. There are over 13000 borehole locations in Region D that have data available via the DWS Resource Quality Information Services (RQIS). Poorer groundwater is a natural feature of the western portion of the Lower Vaal WMA within the Kalahari group primary (sand/gravel) aquifers and clay formations, where relatively high nitrite concentrations may occur due to agricultural activities in the region.

The data from the DWS shows that the proposed prospecting area has groundwater considered to be generally of good quality with Electrical Conductivity (EC) levels between 70 and 300mS/m (Figure 12-8).

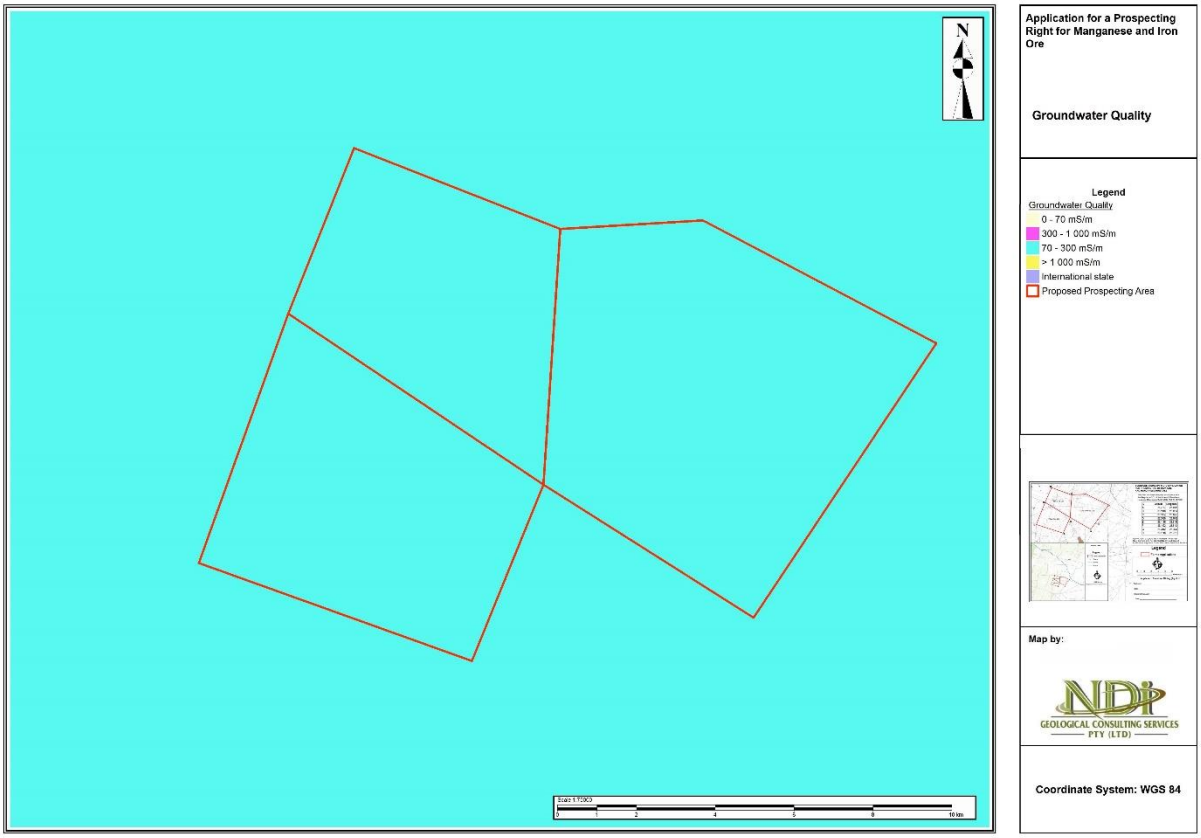

Figure 12-8: Groundwater Quality

Groundwater Recharge

The groundwater recharge is considered low, between 0 and 100mm/yr. (Figure 12-9). This is expected due to the dry and hot climate in the area.

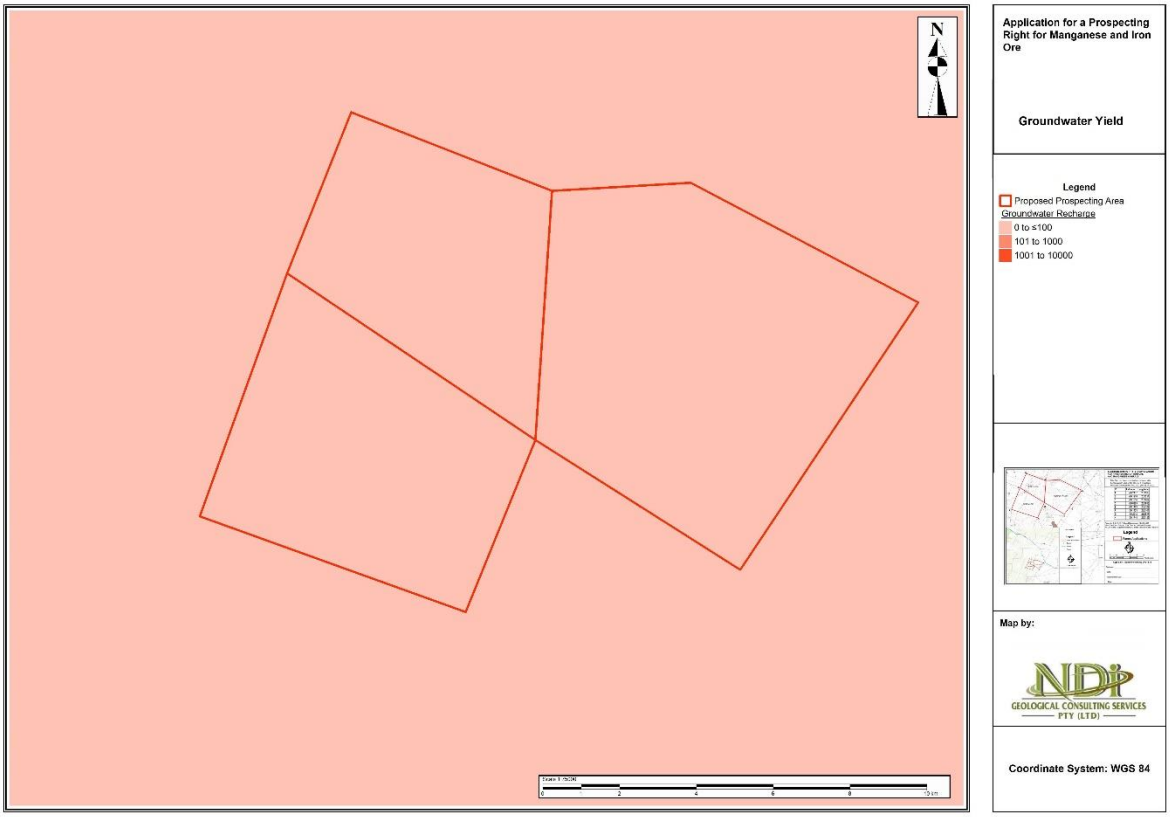

Figure 12-9**: Groundwater Recharge**

12.2 Biodiversity

Biomes

The proposed prospecting area is located in the Savanna Biome as shown in Figure 12-10. The Savanna Biome is the largest Biome in southern Africa, occupying 46% of its area, and over one-third the area of South Africa. It is well developed over the lowveld and Kalahari region of South Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground the vegetation may be referred to as Shrubveld, where it is dense as Woodland, and the intermediate stages are locally known as Bushveld.

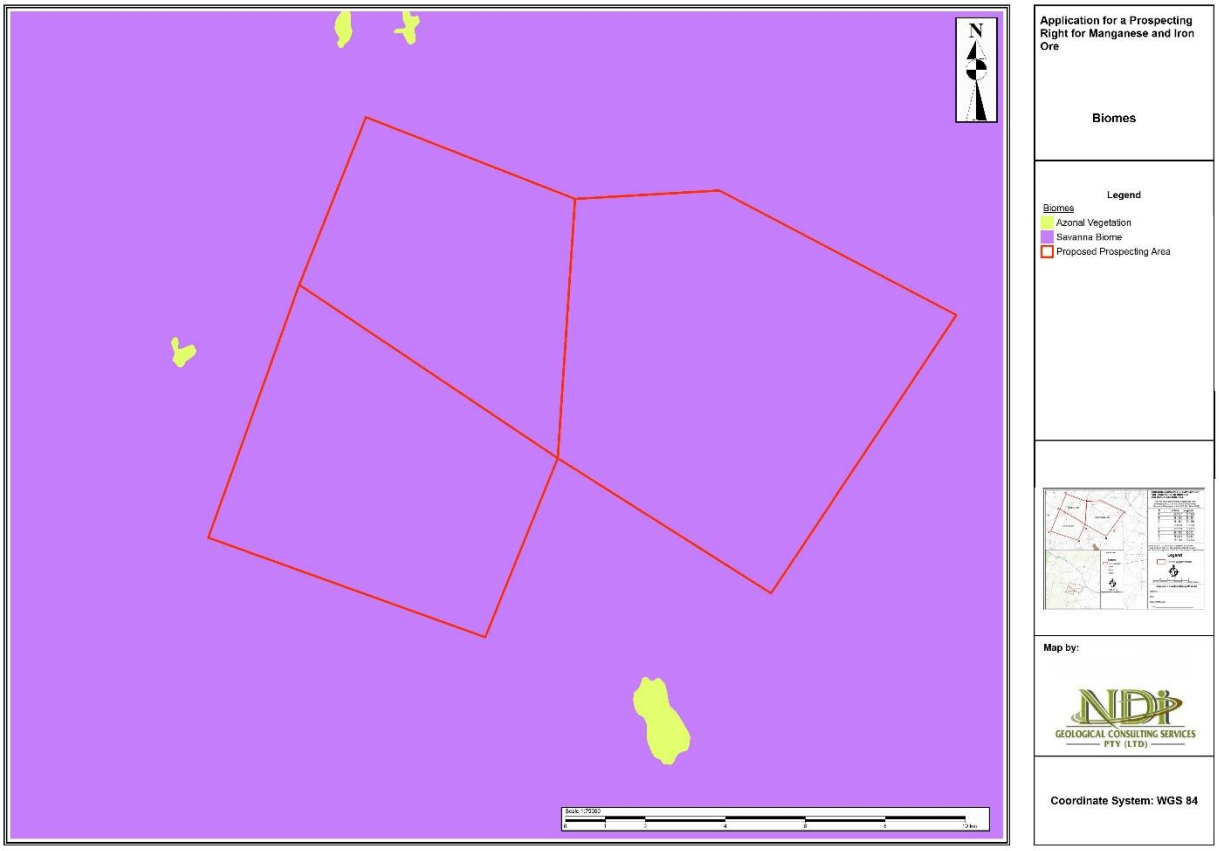

Figure 12-10: Biomes

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

Bioregions

The proposed prospecting area is located in the Eastern Kalahari Bushveld Bioregion (Figure 12-11). The Eastern Kalahari Bushveld Bioregion is the largest savanna bioregion and is on average at the highest altitude. It is roughly bounded by Mafikeng, Bloemhof, Kimberley, Groblershoop and Van Zylsrus.

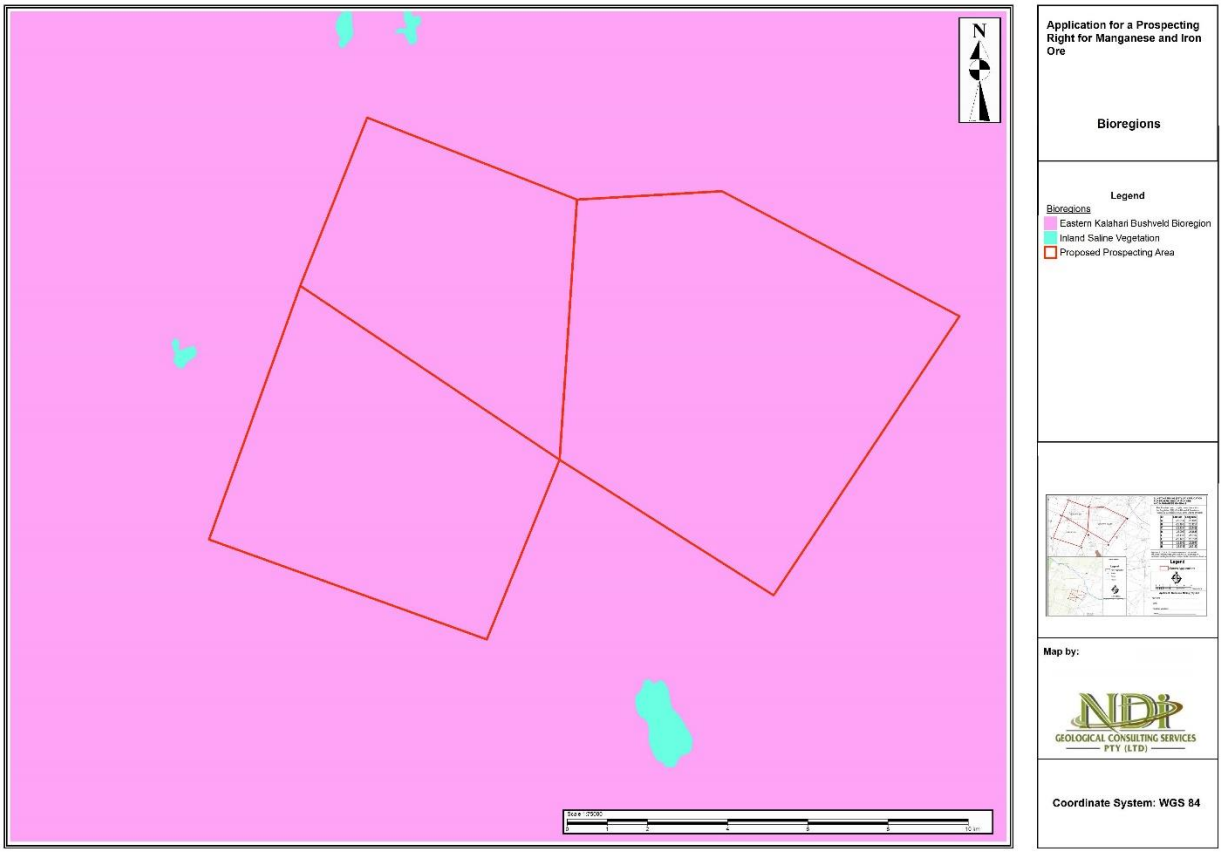

Figure 12-11: Bioregions

Vegetation Types

According to the SANBI remaining vegetation types database, there is no remaining natural vegetation on the affected area. The threatened ecosystems associated with the site is the Kuruman Mountain Bushveld and the Molopo Bushveld (Figure 12-12). According to SANBI, the ecosystem is classified at Least Threatened (Figure 12-13).

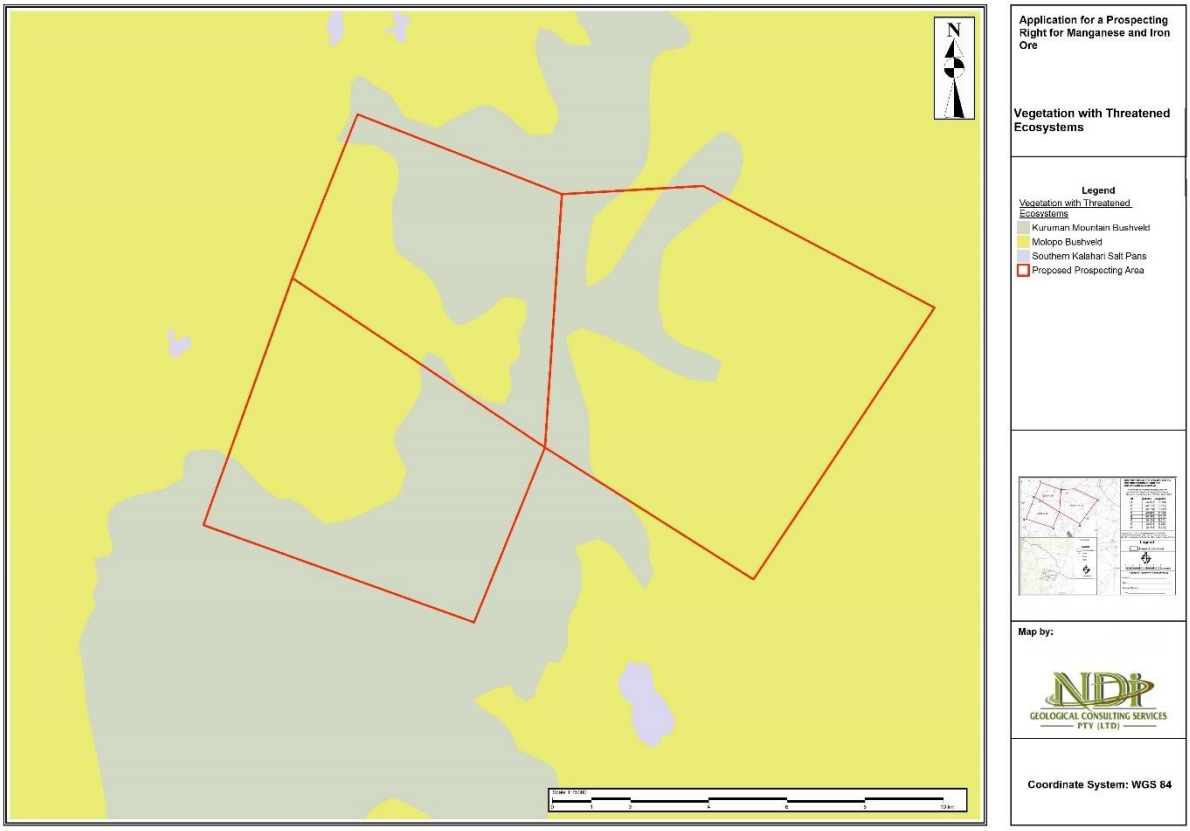

Figure 12-12: Vegetation with Threatened Ecosystems

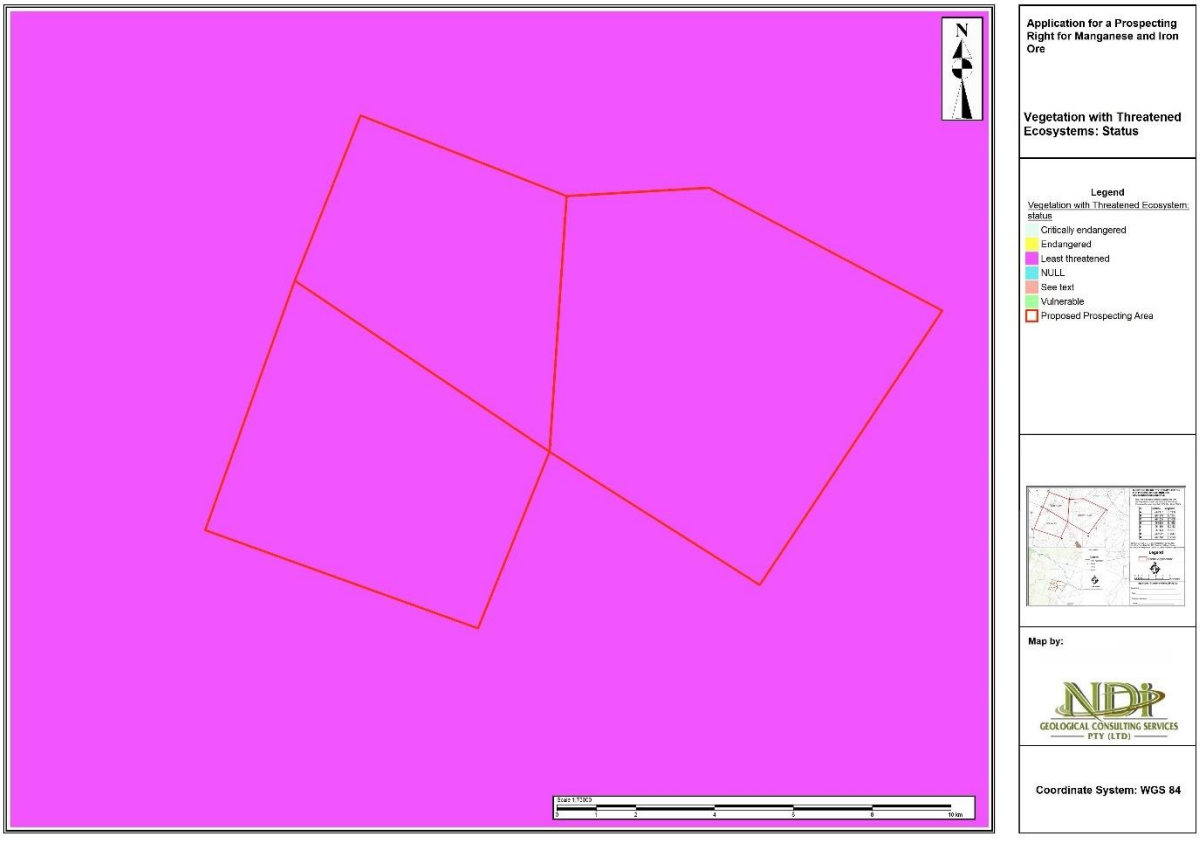

Figure 12-13: Status of Vegetation with Threatened Ecosystems

12.2.1 Conservation Plan

According to the Norther Cape Provincial Biodiversity Conservation Plan (C Plan), there are Ecological Support Area (ESA) or Critical Biodiversity Areas 2 (CBA 2) associated with the proposed project area as shown in Figure 12-14. *CBAs are areas required to meet biodiversity targets for ecosystems, species, and ecological processes, as identified in a systematic biodiversity plan*) and *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* (Figure 12-14).

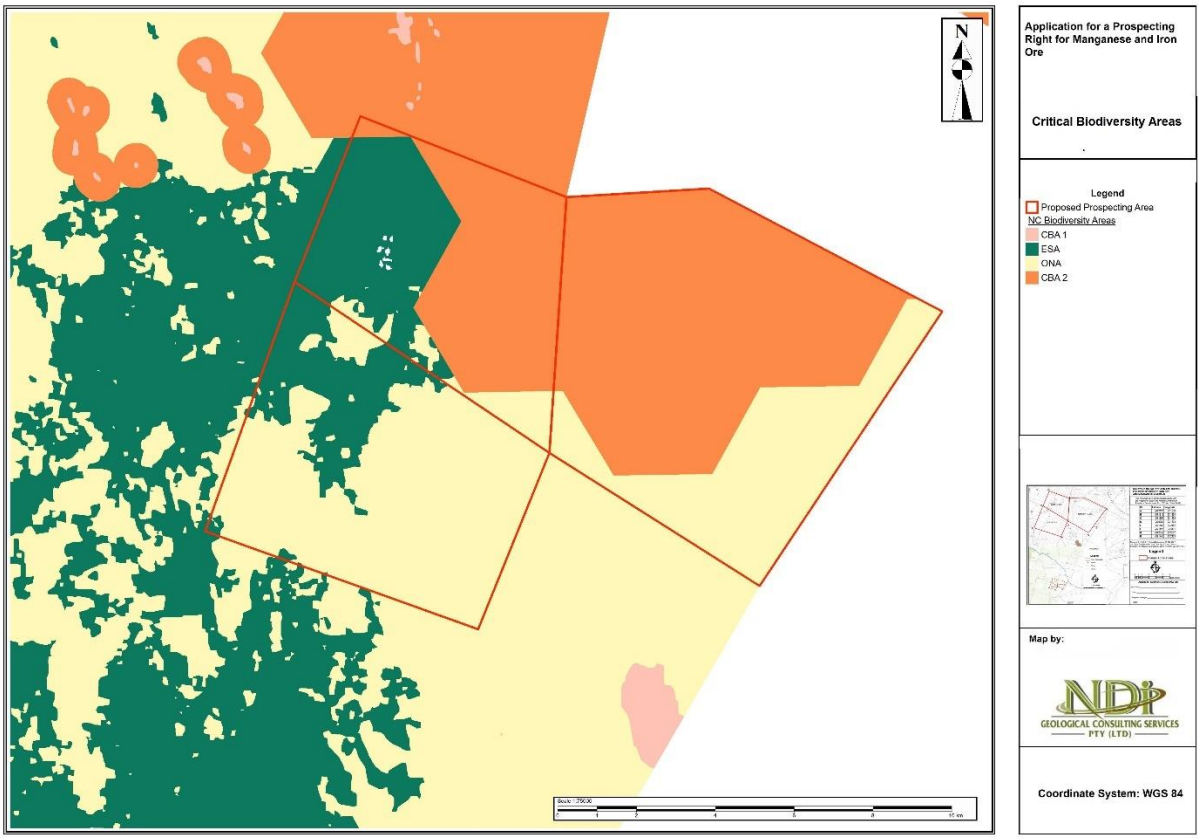

Figure 12-14: Areas of Conservation Importance

12.2.2 Noise

The typical noise rating in the area is expected to be that for rural districts / suburban 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.

12.2.3 Heritage Resources

Heritage resources may be tangible, such as buildings and archaeological artefacts or intangible such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical scientific, social, spiritual, linguistic economic or technological values; their representation of a particular period; their rarity and their sphere of influence.

There are a number of heritage and cultural resources in the Northern Cape Province. However, there are no major heritage resources sites that are associated with the affected properties. It is however expected that there may be graves and burial sites that may be affected by the proposed prospecting activities.

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

12.2.4 Socio-Economic

Regional context

The John Taolo Gaetsewe District Municipality (previously Kgalagadi) is located to the northeast of the province and borders Botswana. It is comprised of three local municipalities: Gamagara, Ga-Segonyana and Joe Morolong. Joe Morolong is the largest of these municipalities in terms of area.

There are 186 towns and settlements, of which the majority (approximately 80%) are villages.

The district has an established rail network from Sishen South and between Black Rock and Dibeng. It is characterised by a mixture of land uses, of which agriculture and mining are dominant.

The population of the District Municipality was 242 264 (Community Survey 2016), of which 63.3% were aged between 15 and 64 years and 31.9% of the population was under the age of 15. The official unemployment rate of the District Municipality is 29.7%, while the youth unemployment rate is 37.2%.

Local context

The prospecting area is situated within the Joe Morolong Local Municipality (JMLM). JMLM is mostly rural, with virgin land surface comprising about 60% of the surface. Agriculture, mining, and community services are the primary economic sectors. JMLM has three main nodes where relatively higher economic activity takes place, namely Vanzylsrus, Hotazel and Blackrock. Mining is the predominant economic activity in Hotazel and Blackrock. Vanzylsrus operates as service centre for the surrounding area.

According to 2011 Census data, there are 12 740 people that are economically active (employed or unemployed but looking for work), and of these, 38.6% are unemployed. Of the 6 323 economically active youth (15–34 years) in the area, 49.5% are unemployed.

According to the 2011 Census, JMLM has a total population of 89 530 people. The majority of the population in the municipality are black African (96.4%), 2.0% are coloured, with the other population groups making up the remaining 1.6%.

Setswana is the most prevalent language spoken in the community with 90.1% of people listing it as their first language. Afrikaans and English are the first languages of 3.6% and 1.9% of the population respectively.

Of the population aged 20 years and older, 5.2% have completed primary school, 27.8% have some secondary education, 13.4% have completed matric, 4.1% have some form of higher education and 22.9% have no form of schooling.

There are 168 schools, 4 police stations, 24 clinics and 3 community health centres located in JMLM. There is no hospital in JMLM. According to the IDP, there are 23 707 households with a population growth of - 0.9%. The average household size is 3.4 persons per household.

JMLM does not own any land in their jurisdiction. Most of the land either belongs to the state or falls under the jurisdiction of the Tribal leaders.

As per the IDP, JMLM itself is not responsible for the implementation of electrification projects. The Municipality acts as a project coordinator for projects implemented by ESKOM and Department of Energy. Within JMLM, 81.8% of households have access electricity and use it for lighting while 16.1% still use candles for lighting. Wood is used for heating in 51.2% and for cooking in 39.3% of households.

Currently, most of the communities within JMLM receive water for free. Of all households, only 6.6% have access to piped water either in their dwelling or in the yard. As per the 2011 Census, 71.7% sourced water from a water services provider (municipality or other), 15.6% used borehole water and 5.8% received water via a water truck. Vanzylsrus and Hotazel are the only areas that have water borne system in JMLM. According to the IDP, there are 24 villages that are without access to piped water.

They receive water by means of truck delivery or through a windmill equipped with a tap. The IDP identified the following as challenges to the provision of water:

- Community disruptions caused some projects to lag the programme of works;
- Vandalism of infrastructure equipment;
- Insufficient funding; and
- Illegal water connections.

Due to the shortage or lack of water supply, JMLM is unable to provide adequate sanitation to their communities. The majority of the population uses pit toilets (40.3% with ventilation and 36.7% without ventilation), 10.3% of the population have no access to toilet facilities and 6% are connected to a sewerage system.

JMLM collects refuse in Hotazel and Vanzylsrus, serving 1 144 households in the two areas. According to the 2011 Census, this service is provided for 6.1% of households, while 79.8% of households provide their own refuse dump and 11.4% do not have access to rubbish disposal.

JMLM conducts Environmental Awareness campaigns in all of the wards annually. The communities are given information on issues that need to be taken care of in their respective environmental areas. The most challenging issue of environmental management in JMLM is veld fires and to minimize that the municipality has entered into an agreement with Working on Fire through Expanded Public Works Programme.

12.3 Description of the current land uses.

The land use associated with the PRA is farming.

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 map has been attached as Figure 12-15.

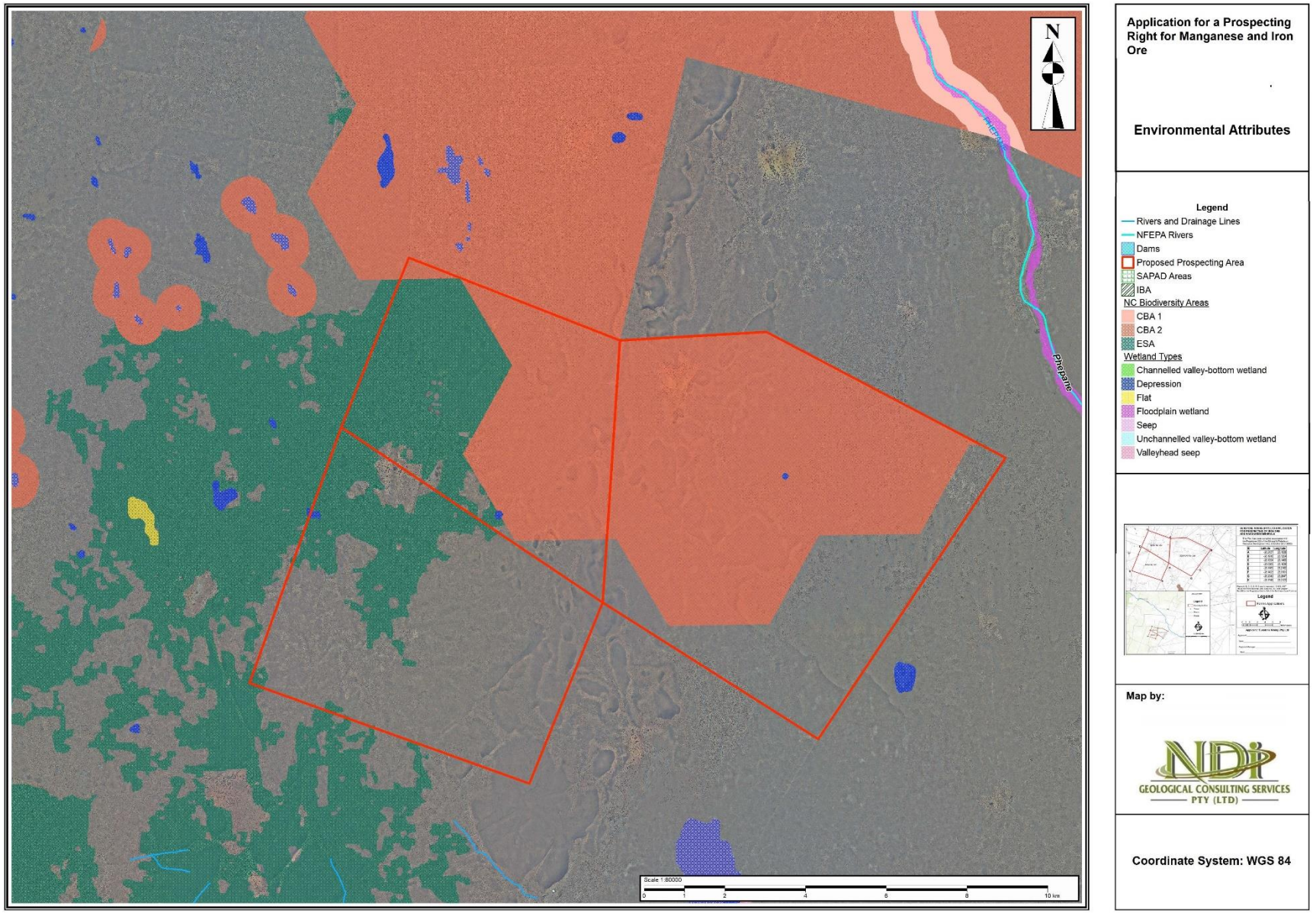

Figure 12-15: Current Environmental Attributes and Landuse Map

13 Impacts and Risks Identified

Table 13-1 provide a high-level assessment of the potential impacts and associated mitigation measures which could result from the proposed prospecting 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.
Hydrogeology	Possible groundwater contamination.
Surface water	Possible surface water contamination.
Air Quality	Possible impact on Air Quality in the area.
Climate Change	Possible contribution to climate change through emission of Green House Gases
Noise	Possible generation of noise during construction and operation.
Visual	Possible visual impacts
Soils/Land Use/Land Capability	Localised loss of soil resource and change in land capability and land use.
Geology	Localised impacts on geology
Biodiversity	Localise disturbance and loss of biodiversity, especially SCC.
Heritage	Unlikely but localised possible impact on heritage and cultural resources (including graves) in the area.
Traffic	Potential safety issues due to the increased traffic.
Cumulative Impacts	Cumulative Impacts

13.1 Construction

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

13.1.1 Socio-Economic

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

Site establishment activities may result in grievance as a result of possible grave relocation. It is expected that the final site layout will take into account all the sensitive environment in the area and will avoid graves and other heritage and cultural resources in the area. Movement of construction vehicles on public roads may increase the risks accidents on the roads. Other health and safety risks may be as a result on construction workers lighting fires on site, littering and lack of housekeeping. Potential increase in social pathologies and negative health impacts due to potential squatting of job seekers and increase in nuisance dust may also occur.

13.1.2 Groundwater

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

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

13.1.3 Surface water

There are no watercourses located on the PRA area, but a river is located to the north and northeast of the site which may be impacted by the project. The potential impacts on surface water during the construction phase of the proposed project are as follows:

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

13.1.4 Wetlands and Aquatic Ecosystems

The removal of vegetation from the construction area is also expected to have an impact on the provision of ecological and sociocultural services by wetlands and 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 wetlands and aquatic ecosystem and wetland species inhabiting the area. Impacts on the aquatic ecosystems and will include:

- Loss of habitat and aquatic ecosystem and wetland ecological structure as a result of site clearance activities and uncontrolled aquatic ecosystem and wetland habitat degradation;
- Impact on the aquatic ecosystem and wetland systems as a result of changes to the sociocultural service provisions though site clearance, waste management and wetland disturbance;
- Potential poor planning, resulting in the placement of the access roads across 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 as a result of construction activities and vehicle movement leading to loss of wetland habitat; and

- Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of wetland resources.

13.1.5 Heritage and Archaeological Resources

The following impacts are envisaged on archaeological artefacts and graves as a result of the construction phase of the proposed project:

- 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 boreholes and 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 as a result of site clearing, alien species, waste management and soil compaction;
- Vegetation clearance may lead to floral habitat loss of potential species of conservational concern (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 of the access roads leading to loss of floral diversity.

13.1.8 Fauna

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

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

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

13.1.9 Air Quality

The movement of construction vehicles and earth moving machinery as well as the stripping of vegetation will likely result in an increase in nuisance dust, PM_{10} and $PM_{2.5}$. 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 proposed project is expected to have visual impacts on the community. The following impacts on the visual character as a result of the proposed project are envisaged during the construction phase:

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

13.1.11 Ambient Noise

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

13.1.12 Soil Landuse and Land Capability

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

- Movement of construction vehicles, machinery, and workers in unprotected areas (bare) may result in compacting of the soil of the existing roads. Fuel and oil spills from vehicles may result in soil chemical pollution;
- Clearing of vegetation will result in the soils being particularly more vulnerable to soil erosion. The impact can persist long after cessation of prospecting 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
- In areas of permanent changes such as the borehole and sump area, access roads (tracks), the erection of infrastructure and stockpiles, the current land capability and land use will be lost permanently. This will however be localised to the footprint of the infrastructure.

13.1.13 Traffic

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

13.1.14 Climate Change

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

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

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

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

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
Site Establishment: Establishment of the access (tracks) to the prospecting site, Establishment of the campsite, site physical surveying and pegging of drilling sites																
Socio-economic	Influx of job seekers will have a negative social impact on the landowners and land occupiers.	2	2	3	2	2	28	Medium Low (-)	Random and regular alcohol and drug testing shall be conducted on all personnel responsible for operating machinery and driving construction vehicles to ensure the safety of the public; Security and safety should be emphasised; Recruitment will not be undertaken on site; Recruitment practises will favour locals, but farm labourers will not be employed unless agreed to with the farm owners; Liaise with the SAPD and existing forums in order to implement effective crime prevention strategies; and No construction workers shall be allowed to access private properties without the owner's knowledge and consent.	1	1	1	1	2	9	Low (-)
	Unauthorised access to private property outside of the demarcated areas will result in conflict with landowners.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Increased traffic in the area will increase the likelihood of accidents on the roads, posing a health and safety issue for the landowners and land occupiers.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	The influx of job seekers in the area may result in an increase in petty crimes.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Ineffective communication channels leading to community unrest.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Negative impact as a result of the dissection of land by clearing and excavations for construction of infrastructure, constraints to access to farmland to farmers, impacting on day-to-day farm activity.	3	1	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Possible boost in short term local small business opportunities.	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 or a drain where necessary to contain any spillages during the use, loading and off-loading of the material; Bund areas shall contain 110% of the stored volume; Bund areas must be impermeable; Bund areas must have a facility such as a valve/sump to drain or remove clean stormwater; Contaminated water shall be pumped into a container for removal by an approved service provider; Regular inspections shall be carried out to ensure the integrity of the bundwalls; All preventative servicing of earth moving equipment and construction vehicles shall be undertaken off site; Runoff from this area shall be contained;	2	1	1	2	2	16	Low (-)
	Existing boreholes within the prospecting 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
									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 drill sites and associated infrastructure.	2	3	2	2	2	28	Medium Low (-)	Ensure that topsoil is properly stored, away from water courses; No construction activities will be undertaken within 100 metres of any water courses and 500 meters from wetland areas without consent from the DWS; Vehicle and personnel movement within watercourses and wetland areas shall be strictly prohibited; Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses from dirty water.	1	1	1	2	2	12	Low (-)
	Potential deterioration in water quality due to the potential accidental spillages of hazardous substances.	2	3	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
	Debris from poor handling of materials and/or waste blocking watercourses, resulting in flow impediment and pollution.	2	2	2	2	2	24	Low (-)		1	1	1	2	2	12	Low (-)
	Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality.	2	3	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
	Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing occurred.	3	2	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
Aquatic Ecosystems	Localised changes to the 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 wetland areas without consent from the DWS; No vehicles may be allowed to indiscriminately drive through the 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 wetland areas; and All vehicles shall be regularly inspected for leaks. Re-fuelling must take place outside the project area, on a sealed surface area to prevent ingress of hydrocarbons into topsoil and aquatic ecosystems							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 (-)								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 (-)								Low (-)
	Increased runoff due to topsoil removal and vegetation clearance leading to possible erosion and sedimentation of wetland resources.	3	2	2	2	2	28	Medium Low (-)								Low (-)
	Soil compaction and levelling as a result of construction activities and vehicle movement leading to loss of wetland habitat.	3	2	2	2	2	28	Medium Low (-)								Low (-)
	Impact on the hydrological functioning of the aquatic ecosystems.	3	2	2	2	2	28	Medium Low (-)								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	Drilling of exploratory boreholes 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 (-)

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
Flora	Loss of localised biodiversity habitats within sensitive areas due to site clearance and establishment of drill sites and access roads.	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; 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 wetland area; All sites disturbed by construction activities shall be monitored for colonisation by exotic or invasive plants; Exotic or invasive plants shall be controlled as they emerge; An alien vegetation control program must be developed and implemented within all disturbed areas. After removal of alien vegetation, the affected areas must be re-assessed to determine the success of the program and any follow up measures that may be required; The eradicated plant material must be disposed of at an approved solid waste disposal site; During post-construction, an alien vegetation removal and monitoring plan must be compiled for those areas which were not effectively rehabilitated; 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	1	1	1	1	2	9	Low (-)
	Loss of localised floral species diversity including RDL 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
									species. Chemical removal shall only be undertaken by a suitably qualified and approved person; and As much vegetation growth as possible must be promoted in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro seeding, rehabilitation planting (where applicable) 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, PM_{10} and $PM_{2.5}$ 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 spraying with water; Where practical rehabilitation should be undertaken in tandem with the construction activities; A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved road; All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution; Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance, and spraying with water; Where practical rehabilitation should be undertaken progressively; Materials transported on public roads must be covered; Odours: Putrescible waste must be handled, stored, and disposed of before the probability of it generating odours; and Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.	1	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 (-)
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;	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
	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 (-)	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 (-)
	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.gw. noise) in advance; Surrounding communities must be notified in advance of noisy construction activities; All equipment should be provided with standard mufflers; Muffling units on vehicles and equipment must be kept in good working order. Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment; Where possible, operation of several equipment and machinery simultaneously must be avoided; All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping 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; and Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 18H00 and Saturday 07H00 -14H00).	1	1	1	2	1	9	Low (-)
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;	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 (-)

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
	Localised loss of resource and its utilisation potential due to compaction over unprotected ground/soil.	2	1	2	2	2	20	Low (-)	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;	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 (-)	If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.	1	1	1	1	2	9	Low (-)
Traffic	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion along the public roads as well as the farm roads around the prospecting area.	2	3	2	2	2	28	Medium Low (-)	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; The number of construction vehicles and trips shall be kept to a minimum; and Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	2	2	2	1	2	18	Low (-)
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low (-)	All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	2	1	1	1	8	Low (-)
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices.	2	3	2	2	2	28	Medium Low (-)	Separation of waste: All waste shall be separated into general waste and hazardous waste; Hazardous waste shall not be mixed with general waste and in doing so increase the quantities of hazardous waste to be managed; General waste can further be separated into waste that can be recycled and or reused; 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:	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
									No stockpiling of debris shall be permitted within 100 m of any water courses or within 500 m of 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; 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 area; If construction rubble is not removed immediately, it shall be stockpiled outside the 1:100-year floodline and outside the sensitive 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 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 builders' rubble to the landfill site.							

13.2 Operational Phase

The operation phase of the project will include Diamond Drilling at 13 boreholes sites.

13.2.1 Social-Economic

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

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

13.2.2 Groundwater

The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater.

The prospecting operations will require the drilling of boreholes, which my result in the drawdown, which may affect the yield to the surrounding groundwater users.

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

13.2.3 Surface water

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

13.2.4 Aquatic Ecology

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

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

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

13.2.6 Fauna

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

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

13.2.7 Soils, Land Use and Land Capability

The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.

13.2.8 Air Quality

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

13.2.9 Visual

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

13.2.10 Heritage, Archaeological Resources

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

13.2.11 Palaeontology Impacts

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

13.2.12 Ambient Noise

The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The drilling activities will also result in an increase in noise in the vicinity of the project.

13.2.13 Traffic

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

13.2.14 Climate

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

13.2.15 Vibrations

Drilling ground vibrations may result in possible damage to infrastructure and private property.

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	Operation may affect the day-to-day operation of the landowners hence result in direct impact on their livelihood.	2	1	2	2	3	25	Low (-)	Random and regular alcohol and drug testing shall be conducted on all personnel responsible for operating machinery and driving construction vehicles to ensure the safety of the public; Drill sites shall be kept to a minimum; Landowners shall be informed of the exact location of the drill sites and shall be privy to the drilling programme, indicating the days on which each site will be drilled; and The time spent at each drill site shall be kept to a minimum.	1	1	2	1	1	8	Low (-)
	Uncontrolled access of private property during operation may result in conflict with affected landowners and occupiers.	2	1	1	2	2	16	Low (-)	Security and safety should be emphasized; No construction workers shall be allowed to access private properties without the owner's knowledge and consent; Access to private property and areas outside the designated operation areas shall be strictly prohibited.	1	1	1	1	1	6	Low (-)
	Negative impact as a result of additional trucks on the roads, impacting on local communities' health and safety.	3	3	2	1	2	24	Low (-)	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; Where possible the transportation of materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents; The number of vehicles on the roads shall be kept to a minimum; Materials transported on public roads must be covered.	1	2	1	1	1	8	Low (-)
	Negative impact on, local community health and safety due to potential influx of employees, the presence of job seekers, which may lead to prostitution and conflict with the local communities. Illegal informal settlement of job seekers in the area may exacerbate the situation.	3	3	2	1	2	24	Low (-)	Liaise with the SAPD and existing forums in order to implement effective crime prevention strategies; and The applicant will ensure that as far as possible locals will be used during the operation of the prospecting project. Recruitment will not be undertaken on site.	1	2	1	1	1	8	Low (-)
	As a result of drilling activities during operation, potential damage to adjacent landowner's/occupiers' infrastructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Drill sites shall be located as far from private property as is possible to minimise damage to infrastructure; Should private property be damaged due to operation activities, property owners shall be appropriately compensated.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	As a result of drilling, there is potential for the occurrence of subsidence, impacting on the safety surface land dwellers and users.	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Groundwater	The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination of the vegetation cover and soils. The material removed from the drilling exercises will contain carbonaceous material, which has a potential for pollution should it be allowed stay for a prolonged period at the drilling site.	3	2	2	2	2	28	Medium Low (-)	Ensure that the drilling of the exploration boreholes is conducted in such a manner that the environment is protected from probable spillages and contamination. All boreholes and sumps will be rehabilitated to pre-drilling conditions. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid, and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility. All waste generated from the drilling sites and the campsite will be collected in proper receptacles and removed to a registered disposal facility e.g., sewage treatment plant, sold waste disposal site or hydrocarbon recycling or treatment facilities.	2	1	2	1	2	15	Low (-)
	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 (-)		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
	The prospecting operations will require the drilling of boreholes. The boreholes may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling may leach pollutants that will result in the pollution of the surrounding groundwater regime. This may even spread beyond the backfilling site via plume migration.	2	2	2	2	2	24	Low (-)	Ensure that the landowners' borehole yields are monitored during the drilling operation. Should it be proven that the operation is indeed affecting the quantity and quality of groundwater available to users and surrounding water resources, the affected parties must be compensated.	2	1	2	1	2	15	Low (-)
Surface Water	The drilling operations may result in the generation of surface water runoff contaminated with drilling muds and cuttings should spillages occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the surrounding clean water environment. These will cause an increase in the turbidity and will decrease acidity of the water in the streams, which will affect the aquatic habitat, hence important habitats may be lost.	2	2	2	2	3	30	Medium Low (-)	No prospecting operations will be undertaken within 100 metres from the nearby steams and 500 meters from wetland areas without consent from the DWS; Sumps will be excavated for the collection mud and excess water from the drilling sites; The sumps will be sized such that they will be able to contain the water and mud that will be generated during the prospecting operation; Storm water generated around the drilling site will be diverted away to the clean water environment; No concrete mixing and vehicle maintenance will be allowed on site. All hydrocarbons will be stored on protected storage areas away from the streams.	2	1	2	1	2	15	Low (-)
Aquatic Ecology	Loss of habitat and aquatic ecological structure as a result of continual disturbance and uncontrolled degradation; Impact on the aquatic ecological systems as a result of changes to the sociocultural service provisions through continued uncontrolled vegetation clearance, waste management and disturbance; and Impact on the hydrological functioning of the aquatic ecological and wetland systems as a result of reduced aquatic ecosystem 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 drilling activities shall be allowed within 500 m of wetland areas without consent from the DWS; No vehicles may be allowed to indiscriminately drive through the 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 wetland areas; and All vehicles shall be regularly inspected for leaks. Re-fuelling must take place outside the project area, on a sealed surface area to prevent ingress of hydrocarbons into topsoil and aquatic ecosystems	2	1	2	1	2	15	Low (-)
Biodiversity	Continued destruction of potential floral habitats for species of conservational concern as a result continual disturbance of soils leading to altered floral habitats, erosion, and sedimentation.	2	1	3	2	2	24	Low (-)	All disturbed areas must be rehabilitated in tandem with construction activities. The collection of any plant material for firewood or medicinal purposes shall be strictly prohibited.	2	1	1	1	1	8	Low (-)
	Impact on floral species of conservational concern as a result of an increased in alien species proliferation and ineffective rehabilitation of exposed areas	2	1	3	2	2	24	Low (-)	The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the demarcated drill sites.	2	1	1	1	1	8	Low (-)
	Loss of faunal habitat and ecological structure as a result of increased fires during operation and introduction of alien species, leading to transformation of the natural habitat	2	1	3	2	2	24	Low (-)	The rehabilitation of the disturbed areas must be conducted such that the rehabilitated areas will encourage the migration of animals back into the rehabilitated areas. The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas. No trapping or hunting of fauna shall be permitted.	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						
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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
									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 drill sites 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.							
Soils Land use and Land Capability	Topsoil removal, storage, and replacement during the excavation of the sumps will result. This will result in the disruption of the soils profile.	2	1	2	2	2	20	Low (-)	Ensure that topsoil is properly stored, away from watercourses. The soils must be used for the backfilling and rehabilitation of the sumps.	1	1	1	1	1	6	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).	3	1	2	2	2	24	Low (-)	The rehabilitated sump must be seeded with recommended seed mix consisting of indigenous species. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid, and diesel spills during emergency repairs. Soil disturbance within the drill sites shall be kept to a minimum.	2	1	1	1	1	8	Low (-)
Air Quality	The prospecting operation will require vehicular movement which may result in Possible increase in dust generation, PM10 and PM2.5 as a result of stockpiling material, use of heavy machinery, and material movement.	2	3	2	2	2	28	Medium Low (-)	Dust suppression must be conducted during the operational phase of the project. Correct speed will be maintained at the proposed project site. Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes.	1	1	1	1	1	6	Low (-)
	Increase in carbon emissions and ambient air pollutants (NO2 and SO2) as a result of movement of vehicles and operation of machinery/equipment.	2	3	2	2	2	28	Medium Low (-)	Where practical possibly rehabilitation should be undertaken progressively. A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved roads. All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution. Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance, and spraying with water; Materials transported on public roads must be covered; and Where practical rehabilitation should be undertaken progressively. *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.	1	1	1	1	1	6	Low (-)
Visual	The drill rigs and towers used during the drilling operations will be visible from the nearby Hotazel residents and properties.	2	2	3	2	3	35	Medium Low (-)	Ensure that the time period used for the drill rigs is optimised to ensure that the drill rigs are moved from one site to another over short periods Materials transported on public roads must be covered.	1	1	1	1	1	6	Low (-)
Heritage Resources	The drilling 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 (-)	Locate exploration borehole more than 50 m from the identified heritage sites.	1	1	1	1	1	6	Low (-)
Palaeontological Resources	Drilling of exploratory boreholes 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 (-)

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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
Noise	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 (-)	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 construction activities. All equipment should be provided with standard mufflers. Muffling units on vehicles and equipment must be kept in good working order. Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment. Where possible, operation of several equipment and machinery must be avoided; All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping 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 (-)
	Increase in ambient noise levels as a result of the drilling activities.	2	2	3	2	3	35	Medium Low (-)		1	1	1	1	1	6	Low (-)
Traffic	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion on the public roads roads as well as the farm roads around the prospecting area.	2	3	1	2	2	24	Low (-)	Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; and Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	1	2	1	1	1	8	Low (-)
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low (-)	The number of construction vehicles and trips shall be kept to a minimum All the vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	1	1	1	1	6	Low (-)
Drilling and Vibrations	Impact of drilling ground vibration on houses, boreholes, and roads, resulting in possible damage to infrastructure	2	1	1	2	2	16	Low (-)	Drill sites shall be located as far from private property as is possible. Affected property owners shall be notified of any drilling activities before commencement of the activities.	1	1	1	1	1	6	Low (-)
	Fly rock impact on houses, boreholes, and roads, resulting in possible damage to infrastructure;	2	1	1	2	2	16	Low (-)		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						
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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
									Should there be damage to private property as a result of drilling activities, property owners shall be appropriately compensated.							
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices.	2	1	1	2	2	16	Low (-)	*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 drill sites 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 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 drill sites; 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

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

13.3.1 Soils and Land Capability

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

13.3.2 Land Use

Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available areas that were covered by the campsite, and drilling sites.

13.3.3 Soils and Vegetation

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

13.3.4 Surface Water and Aquatic Ecosystems

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

13.3.5 Air Quality

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

13.3.6 Noise

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

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

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

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

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	Management and Mitigation Measures	Consequence			Likelihood (Probability)	Frequency:	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency Activity			
Noise	Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	2	1	2	2	2	20	Low (-)	Where necessary, provide employees with ear plugs and employees must be instructed to use the ear plugs. Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.	1	1	1	1	2	9	Low (-)

14 Impact Assessment Methodology

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

The first stage of any impact assessment is the identification of potential environmental 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 Table 14-1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity[6], spatial scope[7] and duration[8] of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity[9] and the frequency of the impact[10] together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix table as shown in Table 14-2. 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.

[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.

[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: 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 prospecting area boundary)	2
Local area (within 5 km of the PRA 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

Table 14-2: Significance Classification

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

The impacts of the proposed site layout will be the same as those of the alternative sites that may be identified during the prospecting exercise. The alternative sites will be identified based on the location of sensitive environments such as heritage sites (graves etc.), aquatic ecosystems, wetland areas, and areas with Red Data Species. Changes in the layout plan will be discussed and agreed on with the affected landowners and the DMR.

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

Mn and Fe ore mining in South Africa is of important economic value, especially for the steel industry. This prospecting activity has a potential to decrease levels of unemployment rates in proposed areas and surroundings. This prospecting activity will bring revenue into the city and the province which will in turn boost the economy of the country.

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

Please refer to Section 13 for a comprehensive impact assessment.

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

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

17 Motivation where no alternative sites were considered.

As discussed previously, the site is located in an area where there is geological potential for Mn and Fe Ore. The proposed prospecting area is located in an area where Mn and Fe Ore occurs widely spread. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering.

According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault.

The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

The site is therefore regarded as the preferred site and alternatives sites are not considered.

The alternative drill sites will be identified based on the location of sensitive environments such as heritage sites (graves etc.), aquatic ecosystems, wetland areas, and areas with Red Data Species. Changes in the layout plan will be discussed and agreed on with the affected landowners and DMR.

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

The location and extent of the prospecting activities will be based on the information derived from the desktop surveys as well as existing environmental databases from SANBI and the Department Water and Sanitation (DWS) as well as existing specialist studies from projects around the proposed project area. The geological assessment shows that the proposed prospecting area is located in an area where Mn and Fe Ore occurs widely spread. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering. According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault. The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

The site is therefore regarded as the preferred site and alternatives sites are not considered.

Where practicable and required, the drilling sites and location of infrastructure will be selected to avoid sensitive environments such as aquatic ecosystems, wetland 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 prospecting activities, the following steps were undertaken:

- The stakeholder consultation process is currently being undertaken in a manner to be interactive, providing the landowners and identified stakeholders with an opportunity to provide input into the project. This is considered a key focus as the local residents have capabilities of providing site-specific information, which may not be available in desktop research material. Stakeholders were requested, as part of the notification letter, to provide their views on the project, and to state any potential concerns they may have. All comments and responses provide will be collated into the Comments and Responses Table, which will be included in 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 Vaal River and Groundwater Vulnerability Reports;
- The Municipal Integrated Development Plan for Joe Morolong Local Municipality; and
- The Spatial Development Framework for John Taolo Gaetsewe 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

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

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Data Collection and Assessment	Desktop Study	None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Geological Mapping		None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Planning for Drilling Surveys		None	N/A	Planning	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	N/A
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of drilling boreholes	Loss of soils, erosion of the soils and impacts on landowners' livelihood.	Soils, Land capability and Land use	Construction	Low (-)	Rehabilitation of areas cleared of vegetation and dust control	Low (-)
Drill Sites		Contamination of groundwater from hydrocarbon spillages	Groundwater	Construction	Medium Low (-)	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Low (-)
Sample Storage Area		Contamination of surface water due to erosion of soils which will lead to increased turbidity as well as contamination from hydrocarbon spillages	Surface water	Construction	Medium Low (-)	Monitoring through rehabilitation and management of spoil sites	Low (-)
Site Camp							
Equipment Storage		Aquatic Ecosystem contamination, destruction, and loss of habitat	Aquatic ecosystems	Construction	Medium Low (-)	Control of access to aquatic ecosystems and wetland habitat areas and within the regulated 500 m buffer.	Low (-)
Accommodation		Destruction of graves and cultural heritage sites	Heritage and archaeological resources	Construction	Low (-)	Control through clear demarcation of prospecting areas to ensure avoidance of graves and other heritage sites	Low (-)
Temporary Site offices		Destruction of fossils	Palaeontological resources	Construction	Low (-)	Management of drill sites. Should any fossils be discovered, operations must cease and SAHRA must be notified	Low (-)
Ablution Facility		Loss of natural vegetation in the affected areas	Flora	Construction	Medium Low (-)	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Low (-)
		Migration of fauna due to disturbance caused by the proposed project	Fauna	Construction	Low (-)	Relocation of affected species of conservation importance	Low (-)
		Air pollution through nuisance dust, PM10 and PM2.5 as well as emissions from construction vehicles and machinery.	Air Quality	Construction	Medium Low (-)	Dust control measures	Low (-)
		Increase in ambient noise due to movement of construction vehicles and machinery	Noise	Construction	Medium Low (-)	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers Control through the limiting of the activities to the daytime and the implementation of an open and transparent channel of communication	Low (-)
		Visual impacts as a result of vegetation clearance	Visual	Construction	Medium Low (-)	Rehabilitation of areas cleared of vegetation	Low (-)
		Increased traffic on the roads due to additional construction vehicles	Traffic, Socio-economic	Construction	Medium Low (-)	Speed control and limitation of the times when construction vehicles may be on the roads	Low
		Impact of carbon dioxide (GHG) produced by construction vehicles on the local climate	Climate Change	Construction	Low (-)	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Low (-)

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Diamond and Reverse Circulation Drilling	Drilling of 30 boreholes Movement of vehicles	It is expected that during the operation phase the project will not result in the creation of employment as prospecting requires highly specialised personnel. The applicant will make use of qualified contractors for the drilling and sampling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day-to-day operations by affected landowners	Socio-Economic	Operation	Low (+)	Control of times during which operation activities will take place	Low (+)
		The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The prospecting operations will require the drilling of boreholes, which my result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Groundwater	Operation	Medium Low (-)	Rehabilitation of affected areas and control using bunds	Low (-)
		Drilling operations my result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation will have negative impacts on the water quality due to increase turbidity in the watercourses. This will have an impact on aquatic habitats.	Surface Water	Operation	Medium Low (-)	Control through management and monitoring of surface runoff	Low (-)
		The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.	Soils Land use and Land Capability	Operation	Low (-)	Rehabilitation of affected areas	Low (-)
		The movement of vehicles and drilling machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery.	Air Quality	Operation	Medium Low (-)	Dust control measures	Low (-)
		The drill rigs and towers used during the drilling operation phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the prospecting area.	Visual	Operation	Medium Low (-)	Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable	Low (-)
		The drilling operations may result in the destruction of graves and other heritage resources.	Heritage Resources	Operation	Low (-)	Control through clear demarcation of prospecting areas to ensure avoidance of graves and other heritage sites	Low (-)
		Earth moving activities may result in the destruction of fossils (if any).	Palaeontological Resources	Operation	Low (-)	Management of drill sites. Should any fossils be discovered, operations must cease and SAHRA must be notified	Low (-)
		The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The drilling activities will also result in an increase in noise in the vicinity of the project.	Noise	Operation	Low (-)	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Low (-)
		The movement of vehicles in the project area will result in an increase in traffic on the roads.	Traffic	Operation	Low (-)	Speed control and limitation of the times when construction vehicles may be on the roads	Low (-)

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
		The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.	Climate	Operation	Low (-)	Control and keep to a minimal the number of vehicles used for operations. Vehicles must be maintained to ensure efficient use of fuel.	Low (-)
		Drilling ground vibrations may result in possible damage to infrastructure.	Drilling and Vibrations	Operation	Low (-)	Drill sites must be located as far from infrastructure as is possible to avoid damage to infrastructure	Low (-)
Data Analysis	Feasibility Studies	None	N/A	Operation	N/A	N/A	N/A
Feasibility Studies Report		None	N/A	Operation	N/A	N/A	N/A
Borehole capping Removal of equipment and infrastructure	Closure and Rehabilitation of borehole and infrastructure sites	The removal of the campsite equipment and the rehabilitation of the drilling sites and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Soils, Land Capability and Land Use	Decommissioning and Closure	N/A	N/A	N/A
		Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by the campsite and drilling sites.	Land Use	Decommissioning and Closure	N/A	N/A	N/A
		The use of vehicles/machinery during the rehabilitation of the exploration sites may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	Soils and Vegetation	Decommissioning and Closure	Low (-)	Control and prohibit access of vehicles and machinery to areas outside of established access tracks Control through the clear delineation of the prospecting area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of a soil management programme in terms of the correct tops oil removal, stockpiling and rehabilitation practices as discussed in the EMPr.	Low (-)
		During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Surface Water	Decommissioning and Closure	Medium Low (-)	Control through the clear delineation of the prospecting area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of the NWA GN 704 water management principles.	Low (-)
		Rehabilitation and removal of the prospecting sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generate diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Air Quality	Decommissioning and Closure	Low (-)	Dust control measures and rehabilitation of areas stripped of vegetation	Low (-)
		Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Noise	Decommissioning and Closure	Low (-)	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Low (-)

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

Please refer to Appendix 5.

20 Summary of specialist reports.

No specialist studies were conducted as part of this application. Desktop information was used to compile the report and to conduct the impact assessment.

LIST OF STUDIES UNDERTAKEN	**RECOMMENDATIONS OF SPECIALIST REPORTS**	**SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)**	**REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.**
No specialist studies have been undertaken		N/A	N/A

Attach copies of Specialist Reports as appendices (N/A)

21 Environmental impact statement

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

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

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

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

Storm water runoff from the dirty water areas of the drilling sites, its associated surface infrastructure (campsite) may have a detrimental impact on the surrounding environment, wetlands and water resources, particularly the wetlands located on the property should this water be released to the environment. In order to prevent the occurrence of the above-mentioned impacts, dirty water collection sumps will be used to collect all dirty water from the drilling site. The water collected from the sump will be re-used, evaporated and the sump will be rehabilitated once the drilling is finished. Sediments will be created from the site during the construction, operational and decommissioning phase, which may impact negatively on the surrounding environment. The sediments will be treated should they contain hydrocarbon waste.

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

Key findings of the environmental impact assessment include:

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

21.2 Final Site Map

Please refer to Figure 21-1 and Appendix 6 for the preliminary site map which includes the environmental sensitive areas.

The final map showing the layout of the proposed project will be submitted to the DMR on granting of the prospecting right. The map will be developed to superimpose the proposed prospecting project and associated infrastructure together with the environmentally sensitive areas within the proposed project site.

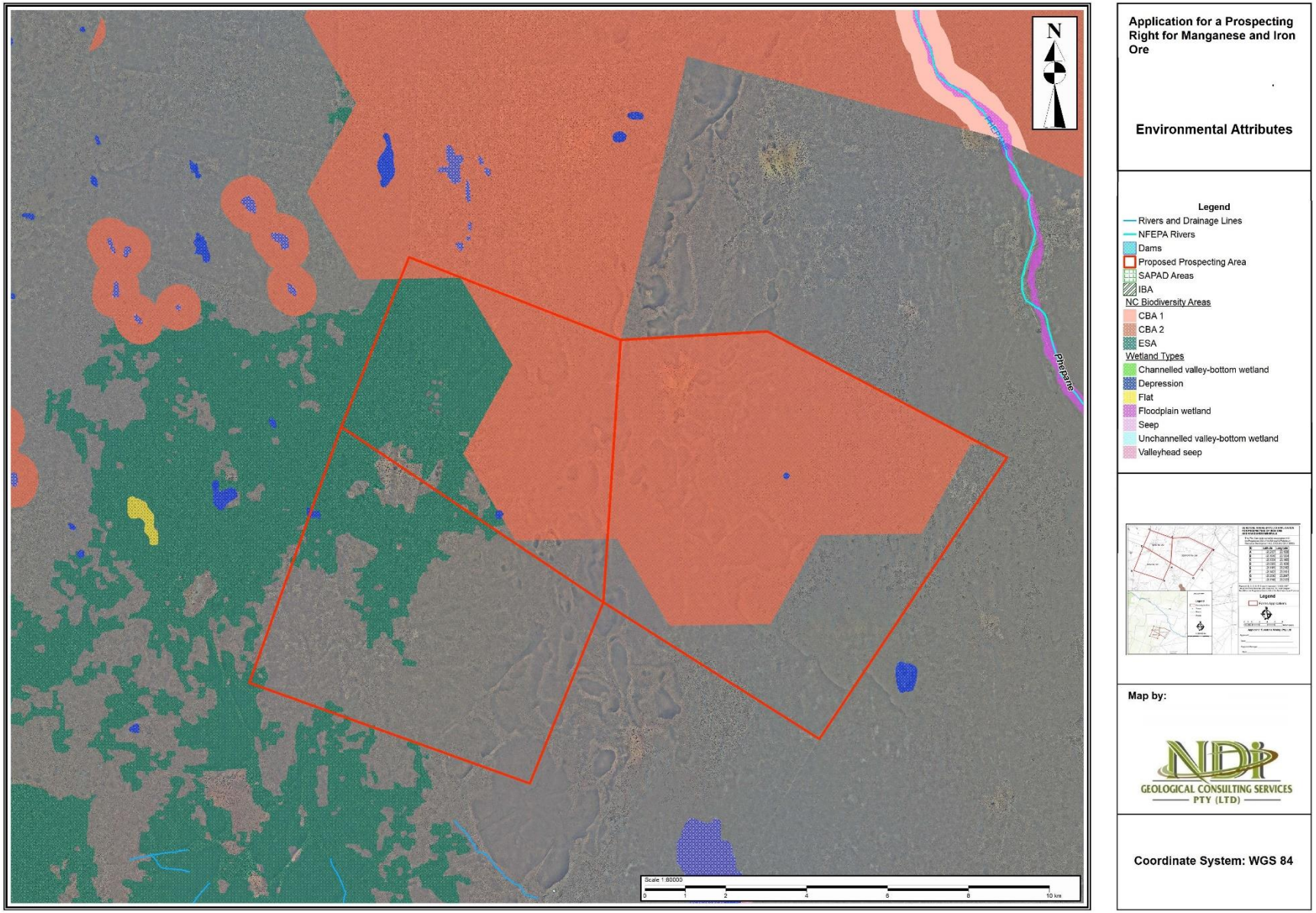

Figure 21-1: Preliminary Site Map

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

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

- Increased ambient noise levels resulting from drilling activities and increased traffic movement;
- Potential water (surface and groundwater) and soil pollution resulting from hydrocarbon spills and soil erosion which may impact on the water resources utilised by the communities and landowners;
- Potential impact on aquatic ecosystems from sediments and hydrocarbon spills as well as uncontrolled disturbance;
- Potential water and soil pollution resulting from hydrocarbon spills and soil erosion which may impact on ecosystem functioning;
- Increased vehicle activity within the area resulting in potential destruction and disturbance of flora and fauna;
- Influx of job seekers to site may result in increased opportunistic crimes;
- Potential visual impacts by drilling activities as well as vegetation clearance;
- Prospecting will be undertaken by special sub-contractors, and it is not anticipated that employment opportunities for local and/or regional communities will result from prospecting activities; and
- Short term creation of employment and boost for local businesses.

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

The objectives of the EMPr will be to:

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

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

23 Aspects for inclusion as conditions of Authorisation.

The following conditions should be included in the Environmental Authorisation:

- A minimum distance of 100 m from any dwellings or infrastructure must be kept;
- Landowners as well as land occupiers must be re-consulted at least 30 days prior to any prospecting activities undertaken on their properties;
- A map detailing the drilling locations should be submitted to the relevant landowners and DMR prior to the commencement of the prospecting activities;
- No activities may be undertaken within 500 m of wetland areas/wetland areas and/or within 100 m of watercourses without approval from the DWS;
- No relocation or destruction of heritage resources may be undertaken without the approval of SAHRA;
- No relocation or cutting down of SCC may be undertaken without approval from the DENC and DAFF; and
- Heritage Impact Assessment must be undertaken were infrastructure and drilling sites will be located, prior to commencement of the prospecting activities.

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 Stakeholder Consultation is not yet complete. The Draft BAR will be updated once the 30-day public review and comment period has lapsed. Comments from the stakeholders will be incorporated into the Final BAR to be submitted to the DMR;

Ndi Geological assumes that Sunstone 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

No specialist studies were conducted as part of the EIA and the identification and assessment of the significance of potential impacts was based on available information, knowledge of the project area and experience of the EAP team. Due to the nature of the project (prospecting) the infrastructure and activities will be temporary and of short duration and all identified impacts on the environment are deemed to have a minimal effect and were assessed using the professional judgement of Ndi Geological's project team. It must be noted that the following also applies:

- Details on the Water Use Licence requirements are not available, it is assumed that no water abstraction from ground or surface will be required;
- No Heritage Impact Assessment was undertaken therefore details on the SAHRA permit requirement are not available;
- No terrestrial ecology assessment was conducted, SANBI databases and literature review were used for the assessment of potential flora and fauna that may occur in the area;
- No wetland/wetland area delineation was undertaken but the SANBI and DWS databases show that there are no wetlands in the area;
- No detailed site layout is currently available due to the nature of the prospecting activities. The impact assessment was undertaken as a holistic assessment for the overall site.

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

25.1 Reasons why the activity should be authorized or not.

It is the considered opinion of the EAP that the activity may be authorised. The proposed prospecting area that Sunstone identified is located in an area where Mn and Fe Ore occurs widely. The geological assessment shows that the proposed prospecting area is located in an area where Mn and Fe Ore occurs widely spread. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering. According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault. The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

Where practicable and required, the drilling sites and location of infrastructure will be selected to avoid sensitive environments such as aquatic ecosystems, wetland areas, watercourses, biodiversity of conservation importance and heritage features.

The option of not approving the activities will result in a significant loss of valuable information regarding the mineral status in terms of Mn and Fe Ore present on the identified property. In addition, should economical reserves be present, and the applicant does not have the opportunity to prospect the opportunity to utilize these reserves for future phases will be lost.

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

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

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

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

25.2 Conditions that must be included in the authorisation

See Section 23 of the BAR.

26 Period for which the Environmental Authorisation is required.

The prospecting right has been applied for a period of two (2) years. The Environmental Authorisation should therefore allow for 2 years of prospecting.

27 Undertaking

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

28 Financial Provision

The amount required to cover the prospecting operation is anticipated to be R 2 750 000.00 at this stage as shown in Table 28-1. Work will be carried out by the contractors and consultant.

Table 28-1: Cost Estimate Expenditure

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
ACTIVITY	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**
PHASE 1 (e.g., 12 Months)					
Compilation of all available geological, remote sensing, and exploration data	R 20 000.00				
Site preparation – accessibility, water supply, set-up of field camp, consultation with landowners, general infrastructure, and logistics, etc.	R 80 000.00				
PHASE 2 (e.g., 12 Months)					
Extensive detailed field mapping		R 50 000.00			
Initial Diamond core drilling of 3 NQ boreholes average depth of 100m, to test the pyroxenite outcrops of the lower critical zones.		R 240 000.00			
Logging and sampling of the boreholes		R 100 000.00			
Consolidation of results and report writing		R 20 000.00			
Assessment and target selection for the next phase		R 15 000.00			
PHASE 3 (e.g., 12 Months)					
Wide-spaced drilling and sampling to determine the distribution and lateral extent of the Chrome layers established in the previous drilling phase (3 NQ holes averaging 100m at > 1 km spacing)			R 240 000.00		
Detailed geological logging and sampling of the drill core.			R 100 000.00		
Analyses of samples			R 150 000.00		
Construction of preliminary geological model.			R 20 000.00		

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
ACTIVITY	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**	**Expenditure (R')**
Consolidation of results and report writing Selection of targets for next stage			R 15 000.00		
PHASE 4 (e.g., 14 Months)					
Metallurgical & Geotechnical tests				R 100 000.00	
Update preliminary geological model.				R 30 000.00	
Statistical analysis of geological data.				R 20 000.00	
Resource area selection				R 10 000.00	
Mineral resource estimation.				R 40 000.00	
PHASE 5 (e.g., 10 Months)					
Bulk sampling / trial mining					R 50 000.00
Pilot plant tests					R 400 000.00
Full mine design with cost estimates					R 200 000.00
Detailed evaluation of infrastructure and facilities to support the project					-
Market study					R 150 000.00
Reserve estimation					R 150 000.00
Financial feasibility study					R 400 000.00
Compilation of CPR					R 150 000.00
Annual Total	**R 100 000.00**	**R 425 000.00**	**R 525 000.00**	**R 200 000.00**	**R 1 500 000.00**
					R 2 750 000.00

28.1 Explain how the aforesaid amount was derived.

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

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

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

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

The amount required to cover the prospecting operation, including rehabilitation and closure is estimated to be R2 267 500.0 at this stage. Sunstone will fund the operation.

The applicant hereby confirms that the amount is anticipated to be an operating cost and is provided for as such in the Prospecting Work Programme.

Table 28-2: Cost Estimate Expenditure

ACTIVITY	YEAR 1 (Expenditure (R')		YEAR 2 (Expenditure (R')	
	Direct	**Consult.**	**Direct**	**Consult.**
PHASE 1 (months 1-12)				
Legal and Option Costs	50 000.00			
Setup	20 000.00			
Desktop Study	50 000.00			
Geological Mapping	60 000.00			
PHASE 2 (13-18)				
Drilling			1 260 000.00	
TOTAL DIRECT COST	**180 000.00**		**1 260 000.00**	
PHASE 3 (months 19-24)				
Feasibility Studies				200 000.00
External Consultants			50 000.00	
Contractors		100 000.00		100 000.00
TOTAL LABOUR COST		**100 000.00**	**50 000.00**	**300 000.00**

ACTIVITY	YEAR 1 (Expenditure (R')		YEAR 2 (Expenditure (R')	
	Direct	Consult.	Direct	Consult.
EMPR- Consultants		100 000.00		70 000.00
TOTAL EMPR	**-**	**100 000.00**	**-**	**70 000.00**
Contingencies	65 000.00		130 000.00	
PROSPECTING FEES	5 000.00		7 500.00	
TOTALS	**250 000.00**	**200 000.00**	**1 447 500.00**	**370 000.00**
			Total	**2 267 500.00**

29 Specific Information required by the competent Authority

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

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

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

- Nuisance noise due to on site activities and drilling;
- Poor access control resulting in impacts on farming activities;
- 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.

Prospecting will be undertaken by specialist sub-contractors, and it is not anticipated that employment opportunities for local and/or regional communities will result from the prospecting activities during the drilling phases.

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

Noise due to construction activities and drilling:

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

Poor access control resulting in impacts on farming activities:

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

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

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

Visual Impact:

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

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

As outlined in Section 7 of this report, prospecting will be undertaken in phases. The first phase will be a desktop study, which will be followed by ground surveys and soil sampling.

Based on the outcome of the activities, soil sampling and drill sites will be determined. Potential heritage impacts will only occur once the drilling sites have been identified. It is therefore recommended that the HIA be undertaken prior to the commencement of the drilling activities, and that the HIA be conducted over the identified localised drill sites and access routes, as opposed to the entire exploration area.

This recommendation will be submitted to the SAHRA for approval.

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

The location and extent of the prospecting activities will be based on the information derived from the desktop surveys as well as existing environmental databases from SANBI and the Department Water and Sanitation (DWS) as well as existing specialist studies from projects around the proposed project area. The geological assessment shows that the proposed prospecting area is located in an area where Mn and Fe Ore occurs widely spread. The proposed prospecting area is geologically belonging to the Asbestos Hills Subgroup of the Ghaap Group, in the Griqualand West Sequence. The Asbestos Hills Subgroup is overlain by a Manganore Formation also belonging to the Ghaap Group. The Kuruman Member and Danielskuil Member make up the Asbestos Hills Subgroup. The former varies in thickness from 150 m to 750 m from the north and to the south of the Griqualand Falt Zone. It also mostly consists of banded iron formation while the latter predominantly consist of iron rich lithologies which are more prominent to weathering. According to Altermann and Albitch, 1990, the Kuruman Formation north of Kuruman bears evidence of layer-parallel dislocations with accompanying metamorphism. Layer-parallel breccias can be followed out in several places in the transition zone from the Campbellrand Subgroup to the Asbesheuwels Subgroup, along the Asbestos Mountains from Kuruman to just north of the Griquatown Fault. The Kuruman Iron Formation hosts the Zeekoebaart and Nauga East high-grade iron ore deposits. Mining operations on the two ironstone belts have proven to produce more manganese ore than iron ore.

The location of the infrastructure will be determined based on the location of the prospecting activities, which will only be determined during Phase 1 of the Prospecting Works Programme, as well as the presence of sensitive environmental attributes such as wetlands, protected biodiversity and habitats and graves. All infrastructure will be temporary and/or mobile (Refer to Section 7 of this report).

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

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

30 Draft environmental management programme.

30.1 Details of the EAP

Details of the EAP are included in Part A Section 3

30.2 Description of the Aspects of the Activity

The EAP hereby confirms that the requirement to describe the aspects of the activity that are covered by the draft Environmental Management Programme is already included in Part A, Section 7 of this report as required.

30.3 Composite Map

Please refer to Figure 30-1 and Appendix 7 for the composite map. No specific heritage sites have been identified and therefore have not been included in the preliminary composite map. The composite map will be updated once all the sensitive environmental sites have been identified. The current composite map includes fatal flaws which include areas where mineral rights are already owned by others and red flag areas which include the following:

- Water Courses and 100m regulated buffer area;
- Wetlands and regulated 500m areas;
- CBAs and ESAs; and
- Protected Areas.

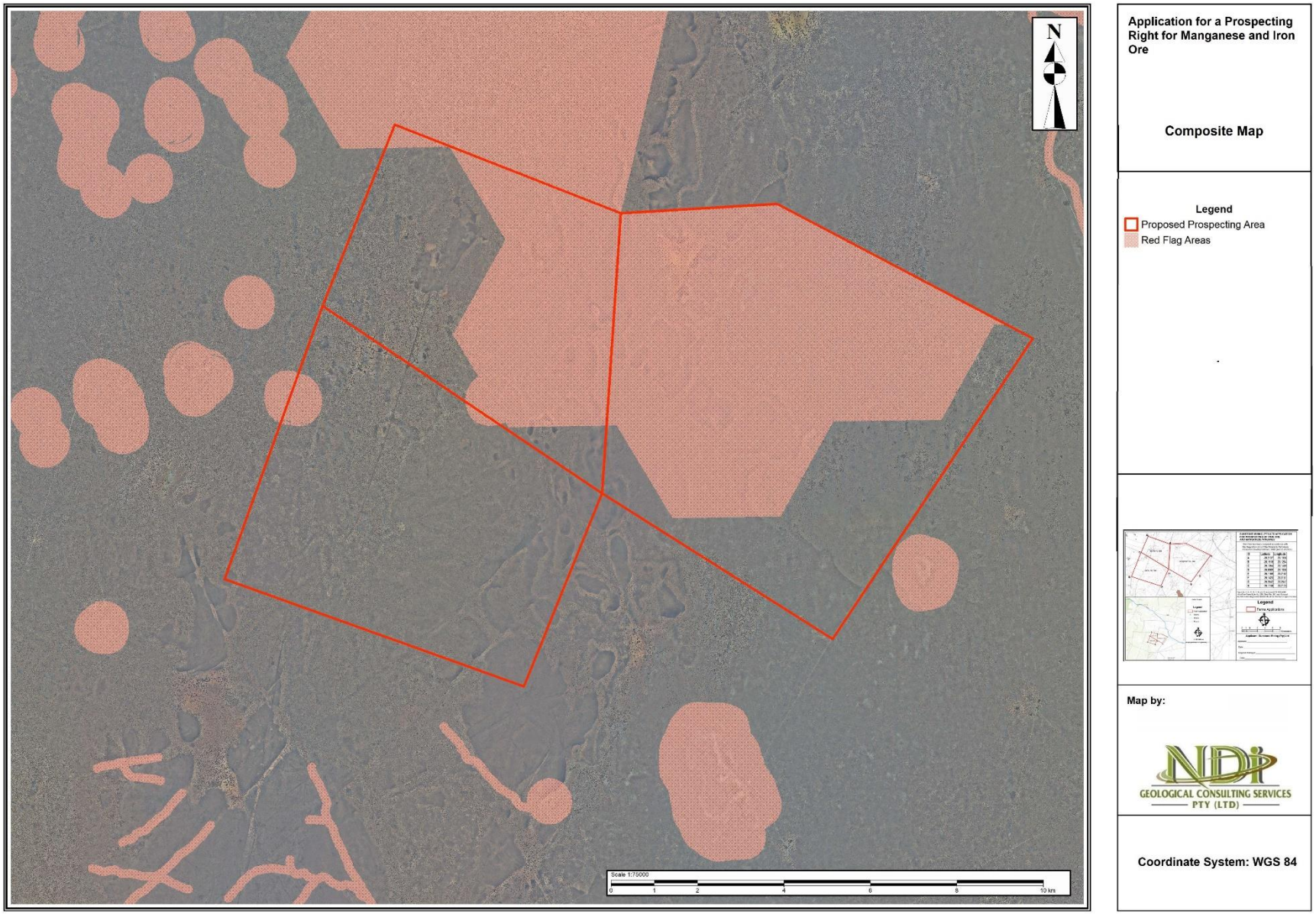

Figure 30-1: Composite Map

31 Description of Impact management objectives including management statements

31.1 Determination of closure objectives.

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

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

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

The closure objectives are to:

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

32 Volumes and rate of water use required for the operation

It is anticipated that approximately 10 000ℓ of water will be required for the process. The water will either be sourced from the municipality and brought onto site and trucked to the identified drill site or abstracted from the groundwater. The option of abstracting groundwater will be confirmed, with the DWS and should groundwater abstraction be required, a Section 21 (a) water use licence will be required.

33 Has a water use licence has been applied for?

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

Furthermore, there are wetlands located on the project area and any activities within 500m of a wetland require a Section 21 (c) and (i) WUL. The applicant will submit a water use licence application.

34 Impacts to be mitigated in their respective phases

Table 34-1: Environmental Management Programme for the proposed Sunstone Prospecting project

NAME OF ACTIVITY		PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Data Collection and Assessment	Desktop Study	Planning	N/A	N/A	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Throughout the planning phase
Geological Mapping			N/A	N/A		
Planning for Drilling Surveys			N/A	N/A		
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of drilling boreholes	Construction	100 m^2	<u>Loss of soils, erosion of the soils and impacts on landowner's livelihood:</u> No soil stripping will be allowed during site establishment; Should it be necessary to conduct geophysical surveys and geological mapping, ensure minimal disturbance of soil; Any activity that may result into the disturbance of the soils must be rehabilitated immediately on discovery; Machinery to be used for the operation will be of good working conditions; Any hydrocarbon spill from the site establishment will be remediated as soon as possible; Use sites that are unused and that are in the degraded state for the proposed development. This must be done in agreement with the landowner. The siting of the boreholes must be conducted such that rocky ridges, sensitive grass lands, indigenous trees and shrubs, sites of geological importance and farmlands actively used for crop farming are avoided; 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; Institute adequate sedimentation control measures where necessary when excavation; The time in which soils are exposed during construction activities; If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion and resulting in the increase in turbidity; Runoff from stockpiles shall be detained in order to support growth of vegetation; Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; <u>Loss of natural vegetation in the affected areas</u>: Use sites with most disturbed vegetation cover for the development; No strip of topsoil and vegetation will be allowed during site establishment; Ensure minimal disturbance of vegetation when conducting geophysical surveys and geological mapping; Use existing track and roads in all instances as far as is practicable; As part of the soil sampling programme, no tracks will be cleared for once-off access to sampling sites;	Implementation of mitigation measures will ensure that the activities in the development of the prospecting sites and associated infrastructure do not have detrimental impacts on the soils, land use and land capability. The implementation of mitigation measures will ensure that the establishment of the prospecting 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.	During the construction phase
Drill Sites			Total 30 drilling sites with a total footprint of 0.3 ha			
Site establishment			13829.4687ha			
Land Clearance			<1 ha			
Temporal Roads construction			<0.3 ha			
Ablution Facility			10 m^2			

				Avoid significant vegetation such as trees and large shrubs in the event that driving through the veld is required to access an identified sampling site; Any area that may result into the disturbance of the vegetation cover must be rehabilitated immediately on discovery; 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; 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; Construction vehicles shall only be allowed on designated roadways to limit the ecological footprint of the project; Implementation of an Alien Invasive Plant Species Management plan; 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; Exotic or invasive plants shall be controlled as they emerge; An alien vegetation control program must be developed and implemented within all disturbed areas;		
				<u>Migration of animal life due to disturbance caused proposed project:</u> 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; 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 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; Poaching will be prohibited at the prospecting site;	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	
				<u>Deterioration of water quality in in the nearby streams and within the groundwater regime</u>: No site establishment shall be permitted within sensitive landscapes; No construction activities shall be permitted within 100 meters of water courses and/or and within 500 m of wetland areas without consent from the DWS; Avoid stripping of areas within the construction sites; Rehabilitate areas that may have been mistakenly stripped; Storm water upslope of the campsite and drill sites should be diverted around these sites;	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 be in compliance with the regulations under the GN704.	

				Proper waste management facilities will be put in place at the campsite and drilling site. 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, 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 conducted off site; Runoff from this area shall be contained; Spill kits shall be made available, and all personnel shall be trained, and training records shall be made available on request; Ensure that topsoil is properly stored, away from water resources; Vehicle and personnel movement within watercourses and wetland 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;		
				<u>Water abstraction:</u> Any abstraction of water for construction purposes must be approved by DWS’	Water abstraction will not be permitted unless authorisation is granted by DWS. Obtain all necessary authorisations in terms of Section 21 of the National Water Act (No.36 of 1998).	
				<u>Wetland and Aquatic Ecosystem Ecology destruction and loss of habitat:</u> Construction activities will be limited to be more than 500 m from the edge of the wetland areas without consent from the DWS; 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 vehicles may be allowed to indiscriminately drive through the 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 wetland areas; 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;	Implementation of mitigation measures will assist with maintaining the current state of the sensitive landscapes within the project area and will enable the project to comply with the requirements of the NWA	
				<u>Air pollution through air pollutants’ emissions, from the construction site</u>: Wet suppression using will be conducted at areas with excessive dust emissions; 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;	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.	

				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; Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance, and spraying with water; Odours: 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; Traffic will be restricted to demarcated areas and traffic volumes and speeds within the construction site will be controlled; <u>Increased nuisance noise levels:</u> 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; 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 18H00 and Saturday 07H00 -14H00); <u>Visual impacts on the surrounding communities and road users from the construction:</u> The landowners will be informed on the type of machinery and equipment to be used at the prospecting sites; Lighting will be conducted in a manner that will reduce the impacts on visual aspects at night times; 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; 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; <u>Damage or destruction of sites with archaeological and cultural significance</u>:	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 prospecting staff and surrounding communities/landowners. 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.	

				Prior to the site establishment, a heritage impact assessment must be undertaken and mitigation and /or management measures for the protection of such resources must be implemented 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; The establishment of the sites will be away from any identified grave site or heritage sites. A buffer of 50 m will be created between the sites and the proposed camp and drilling sites; <u>Impact from the influx of job seekers and employment of farm labourers:</u> Recruitment will not be undertaken on site; Recruitment process shall favour locals, but farm labourers will not be employed unless agreed to with the farm owners; Where required, liaise with the SAPD to ensure safety of landowners in the areas; <u>Waste Management:</u> *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 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 or within 500 m of wetland areas; 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;	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 the heritage sites The identified mitigation measures will result in minimal influx of job seekers to the site The mitigation measures will result in reduced the amounts of waste 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)	

				Traffic: 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 by placing adequate signage; Traffic signs should 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.	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles.	
Diamond and RC Drilling	Drilling and Soil Sampling	Operation	30 Boreholes	Soil profile disruption, contamination of soils, destruction of natural vegetation and loss of land use: The drilling of the exploration boreholes will be undertaken in such a manner that the environment is protected from probable spillages and contamination by carbonaceous material. All boreholes and sumps will be rehabilitated to pre-drilling conditions. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid, and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility. All waste generated from the drilling sites and the campsite will be collected in proper receptacles and removed top registered disposal facilities e.g., sewage treatment plant, sold waste disposal site or hydrocarbon recycling or treatment facilities. No topsoil shall be stored within 100 m of water courses and or within 500 m of wetland areas. The soils must be used for the backfilling and rehabilitation of the sumps. The rehabilitated sump must be seeded with recommended seed mix. Migration of animal life due to disturbance caused proposed project: Where possible drill sites shall be located within degraded environments. Poaching will be prohibited at the prospecting sites.	The implementation of the mitigation measures will ensure that the land use and capability of the sites where the operations will be undertaken will continue after the proposed project. Maintenance of the current status on animal life within the project area.	Upon cessation of the individual activity Throughout the operation phase

Soil Sampling				<u>The drilling operation and use of campsite may result in the generation of surface water runoff contaminated with silt (sedimentation) and possibly hydrocarbon fluids should spillages occur:</u> No prospecting operations will be undertaken within 100 metres from the nearby steams and 500 meters from the wetland areas. Sumps will be excavated for the collection mud and excess water from the drilling sites. The sump will be sized such that it will be able to contain the water and mud that will be generated during the prospecting operation. Storm water generated around the drilling site will be diverted away to the clean water environment. No vehicle maintenance will be allowed on site. All hydrocarbons will be stored on protected storage areas away from the streams. The drilling of the exploration boreholes will be undertaken done in such a manner that the environment is protected from probable spillages and contamination by carbonaceous material. Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid, and diesel spills during emergency repairs. All oil spills will be remedied using approved methodologies. The contaminated soils will be removed and disposed of at a licensed waste disposal facility. The landowners' borehole water quality and yield will be closely monitored during the drilling operation. Should it be proven that the operation is affecting the quantity and quality of groundwater available to users and surrounding water resources, the affected parties must be compensated. All boreholes and sumps will be rehabilitated to pre-drilling conditions. All waste generated from the drilling sires and the campsite will be collected in proper receptacles and removed to a registered disposal facilities e.g., sewage treatment plant, sold waste disposal site or hydrocarbon recycling or treatment facilities. The contaminated soils will be removed and disposed of at a licensed waste disposal facility. All waste generated from the drilling sires and the campsite will be collected in proper receptacles and removed top registered disposal facilities e.g., sewage treatment plant, sold waste disposal site or hydrocarbon recycling or treatment facilities.	The mitigation measures will ensure that the drilling operation does not have detrimental impacts on the surface and ground water environment, and that the activities will comply with the provisions of the NWA.	
				<u>Generation of dust and fuel fumes by vehicular movement:</u> Dust suppression must be conducted during the operational phase of the project. Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes. Maintain a speed limit of 20km/hr during the dry season and or when the wind velocity is likely to result in an increased nuisance dust. Materials transported on public roads must be covered.	The air quality in the vicinity of the drilling sites and sites' access routes will be maintained to stay within the national air quality standards.	
				<u>Increased noise levels</u>: Limit the maximum speed to 40 km/h or less, 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. Drill sites shall be located as far from private property as is possible to minimise noise impacts	The mitigation measures will ensure that the noise levels from the sites will be managed, and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 guidelines.	
				<u>Visual impacts on the surrounding communities and road users from the construction:</u> The landowners will be informed on the type of machinery and equipment to be used at the prospecting sites. Lighting will be conducted in manner that will reduce the impacts on visual aspects at night times. Materials transported on public roads must be covered. The number of construction vehicles and machinery to be used shall be kept to a minimum.	Measures will be undertaken by the mine to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives.	

				Movement of vehicles shall be kept to outside busy hours to minimise the visual impacts on the residents. All lighting shall be kept to a minimum within the requirements of safety and efficiency. Where such lighting is deemed necessary, low-level lighting, which is shielded to reduce light spillage and pollution, shall be used. No naked light sources shall be directly visible from a distance. Only reflected light shall be visible from outside the site. External lighting shall use down-lighters shielded in such a way as to minimise light spillage and pollution beyond the extent of the area that needs to be lit. Security and perimeter lighting shall be shielded so that no light falls outside the area needing to be lit Drill rigs shall be located in areas with adequate tree and bush cover to minimise the visual impact on residents. Where no adequate vegetation cover is available for the drill rigs, shade cloths can be used to screen off the drill rigs. 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		
				<u>Damage or destruction of sites with archaeological and cultural significance:</u> The drilling sites will be situated away from any identified grave site or heritage sites. A 50 m buffer will be created between the sites and the proposed camp and drilling sites.	With the implementation of the mitigation measures, the drilling operations will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist.	
				<u>Safety, intrusion livelihood impacts on the landowners and occupiers:</u> Residents shall be informed of any road closures and other disruptions and maintain roads used for the operation in good order. Clear signage shall be installed around the project area indicating the type of disruption and the time during which the disruptions will occur. Communication with landowners and land occupiers shall be kept open during the operational phase of the project. A record of such communication shall be kept on site. Ensure that negotiations on compensation are undertaken before the drilling programme can commence. This will include any other conditions that the landowners may deem necessary for the prospecting operation. The outcomes of the negotiations shall be recorded and kept in a file on site. Ensure that safety measures are implemented to prevent impacts on landowners and occupiers. Access to private property, outside of the demarcated drill sites, without landowner consent shall be strictly prohibited.	Sunstone will ensure that all safety standards are met and that access to landowners and occupiers are not detrimentally affected	
				<u>Traffic:</u> Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; Where possible the transportation of materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents; The number of construction vehicles and trips shall be kept to a minimum All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	The objective is to warn the general public of construction traffic, and to manage traffic on site and implementing the mitigation measures will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles	
				<u>Flora:</u> All disturbed areas must be concurrently rehabilitated. 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	The implementation of mitigation measures will ensure that the drilling and sampling activities do not have detrimental impact on the area's flora.	

				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 drilling activities. Monitoring of relocation success will be conducted during the operational phase. Monitoring of relocation success shall continue during and beyond the decommissioning and closure phase. All disturbed areas shall be re-vegetated with indigenous species. 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. <u>Fauna:</u> 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, need to be strictly managed. 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. Poaching of wild animals and livestock will be prohibited.	Maintenance of the current status on animal life within the project area.	
Data Analysis	Feasibility Studies		N/A	N/A	N/A	N/A
Feasibility Studies Report			N/A	N/A	N/A	N/A
Borehole capping	Closure and Rehabilitation of borehole and infrastructure sites	Decommissioning and Closure	All the affected sites	<u>Compaction and contamination of soils within the rehabilitation site:</u> All vehicles and machinery used at the rehabilitation site will be kept in good working order. No repairs of vehicles or machinery will be conducted at the rehabilitation site unless it is emergency repairs, which will be conducted on protected ground. Movement of mine vehicles and machinery will be limited to demarcated routes, which will be rehabilitated when no longer in use.	Rehabilitated areas will be maintained to comply with the closure objectives.	Upon cessation of the Mn and Fe Ore prospecting
Removal of equipment and infrastructure				<u>Re-instatement of soil productivity, land capability and land use:</u> All infrastructure will be removed from the site in accordance with the rehabilitation plan. Contaminated soils shall be cleaned or disposed of at a registered landfill site in terms of the requirements of the NEM: WA. <u>Pollution of surface water environment:</u> The site area will be rehabilitated to be free draining. Erosion protection measures such as the use of contour berms and repair of gullies will be undertaken until such time that the rehabilitated surfaces can be shown to be sustainable. Existing roads should be used where possible and new disturbed areas should be minimised. <u>Air pollution from rehabilitation site:</u> Where necessary, wet suppression will be conducted at areas with excessive dust emissions. Vehicles and machinery will be well maintained. The traffic volumes and speed within the rehabilitation site will be controlled. <u>Nuisance Noise:</u> Smaller or less noisy equipment should where possible be used when working near receptors.	Rehabilitated areas will be maintained to comply with the closure objectives. The surface water leaving the rehabilitation site will comply with the DWS target water quality parameters. Decommissioning and rehabilitation of the site will be conducted in such a manner that the ambient air quality does not exceed the air quality standards	

				Equipment will be well maintained and fitted with the correct and appropriate noise abatement measures. <u>Damage or destruction of sites with Archaeological and cultural significance</u>: A 50m buffer will be maintained between any site and the archaeological site.	Ensure that the noise from the rehabilitation activities do not exceed the SANS 10103 Rating Level. Should heritage sites be identified, rehabilitation in close proximity to the sites will not be damaged or destroyed by the rehabilitation activities	

35 Impact Management Outcomes

Table 35-1: Impact Management

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
Data Collection and Assessment	Desktop Study	None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Geological Mapping		None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Planning for Drilling Surveys		None	N/A	Planning	Control potential deviations from the approved EMPr through the effective implementation of the data acquisition and desktop study.	Remain within the ambits of the EMPr and Environmental Authorisation.
Access Roads	Establishment of access roads, campsite, physical surveying of the site and pegging of drilling boreholes	Loss of soils, erosion of the soils and impacts on landowners' livelihood.	Soils, Land capability and Land use	Construction	Rehabilitation of areas cleared of vegetation and dust control	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas
Drill Sites		Contamination of groundwater from hydrocarbon spillages	Groundwater	Construction	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Comply with the EMPr. Retain topsoil integrity for the reuse in rehabilitation. Where required, disposal of contaminated soils shall be undertaken in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA)
Sample Storage Area		Contamination of surface water due to erosion of soils which will lead to increased turbidity as well as contamination from hydrocarbon spillages	Surface water	Construction	Monitoring through rehabilitation and management of spoil sites	Retain topsoil integrity for the reuse in rehabilitation Comply with the requirements of the NWA: no construction activities within 100 m of water courses and 500m of wetland areas without consent from the DWS.
Site Camp		Wetland area contamination, destruction, and loss of habitat	Aquatic ecosystems	Construction	Control of access to wetland areas and within the regulated 500 m buffer.	National Water Act, 1998 (Act 36 of 1998) No construction activities may be conducted within 500 m of wetland zines without approval from the DWS.
Equipment Storage		Destruction of graves and cultural heritage sites	Heritage and archaeological resources	Construction	Control through clear demarcation of prospecting areas to ensure avoidance of graves and other heritage sites	No destruction/loss of heritage resources without consent from SAHRA
Accommodation						
Temporary Site offices		Destruction of fossils	Palaeontological resources	Construction	Management of drill sites. Should any fossils be discovered, operations must cease and SAHRA must be notified	No destruction/loss of fossils without consent from SAHRA
Ablution Facility						
		Loss of natural vegetation in the affected areas	Flora	Construction	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) and Alien and Invasive Species Regulations, 2014. No vegetation clearance outside of demarcated areas
		Migration of fauna due to disturbance caused by the proposed project	Fauna	Construction	Relocation of affected species of conservation importance	Remain within the designated area demarcated for prospecting activities. Ensure minimal clearance of vegetation
		Air pollution through nuisance dust, PM 10 and PM2.5 as well as emissions from construction vehicles and machinery.	Air Quality	Construction	Dust control measures	Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural districts / suburban districts communities. Comply with the requirements of the Minimum Emission Standards

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		Increase in ambient noise due to movement of construction vehicles and machinery	Noise	Construction	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies 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	Remain within the Noise Regulation Standards for Rural districts / suburban districts with little road traffic.
		Visual impacts as a result of vegetation clearance	Visual	Construction	Rehabilitation of areas cleared of vegetation	Vegetation clearance must be limited to demarcated areas only
		Increased traffic on the roads due to additional construction vehicles	Traffic, Socio-economic	Construction	Speed control and limitation of the times when construction vehicles may be on the roads	Minimise the number of vehicles used during construction Movement of construction vehicles shall be limited to outside of busy hours
		Impact of carbon dioxide (GHG) produced by construction vehicles on the local climate	Climate Change	Construction	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Comply with the EMPr Minimise the number of vehicles used during construction Regular maintenance of vehicles and machinery to improve fuel efficiency Comply with requirements of the National Environmental Management: Air Quality Act, 2004
Drilling (Diamond and RC)	Drilling and Soil Sampling	It is expected that during the operation phase the project will not result in the creation of employment as prospecting requires highly specialised personnel. The applicant will make use of qualified contractors for the drilling and sampling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day-to-day operations by affected landowners	Socio-Economic	Operation	Control of times during which operation activities will take place	Maintain a 100% crime free area within the control of the prospecting No complaints from landowners due to prospecting activities. Should there be conflicts, these must be resolved
		The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The prospecting operations will require the drilling of boreholes, which my result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Groundwater	Operation	Rehabilitation of affected areas and control using bunds	No soil contamination as a result of hydrocarbon spillages Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
Soil Sampling		Drilling operations my result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the water quality due to increase turbidity and an increase in acidity of the water in the streams.	Surface Water	Operation	Control through management and monitoring of surface runoff	Retain topsoil integrity for the reuse in rehabilitation. No dirty runoff/stormwater entering water courses. The NWA: No activities within 100 m of watercourses without consent from the DWS. No soil contamination as a result of hydrocarbon spillages Rehabilitation and disposal of contaminated soils conducted in terms of the NEM:WA
		Uncontrolled movement within wetland areas may have an impact on the aquatic ecological habitat, ecological functioning, and structure.	Aquatic Ecosystems	Operation	Avoidance of wetland areas	NWA: No activities shall be permitted within 500 m of wetland areas without prior approval from the DWS Comply with requirements of the NWA
		The project may result in the following impacts on the floral environment during the operation phase: Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion, and sedimentation;	Flora	Operation	Rehabilitation of affected areas Monitoring of rehabilitated areas to ensure success.	No invasive plant species in rehabilitated areas No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation and/or removal of contaminated soils

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		Impact on floral diversity as a result of possible uncontrolled fires; Potential spreading of alien invasive species as a result of floral disturbance; and Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase				
		The project may result in the following impacts on the faunal environment during the operation phase: Migration of fauna from the prospecting area due to noise as a resulting of drilling activities; Loss of faunal due to collisions with vehicles and machinery; Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping; Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.	Fauna	Operation	Rehabilitation of affected areas Drill holes must be temporarily plugged immediately after drilling is completed and remain plugged until they are permanently plugged below ground to eliminate the risk posed to fauna by open drill holes. Drill holes must be permanently capped as soon as is practicable	No removal of vegetation outside of demarcated areas. Successful plugging of drill holes, with no faunal casualties as a result of holes being left open
		The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The materials removed from the drilling sites will contain carbonaceous material, which has potential for contamination should it not be managed properly. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.	Soils Land use and Land Capability	Operation	Rehabilitation of affected areas	Retain topsoil integrity for the reuse in rehabilitation.
		The movement of vehicles and drilling machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery.	Air Quality	Operation	Dust control measures	Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural as well as Minimum Air Emissions Standards
		The drill rigs and towers used during the drilling operation phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the prospecting area.	Visual	Operation	Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable	No removal of vegetation outside de of demarcated area to ensure as much vegetation cover for the rigs, as possible Make use of rigs that have earthy cover to minimise the visual impact
		The drilling operations may result in the destruction of graves and other heritage resources.	Heritage Resources	Operation	Control through clear demarcation of prospecting areas to ensure avoidance of graves and other heritage sites	No destruction/loss of heritage resources Comply with requirements of the SAHRA
		Earth moving activities may result in the destruction of fossils (if any).	Palaeontological Resources	Operation	Management of drill sites. Should any fossils be discovered, operations must cease and SAHRA must be notified	No destruction/loss of fossils Comply with requirements of the SAHRA
		The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The drilling activities will also result in an increase in noise in the vicinity of the project.	Noise	Operation	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Remain within the Noise Regulation Standards for Rural Areas. National Noise Control Regulations, SANS10103:2008 guidelines.
		The movement of vehicles in the project area will result in an increase in traffic on the roads.	Traffic	Operation	Speed control and limitation of the times when construction vehicles may be on the roads	Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	Standard to be achieved
		The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.	Climate	Operation	Control and keep to a minimal the number of vehicles used for operations. Vehicles must be maintained to ensure efficient use of fuel.	Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural districts / suburban districts with little road traffic as well as Minimum Air Emissions Standards Minimise the number of vehicles
		Drilling ground vibrations may result in possible damage to infrastructure.	Drilling and Vibrations	Operation	Drill sites must be located as far from infrastructure as is possible to avoid damage to infrastructure	No private infrastructure shall be damaged/lost due to drilling vibrations
Data Analysis	Feasibility Studies	None	N/A	Operation	N/A	N/A
Feasibility Studies Report		None	N/A	Operation	N/A	N/A
Borehole capping	Closure and Rehabilitation of borehole and infrastructure sites	The removal of the campsite equipment and the rehabilitation of the drilling sites and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Soils, Land Capability and Land Use	Decommissioning and Closure	N/A	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before prospecting activities
Removal of equipment and infrastructure		Positive impacts will result due to the reduction in areas of disturbance and the return of land use of the affected areas and making available an area that was covered by the campsite and drilling sites.	Land Use	Decommissioning and Closure	N/A	No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation of contaminated soils Rehabilitation of land to a state it was before prospecting activities
		The use of vehicles/machinery during the rehabilitation of the exploration sites may result compaction of soils and in the spillages of hydrocarbon liquids from the vehicles and machinery. This will result in the contamination and destruction of the vegetation cover and soils.	Soils and Vegetation	Decommissioning and Closure	Control and prohibit access of vehicles and machinery to areas outside of established access tracks Control through the clear delineation of the prospecting area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of a soil management programme in terms of the correct tops oil removal, stockpiling and rehabilitation practices as discussed in the EMPr.	Vehicle movement shall be limited to areas demarcated as access tracks Comply with the requirements of the EMPr
		During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Surface Water	Decommissioning and Closure	Control through the clear delineation of the prospecting area. Control through the implementation of environmental induction and toolbox talks, as well as the implementation of a fine system. Control through the implementation of the NWA GN 704 water management principles.	Maintain the water quality of water courses in the project area Ensure that dirty stormwater and runoff is diverted from the water courses and wetland areas Comply with the requirements of GN704
		Rehabilitation and removal of the prospecting sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generated diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Air Quality	Decommissioning and Closure	Dust control measures and rehabilitation of areas stripped of vegetation	Comply with the requirements of the National Environmental Management Air Quality Act, 2004 Dust Regulation guidelines for rural districts / suburban districts
		Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Noise	Decommissioning and Closure	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Comply with the Noise Regulation Standards for rural districts / suburban districts with little road traffic.

36 Impact Management Actions

Table 36-1: Impact management actions

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

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

NAME OF ACTIVITY		POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	MITIGATION TYPE	Time Period for Implementation	Compliance with standards
		The project may result in the following impacts on the floral environment during the operation phase: Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion, and sedimentation; Impact on floral diversity as a result of possible uncontrolled fires; Potential spreading of alien invasive species as a result of floral disturbance; and Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase	Rehabilitation of affected areas Monitoring of rehabilitated areas to ensure success.	Operation	No invasive plant species in rehabilitated areas No removal of vegetation outside of demarcated areas. Ensure successful rehabilitation and/or removal of contaminated soils
		The project may result in the following impacts on the faunal environment during the operation phase: Migration of fauna from the prospecting area due to noise as a resulting of drilling activities; Loss of faunal due to collisions with vehicles and machinery; Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping; Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.	Rehabilitation of affected areas Drill holes must be temporarily plugged immediately after drilling is completed and remain plugged until they are permanently plugged below ground to eliminate the risk posed to fauna by open drill holes. Drill holes must be permanently capped as soon as is practicable	Operation	No removal of vegetation outside of demarcated areas. Successful plugging of drill holes, with no faunal casualties as a result of holes being left open
		The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The materials removed from the drilling sites will contain carbonaceous material, which has potential for contamination should it not be managed properly. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.	Rehabilitation of affected areas	Operation	Retain topsoil integrity for the reuse in rehabilitation.
		The movement of vehicles and drilling machinery will likely result in an increase in nuisance dust, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and construction machinery.	Dust control measures	Operation	Remain within the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural/suburban communities as well as Minimum Air Emissions Standards
		The drill rigs and towers used during the drilling operation phase will be visible from nearby locations and will have visual impact on the local communities in close proximity to the prospecting area.	Strategic location of rigs and towers to areas where there may be some tree cover, as far as practicable	Operation	No removal of vegetation outside de of demarcated area to ensure as much vegetation cover for the rigs, as possible Make use of rigs that have earthy cover to minimise the visual impact
		The drilling operations may result in the destruction of graves and other heritage resources.	Control through clear demarcation of prospecting areas to ensure avoidance of graves and other heritage sites	Operation	No destruction/loss of heritage resources Comply with requirements of the SAHRA
		Earth moving activities may result in the destruction of fossils (if any).	Management of drill sites. Should any fossils be discovered, operations must cease and SAHRA must be notified	Operation	No destruction/loss of fossils Comply with requirements of the SAHRA
		The use of vehicles and machinery may result in an increase in noise in the immediate vicinity of the project. The drilling activities will also result in an increase in noise in the vicinity of the project.	Management and maintenance of construction vehicles. Management through the use of noise dissipating technologies e.g. noise mufflers	Operation	Remain within the Noise Regulation Standards for rural/suburban areas. National Noise Control Regulations, SANS10103:2008 guidelines.
		The movement of vehicles in the project area will result in an increase in traffic on the roads.	Speed control and limitation of the times when construction vehicles may be on the roads	Operation	Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times

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

37 Financial Provision

37.1 Determination of the amount of Financial Provision.

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

Each phase of the prospecting activities is dependent on the success of the preceding phase. Depending on the outcome of the desktop and geological mapping phase, the prospecting drilling will be initiated. The location and extent of the drill and infrastructure sites cannot be determined at this stage. Mapping of the actual prospecting activities cannot be undertaken.

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

The closure objectives are to:

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

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

The draft BAR and EMPr will be made available to all registered I&APs for a 30-day review and comment period. All comments received and responses provided to the stakeholders will be incorporated into the final BAR and EMPr and will be collated into a Comments and Responses Register.

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

As mentioned previously, each phase of the prospecting activities is dependent on the success of the preceding phase. Depending on the outcome of the desktop and geological mapping phase, the prospecting drilling will be initiated. The location and extent of the drill and infrastructure sites cannot be determined at this stage. Mapping of the actual prospecting activities cannot be undertaken.

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

will be temporary in nature, and a detailed management plan has been provided to address the potential impacts associated with these activities.

The only rehabilitation that will specifically be required is borehole capping and revegetation:

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

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

Due to the nature of the activities, the impacts will be very limited and of short duration. The management plan is in such a manner as to ensure concurrent rehabilitation. The areas for drilling purposes will be the main areas that will require rehabilitation at the end of the prospecting activities. The impacts of the drilling activities will be temporary in nature and a detailed management plan has been provided to address potential impacts.

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

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

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

With the determination of the quantum for closure, it must be assumed that the infrastructure had no salvage value (clean closure). The closure cost estimate (clean closure) was determined in accordance with the DMR guidelines and are provided in Table 37-1.

Table 37-1: Cost Estimate Expenditure

ACTIVITY	YEAR 1 (Expenditure (R')		YEAR 2 (Expenditure (R')	
	Direct	**Consult.**	**Direct**	**Consult.**
PHASE 1 (months 1-12)				
Legal and Option Costs	50 000.00			
Setup	20 000.00			
Desktop Study	50 000.00			
Geological Mapping	60 000.00			
PHASE 2 (13-18)				
Drilling			1 260 000.00	
TOTAL DIRECT COST	**180 000.00**		**1 260 000.00**	
PHASE 3 (months 19-24)				
Feasibility Studies				200 000.00
External Consultants			50 000.00	
Contractors		100 000.00		100 000.00
TOTAL LABOUR COST		**100 000.00**	**50 000.00**	**300 000.00**
EMPR- Consultants		100 000.00		70 000.00

ACTIVITY	YEAR 1 (Expenditure (R')		YEAR 2 (Expenditure (R')	
	Direct	**Consult.**	**Direct**	**Consult.**
TOTAL EMPR	**-**	**100 000.00**	**-**	**70 000.00**
Contingencies	65 000.00		130 000.00	
PROSPECTING FEES	5 000.00		7 500.00	
TOTALS	**250 000.00**	**200 000.00**	**1 447 500.00**	**370 000.00**
			Total	**2 267 500.00**

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

The amount required to cover the prospecting operation, including rehabilitation and closure is estimated to be R 2 267 500.00 at this stage. Work will be carried out by the contractors and consultant and the costs are included in the estimate provided in Table 37-1.

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

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

38.1 Monitoring of Impact Management Actions

Please refer to Table 38-1.

38.2 Monitoring and Reporting Frequency

Please refer to Table 38-1.

38.3 Responsible Persons (Roles and Responsibilities)

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

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

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

38.3.1 Department of Mineral Resource (Competent Authority)

The DMR 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 prospecting activities are conducted in a sustainable manner, in compliance with the relevant environmental legislation. DMR is responsible for approving the EMPr for the project and any revisions and amendments thereto.

38.3.2 Project Developer (Sunstone

The Project Developer (Sunstone 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 Sunstone will appoint the Environmental Control Officer, EHS Manager and Site Manager.

38.3.3 Environmental Control Officer

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

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-

conformances. It is recommended that weekly or bi-weekly environmental audits be undertaken by the ECO during the construction phase.

- Environmental compliance reports must be submitted by the ECO to the DMR on an annual basis or as stipulated by the DMR.
- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by DMR) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.
- Prior to the commencement of construction, the ECO must meet on site with the Site Manager to confirm the construction procedure and designated construction areas.

38.3.4 Environmental Health and Safety (EHS) Manager

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

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

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

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

38.3.5 Site Manager

The site manager will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the facility.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and ensuring that all employees and contractors and sub-contractors are aware of the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employ an Environmental Officer (or have a designated Environmental Officer function) to monitor and report on the daily activities on-site during the construction period.
- Ensuring that safe, environmentally acceptable working methods and practices are implemented, and that sufficient plant and equipment is made available, is properly operated

and maintained in order to facilitate proper access and enable any operation to be carried out safely.

- Meeting on site with the EHS Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the programme.
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the EHS Manager.

38.4 Time Period for Implementing Impact Management Actions

Please refer to Table 38-1.

38.5 Mechanism for Monitoring Compliance

Please refer to Table 38-1.

Table 38-1: Mechanisms for Monitoring

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

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
	Wetland Area and Aquatic Ecosystem Loss	Ensure that there are construction activities that will be located within any wetland and aquatic ecosystem areas. Demarcate and fence off wetland areas as no-go zones	ECO, Site Manager	Monthly monitoring and reporting
	Destruction of graves and cultural resources	No drilling sites shall impact graves and sites of heritage or cultural importance	ECO, Site Manager	Monthly monitoring and reporting
	Water Use	No water may be sources from rivers and streams without approval from the DWS. No clean water shall be used for dust suppression	ECO, Site Manager	
	Nuisance Noise	Measure noise levels routinely to ensure the noise levels are being kept within the acceptable ISO standards.	ECO, Site Manager	Monthly monitoring and reporting
	Health and safety of personnel	Routine safety checks, safety training and Inspections to be carried out during the construction and operation phase to enforce the use of Personnel Protective Equipment (PPE). This must also be included in the safety requirements of the Contract.	ECO, Site Manager	Routine inspection and Quarterly reporting
	Waste Management	Maintain a waste manifest book to record volumes of waste leaving the site, including recyclables. Keep safe disposal certificates on file on site for Hazardous waste. Way Bridge slips must be obtained for all other waste streams and kept on file on site	ECO, Site Manager	Monthly daily and report on a monthly basis
	Stormwater Management	Visual monitoring based on sediment Clean water must be kept separate from contaminated water emanating from the project sites	ECO, Site Manager	Monthly daily and report on a monthly basis
	Rehabilitation	Monitoring of the following: • Basal Cover • Arial Cover • Species diversity	ECO, Site Manager	Rehabilitation will be undertaken throughout all the project phases. The final rehabilitation will be undertaken when the prospecting activities have been finalised. The ECO shall inspect the affected areas 6 months after finalisation of rehabilitation to assess the success of the rehabilitation.

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

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

40 Environmental Awareness Plan

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

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

Table 40-1: Environmental Training and Awareness Schedule

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

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

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

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

- Description of the approved prospecting activities and content of the prospecting right;
- 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.

40.3 Specific information required by the Competent Authority

No specific information was required by the Competent Authority.

41 UNDERTAKING

The EAP herewith confirms

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

b) the inclusion of comments and inputs from stakeholders and I&APs ; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

d) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein. ☒

Signature of the environmental assessment practitioner:

Ndi Geological

Name of company:

15 September 2022

Date:

-END-

Appendices

Appendix 1: The Qualifications of the Environmental Assessment Practitioner

Appendix 2: Curriculum Vitae of the EAP

Appendix 3: Locality and Layout Maps

Appendix 4: Stakeholder Engagement Documents

Appendix 5: Supporting Impact Assessment

Appendix 6: Preliminary Layout Plan, including Environmental Attributes

Appendix 7: Composite Map