mineral resources & energy

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

FINAL BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (AS AMMENDED IN 2017) 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).

Prepared for

ELENGABADI CONSTRUCTION & PROJECTS (PTY) LTD

Prepared by

NRK RESOURCES
YOUR PATNERS IN GROWTH

FILE REFERENCE NUMBER SAMRAD: NC 30/5/1/1/2/12963PR

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HIA	Heritage Impact Assessment
ASAPA	Association of Southern African Professional Archaeologists
BID	Background Information Document
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CSA	Constitution of South Africa (Act No. 108 of 1996)
DEFF	Department of Environment, Forestry and Fisheries
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GN	Government Notice
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
MPRDA	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (as amended)
NEMA	National Environmental Management Act (EIA regulations of April 21017)
NEMAQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act (Act No. 85 of 1993)
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute

PART A

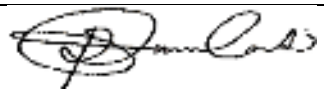
SCOPE OF ASSSSMENT AND BASIC ASSESSMENT REPORT

1 APPLICANT AND EAP DETAILS

1.1 Details of Applicant

Applicant	Elengabadi Construction & Projects (Pty) Ltd
File Reference Number SAMRAD	NC 30/5/1/1/2/12963PR
Contact Person	Sibusiso Mncube
Address	63 Kingston Drive Umhlanga Rocks Durban,Kwa-Zulu Natal
Telephone	083 701 1234
Fax	0866955990
Email	sibusisomncube0628@gmail.com

1.2 Details of the EAP

Company:	**NRK RESOURCES (PTY) LTD**
Project LEAD EAP	Khuliso Ramulondi (Pr.Sci.Nat; REG. EAP) 
EAP Qualifications	**Khuliso Ramulondi** Bachelor of Earth Science in Mining and Environmental Geology (UV) **Membership of Professional Associations:** SACNASP, EAPASA, GSSA, & IAIASA
Author	**Judith Mlanda** M.A Environmental Studies (Environment & Society), University of Pretoria B.A (Sociology & Psychology), University of Namibia **Membership of Professional Associations:** EAPSA Certified Environmental Assessment Practitioner SATTCA Internal Auditor Certificate in environmental management systems (ISO 14001:2004)
Contact Person (s)	Nhlanhla Khosa
Telephone	071 589 6813
Fax Number	086 626 4839
EMAIL:	nrkresources@yahoo.com

1.3 Expertise of the EAP

The EAP's combined have over twenty years' experience. Summary of Environmental aspects below:

- Environmental Impact Assessments
- Basic assessments, WULA reports
- Water use license application
- Waste use license application
- Soil Assessment, Specialist Studies
- Prospecting and Mining Right Authorizations
- Environmental Management Plans
- Public Participation
- Environmental Authorizations

2 PROJECT INFORMATION

2.1 Location of the overall Activity.

Farm Name:	Portion 0 and 1 of LYMINGTON 423
Application area (Ha)	3086 hectares
Magisterial district:	Joe Morolong Local Municipality, John Taole Gaetsewe District Municipality (Kuruman), Northern Cape
Distance and direction from nearest town	Approximately 35km North-West of Khathu in the Northern Cape Province.
21-digit Surveyor General Code for each farm portion	C04100000000042300000 C04100000000042300001

2.2 Locality map
(Show nearest town, scale not smaller than 1:250000).

The proposed prospecting will be on Portion 0 and 1 of Lymington 423, John Taolo Gaetsewe District Municipality, approximately 35km North-West of Khathu in the Northern Cape Province.

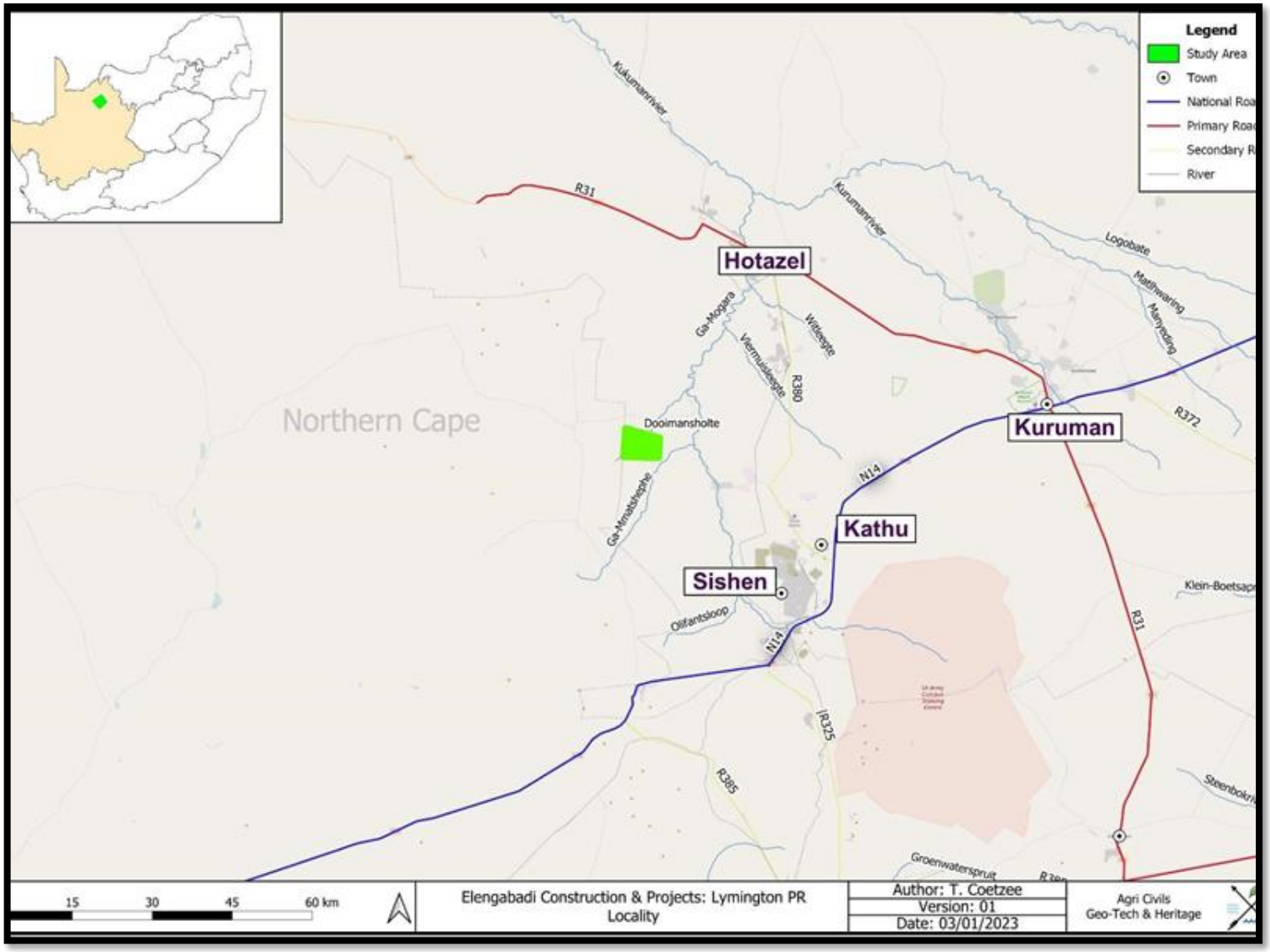


Figure 1: Locality Map

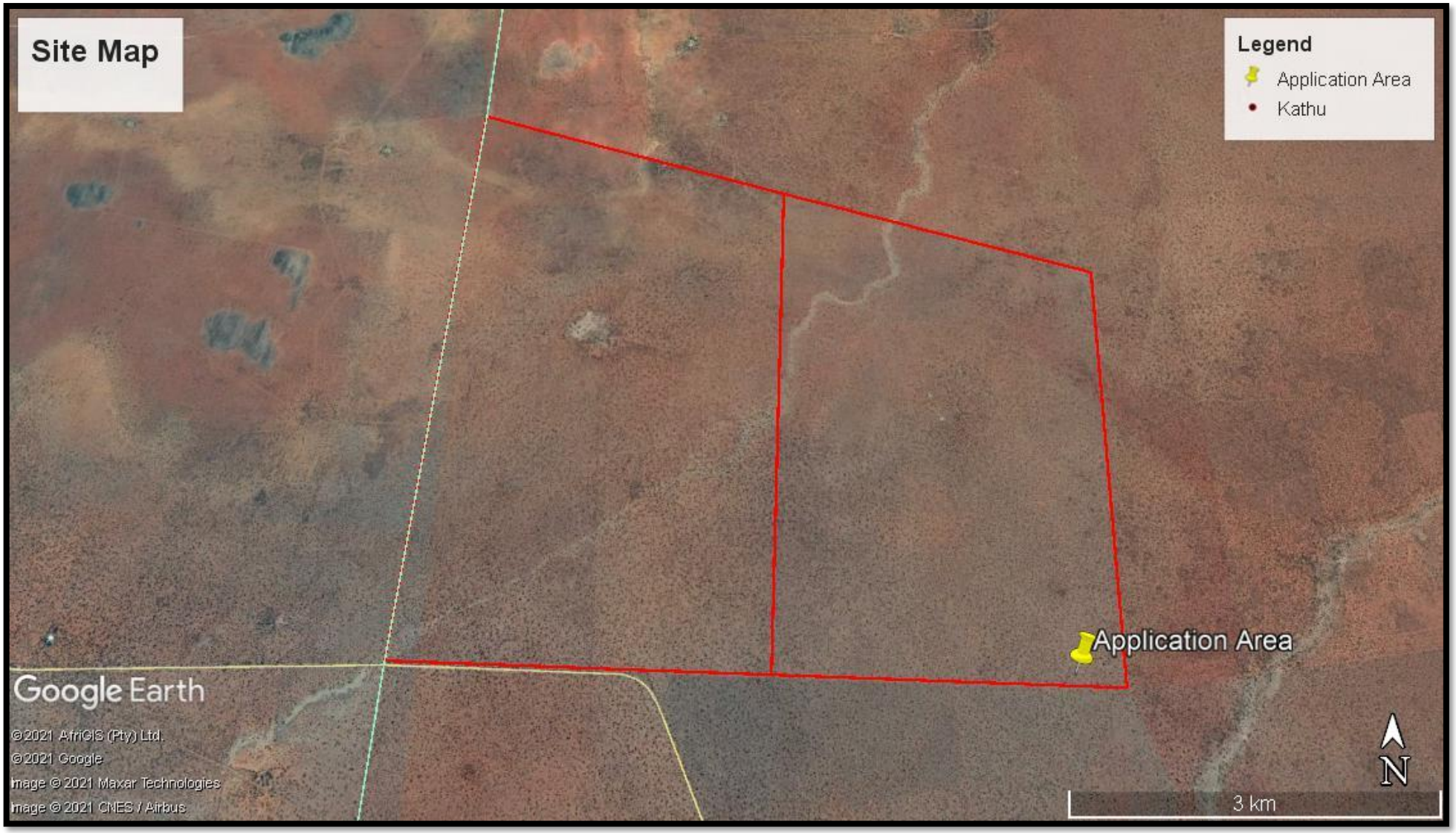


Figure 2: Google Site Map

2.3 Description of the scope of the proposed overall activity.

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

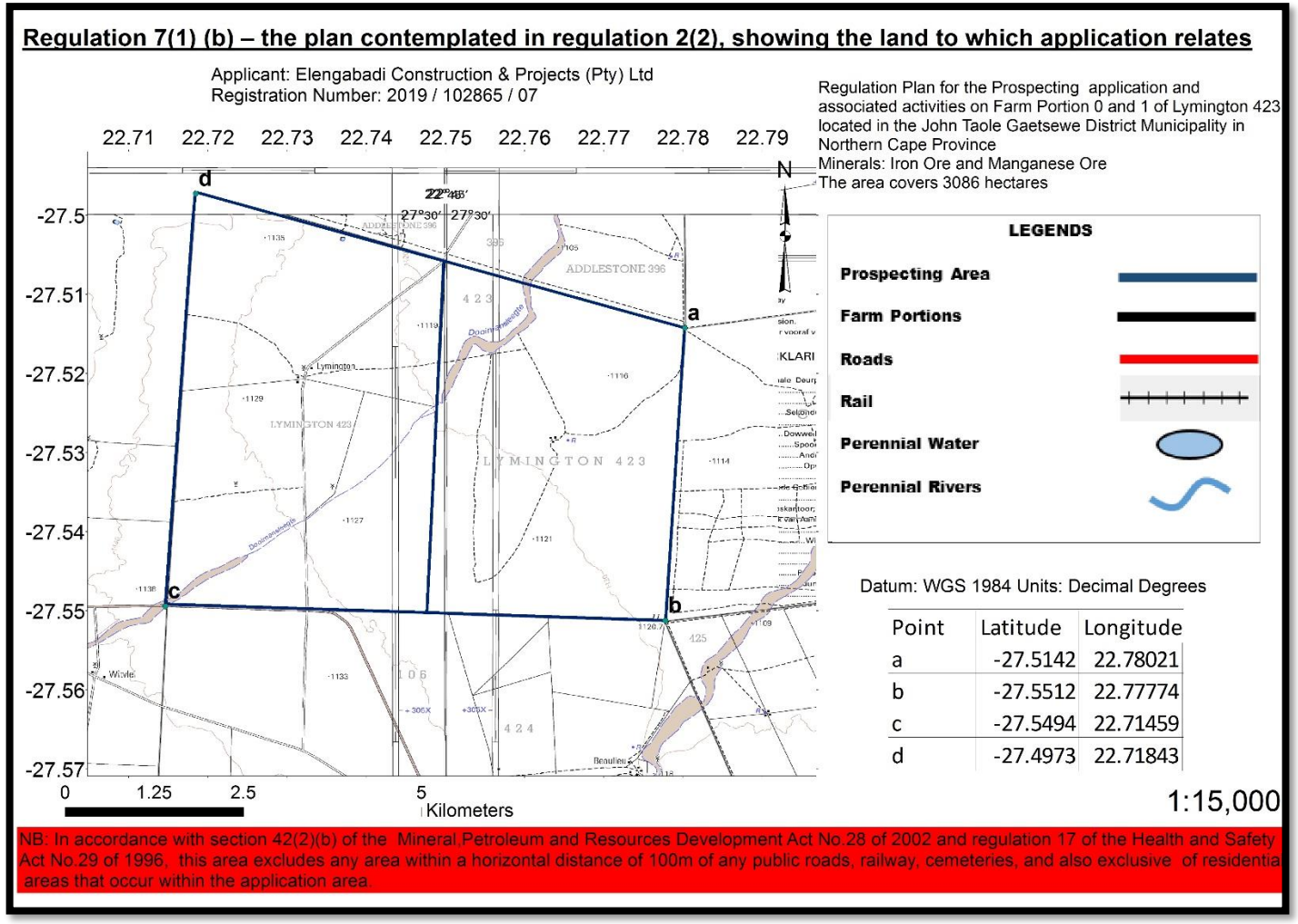


Figure 3: Regulation 2.2 Map of the Prospecting Right Application Area

2.3.1 Description of overall Activity

Field Mapping- This method includes the identification of exposed geological structures and lithological outcrops, through aerial photo interpretation, satellite image interpretation and also by walking the farms/folios.

F.1 Drilling

A proposed drilling programme of 10 boreholes will be used to further define the ore body. The drilling program will determine the exact outline, shape and size of the ore body. The core drilling is generally done in this target. The different rock sample intersecting the deposit will be sent for assay at one of the accredited laboratories.

RC-drilling- Drilling is done in phases, as outlined elsewhere, over anomalous target areas, using reconnaissance lines or a grid of 100m or 400m x 400m holes will be approximately >50m deep depending on the local depth. The drill holes will be sent to the laboratory for assay.

F.2 Geophysical Survey

Ground gravity surveys are applied in order to outline ore deposit positions and size accurately. Ground gravity surveys are carried out on a grid layout. The grid is placed in the field through the use of total station or real time GPS system. Gravity readings and accurate elevations are recorded at each station on the grid. The grid that is used is a 200m x 200m and if there are anomalies in the data the grid is tightened to 100m x 100m. The smaller grid increases the resolution and smaller features then become visible. 1000 gravity points will be needed to delineate the ore bearing lithologies. The gravity data will be evaluated by means of RC Diamond drilling.

Geophysical Survey- Ground geophysical surveys will be conducted over selected target areas on a 200m x 200m grid. Ground gravity surveys is used to outline the ore hosting lithology.

A phased prospecting programme will be applied:

Phase 1- Desktop Studies

It will comprise of gathering geological information about the project area. This will also include visiting organizations like the council of geosciences in order to research on what has been done in the region. This will take about the whole month to complete.

Phase 2- Field Mapping

It mainly consist of a comprehensive field mapping, geologist will complete properly selected transverse while recording their geological observations.

Geophysical Survey

Mainly consist of a comprehensive ground gravity survey to delineate magnetic anomalies and potential target areas.

Preliminary Drilling and assaying

It consists of reconnaissance drilling of ± 5 Boreholes. The proposed drilling program in its entirety consists of 10 holes.

Detailed drilling and assaying

It consists of the remainder of the 10 boreholes minus the preliminary boreholes for detailed drilling within the determined target areas, to delineate the ore body accurately, and to determine depth to bedrock and internal stratigraphic composition of the ore body.

Geological Modelling

This will be comprised by detailed geological modeling.

2.3.1.1 Description Of Planned Non-Invasive Activities:

(These activities do not disturb the land where prospecting will take place e.g. aerial photography, desktop studies, aeromagnetic surveys, etc)

a) Desktop Study

It is more of a literature review and research on all the completed work on the area, it also include accruing results from the companies that has already worked on the area.

b) Field Mapping

This involves the geologist walking the area and making observations which are then recorded on a map.

c) Geophysical surveys

The gravity method measures the gravitational attraction exerted by the earth at a measurement station on the surface. The strength of the gravitational field is directly proportional to the mass and therefore, the density of subsurface materials. Anomalies in the earth's gravitational field result from lateral and depth variations in the density of subsurface materials.

Gravitational acceleration is measured in MilliGals or sometimes in microGal for very high resolution surveys. Gravity acceleration variations as a result of geological changes is very small compared to the average gravity acceleration measured and require the need for very precise measuring and field techniques.

Gravity works well in environments where there is a dramatic density contrast between the host and the target mediums.

2.3.1.2 Description Of Planned Invasive Activities:

(These activities result in land disturbances e.g. sampling, drilling, bulk sampling, etc)

a) Drilling

This will involve both Reverse circulation and core drilling, the drilling equipment mounted on heavy truck will be use. All means will be done to reduce the environmental damages.

Purpose of the drilling activity will be to collect samples to be tested at the laboratory.

(iii) DESCRIPTION OF PRE-/FEASIBILITY STUDIES

(Activities in this section includes but are not limited to: initial, geological modeling, resource determination, possible future funding models, etc)

Geological modeling and resource evaluation will be done using the computer softwate Supac version 6. This will results in the compilation of the competent person report.

Table 1: Prospecting phases

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	None invasive Desktop study	Geologist	0-6month	Desktop study report	6month	Geologist
2	None Invasive Field mapping	Geologist	5-8 month	Geological Maps	Month 14	Geologist
3	None Invasive Geophysical survey	Geologist	8-10 Month	Anomaly Maps	Month 24	Geophysicist
4	Invasive prospecting Preliminary Drilling and Assaying	Drillers Geologist	12 -14 Month	Preliminary resource model	Month 38	Geologist, Surveyors
5	Invasive prospecting Detailed Drilling and assaying	Drillers Geologist	12 Moth	Resource Model	Month 50	Resource geologist
6.	Geological modeling and evaluation	Geologist	10	CPR	Month 60	Resource Geologist

3 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

The following section presents a detailed description of all the activities associated with the proposed Prospecting Application.

- Access Roads

Access to the site will be required during mapping, drilling and sampling activities. A number of existing roads and tracks already traverse the proposed prospecting site and where practicable, these roads will be used.

During mapping activities, vehicle access will be gained to site through the veld and the establishment of a track to gain repeated access to a mapping site will not be required.

Once drilling activities are underway, temporary access roads may be established for repeated access to the drill site if the identified drill site cannot be access via existing roads and tracks.

- Water Supply

It is anticipated that water brought onto the site, will be sourced from Khatu or Kuruman. Water will be trucked from these sources to the identified drill sites, water bowsers will be deployed to these sites as and when required.

Continuous water supply will be required during drilling, and On-site water storage tanks with a capacity of 15,000 for water supply to the drill, will be installed.

Additional water requirements relate to the potable water supply for employees and workers. A temporary 260litre on-site vertical water storage tank for drinking water and generalise by persons will be provided at the drill site.

- Ablution

Ablution facilities at the drill site will involve the installation of drum or tank type portable toilets.

- Temporary Office Area

A temporary site office shaded area will be erected at the drill sites. No on-site electricity generation using generators will be undertaken as the drilling will come fully equipped.

Meals will be provided to the staff and workers as no heating and/or cold storage facilities will be available. A shaded eating area will be provided.

- Accommodation

No accommodation for staff and workers will be provided on- site and all persons will be accommodated in nearby towns. Workers will be transported to and from the prospecting site daily. Night security staff will be employed once equipment has been established onsite.

- ❖ Blasting

As the Prospecting Works Programme does not allow for bulk sampling, **NO** blasting will take place.

- ❖ Storage of Dangerous Goods

During the drilling activities limited quantities of diesel fuel, oil and lubricants hence no hydrocarbons will be stored on site.

3.1 Policy and Legislative Context

3.1.1 Listed and specified activities

Table 2: Listed 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**	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY** (Mark with an **X** where applicable or affected).	**APPLICABLE LISTING NOTICE (*GNR 324, 325, 327)***	**WASTE MANAGEMENT AUTHORISATION** (Indicate whether an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Any activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Extent of application area: 3086 hectares	**X**	GNR 327 – Listing 1: Activity No. 20	N/A

.

3.2 Legislation / Policy / Guideline

Table 3: Legislation / Policy / Guideline

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process	**REFERENCE WHERE APPLIED**	**HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.** (E.g. In terms of the National Water Act a Water Use License has/ has not been applied for)
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	The project requires a prospecting right authorisation from the Department of Mineral Resources	A prospecting right was lodged with the DMRE.
NEMA Environmental Impact Assessment (EIA) Regulations, as amended	This Basic Assessment and Environmental Management Plan To be conducted. Baseline environmental information of the project area will be assessed. Mitigation measures and recommendations where provided according to best practice standards.	An Application for Environmental Authorisation was submitted to the DMRE when the application was lodged. The DMRE Requested the submission of the Basic Assessment Report and EMP within 90 days of the letter.
The South African Constitution The South African Constitution (Act 108 of 1996) constitutes the supreme law of the country and guarantee the rights of all people in South Africa	Applied at potential impacts identification as well as mitigation measures and public participation	A public participation process will be followed, and consultations will be done regarding the proposed project. An EMP and awareness plan will be designed according to the issues raised during this process
National Environmental Management: Biodiversity Act, 2004	Presence of indigenous trees or extinct species	The EMP will regulate the applicant to apply for Tree Removal Permit from the Relevant authority prior to the potential removal of any sensitive and/or protected species.
National Environmental Management: Waste Act	Provisions of the waste act were consulted to determine whether a waste license was required for any aspect of the proposed development.	The project activities do not trigger a waste management license, but proper waste management measures will be addressed in the EMPr.
Section 38 of the National Heritage Resources Act (Act No. 25 of 1999)	Legislation consulted during the impact assessment process, to determine what legal requirements with regards to the	The Northern Cape heritage association has been notified of the project. An upload of the BAR will be done on the

	management of national heritage resources were relevant to this application.	SAHRIS online system for comment as well as the HIA desktop study.
National Environmental Biodiversity Act The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: (i) the management and conservation of South Africa`s biodiversity within the framework of the National Environmental Management Act, 1998; (ii) the protection of species and ecosystems that warrant national protection; (iii) the sustainable use of indigenous biological resources; (iv) the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; (v) the establishment and functions of a South African National Biodiversity Institute;	Baseline review of the biodiversity.	SANBI database will be used to determine conservancy status as well as mitigation measures for alien invasive species encroaching the project area.
National Water Act The NWA (Act No. 36 of 1998)	The proposed activities do not require a water use license	The department has been notified of the proposed project and comments will be addressed.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);	Dust monitoring on site during the operation	As part of the EMPr dust suppression methods will be used.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996);	Health and Safety Policy	Risk Impact Assessment to be conducted
Land Use Planning & Management Guidelines	Used in the BAR to identify Ned and Desirability	Guideline considered during the assessment of the need and desirability of the proposed development, at the provincial scale.
John Taolo Gaetsewe District Municipality (DC45) Integrated Development Plan	Source of background demographic and socio-economic information	Utilized as a source of demographic and socio-economic information for the area.
2016 Northern Cape Critical Biodiversity Areas	The Northern Cape CBA Map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs),	Sensitive area and conservation of vulnerable and threatened biodiversity areas

3.3 Need and desirability of the proposed activities.

South African economy heavily relies on the mining sector. Successful prospecting for the manganese will boost the local economy as the project will advance to mining phase creating employment, additions to the social and labour plan as well as HDSA. The mining sector has provided employment opportunities for the citizens in general. The Project is in line with the with the current mining activities occurring in the area. The proposed project should be considered considering the current land use with minimal impact or disturbance to these activities and concurrent rehabilitation of the drilled areas will be undertaken.

3.4 Motivation for the overall preferred site, activities and technology alternative.

3.4.1 Regional Geology

A (very) brief introduction to the Iron – Manganese deposits

The manganese and associated iron of the Transvaal Supergroup were deposited in an ancient shallow sea on the border of the Kaapvaal Craton, hosting some of the oldest rocks on our continent. The Transvaal Supergroup was deposited between 2200 and 2600 million years ago, and is an exceptionally well-preserved succession, allowing one to examine in detail the depositional environment of the late Archean to early Proterozoic time span. Indeed, the Transvaal Supergroup is considered to be one of the geological wonders of the world, as most of these early depositional systems have undergone massive deformation throughout the course of geological history.

The giant Kalahari manganese field, situated 60 km northwest of Kuruman in the Northem Cape Province of South Africa, is the largest known land-based manganese deposit in the world, hosting more than 80 % of the worlds minable manganese resources (V ermaak, 1997).

Mamatwan-type ore is the major manganese ore in the Kalahari basin. It is primary a diagenetic to low-grade metamorphic ore, consisting of braunitic matrix and abundant primary carbonates and ovoids of kutnohorite. Minor minerals also include hausmannite, cryptomelane, jacobsite and hematite. This type of ore is found in the Mamatwan, Middelplaats, Adams, Perth, Smartt, Gloria and Devon Mines.

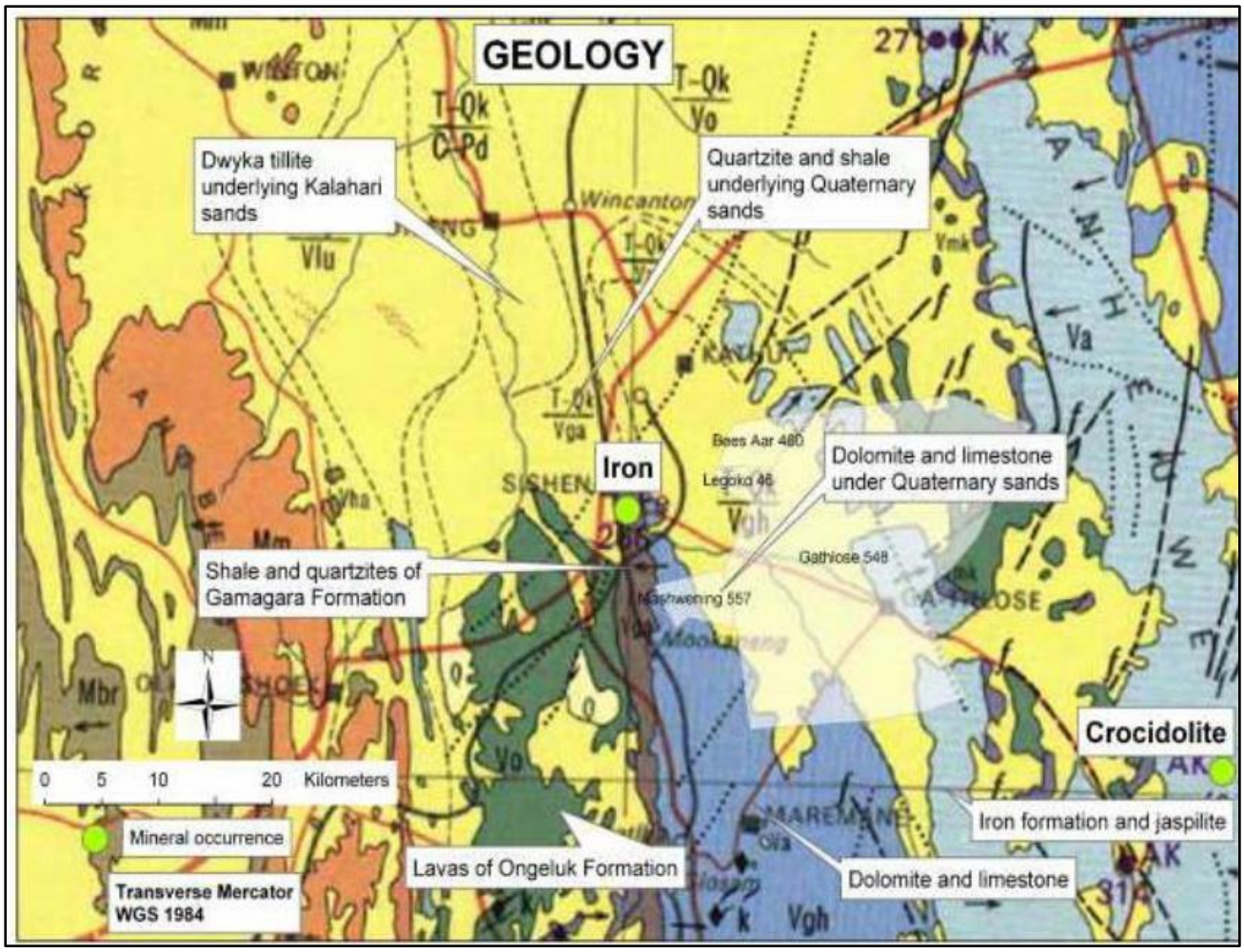


Figure 4: Geology of the Manganese and iron ore

The manganese ore bodies in the north-western part of the Kalahari manganese field (Wessels, Black Rock and N'Chwaning Mines) have been termed **Wessels-type ore**. These ore bodies contrast markedly to the primary Mamatwan-type ore. The ore has been hydrothermically altered and metamorphized. This resulted in a manganese ore with a coarser grain size with higher manganes content. This ore is braunite-rich and contains other major minerals such as braunite II, bixbyite, hausmannite, marokite and hematite together with minor amounts of calcite. The overall carbonate content of the Wessels-type ore is lower than that of the Mamatwan-type ore. Andradite and barite are common gangue minerals. Additionally, minor minerls such as tephroite and rhodochrosite as well as aegirine (in the iron formation above the ore layers) are associated with this ore type.
Most of the Wessels, Black Rock, N'Chwaning II and parts of N'Chwaning I ores are of this type.

The Hotazel outlier is situated in a graben to the east of Black Rock and contains a very high-grade ore (60 to 70 per cent average). Hausmannite with lesser amounts of other minerals and a very low carbonate component are the main constituents of the Hotazel super grade ores. Although the ore is

found typically in the Hotazel Mine, parts of the Langdon Annex and N'Chwaning I Mines also contain this ore-type.

Mines of the Kalahari Manganese Fields

The first mine to open is the iconic Black Rock mine, in 1940, with underground operations beginning in 1942. This was followed in quick succession by Devon in 1954 and Smartt in 1959, by Assmang and Samancor respectively. The discovery of the high grade Hotazel ore in the 1950's also led to the opening of Langdon, famous for stunning Tudorokite specimens, and the Hotazel mine, where the first of the soon to be world famous Rhodochrosite from the Kalahari field was discovered.

From here expansion and growth kicks up a notch, with the opening of the Adams open pit in 1959 and Mamatwan in 1960. Mamatwan is the only early open pit to still be in operation

Gloria, Belgravia and N'Chwaning I date back to the 1970's, following the installation of a private railway line by Assmang. This railway line made economic the opening of Wessels by Samancor in the same time span. Currently, Wessels and Gloria are still mining, with N'Chwaning I closed and replaced by N'Chwaning II in 2004, and later N'Chwaning III in 2006.

Development in the area is ongoing, with rapid expansion - Smartt was reopened in 2008 by the United Manganese of Kalahari, amongst others. Early ownership of the majority of mines by Assmang and Samancor has now been split between many companies, new entrants and titans like Anglo alike.

Most of the mining activities within the Joe Morelong and Gamagara areas are connected to the Sishen-Saldanha route. To this effect, mining and exploration activities occurring within the surrounding area includes *inter alia*:

- Wessels Mine (underground operation);
- Tshipi Mine (opencast mining);
- Mamatwan Mine (opencast mining);
- UMK Mine (opencast mining) and
- Kudumane (opencast mining).

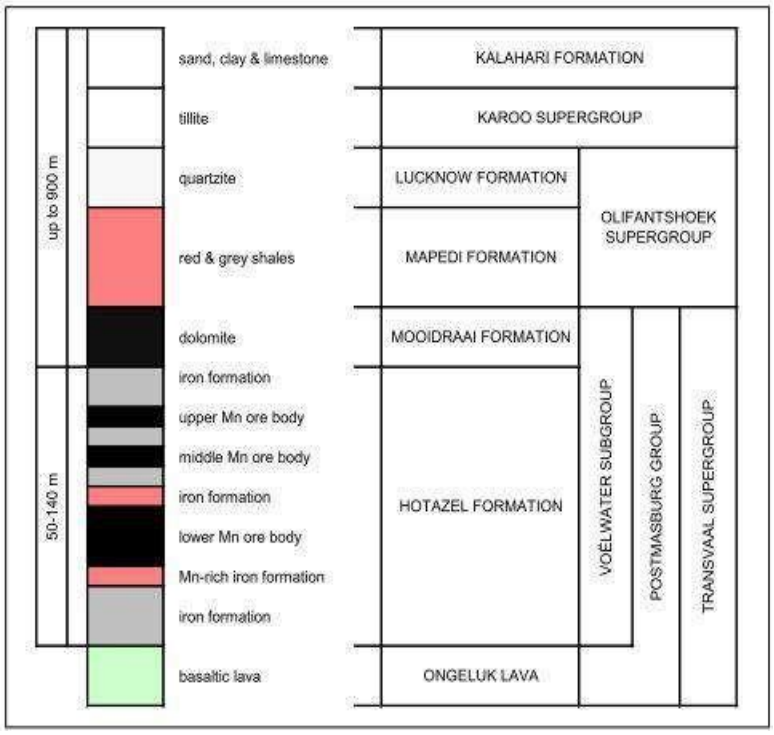


Figure 5: Stratigraphy of the Kalahari Manganese Field (Royal HaskoningDHV, 2013)

- Technological and Site Activity Alternatives

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

In terms of the technologies proposed, these have been chosen based on the long term success of the company in terms of their prospecting history. The prospecting activities proposed in the Prospecting Works Programme is dependent on the preceding phase as previously discussed, there fore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques. All infrastructure will be temporary and/or mobile.

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

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

The proposed prospecting will be on Portion 0 and 1 of Lymington 423, John Taolo Gaetsewe District Municipality, approximately 35km North-West of Khathu in the Northern Cape Province.

3.5.2 Minerals applied for

Iron ore and Manganese ore.

3.5.3 The type of activity to be undertaken;

In terms of the technologies proposed, these have been chosen based on the long-term success of their prospecting history in this sector. Drilling allows for sampling and targeting the desired mineralisation as well as resources determination. The prospecting activities proposed in the PWP are depended on the preceding phase as discussed previously therefore no alternatives are indicated but rather a phased approach of trusted prospecting techniques.

3.5.4 The design or layout of the activity;

The sit layout and proposed drilling will be planned on areas where the geological data available indicating areas of high mineralisation potential after the geological mapping. The borehole locations will be submitted to the DMRE and the landowner.

3.5.5 The technology to be used in the activity;

All equipment to be used will be provided by contractors.

Recycling: The prospecting project will in its operational phase implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation.

Stores and Material: A containerized store will be provided by the contractor, in the contractor's yard, to hold a limited store of high use items such as oils, grease, air filters etc. These stores will meet the requirements of the various health and safety and environmental legislation.

Electricity: Electricity is sourced from a mobile generator.

Water: Potable water at the project area will be sourced and transported to site by the contractor. The same water is also used for dust suppression when necessary.

Access Roads: The existing access tracks on site will be used to access drilling points. No new roads will be developed without prior communication with the landowner.

Offices: The contractor will provide a mobile office.

Energy:

Fuel types will be investigated as well as energy conserving measures will be implemented i.e. prospecting times will be during the day to save on using lights in the evening.

3.5.6 The option of not implementing the activity.

The option of not approving the activities will result in a significant loss to valuable information regarding the iron ore and Manganese ore reserve status on these properties. In addition to this, 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.

4 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

4.1 Consultation

This section of the report provides an overview of the tasks undertaken for the PPP to date. All PPP undertaken is in accordance with the requirements of the EIA Regulations 2017 (as amended). It further provides an outline of the next steps in the PPP and makes recommendations for tasks to be undertaken during the environmental assessment phase of the environmental authorisation process.

Landowners where identified through a search conducted via online search engines accessing the Title Deed office database. In addition to landowners, other relevant organisations where identified and notified of the application. This includes municipal and State departments with jurisdiction in the area and Non-Governmental Organisations (NGOs) with an interest.

4.1.1 List of landowners

- CLOETE PETRUS JOZUA- 0 (REMAINING EXTENT)
- ANTHONISSEN ANNA SOPHIA -Portion 1

4.1.2 I&AP and Stakeholder identification, registration and the creation of an electronic database

Public Participation is the involvement of all parties who are either potentially interested and or affected by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in this Environmental Impact Assessment (EIA) process. Interested and Affected parties (I&Aps) have been identified preliminarily and it is expected that more I&AP's will register during the course of the consultation period.

A public meeting was held as part of the consultation. The meeting aimed to introduce the project and address concerns raised.

The PPP tasks conducted for the proposed project to date include:

1. Identification of key Interested and Affected Parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties);
2. Formal notification of the application to key Interested and Affected Parties (all adjacent landowners) and other stakeholders;
3. Consultation and correspondence with I&AP's and Stakeholders and the addressing of their comments; and
4. Newspaper adverts.

4.2 Formal notification of the application to key Interested and Affected Parties (adjacent landowners) and other stakeholders

The project was announced as follows:

4.2.1 Newspaper advertisement

An advertisement has been published in English in a local newspaper on the 18th of November 2022 announcing the project and requesting interested and affected parties to register, the availability of the Basic Assessment report and stating the date and place for the Public Meeting. All interested and affected parties are invited and welcome to attend this meeting.

4.2.2 Site notice placement

In order to inform surrounding communities and adjacent landowners of the proposed development, site notices were erected on site and at visible locations close to the site on the 17th and 18th of November 2022.

4.2.3 Written notification

I&AP's and other key stakeholders were notified of the project and public meeting. A background information document and landowner notification letter were sent out to the identified I&AP's. The Draft Basic Assessment Report was available for comment for 30 days from the 18 of November 2022 to the 11th of January 2022 at the Deben public library. Hard Copies were submitted to commenting authorities and their comments have been incorporated in the final BAR

4.2.4 Background Information Document

A Background Information Document (BID) was distributed (by site notice and attempts through the ward councillor) to landowners. The BID provides information concerning the proposed project and invited IAPs to register and to attend the public meeting. IAPs distributed the documents to other parties who may be interested or affected by the project.

4.2.5 Public Meeting

A public meeting was advertised via email, site notices, background information documents and newspaper advertisement. The Public meeting will be held at the Deben Community Hall on the 09th December 2022. All interested and affected parties were welcome to attend. Time 10h00am.

4.3 Consultation and correspondence with I&AP's and Stakeholders and the addressing of their comments (continuous).

Comments received regarding this project have been addressed and included in the final BAR.

4.4 Release of the Report to I&AP's and stakeholders for review and comment.

This report was released to the public for public review and comment. All stakeholders and I&AP's were welcome to comment for 30 days from the 18 of November 2022 to the 11th of January 2022.

Additional electronic and or hard copies were made available to interested and affected parties and stakeholders who request for them. Hardcopies of the report were also submitted to all organs of state and relevant authorities.

4.5 Next Phases of the Public Participation Process

All comments and responses received and sent throughout the entire process will be captured and included in the consultation report which will be submitted to the Department of Mineral Resources and energy. Proof of consultation will also be included.

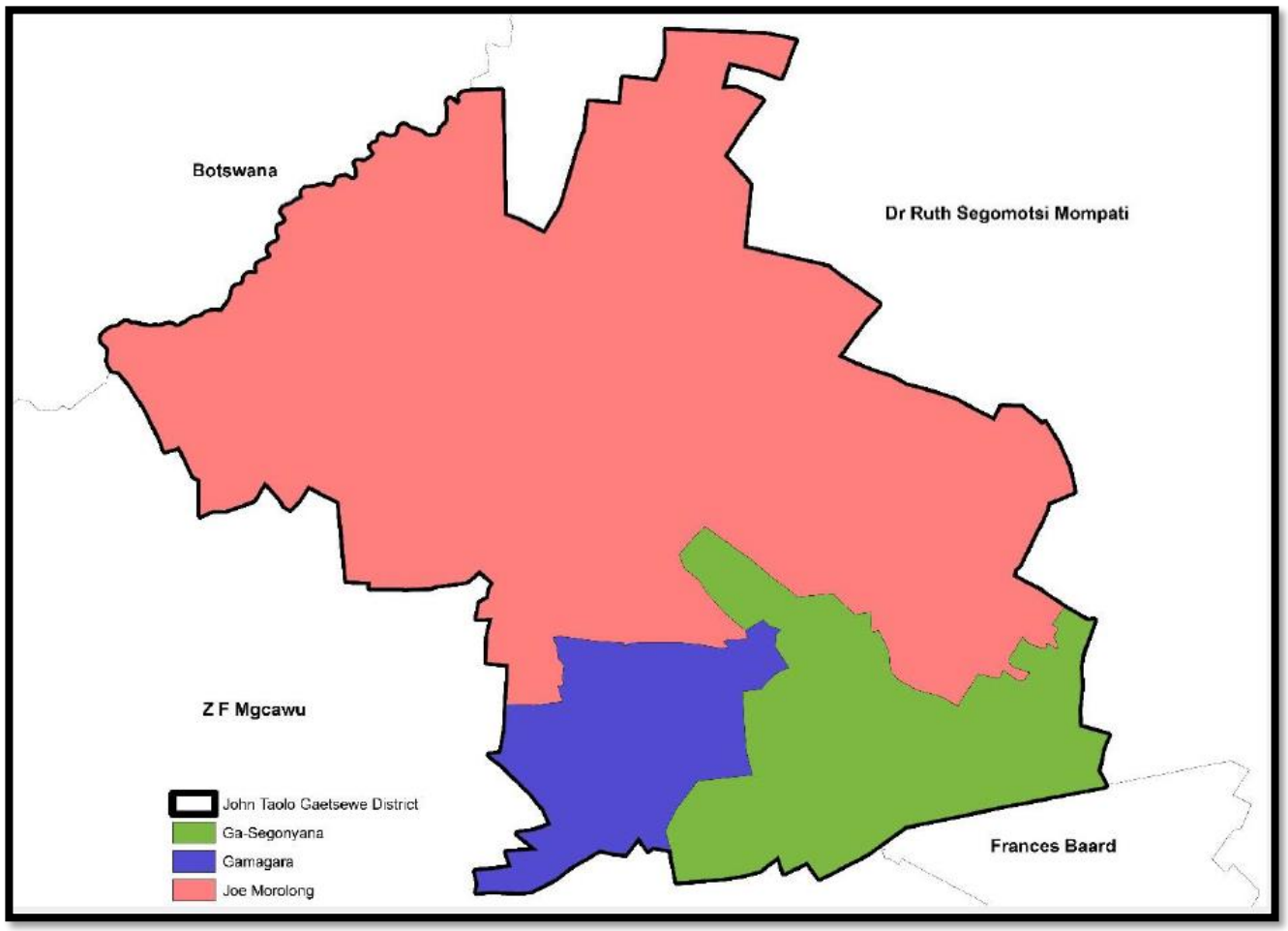
CONSULTATION APPENDICES

Appendix 1 - Tittle deeds.pdf
Appendix 2 - Acceptance letter.pdf
Appendix 3 - Newspaper advert .pdf
Appendix 4 - Site Notice .pdf
Appendix 5 -BID
Appendix 6 - Site Notice placement.pdf
Appendix 7 - Library Placement of Draft BAR.pdf
Appendix 8 – Draft BAR notification
Appendix 9 - SAHRA upload
Appendix 10 - Meeting Presentation
Appendix 11 - Attendance Register
Appendix 12 - Meeting Minutes
Appendix 13 - Meeting Pictures
Appendix 14 – Final BAR Notification
Appendix 15 – I&AP List

5 BASELINE ENVIRONMENT

5.1 Type of environment affected by the proposed activity.

The application area is located in the John Taolo Gaetsewe District Municipality. The John Taolo Gaetsewe District Municipality (JTGDM) is situated in the Northern Cape Province and is bordered by (1) The ZF Mgcawu and Frances Baard District Municipalities to the west and south; (2) The North West Province (Dr. Ruth Segomotsi Mompati District Municipality) to the east and northeast; and (3) Botswana to the northwest.



Source: JTGDM SDF Review 2017

Figure 6: Municipal Location

JTGDM is the second smallest district in the Northern Cape, occupying only 7% of the Province (27 498.9 km2) (StatsSA 2016). Administratively, the JTGDM comprises three Local Municipalities: (1) The Gamagara Local Municipality; (2) The Ga-Segonyana Local Municipality; and (3) The Joe Morolong Local Municipality, which encapsulates the geographical area covered by the former District Management Area and the former Moshaweng Local Municipality. The largest area within the District is the former District Management Area (DMA) with over 10 000 km2. Joe Morolong Local Municipality is the District's largest local municipality in terms of area size; covering an extent of 20 215 km2, with

Ga-Segonyana LM and Gamagara LM covering for 16% and 10% respectively. The JT Gaetsewe District comprises of 186 towns and settlements of which the majority (80%) are villages in the Joe Morolong Municipality.

5.1.1 Topography and Geography

The vicinity of the proposed project is characterised by flat rocky plains and sloping hills with well developed, closed shrub layer and well-developed open tree stratum consisting of *Acacia erioloba*. There are more several manganese and iron ore mining operations located within the sides of the N14 national road following the mountainous terrains.

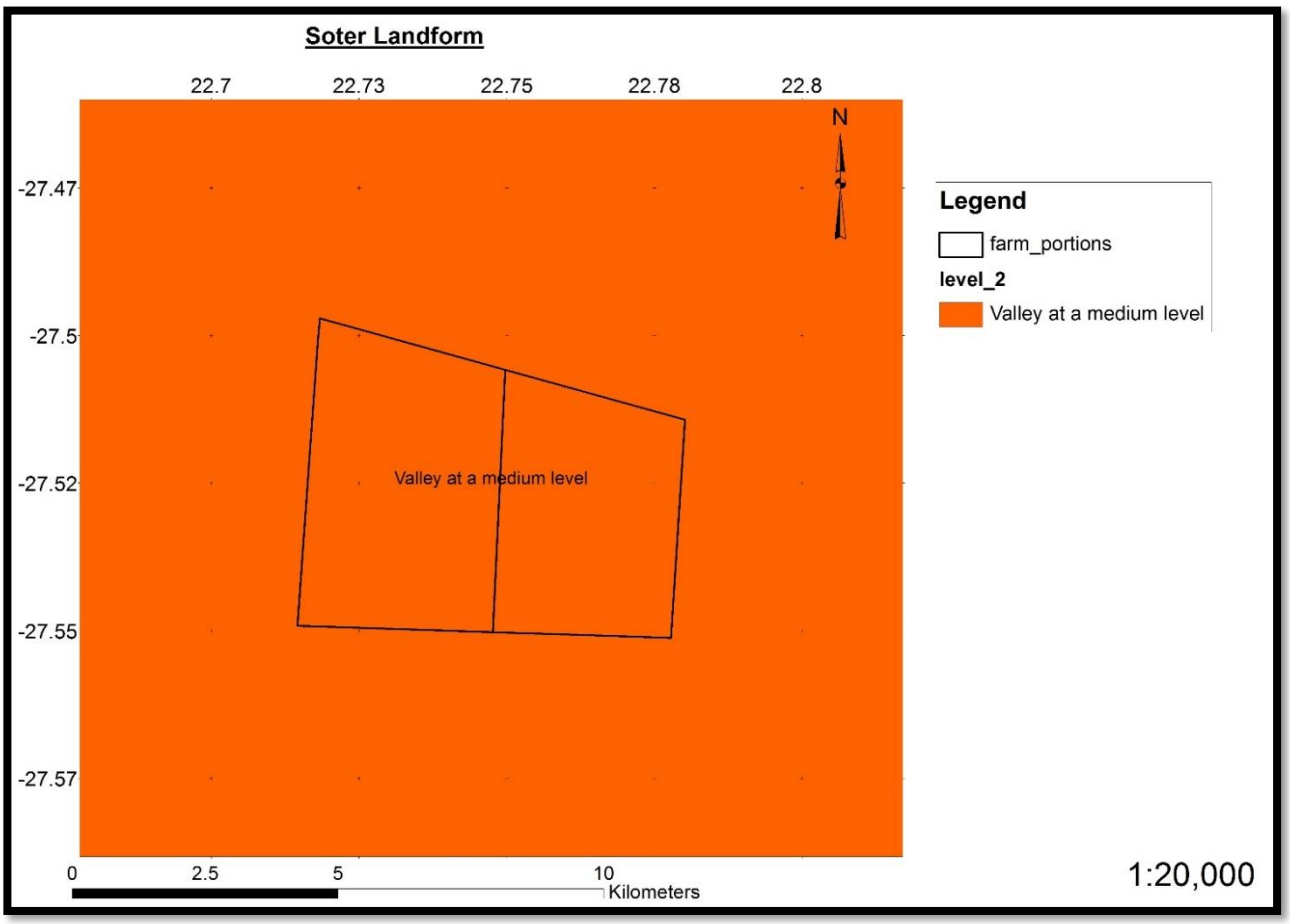


Figure 7: Relief Map

5.1.2 Climate

The proposed prospecting area comprises of summer and autumn rainfall with very dry winters. The actual Mean Annual Precipitation (MAP) is about 358 mm. However, the maximum MAP can reach about 450 mm. The wet season occurs between the months of October to March. In addition, the mean monthly maximum and minimum temperatures is about 35.9°C and -3.3°C for January and June respectively. Frost is frequent usually occurs in winter seasons. The Mean Annual Evaporation (MAE) is in the range between 2200-2600 mm (Bassom and Rossouw, 2003).

5.1.3 Air Quality

The diffusion of pollutants into the atmosphere is dependent on climatic conditions and local atmospheric stability, which may vary on a daily and seasonal basis. Potential sources of dust may be caused by moving vehicles and earthworks during drilling. Dust could also emanate from mining activities on the adjoining area.

5.1.4 Hydrology and Geohydrology

The project area falls within the Lower Vaal WMA with the major rivers located within the mentioned WMA being the Molopo River, Harts River and the Vaal River. All runoff from the project area is eventually drained westward into the Orange River.The drainage pattern in the district is determined by this ridge system, channeling all streams northwards and then sharply westwards. Falling in the Lower Vaal Water Management Area, the most important catchment area in the JTGDM is the Korannaberg Mountains, from which the majority of the streams in the district spring and from where they drain into the Kuruman River system. The project area falls within the quaternary catchment D41K which has a gross total catchment area of 4216 km2, with a net MAR of 1.92 Mm3. The upstream contributing quaternary catchment to D41K is D41J. Quaternary catchment D41J has a gross total catchment area of 3878 km2, with a net MAR of 1.75 Mm3

The major river within quaternary catchments D41K and D41J is the Ga-Mogara River which flows through the proposed project area. The Ga-Mogara River is an ephemeral river which forms a tributary to the Kuruman River. The Kuruman River flows west joining the Molopo River approximately 250 km from the confluence of the Ga-Mogara River and Kuruman River. The Molopo River drains in a southerly direction eventually joining the Orange River. The entire Molopo catchment (including D14K and D41J) are classified as endoreic i.e. catchments with large areas which do not contribute to runoff as the watercourses drain to inland pans. Average elevations at the eastern and western quaternary catchment boundary of D41K range from approximately 1200 mamsl to 1650 mamsl. The elevation drops gradually to 1000 mamsl at the confluence of the Ga-Mogara River and the Kuruman River at the outlet of D41K.

Water User Association

The proposed project falls under the Tshiping Water User Association (TWUA). The TWUA aims to promote sustainable use of water resources for the benefit of the ecology and all water users within the LV-WMA in Quaternary Catchment D41J and D73A of the Northern Cape Province. The association objectively aims to:

- Monitor and control the use of water from and on all water sources in the area of operation by way of privately-owned waterworks;

- To make sure persons or organisations use and abstract water in accordance with water use authorizations as provided for in Sections 22(1) and 32 (1) (a) of the NWA.
- To exercise cost accounting from the user and user groups

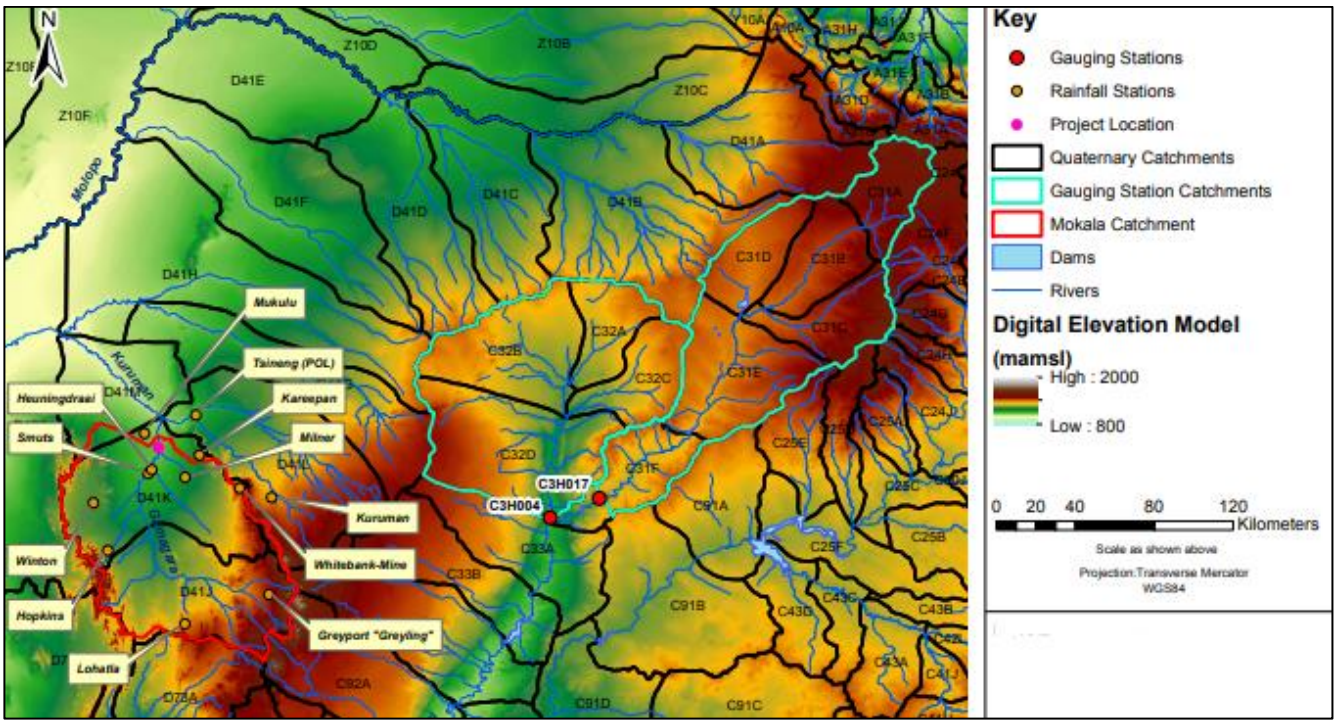


Figure 8: Surface Water

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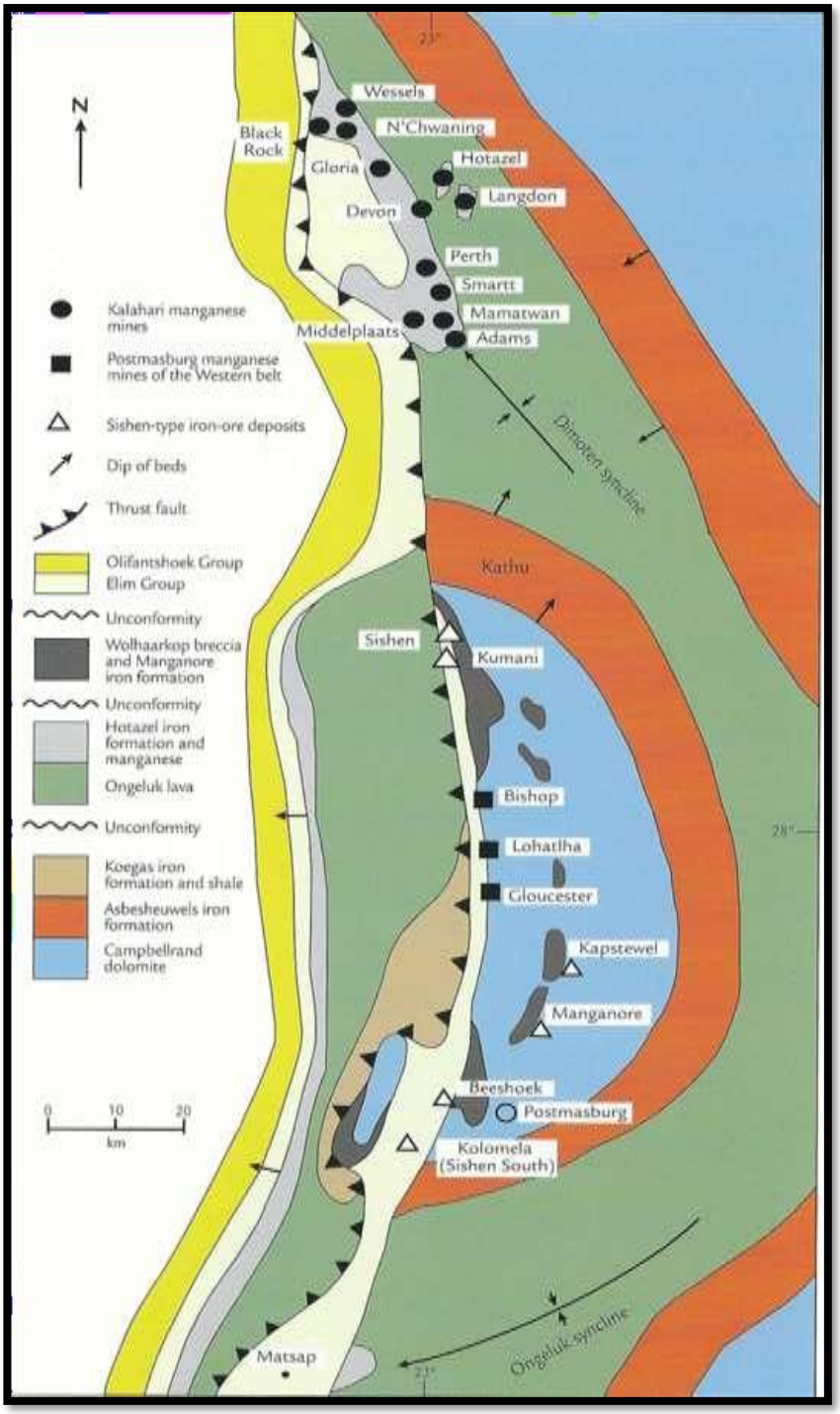

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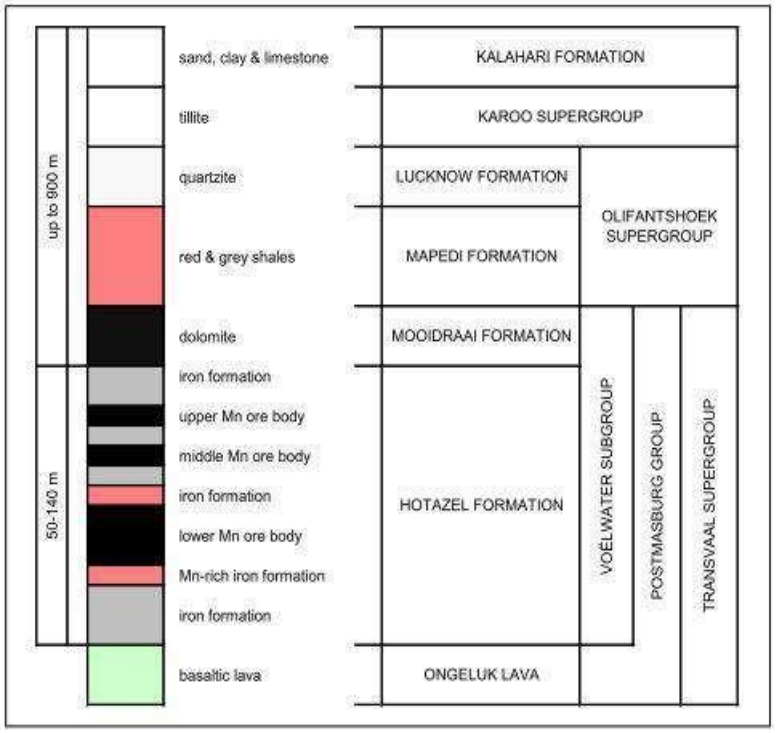

Figure 10: Stratigraphy of the Kalahari Manganese Field (Royal HaskoningDHV, 2013)

5.1.6 Soils

The soil type on site are red massive or weakly structured soils with high base status (association of well drained lixisols Cambisols, Luvisols).

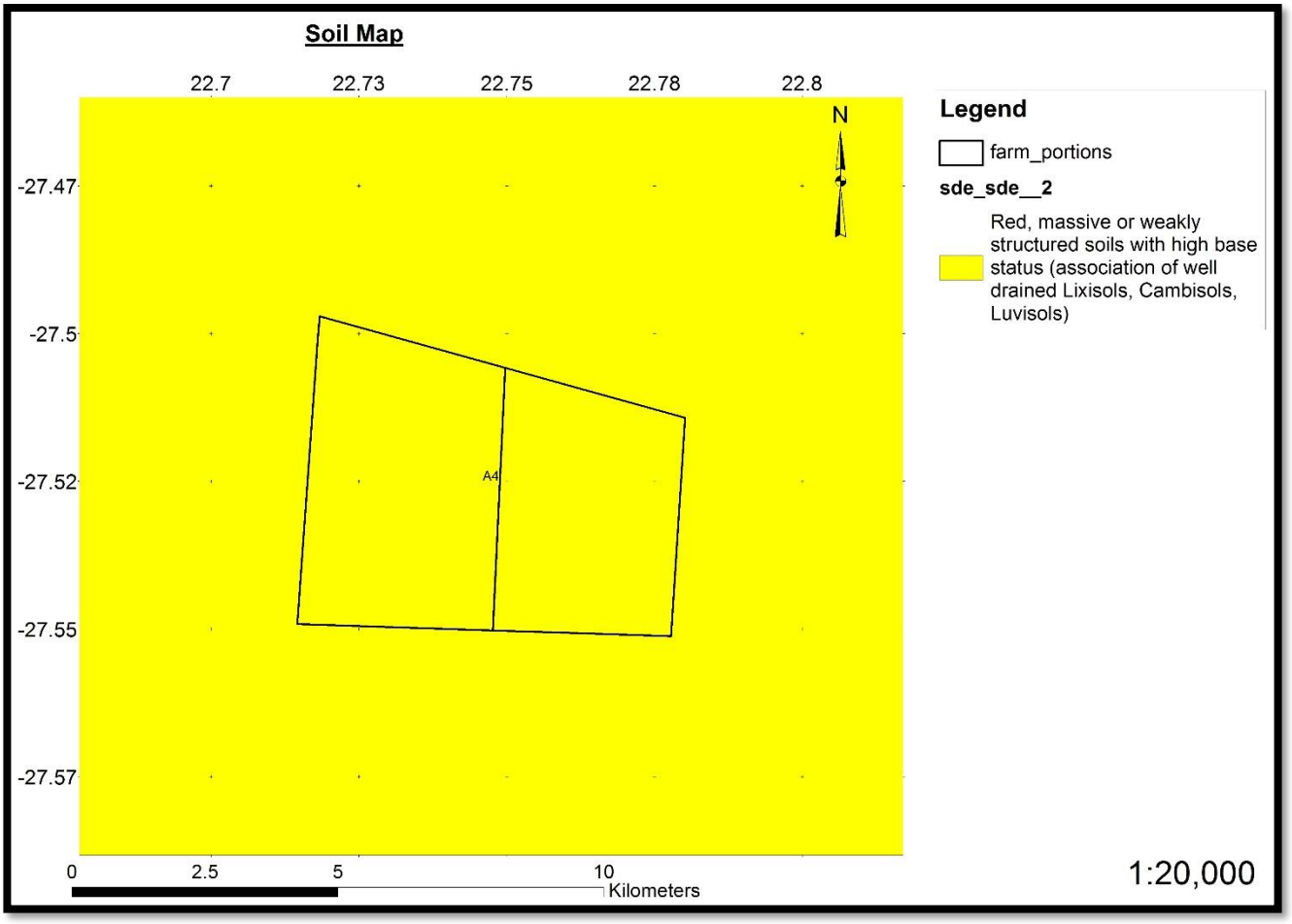

Figure 11: Soil Types

These soils are characteristic of having a loamy sand to a coarse type texture, for depths of about 1 m. The pore spaces for these soils are usually large, allowing for free drainage and increased permeability. The available water capacity (AWC) is therefore low.

5.1.7 Vegetation

Biome and bioregion

The geographic region of the study site falls on the Savanna Biome as shown below. 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 and is also the dominant vegetation in Botswana, Namibia and Zimbabwe. 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.

The environmental factors delimiting the biome are complex: altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and

almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. Summer rainfall is essential for the grass dominance, which, with its fine material, fuels near-annual fires. In fact, almost all species are adapted to survive fires, usually with less than 10% of plants, both in the grass and tree layer, killed by fire. Even with severe burning, most species can resprout from the stem bases.

The grass layer is dominated by C 4-type grasses, which are at an advantage where the growing season is hot, but where rainfall has a stronger winter component, C 3-type grasses dominate. The shrub-tree layer may vary from 1 to 20 m in height, but in Bushveld typically varies from 3 to 7m. The shrub-tree element may come to dominate the vegetation in areas which are being overgrazed (Low & Rebelo, 1996). The vegetation types found within the study site are Granite Lowveld and Tzaneen Sour Bushveld, and they are described below.

- **Southern Kalahari Mekgacha**

Distribution

This vegetation type is found Northern Cape and North-West Provinces as shown below: Valleys (including beds and adjacent slopes) of the intermittent rivers draining the dry savanna south of the Bakalahari Schwelle (broad interfluve at 1 000–1 100 m altitude) in the South African part of the Kalahari region. The major mekgacha of the region include the Nossob, Auob, Molopo and Kuruman Rivers. A more extensive (endorheic) system of mekgacha is found north of the Bakalahari Schwelle in central Botswana.

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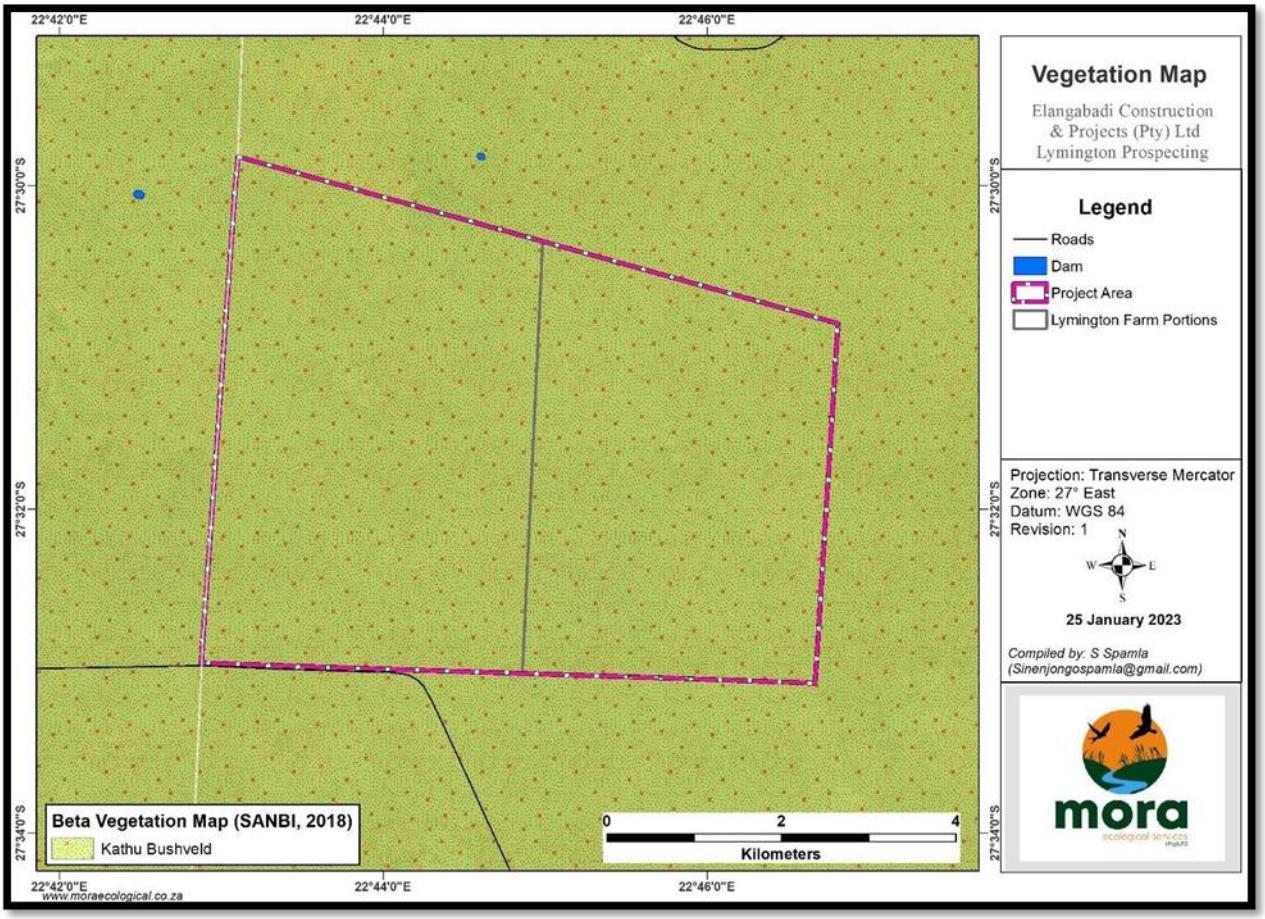


Figure 12: Vegetation Map

5.1.7.1 Results Of the Ecological Assessment

The vegetation around the study area is characterised by low shrubs, few tall trees and tall grasses.

No sensitive faunal species were observed during the survey.

Species recorded in the proposed development area are represented in Appendix B of the Ecological Study. All of the recorded species are of low sensitivity as they are mostly widespread species. There are no objections from an ecological perspective for the proposed prospecting activities to proceed.

Figure 13. Photographic representation of the untransformed habitats.

Figure 14. Photographic representation of the untransformed habitat.

Figure 15. Photographic representation of the untransformed habitat.

Figure 16. Purple Roller (top), White-browed Sparrow Weaver (bottom) and nest of Sociable Weaver.

5.1.7.2 Alien and Invasive flora species

Invasive alien species are establishing and expanding in growing number world, and in many parts of the invasions are often followed by major negative effects on ecosystems, the environment, and human health. No alien and invasive species were encountered on site.

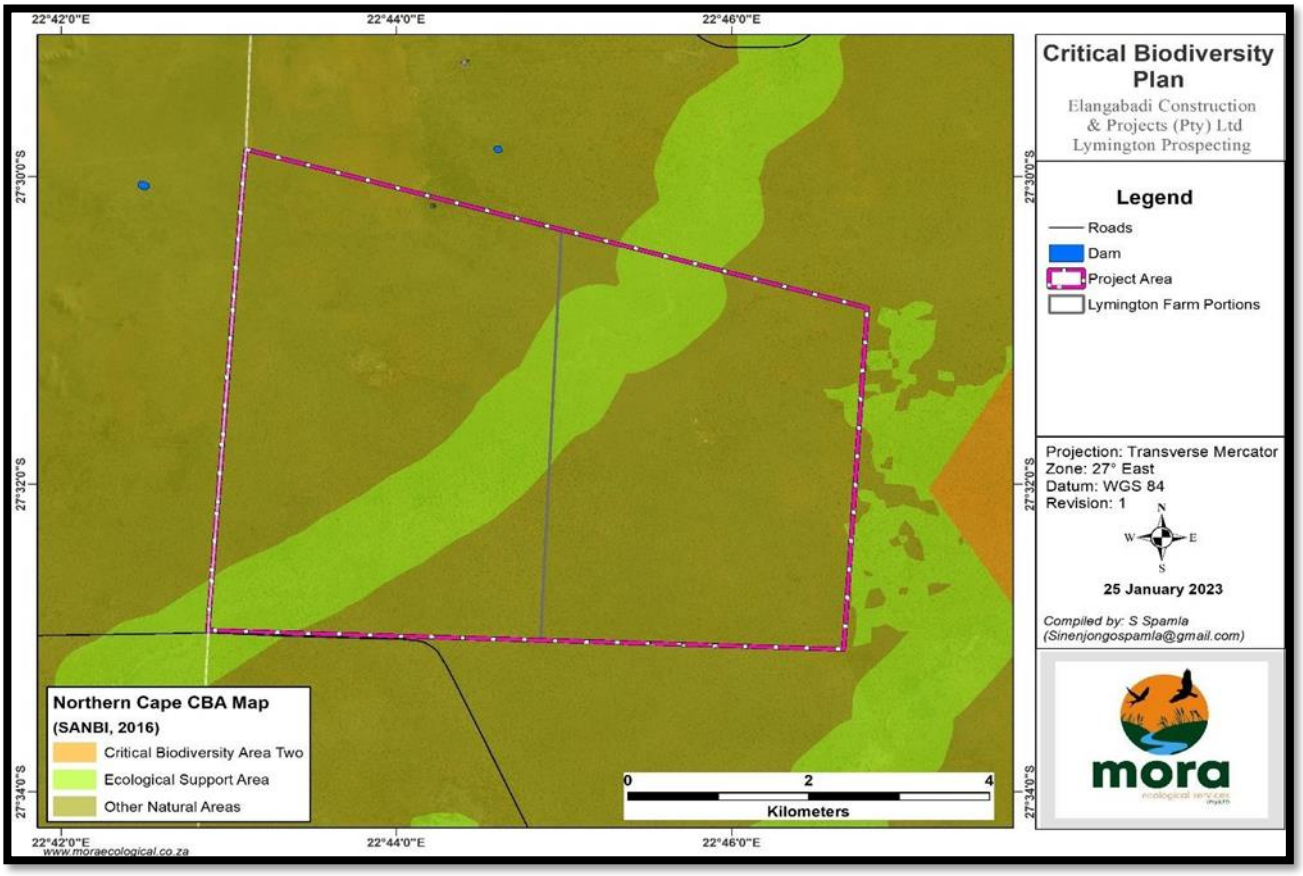


Figure 17: Northern Cape Critical Biodiversity Plan within the proposed development area.

5.1.8 Heritage Resources

Archaeological reconnaissance of the study area was conducted by means of inspecting historical aerial imagery and topographical maps in order to identify potential heritage remains. The historical topographical datasets dating to 1973/1974, 2001, and 2009/2013, as well as the historical aerial images dating to 1957, 1965, 1972, and 1988, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. Five potential sites were observed within the demarcated boundary. It should be noted that the prefixes '2722DA' and '2722DB' are not used when referring to the site names due to the length of the name, but are recorded as such. Based on contemporary satellite imagery, one of the sites (B02) appears to have been demolished

since no surface remains could be detected . The remaining sites appear to consist of intact surface infrastructure (B01, B03 – B05). The total area inspected was 3080.7 ha. Because heritage resources are often associated with water sources such as perennial and non-perennial rivers/streams, as well as perennial and non-perennial pans, these water sources were buffered by a distance of 500 m, indicating a potentially sensitive area.

Table 4**:** Potential site location.

Site No	**Type**	**Identification Source**	**Parent Farm**	**Farm Portion**	**Current Status**	**Estimated Extent (ha)**	**Lat (y)**	**Lon (x)**
2722DA-B01	Building	1957 Aerial	Lymington 423	RE	Surface Remains	9.3	-27.5205	22.73105
2722DB-B02	Building	1974 Topo	Lymington 423	1	Demolished	4.4	-27.5281	22.76574
2722DA-B03	Building	2001 Topo	Lymington 423	RE	Surface Remains	1.2	-27.5193	22.73303
2722DB-B04	Building	2001 Topo	Lymington 423	1	Surface Remains	2.1	-27.5285	22.76372
2722DB-B05	Building	2017 Satellite	Lymington 423	1	Surface Remains	0.8	-27.5265	22.76298

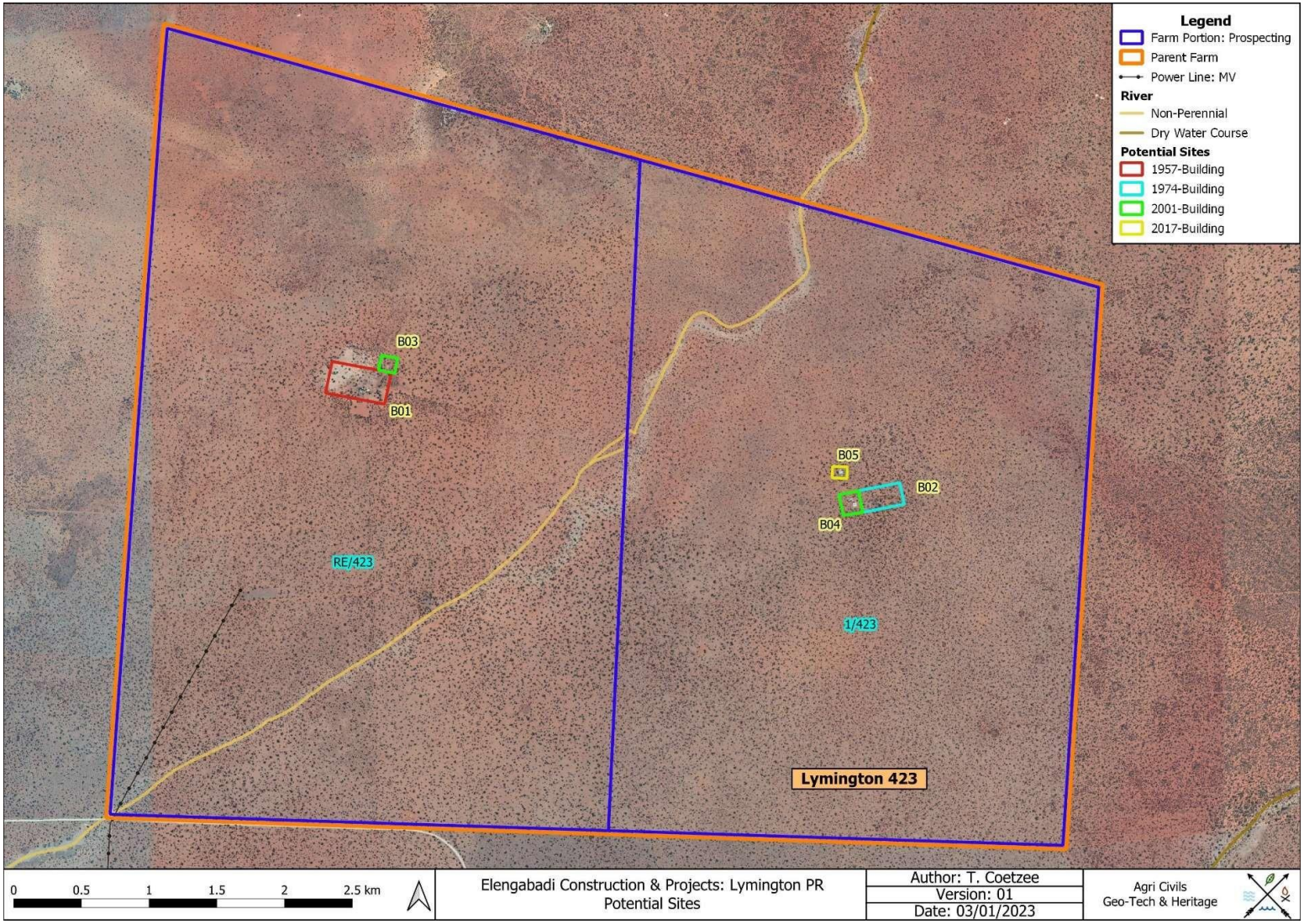


Figure 18**:** Potential Sites.

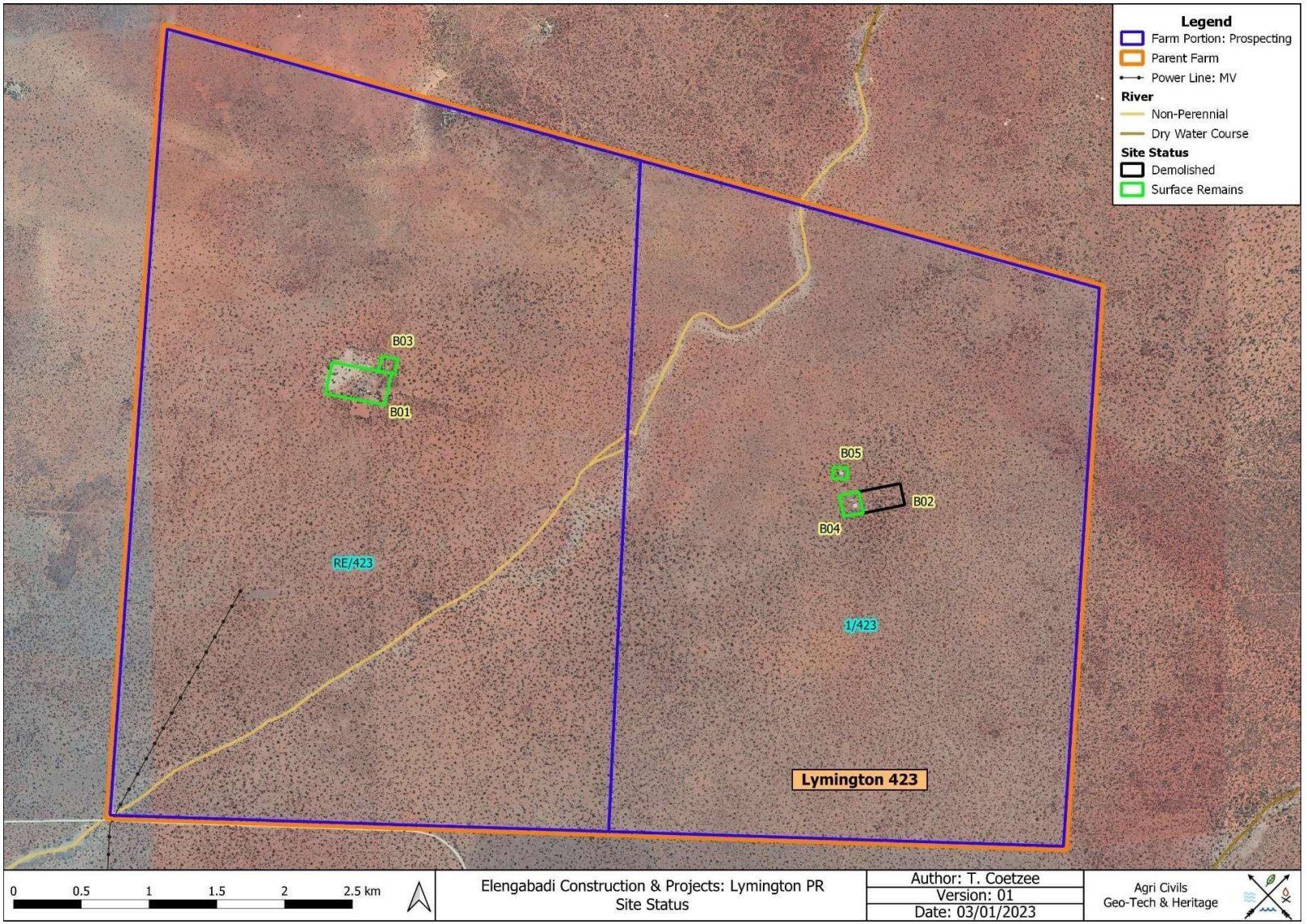


Figure 19**:** Site Status.

5.1.8.1.1 Limitations

Using historical topographical maps and historical aerial images for locating heritage resources have several shortcomings. Potential heritage remains, such as buildings, structures and graves/cemeteries, are not always indicated on topographical maps and are often omitted between different publications. Historical aerial imagery, on the other hand, might have a poor image resolution that renders potential heritage sites invisible. Inaccuracies during the georeferencing process may also lead to some heritage sites not being plotted, as well as dense vegetation obscuring heritage sites. Due to the small size of some heritage sites, such as Stone Age sites, small Iron Age features, rock art sites and burials, such sites are rarely visible on aerial imagery and are generally only detected during pedestrian surveys.

5.1.8.2 Archaeological Background

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods. This section of the report provides a general background to archaeology in South Africa.

5.1.8.2.1 The Stone Age

The earliest stone tool industry, the Oldowan, was developed by early human ancestors which were the earliest members of the genus *Homo,* such as *Homo habilis*, around 2.6 million years ago. It comprises tools such as cobble cores and pebble choppers (Toth & Schick 2007). Archaeologists suggest these stone tools are the earliest direct evidence for culture in southern Africa (Clarke & Kuman 2000). The advent of culture indicates the advent of more cognitively modern hominins (Mitchell 2002: 56, 57).

The Acheulean industry completely replaced the Oldowan industry. The Acheulian industry was first developed by *Homo ergaster* between 1.8 to 1.65 million years ago and lasted until around 300 000 years ago. Archaeological evidence from this period is also found at Swartkrans, Kromdraai and Sterkfontein. The most typical tools of the ESA (Early Stone Age) are handaxes, cleavers, choppers and spheroids. Although hominins seemingly used handaxes often, scholars disagree about their use. There are no indications of hafting, and some artefacts are far too large for it. Hominins likely used choppers and scrapers for skinning and butchering scavenged animals and often obtained sharp ended sticks for digging up edible roots. Presumably, early humans used wooden spears as early as 5 million years ago to hunt small animals.

Middle Stone Age (MSA) artefacts started appearing about 250 000 years ago and replaced the larger Early Stone Age bifaces, handaxes and cleavers with smaller flake industries consisting of scrapers, points and blades. These artefacts roughly fall in the 40-100 mm size range and were, in some cases,

attached to handles, indicating a significant technical advance. The first *Homo sapiens* species also emerged during this period. Associated sites are Klasies River Mouth, Blombos Cave and Border Cave (Deacon & Deacon 1999).

Although the transition from the Middle Stone Age to the Later Stone Age (LSA) did not occur simultaneously across the whole of southern Africa, the Later Stone Age ranges from about 20 000 to 2000 years ago. Stone tools from this period are generally smaller, but were used to do the same job as those from previous periods; only in a different, more efficient way. The Later Stone Age is associated with: rock art, smaller stone tools (microliths), bows and arrows, bored stones, grooved stones, polished bone tools, earthenware pottery and beads. Examples of Later Stone Age sites are Nelson Bay Cave, Rose Cottage Cave and Boomplaas Cave (Deacon & Deacon 1999). These artefacts are often associated with rocky outcrops or water sources.

5.1.8.2.2 The Iron Age & Historical Period

The Early Iron Age marks the movement of farming communities into South Africa in the first millennium AD, or around 2500 years ago (Mitchell 2002:259, 260). These groups were agro-pastoralist communities that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Archaeological evidence from Early Iron Age sites is mostly artefacts in the form of ceramic assemblages. The origins and archaeological identities of this period are largely based upon ceramic typologies. Some scholars classify Early Iron Age ceramic traditions into different “streams” or “trends” in pot types and decoration, which emerged over time in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). Early Iron Age ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. This period continued until the end of the first millennium AD (Mitchell 2002; Huffman 2007). Some well-known Early Iron Age sites include the Lydenburg Heads in Mpumalanga, Happy Rest in the Limpopo Province and Mzonjani in Kwa-Zulu Natal.

The Middle Iron Age roughly stretches from AD 900 to 1300 and marks the origins of the Zimbabwe culture. During this period cattle herding appeared to play an increasingly important role in society. However, it was proved that cattle remained an important source of wealth throughout the Iron Age. An important shift in the Iron Age of southern Africa took place in the Shashe-Limpopo basin during this period, namely the development of class distinction and sacred leadership. The Zimbabwe culture can be divided into three periods based on certain capitals. Mapungubwe, the first period, dates from AD 1220 to 1300, Great Zimbabwe from AD 1300 to 1450, and Khami from AD 1450 to 1820 (Huffman 2007: 361, 362).

The Late Iron Age (LIA) roughly dates from AD 1300 to 1840. It is generally accepted that Great Zimbabwe replaced Mapungubwe. Some characteristics include a greater focus on economic growth and the increased importance of trade. Specialisation in terms of natural resources also started to play a role, as can be seen from the distribution of iron slag which tend to occur only in certain localities compared to a wide distribution during earlier times. It was also during the Late Iron Age that different areas of South Africa were populated, such as the interior of KwaZulu Natal, the Free State, the Gauteng Highveld and the Transkei. Another characteristic is the increased use of stone as building material. Some artefacts associated with this period are knife-blades, hoes, adzes, awls, other metal objects as well as bone tools and grinding stones.

The Historical period mainly deals with Europe's discovery, settlement and impact on southern Africa. Some topics covered by the Historical period include Dutch settlement in the Western Cape, early mission stations, Voortrekker routes and the Anglo Boer War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

5.1.8.2.3 Archaeo-History

Worth mentioning is the fact that Wonderwerk Cave, a provincial heritage site, is located in the Kuruman- Postmasburg district. The cave bears evidence of continued human activity from 10 000 years ago (Snyman 1992: 13). Also, the remains of the extinct Cape horse and giant hartebeest were discovered (Mitchell 2002: 140). Wonderwerk Cave is also known for the abundant material culture and include unusual finds such as stone rings, chert pendants and engraved stones (Mitchell 2002: 184).

The Kuruman/Postmasburg area has a rich history spanning from the Early Stone Age to the Historical times. Below is a brief account of earlier events in the general area.

Hunter gatherer activities in the Kuruman area were present until the 1880's and even after that in the area west of the town. Several rock engravings in the Kuruman valley bear testimony to their presence in the area. Due to increased population hunter gatherer communities moved in a western and north-western direction in order to be able to continue exploiting game. Contact with early Batswana communities also resulted in the integration of the two groups. It was only during the last 500 years that the Batswana entered the northern regions of the Northern Cape. Possible factors affecting this might have been unfavourable environmental conditions such as heat, drought and poor soils in terms of agriculture. However, it appears that the Tlharo were the first Batswana group to arrive in the general area. Accordingly, the Batswana under Notwane clashed with Kudumane's hunter gatherer community near the area where the town is today. After Notwane defeated Kudumane they explored

in the direction of present day Postmasburg, Danielskuil and Campbell, where he clashed with the Batlhaping (Snyman 1992: 15-16).

During the mid-18th Century, the Batlhaping moved from the Taung area first in a southern direction and later in a western direction and settled at Nokaneng, south of Olifantshoek. Towards the end of the 18th Century the Batlhaping under Molehabangwe established a loose confederation. Around 1770 the Korana crossed the Orange River and made contact with the Batlhaping. Initial interaction was peaceful and both groups benefitted from trade activities. Accusations of cattle theft, however, ended peaceful relations. Due to additional conflict with Korana groups, the Batlhaping first moved to Kathu and from there to Ga-Mopedi near the Kuruman River. With the first colonial contact in 1801 the area was in a rather fragile state as Korana and Griqua groups exerted additional pressure on existing communities (Snyman 1992: 16).

A few European explorers ventured to these areas as well. Two expeditions worth mentioning are that of Lichtenstein in 1805 and that of Andrew Smith in 1835. After Lichtenstein reached the Kuruman River where they met Tswana speaking people, they turned in a southern direction towards the Orange River. It is noted that Lichtenstein's party made contact with Mulihawang's capital consisting of about 600 houses near the Kuruman River (PGS 2010).

Following the first colonial contact with the area, colonials in the Cape thrived to establish a cattle trade with the Batlhaping. The Batswana also caught the attention of missionaries such as Jan Matthys Kok and William Edwards who accompanied the expedition led by P.J. Truter and William Somerville to the Batlhaping. This first mission expedition was unsuccessful, but follow-up expeditions around 1817 succeeded. Robert Moffat succeeded James Read at the mission station in 1821 and moved the mission station to its present location in 1824 (Snyman 1992: 17-25).

During the mid-19th Century, Kuruman served as the gate to the interior of South Africa and was regarded as a hub for hunting expeditions, trade, missionary work and exploration. With the discovery of diamonds in 1867 near Hopetown and gold in 1868 in Matabeleland, however, political instability in the general area increased (Snyman 1992: 42-43).

Evidence regarding white settlement in the study area suggests brief occupation during the latter part of the 19th Century. Permanent settlement, however, only followed around 1907 and 1908 when a period of drought in the then Cape Colony encouraged relocation (Smith 1966 cited in PGS 2010: 25).

5.1.8.3 Historical aerial Imagery and topographical maps

Historical images and topographical maps dating to 1957, 1965, 1972, 1973/1974, 1988, 2001, and 2009/2013 were used to determine the location and relative age of the structures and buildings associated with the demarcated farm portion, as well as to establish historical land uses associated with the land parcels.

- **1957 Aerial Image**

The aerial image dating to 1957 (**Appendix A: Figure 20 of the Heritage Study**) indicates the presence of one area associated with buildings or structures (Site B01), while the remaining area seems to consist of open bushveld.

- **1965 & 1972 Aerial Images**

The 1965 and 1972 aerial images (**Appendix A: Figures 21 & 22 of the Heritage Study**) show no additional buildings, structures or activities.

- **1973/1974 Topographical Map**

The 1973/1974 topographical map indicates one additional site (B02) consisting of two buildings near the centre of Portion 1, while no additional activities appear to be associated with the surrounding environment (**Appendix A: Figure 23**). It should also be noted that two buildings and two kraals are noted at Site B01.

- **1988 Aerial Image**

The 1988 aerial image (**Appendix A: Figure 24 of the Heritage Study**) shows no additional buildings, structures or activities. However, Site B02 identified on the 1973/1974 topographical map, is not visible (**Appendix A: Figure 23 of the Heritage Study**).

- **2001 Topographical Map**

Two building sites (B03 & B04) were identified within the study area: Site B03 consisting of one building bordering Site B01 on the Remaining Extent and Site B04 consisting of three buildings bordering Site B02 on Portion 1 (**Appendix A: Figure 25 of the Heritage Study**). Also, two buildings are noted at Site B01, and none at Site B02.

- **2009/2013 Topographical Map**

No additional sites were identified on the topographical map dating to 2009/2013 (**Appendix A: Figure 26 of the Heritage Study**), while only one building is indicated at Sites B01 and B04.

- **Satellite Imagery (Google Earth 2017)**

Site B05 was identified as a building to the north of Site B04 on Portion 1 and is still visible on the most recent satellite imagery dating to 2020 (**Figure 6 of the Heritage Study**).

5.1.8.3.1 Examples of Heritage Sites

Figures below are examples of heritage sites often encountered. Iron Age and Stone Age sites are often associated with water sources, rocky outcrops and hills and should be avoided by the proposed prospecting activities.

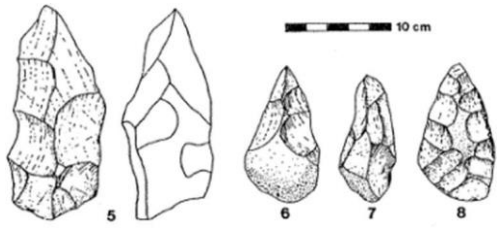


Figure 20**:** ESA artefacts from Sterkfontein (Volman 1984).

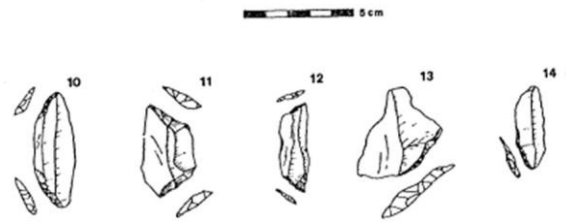


Figure 21**:** MSA artefacts from Howiesons Poort (Volman 1984).

Figure 22**:** LSA scrapers (Klein 1984).

Figure 23**:** Example of undecorated Iron Age potsherds.

Figure 24**:** Example of a decorated Iron Age potsherd.

Figure 25**:** Example of a potential Iron Age granary base.

Figure 26**:** Example of a stone-walled Iron Age site.

Figure 27**:** Example of a broken lower grinding stone dating to the LIA.

Figure 28**:** Example of a dilapidated stone-walled site dating to the LIA.

Figure 29**:** Example of a historical building.

Figure 30**:** Example of a dilapidated historical kraal.

Figure 31**:** Example of a potential informal grave.

5.1.8.4 Previous Heritage Studies

- **Khumani Iron Ore Mine: Return Water Dam, Pipelines and Water Containment Facility**

A Heritage Impact Assessment was conducted for the construction of a new Return Water Dam, Pipelines and Containment Facility for the Khumani Iron Ore Mine near Sishen in the Northern Cape Province. The Khumani Iron Ore HIA project area is located approximately 40 km southeast the proposed Elengabadi Lymington project area. The HIA noted that the study area is located within areas transformed by mining activities. A few undiagnostic stone flakes were observed, but according to the author the flakes occurred out of context and the possibility exists that it might have been pseudo tools created by heavy duty machinery (Van der Walt 2019).

- **AIA for the Photo-Voltaic Solar Power Generation Plant on the Farm Adams 328**

A Heritage Impact Assessment was conducted by Archaetnos & Cultural for the construction of a photo-voltaic solar power generation plant on a portion of the remaining extent of the farm Adams 328 near Hotazel. The study, located approximately 27 km northeast of the proposed Elengabadi Lymington prospecting area, recorded one stone tool that possibly dates to the MSA, as well as building ruins dating to contemporary or possibly historical times. Both sites were assigned a low significance (Pelser 2012).

- **Lomoteng heritage study, Postmasburg**

Peter Beaumont (2011) conducted a baseline archaeological study on the 6404 ha Lomoteng 669 farm 30 km north of Postmasburg and approximately 63 km southeast of the proposed Elengabadi Lymington project area. The purpose of the study was to evaluate the area to determine the level of impact 18 prospecting boreholes would have on heritage resources. During the survey, four Stone Age sites of heritage importance were recorded. These included: a core from which four flakes had been detached; a weathered andesite flake, an irregular red jasper flake, and blade distal portion of foreign jaspilite. A possible explanation offered for the low artefact densities suggests that the lack of surface water in the area played a determining role in site settlement selection. Other heritage material noted during the survey include a storeroom older than 60 years, as well as six cobble-covered graves.

- **Desktop Heritage survey of the Proposed Mamatwan Manganese Mine**

A desktop heritage survey was conducted for the construction of a slimes handling and bulk water storage facility at the Mamatwan Mine. The area demarcated for the slimes handling and bulk water storage facility is located directly west of R380 secondary road and roughly 24 km northeast of the proposed Elengabadi Lymington project area. According to the desktop study, no national monuments, battlefields or historical cemeteries are known to exist in the immediate area. It is also

mentioned that Stone Age scatters and historical buildings are associated with the general area, while Iron Age settlements tend to occur near riverbanks (Anderson 2016).

5.1.8.5 Archaeological and Historical Remains

This section serves as an indication of heritage material associated with the study area based on previous research, as well as historical aerial images and topographical maps.

5.1.8.5.1 Stone Age Remains

Several of the heritage studies conducted in the vicinity of the study area located Stone Age remains (see Van Der Walt 2019, Pelser 2012, Beaumont 2011), while the study conducted by Anderson notes the presence of Stone Age sites in the general area. None of the studies, however, recorded high artefact densities. Because such sites are often associated with water sources, Stone Age material is more likely to be encountered within the 500 m river buffer zone of the study area.

5.1.8.5.2 Iron Age Farmer Remains

Although stone-walled sites are often detectable on satellite and aerial imagery, none were observed within the demarcated prospecting area. Although not visible on satellite imagery, the presence of such sites might be obscured by dense vegetation and poor preservation. Also, the heritage study conducted by Anderson (2016) notes the potential presence of Iron Age sites near river banks. None of the conducted studies, however, recorded such sites.

5.1.8.5.3 Historical Remains

Site B01 was identified as an area associated with buildings on the 1957 aerial image (Appendix A: Figure 20 of the Heritage Study). Buildings/infrastructure are also evident on all remaining datasets. Although the number of buildings could not be determined from the aerial images, the 1973/1974 topographical map shows the presence of two buildings and two kraals (Appendix A: Figure 23 of the Heritage Study), while the 2001 topographical map also shows two buildings, but at different locations within the site boundary. The 2009/2013 topographical map (Appendix A: Figure 25 of the Heritage Study), however, shows only one building (Appendix A: Figure 26 of the Heritage Study). Since the buildings are shown at different locations, the possibility exists that the buildings were demolished and replaced by modern buildings. However, it is also possible that inaccuracies occurred during the creation of the topographical maps.

Site B02 could not be detected on any of the aerial/satellite images, but was identified on the 1973/1974 topographical map as two buildings. The buildings are also omitted from the remaining topographical maps. The possibility therefore exists that the site might date to an earlier age, but

might not be visible on aerial imagery. Since the site is not shown on subsequent topographical maps, it is assumed that the buildings were demolished between 1974 and 2001.

The heritage study conducted by Pelser (2012) recorded ruins that could date to historical times, while Beaumont (2011) noted a storeroom older than 60 years.

5.1.8.5.4 Contemporary Remains

Evidence from satellite and aerial imagery, as well as topographical maps, indicate the presence of three sites (B03 – B05) that appear to date to contemporary times. These sites do not exceed 60 years of age. Only one of the sites (B03) is located on the Remaining Extent of the Farm Lymington 423, while the remaining sites are located on Portion 1 of the Farm Lymington 423.

Sites B03 and B04 appear to have been constructed between 1988 and 2001. Both sites still appear to be associated with surface infrastructure. It should also be noted that based on the 2009/2013 topographical map, two of the buildings at Site B04 were demolished.

One site was identified on Google Earth satellite imagery dating to 2017 and appears still to be associated with surfaced infrastructure.

The heritage study conducted by Pelser (2012) noted building ruins that might date to contemporary times.

5.1.8.5.5 Graves

No graves, cemeteries or burial grounds were observed on historical aerial imagery and topographical maps. However, such sites are rarely visible on aerial imagery and are not always indicated on topographical maps. Such sites are also often associated with historical buildings and the possibility therefore exists that graves may be associated with the identified sites.

The heritage study conducted by Beaumont (2011) recorded six cobble-covered graves.

The background study revealed that the area was inhabited by descendants of the Khoisan and early colonial settlers.

- Because archaeological artefacts generally occur below the surface, the possibility exists that culturally significant material and skeletal remains may be uncovered during the construction and operational phases of the development. Should any artefacts or skeletal remains be uncovered, all activities must be suspended, pending further archaeological investigations by

a qualified archaeologist in terms of Section 36 (6) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999); and

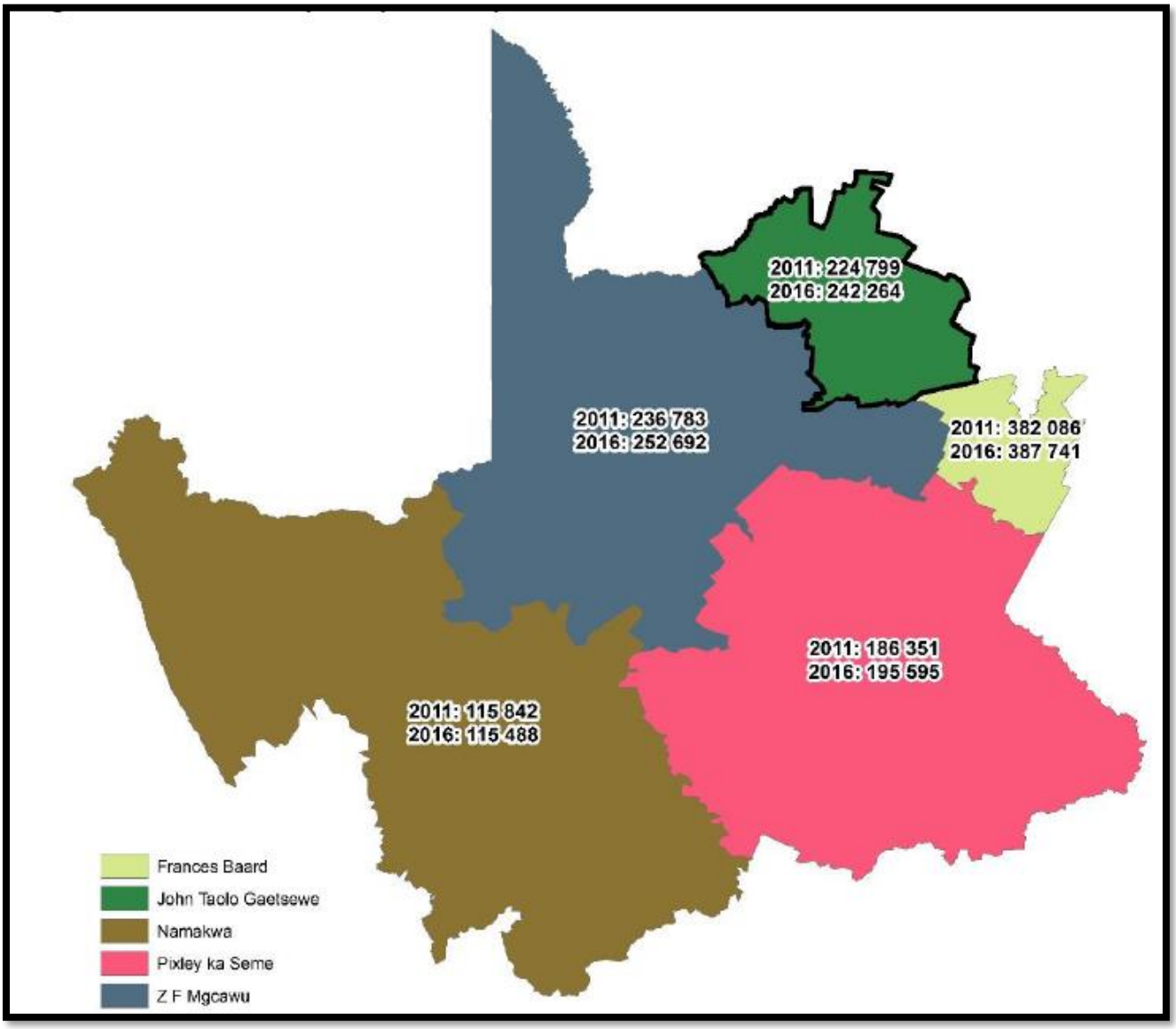
- Should the need arise to expand the development to beyond the study area the following applies: A qualified archaeologist must conduct a full Phase 1 Archaeological Assessment on the area beyond the study area, which will be affected by the expansion of the development, in order to determine the occurrence an extent of any archaeological sites and the impact the expansion of the development might have on these sites.
- Given the nature of the proposed prospecting activities, it is not likely to adversely impact on any archaeological material of the area. However, it should be indicated that if one of the prospecting sampling sites fall on the site where stone tools were recorded, a professional archaeologist should be made available to monitor and document all chance finds.
- In the absence of confirmable archaeological or physical cultural resources along the larger project receiving environment, it is recommended that the project be exempted from any further archaeological assessment studies. However, it should be indicated that if one of the prospecting sampling sites fall on the site where stone tools were recorded, a professional archaeologist should be made available to monitor and document all chance finds. This will also aid in the establishment of whether the densities are universally low, or not. The Environmental Control Officer or any person responsible for site management should be aware of the indicators of sub-surface sites, this may include the following:
    - Bone concentrations, either animal or human,
    - Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate),
    - Ceramic fragments, including potsherds,
    - Bone concentrations,
    - Stone concentrations that appear to be formally arranged (may indicate the presence of an underlying burial),
    - Fossilised remains of fauna and flora, including trees.
- All construction within a radius of at least 10m of such indicator should cease and the area be demarcated by a danger tape. Accordingly, a professional archaeologist or SAHRA officer should be contacted immediately. In the meantime, it is the responsibility of the Environmental officer and the contractor to protect the site from publicity (i.e., media) until a mutual agreement is reached. It is mandatory to report any incident of human remains encountered to the South African Police Services, SAHRA staff member and professional archaeologist. Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or

collect such remains, whether of recent origin or not, without the endorsement by SAHRA or a professional archaeologist.

5.2 Regional Socio-Economic Structure

5.2.1 Population and Demographics

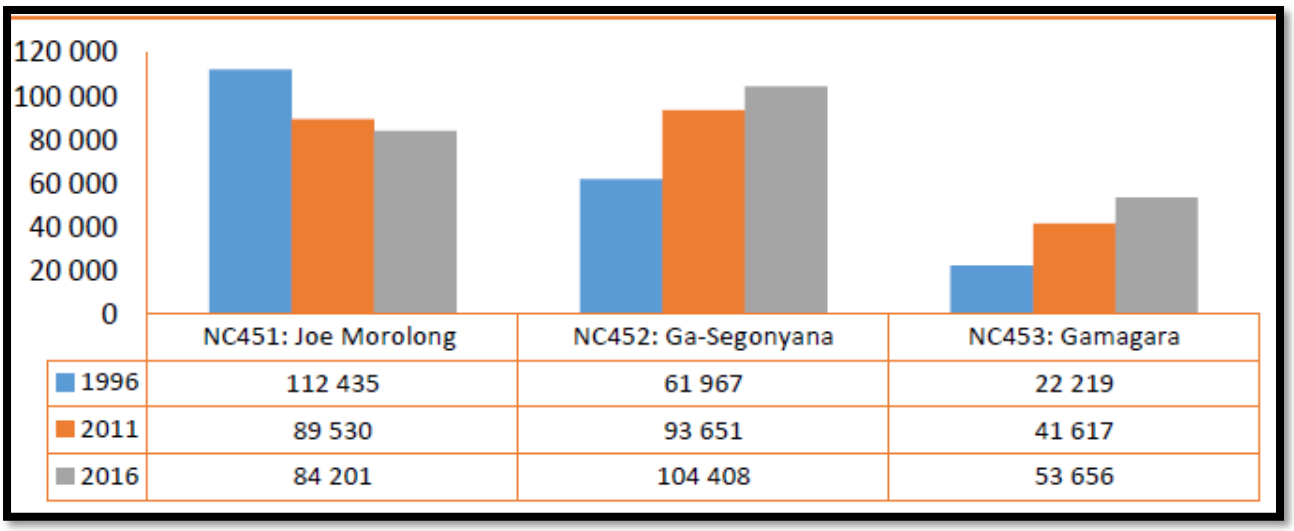
The population of the John Taolo Gaetsewe District Municipality accounts for 20.3% of the total population in the Northern Cape Province. It is the third largest population size after the Frances Baard and ZF Mgcawu Districts. This position has been consistent throughout the period between 2011 and 2016.



Source: StatsSA 2011 & 2016.

Figure 32:Northern Cape Population per District

The JTGDM has had a population increase of about 17 465; from 224 799 in 2011 to 242 264 in 2016; indicating a growth rate of about 1.5%. The increase of the population in the District is evident in the local municipalities of Ga-Segonyana (11.49) and Gamagara (28.93). There has been a major decline of about 25.11% in the population of Joe Morolong Local Municipality in the 10 year period between 1996 and 2016; this is mainly due to the out-migration from the municipality to the Ga-Segonyana and Gamagara Local Municipalities.



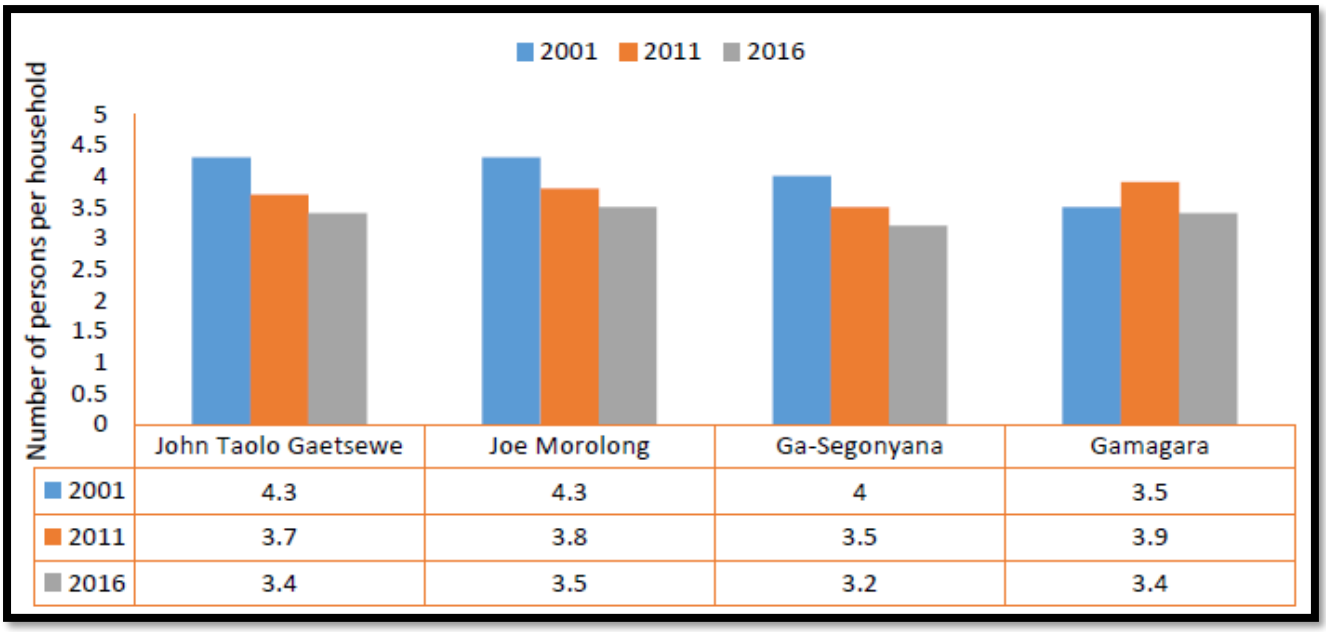
	NC451: Joe Morolong	NC452: Ga-Segonyana	NC453: Gamagara
1996	112 435	61 967	22 219
2011	89 530	93 651	41 617
2016	84 201	104 408	53 656

Source: StatsSA 1996, 2011 & 2016

Figure 33:JTG Population Composition

5.2.1.1 Household sizes

The household sizes decreased from 2011 to 2016 in all local municipalities within the district. A huge decrease is experienced in Gamagara LM from 3.9 in 2011 to 3.4 in 2016, this may be due to the high number of rental accommodation status which includes the in-migration (within the district) and out-migration (from outside the district) arising from work opportunities in Gamagara LM. The low decrease in Joe Morolong LM and Ga-Segonyana LM is as a result of the increase in the number of households and high dependency due to levels of poverty within the areas, especially in Joe Morolong LM where a high number of outmigration is experienced.



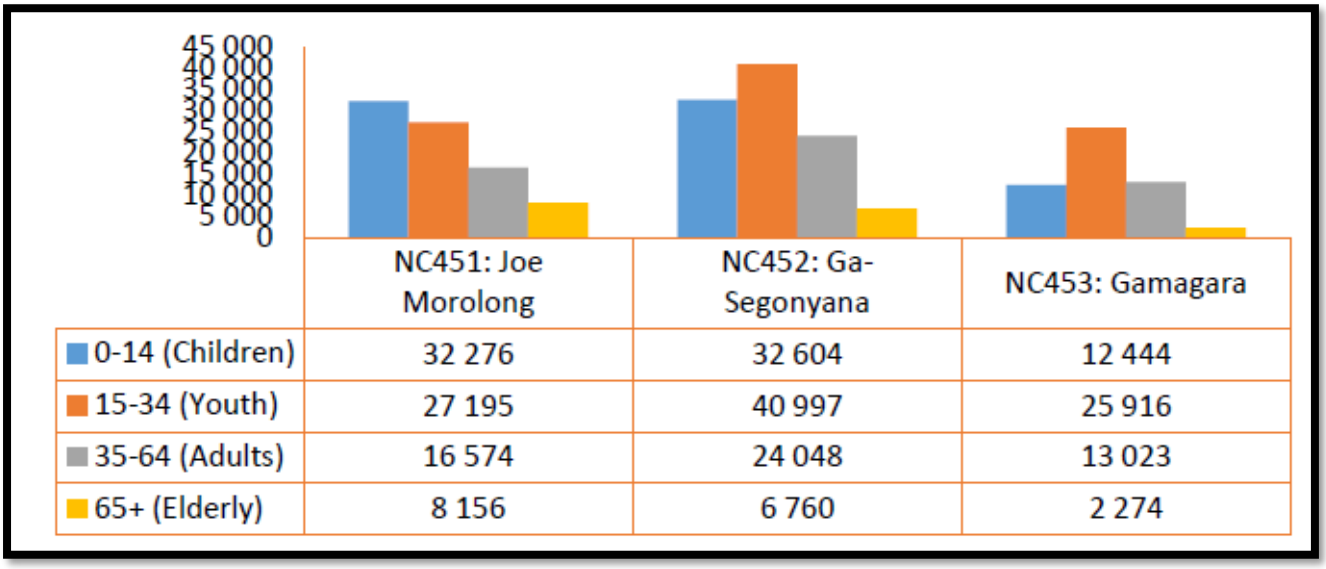
	John Taolo Gaetsewe	Joe Morolong	Ga-Segonyana	Gamagara
2001	4.3	4.3	4	3.5
2011	3.7	3.8	3.5	3.9
2016	3.4	3.5	3.2	3.4

Source: StatsSA 2011 & 2016.

Figure 34:Household size within JTG District Municipality

5.2.1.2 Age Profile

The age profile of the JTGDM is as follows: 0 - 14 years: 31.92%; 15 - 64 years: 63.32%; and older than 65: 4.76%. It is not that different from the national profile on Census 2011 (i.e. 0 - 14 years: 31.03%; 15 - 64 years: 63.59%; and older than 65: 5.39%). The figure below shows a generally youthful population between the age segment 15 – 36 of 100 973 people i.e. 41.68%.



	NC451: Joe Morolong	NC452: Ga-Segonyana	NC453: Gamagara
0-14 (Children)	32 276	32 604	12 444
15-34 (Youth)	27 195	40 997	25 916
35-64 (Adults)	16 574	24 048	13 023
65+ (Elderly)	8 156	6 760	2 274

Figure 35:Age distribution within JTG District Municipality

5.2.1.3 Gender Profile

The gender split in the JTGDM is 49.12% male and 50.88% female. There is generally more females than males in all municipalities with the exception of Gamagara LM; where there are more males than

females, mainly because of the presence of job opportunities that attract men from other areas outside the district.

	John Taolo Gaetsewe	Joe Morolong	Ga-Segonyana	Gamagara
Male	118 988	38 206	50 483	30 299
Female	123 276	45 995	53 925	23 356

Source: StatsSA 2016

Figure 36:Sex Ratio

	2016	2011
Population	242 264	224 799
Age Structure		
Population under 15	31.9%	34.0%
Population 15 to 64	63.3%	61.2%
Population over 65	4.8%	4.8%
Dependency Ratio		
Per 100 (15-64)	57.9	63.3
Sex Ratio		
Males per 100 females	96.5	94.1
Population Growth		
Per annum	1.70%	n/a
Labour Market		
Unemployment rate (official)	n/a	29.7%
Youth unemployment rate (official) 15-34	n/a	37.2%
Education (aged 20 +)		
No schooling	9.8%	14.6%
Matric	25.5%	20.5%
Higher education	6.8%	8.4%
Household Dynamics		
Households	72 310	61 331
Average household size	3.4	3.5
Female headed households	40.6%	43.1%
Formal dwellings	80.6%	76.6%
Housing owned	76.1%	55.1%
Household Services		
Flush toilet connected to sewerage	27.3%	26.2%
Weekly refuse removal	24.0%	26.0%
Piped water inside dwelling	19.2%	22.6%
Electricity for lighting	86.3%	87.0%

Figure 37: Demographic Information

5.2.2 Land Use Composition

John Taolo Gaetsewe Municipal Area is characterised by a mixture of land uses of which agriculture and mining are dominant. JTGDM was the richest mining region in the Northern Cape until a decline in mining employment and the near extinction of the asbestos mining industry in the 1980s. Today, minerals mined include manganese ore, iron ore and tiger's eye. The Sishen iron-ore mine is one of the largest open-cast mines in the world and the iron-ore railway from Sishen to Saldanha is one of the longest iron-ore carriers in the world. The rural land in the district is used extensively for cattle, sheep, goat and game farming. The area is also well known for its good commercial hunting in the winter, and holds potential as a tourism destination. The north-eastern region is comprised principally of high-density rural and peri-urban areas while the western and southern areas are sparsely populated and consist mainly of commercial farms and mining activities. The main towns and villages within the district borders are Kuruman, Kathu, Deben, Dingleton, Olifantshoek, Vanzylsrus, Bothitong, Churchill, Manyeding, Laxey, Batlharos, Mothibistat, Hotazel and Heuningvlei (JTG SDF Review 2017).

5.2.3 Main Economic Sectors

- Agriculture,
- Mining,
- Retail.

5.3 Description of the current land uses.

The application area has road and signs of previous disturbances from mining related activities. No community landownership exists within the project area. The property is privately owned No land claims have been confirmed yet for the study area, the request has been submitted to the relevant authorities.

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

5.4.1 Environmental features.

(Show all environmental, and current land use features)

The Screening Tool Report generated from the National Web Based Environmental Screening Tool recorded the following sensitivities and Impact Assessment as contained in the “Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes of Section 45 (a) and (h) of the National Environmental Management Act, 1998, when applying for Environmental Authorization” (10 May 2020).

Table 5:Proposed Development Area Environmental Sensitivity

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme				X
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			X
Civil Aviation Theme				X
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

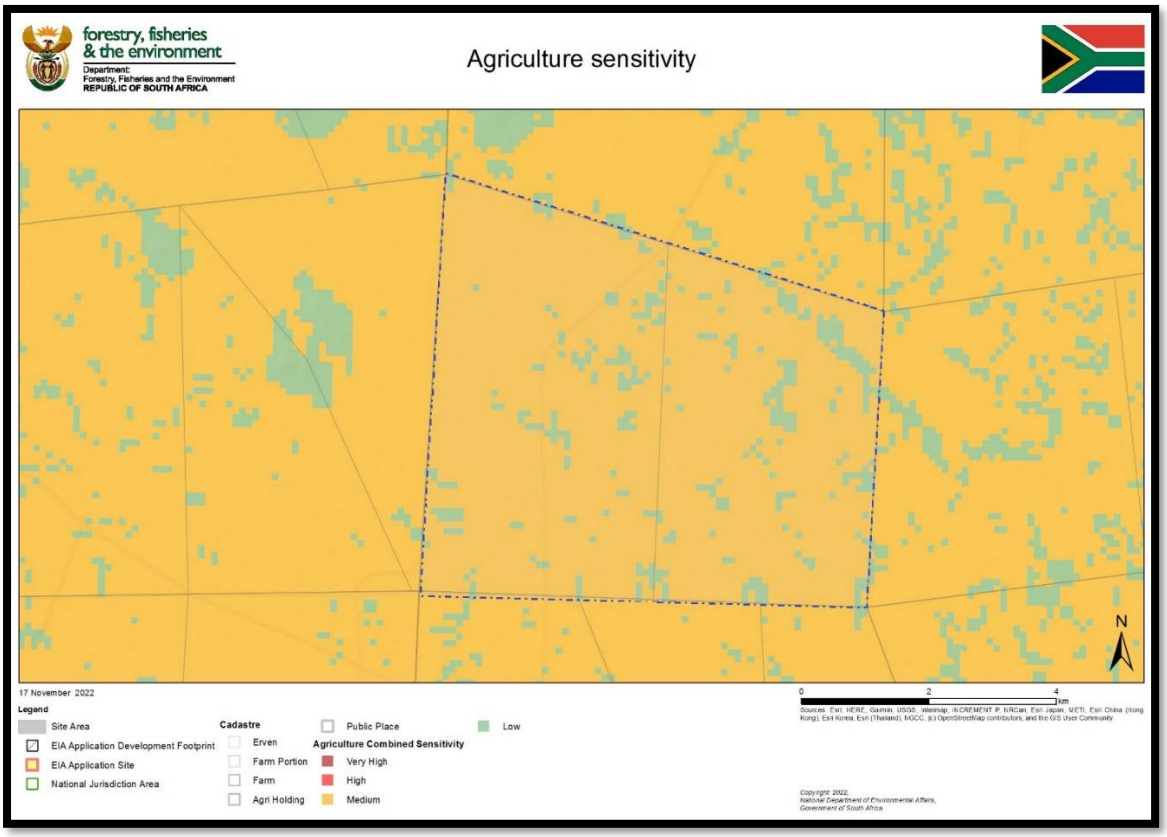


Figure 38: Agriculture Theme

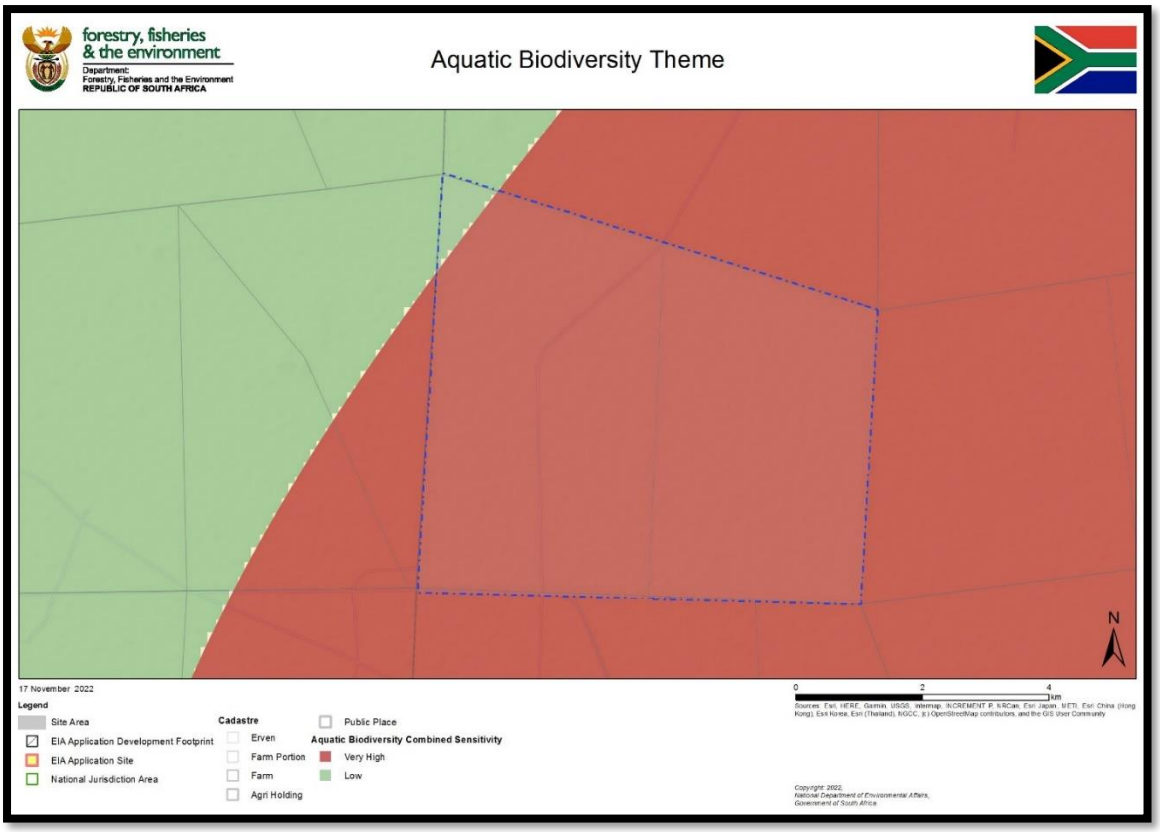


Figure 39: Aquatic Biodiversity Theme

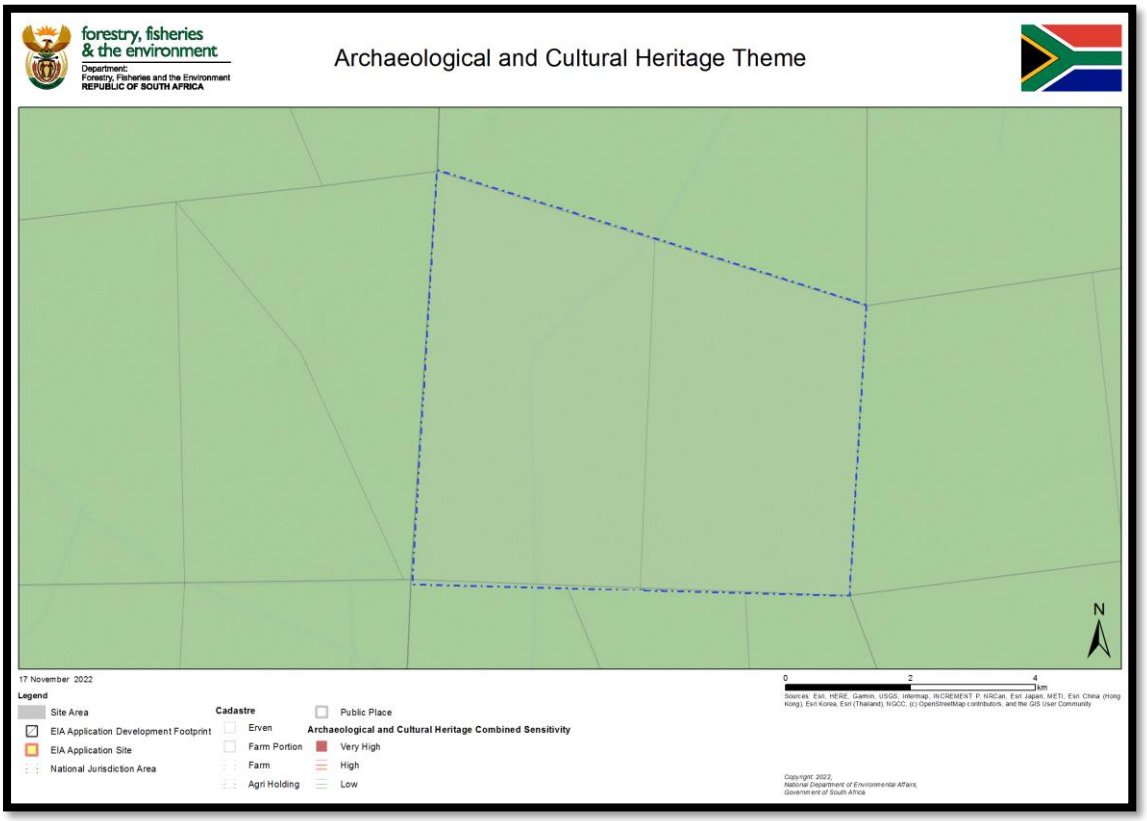


Figure 40: Archaeological and Cultural Heritage Theme

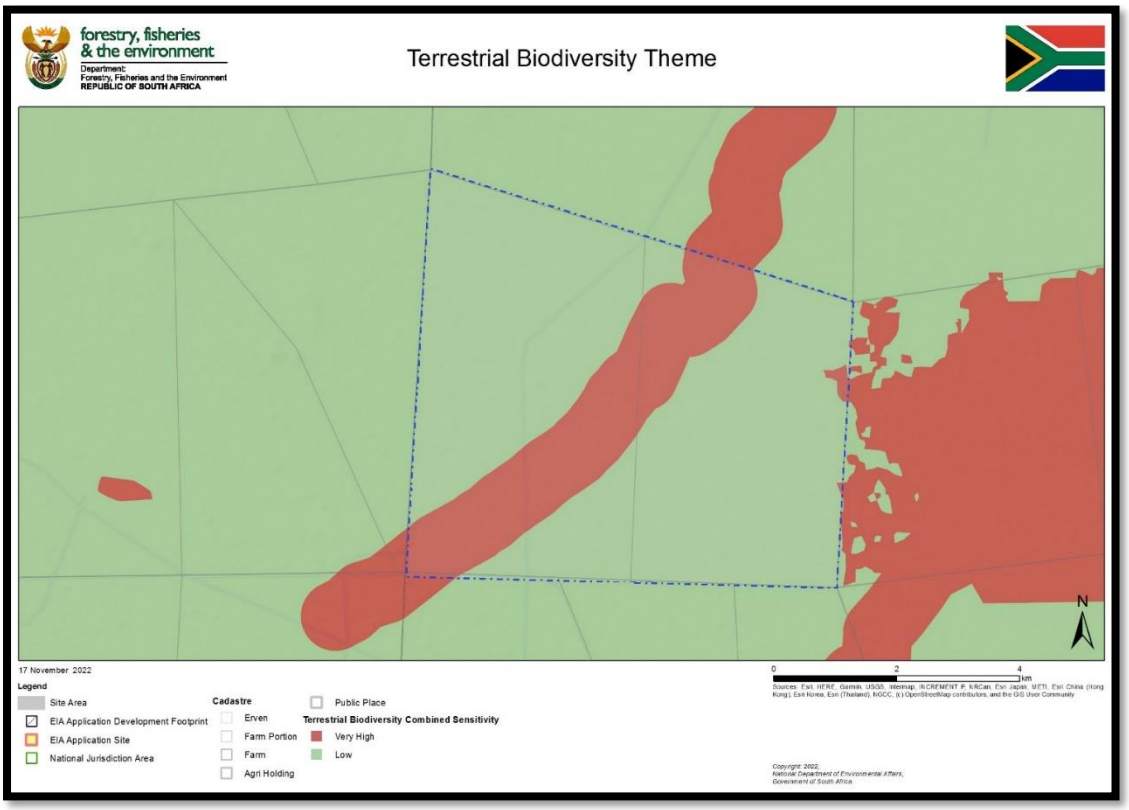


Figure 41: Terrestrial Biodiversity Theme

(i) Environmental Management Frameworks relevant to the application

Siyanda District Municipality EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/SIYANDA_EMF_REPORT_2008.doc

(ii) Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	12/12/20/1860	Solar PV	Approved	14.2
2	14/12/16/3/3/2/1111	Solar PV	Approved	24.8
3	14/12/16/3/3/2/273	Solar PV	Approved	14.2
4	12/12/20/1994/2	Solar PV	Approved	27
5	12/12/20/1994/1	Solar PV	Approved	27
6	12/12/20/2567	Solar PV	Approved	28.7
7	12/12/20/1858/1	Solar PV	Approved	14.2
8	12/12/20/1858/2	Solar PV	Approved	14.2
9	12/12/20/1994/3	Solar PV	Approved	27
10	12/12/20/2566	Solar PV	Approved	28.7

11	12/12/20/1994	Solar PV	Approved	27
12	14/12/16/3/3/2/935	Solar PV	Approved	17.1
13	14/12/16/3/3/2/616	Solar PV	Approved	22.2

Table 6:Specialist Studies Identified

No	Specialist assessment	Assessment Protocol	Recommended Studies
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralAgricultureAssessmentProtocols.pdf	Information collated from GIS
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf	Assessed
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf	Assessed
4	Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedTerrestrialBiodiversityAssessmentProtocols.pdf	Assessed
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAquaticBiodiversityAssessmentProtocols.pdf	Watercourses have been identified and buffer zones implemented.
6	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedNoiseImpactsAssessmentProtocol.pdf	The drilling will be temporary hence no noise impact assessment will be undertaken.
7	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf	None of the elements are naturally radioactive hence the study is not required.
8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedPlantSpeciesAssessmentProtocols.pdf	Assessed and Information collated from previous studies and SANBI
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAnimalSpeciesAssessmentProtocols.pdf	Assessed and Information collated from previous studies and SANBI

5.4.2 current land use and site verification

Portion O
Latitude -27.544501 Longitude 22.732494

Portion 1

Latitude -27.545719 Longitude 22.76099

Figure 42: Veld

5.5 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as inform by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

Table 7: Potential Impacts

ACTIVITY	ASPECT	TYPE OF IMPACT	IMPACT DESCRIPTION
Reconnaissance site visit	No Impact		
Desktop Study	No Impact		
Mapping & Surveying	Vegetation	Negative Medium	Clearing of Vegetation for access to the site
Drilling and sampling	Flora	Negative Medium	Clearing of Vegetation for Access tracks and Clearing of Drilling sites
	Fauna	Negative Medium	The natural habitat of the animals will be disturbed and/or destroyed.
			Potential roadkill
	Soil	Negative Medium	Removal of topsoil at the drilling and pitting sites
			Soil disturbance from soil sampling resulting in soil erosion
			Soil compaction resulting from repeated use of access roads.
			Oil and Fuel spills from drilling equipment
	Water	Negative Medium	Contamination of ground water and reduction of water quantity Change in drainage patterns on areas where the drilling and sampling will occur
			Possible hydrocarbon spills from drill rig.
			Increased water consumption as water will be used to control dust and for sampling
	Air	Negative Low	Generation of dust on the access tracks and drilling points
	Noise	Negative Low	Noise from the drill rig
Access Road	Air quality	Negative Low	Nuisance dust will be created by the prospecting equipment hauling materials and samples to and from site
	Fauna	Negative High	Where new haulage roads will be created the natural habitat of the animals will be disturbed and/or destroyed.

			Road kills.
	Flora	Negative High	Where new haulage roads will be created the vegetation will be disturbed and/or destroyed.
	Soil	Negative Low	Compaction of soil is expected on the roads that are used by the prospecting operation. Possible hydrocarbon spills from equipment and vehicles.
	Surface Water	Negative Low	If roads are not properly maintained, water erosion after thunderstorms can occur. Possible hydrocarbon spills from equipment and vehicles.
	Visual	Negative Low	The haulage roads will visible to some extent from the immediate surroundings.
Decommissioning	Air quality	Negative Low	Dust emissions from decommissioning activities (including vehicle entrained dust)
	Ground Water	Negative Low	Possible hydrocarbon spills by vehicles and equipment in this area.
	Noise	Negative Low	Noise will be created by the vehicles and equipment in this area.
	Soil	Negative Medium	Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established Ripping of compacted areas
	Surface Water	Negative Low	Possible hydrocarbon spills by vehicles and equipment in this area.
Analysis of Samples	No impact on site		
Consolidation of results	No impact on site		

Table 8: Potential Cumulative Impacts

ASPECT	IMPACTS	DETAILED DESCRIPTION
Climate	Release of greenhouse gas emissions	• The release of greenhouse gasses and other contaminants to the atmosphere is expected as a result of land-based vehicle activity. • The clearing of vegetation negatively affects carbon sequestration efficiency and increase emissions resulting from decomposition. These impacts are regarded as insignificant in terms of contribution. The risks are recognised as a cumulative impact.
Soils	Loss of natural resource (topsoil)	The loss of topsoil as a natural resource as a result of soil contamination and erosion negatively affecting land capability
Hydrology	Surface water pollution	Surface water quality impacts will extend beyond the boundary of the site if not managed appropriately which in turn affects the agricultural sector highly dependent on this surface water resource.
Geohydrology	Groundwater pollution	Groundwater contamination is regarded as a cumulative impact. Regionally there is a high dependency on groundwater resources and all activities which may impact on ground water resources are regarded as significant.
Biodiversity (Flora, Fauna and Avifauna)	Loss of biodiversity and disruption of existing ecosystem functioning	The cumulative impacts relate to land transformation resulting in the loss of habitat from the pitting activities which will affect habitats.
Visual	Visual disturbance and change of landscape character	The cumulative impacts relate to visual disturbance is regarded to impact the regional “sense of place”. Regionally the site visual has been affected by mining activities.

5.5.1 Potential impact on heritage resources

The Heritage Impact Assessment will be conducted in order to identify any cultural, heritage and or archaeological features which may be impacted on.

5.5.2 Potential impacts on communities, individuals or competing land uses in close proximity

The surrounding land uses are mainly mining. There are few people who reside in close proximity to the prospecting site as there are small towns. Table 7 highlights the potential impacts the prospecting activity may have on the surrounding areas

Table 9: Potential Impact on Communities

Aspect	Type of Impact	Impact Description
Air quality	Negative High	The movement of vehicles into the site through gravel roads will generate dust which will affect the local air quality.
Water Quality	Negative Low	The flow of stormwater from the gravel roads into the local surface drainage. The water from the gravel roads would be highly contaminated with sediments and spilled fuels and oils.
Noise	Negative Medium	The drill rig and the drilling tractor would potentially create noise that affects fauna in close proximity. The noise generated would also affect the humans in the close proximity to the site.
Soils	Negative Medium	The movement of the vehicle within the farms would compact the soils rendering the soils unproductive hence prior to decommissioning all roads must be rehabilitated.

5.5.3 Positive Impacts (Advantage)

The application is prompted by the fact that adjacent to the application area there are mining rights in the area and have reviewed the geological information prompting the availability of potential iron and manganese ore. While no significant short-term positive impacts are associated with the prospecting activities, in the event that a viable reserve is confirmed, and pending the outcome of a detailed social & environmental impact assessments process, positive socio-economic benefits must be investigated and optimized.

The section below provides a summary of the key management measures associated with the impacts identified in the previous section. The detailed rating and management plan are presented and measures to manage the potential impact on heritage resources

A chance find protocol should be designed and implemented for potential heritage resources where drilling activities are planned. Prior to the establishment of new access roads, heritage induction for all employees and sub-contractors must be undertaken and mitigation and / or management measures for the protection of such resources must be implemented.

Should any unknown heritage sites be identified during the drilling activities, all activities will cease immediately and the SAHRA will be contacted and an appropriate Heritage Impact Assessment will be undertaken on the site identified.

Measures to manage the potential impacts on communities, individuals or competing land uses in close proximity

- ❖ Pollution Prevention

Mitigation and management measures must be implemented to prevent environmental pollution which may impact on environmental resources utilized by communities, landowners and other stakeholders. These mitigation and management measures are discussed in the following section.

- ❖ Noise due to the undertaking of the site prospecting activities;
- Directly affected, adjacent landowners and farms in proximity to the site will be informed of the planned dates of the drilling and pitting and a grievance mechanism will be made available.
- Site activities will be conducted during daytime hours 07h00 – 17h30 to avoid night-time noise disturbances and night time collisions with fauna.
- Poor access control resulting in impacts on fauna movement, breeding and grazing practices;
- Access control procedures must be agreed on with farm owners and all staff trained on these procedures,
- Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime;
- Casual labour will not be recruited at the site to eliminate the incentive for persons travelling to site seeking employment.
- The landowner (all private and state landowners) will be notified of unauthorised persons encountered on site
- If deemed necessary, the South African Police Service will be informed of unauthorised persons encountered on site.

- ❖ Visual Impact
- Based on visual observation, wet dust suppression will be undertaken to manage dust emissions from vehicle movement and other construction activities sand when needed
- Depending on the need and quantity of water used for wet suppression, a suitable, low environmental impact chemical suppression alternative must be considered in order to conserve water resources.

- The portable ablution facilities, vertical water tanks and any other infrastructure should be acquired with a consideration for colour. Natural earth, green and mat black options which will blend in with the surrounding area must be favoured.
- A waste management system will be implemented, and sufficient waste bins will be for onsite. A fine system will be implemented to further prohibit littering and poor housekeeping practices.

5.6 Criteria of Assigning Significance to Potential Impacts

Assessment Criteria Terminology

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

Table 10: Risk Assessment Terminologies

TERM	DEFINITION
Nature of impact	This is an appraisal of the type of effect the activity would have on the affected environmental component. Its description should include what is being affected, and how.
Extent	The physical and spatial size of the impact
Duration	The lifetime of the impact which is measured in the context of the lifetime of the proposed phase
Intensity	This describes how destructive, or benign, the impact is. Does it destroy the impacted environment, alter its functioning, or slightly alter it
Probability	This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time.
significance	Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

Table 11: Criteria Description

CRITERIA	DESCRIPTION			
EXTENT	National (4)	Regional (3)	Local (2)	Site (1)
	The whole of South Africa	Provincial and parts of neighbouring provinces	Within a radius of 2 km of the construction site	Within the construction site
DURATION	Permanent (4)	Long-term (3)	Medium-term (2)	Short-term (1)

	Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	The impact will last for the period of the construction phase, where after it will be entirely negated	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
INTENSITY	Very High (4)	High (3)	Moderate (2)	Low (1)
	Natural, cultural and social functions and processes are altered to extent that they permanently cease	Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILITY OF OCCURRENCE	Definite (4)	Highly Probable (3)	Possible (2)	Improbable (1)
	Impact will certainly occur	Most likely that the impact will occur	The impact may occur	Likelihood of the impact materialising is very low

CRITERIA FOR THE RATING OF CLASSIFIED IMPACTS	
Low impact (3 -10 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium (11 -20 points)	Mitigation is possible with additional design and construction inputs.
High impact (21 -30 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.

Very high impact (31 - 48 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore, not all negative impacts are equally significant.	

5.6.1 Potential Impact of Each Main Activity in Each Phase, and Corresponding Significance Assessment

Table 12: Significance of the Potential Impacts

PROSPECTING POTENTIAL IMPACTS							
E = Extent, D = Duration, I = Intensity, P = Probability of occurrence			Where (E + D + I) X P = Significance				
Phase and Activity	Aspect	Potential Impact	Rating Before Mitigation				Significance before mitigation
			E	I	D	P	
Phase I: Mapping & Surveying	Flora	Loss of Vegetation through clearing of the access tracks	1	2	2	3	15 Negative
Phase II: Drilling & Sampling	Flora	Loss of Vegetation when clearing drilling points	1	3	2	2	12 Negative
	Fauna	• Loss of habitat during clearing of vegetation • Potential roadkill	1	5	3	3	27 Negative
	Soil	• Removal of topsoil on the drilling points • Soil disturbance from soil sampling • Soil compaction resulting from repeated use of access tracks • Oil and fuel spills from drilling equipment	2	3	2	2	14 Negative
	Water	• Contamination of ground water and reduction of water quantity through spills of hydrocarbons from drill rig • Contamination of surface water through the flow of contaminated storm water from site into local water streams	1	2	2	2	10 Negative
	Air	Generation of dust from gravel access tracks, and drilling points	1	2	1	2	8 Negative
	Noise	Noise emanating from drill rig	1	1	1	2	6 Negative

Phase II: Access Road	Air	Nuisance dust will be created by the prospecting equipment hauling materials and samples to and from site	1	2	1	2	8 Negative
	Fauna	• Where new haulage roads will be created the natural habitat of the animals will be destroyed • Potential road kills	2	3	2	3	21 Negative
	Flora	Where new haulage roads will be created the vegetation will be disturbed and/or destroyed	1	3	2	2	12 Negative
	Surface Water	• If roads are not properly maintained, water erosion after thunderstorms can occur. • Possible hydrocarbon spills from equipment and vehicles.	1	2	2	3	15 Negative
	Soil	• Compaction of soil is expected on the roads that are used by the prospecting operation. • Possible hydrocarbon spills from equipment and vehicles.	1	2	1	2	8 Negative
	Visual	The haulage roads will visible to some extent from the immediate surroundings.	1	2	1	2	8 Negative
Phase III: Decommissioning	Air quality	Dust emissions from decommissioning activities (including vehicle entrained dust)	1	2	1	2	8 Negative
	Noise	Noise will be created by the vehicles and equipment in this area.	1	2	1	2	8 Negative
	Soil	• Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established • Ripping of compacted areas	1	2	1	2	8 Negative
	Surface Water	Possible hydrocarbon spills by vehicles and equipment in this area.	1	2	1	2	8 Negative

5.6.2 Assessment of Potential Cumulative Impacts

Table 13: Significance of Cumulative Impacts

ASPECT	IMPACTS	Impact rating Before Mitigation				Significance before mitigation
		E	I	D	P	
Climate	• Release of greenhouse gas emissions is expected as a result of land-based vehicle activity. • The clearing of vegetation negatively affects carbon sequestration efficiency and increase emissions resulting from decomposition. These impacts are regarded as insignificant in terms of contribution. The risks are recognised as a cumulative impact.	1	1	1	2	6 Negative
Soils	The loss of topsoil as a natural resource as a result of soil contamination and erosion negatively affecting land capability	1	2	1	2	8 Negative
Hydrology	Surface water quality impacts will extend beyond the boundary of the site if not managed appropriately which in turn affects the agricultural sector highly dependent on this surface water resource.	2	2	1	2	10 Negative
Geohydrology	Groundwater contamination is regarded as a cumulative impact. Regionally there is a high dependency on groundwater resources and all activities which may impact on ground water resources are regarded as significant.	1	2	1	2	8 Negative
Biodiversity (Flora, Fauna and Avifauna)	Loss of biodiversity and disruption of existing ecosystem functioning – The cumulative impacts relate to land transformation resulting in the loss of habitat	1	2	1	3	12 Negative
Visual	The cumulative impacts relate to visual disturbance is regarded to impact the regional “sense of place”. Regionally the site visual has been affected by mining and prospecting activities.	1	1	1	2	6 Negative

5.7 Proposed Mitigation Measures to Minimise Adverse Impacts

5.7.1 List of Actions, Activities, or Processes that have Sufficiently Significant Impacts to Require Mitigation

Table 14: Activities requiring Impacts Mitigation

ACTIVITY	IMPACT

Drilling and sampling	The drilling activity will create significance impact on the biodiversity, underground and surface water and has the potential to generate noise and dust.
Access Road	The clearing of vegetation for access track road to the drilling site and for hauling samples from the site for analysis in the lab. The movement of vehicles on the haul road would also compact the soils.
Topsoil stockpile	The removed topsoil must be stockpiled for rehabilitation purposes.
Decommissioning and rehabilitation	The decommissioning includes the backfill of the drill sites. The potential impacts of this activity include water contamination and generation of dust.

Table 15: Impact Mitigation

Aspect	Impact	Mitigation Measures
Air quality	creation of nuisance dust	• Avoidance of unnecessary removal of vegetation; • Routine spraying of unpaved site areas and roads • utilized by the prospecting operation with water; • Speed limits of vehicles inside the application area will be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used. • All cleared disturbed or exposed areas to be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.
Fauna	Loss of Fauna	• Speed limits of vehicles inside the application area will be strictly controlled to avoid road kills. • Continuous backfilling and revegetation of open excavations. • No hunting (snares) will be allowed at the application area.
Flora	Loss of Fauna	• Concurrent rehabilitation should be implemented and revegetation with indigenous specious should be implemented • No trees or shrubs will be felled or damaged for obtaining firewood. • Management will take responsibility to control declared invader or exotic species on the site. The following control methods will be used: ➢ "The plants will not be uprooted, felled or cut off and can be destroyed completely." ➢ "The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide." • Continuous backfilling of open excavations and spreading of previously stored topsoil over the rehabilitated areas. • All rehabilitated areas, where applicable and possible, will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to prospecting activities commenced if the natural succession of vegetation is unacceptably slow. • The end objective of the re-vegetation program will be to achieve a stable self-sustaining habitat unit

Groundwater	Contamination of groundwater	• Vehicle- and equipment maintenance will only be allowed within the maintenance area. Only emergency breakdowns will be allowed in other areas. • The following procedure will be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area: • Drip pans will be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil. • All efforts will be made to move the broken-down vehicle or piece of equipment to the maintenance area. • If the vehicle/piece of equipment cannot be moved, the broken part will firstly be drained of all fluid. The part will then be removed and taken to the maintenance area. • Equipment used as part of the proposed operation will be adequately maintained so as to ensure that oil, diesel, grease or hydraulic fluid does not leak during operation. • Fuel and other petrochemicals will be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, will be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall will be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater). The latter will be covered by an approved bacterial hydrocarbon digestion agent that is effective in water.
Noise	Generation of Noise from prospecting equipment and vehicles	• Working hours will be kept between sunrise and sunset as far as possible. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
Soil	Contamination of soil	• In all places of development, the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil will be removed, where possible, from all areas where physical disturbance of the surface will occur. • In all areas where the above growth medium will be impacted on, it will be removed and stockpiled on a dedicated area. The maximum height of stockpiles will be 2 meters • The growth medium/topsoil will be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.

		• If any soil is contaminated during the life of the prospecting period, it will either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company. • Erosion control in the form of re-vegetation and contouring of slopes will be implemented on disturbed areas in and around the site. • Topsoil will be kept separate from overburden and will not be used for building or maintenance of access roads. • The stored topsoil will be adequately protected from being blown away or being eroded. • Compacted areas will be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation. • Vehicle movement will be confined to established roads for as far as practical in order to prevent the compaction of soils.
Surface water	Contamination of surface water	• All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap will be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility. • Erosion and storm water control measures will be implemented. • During rehabilitation the applicant will endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
Topography	Alteration of slopes	• All open excavations will be backfilled if and when possible and made safe so as to reflect as far as possible the pre-prospecting topography of the area. • All temporary features, e.g. plant, containers and stockpiling, will be removed and handled in the prescribed manner during rehabilitation.
Visual	Creation of an unpleasing visual look	• Open excavations will be subject to progressive backfilling and made safe (including the reestablishment of vegetation). • Waste material of any description will be removed from the prospecting area upon completion of the operation and be disposed of at a recognized landfill facility.

Table 16: Significance of Impact after Mitigation

Phase and Activity	Aspect	Potential Impact	Significance before mitigation	Significance After Mitigation
Phase I: Mapping & Surveying	Flora	Loss of Vegetation through clearing of the access tracks	15 Negative	3 Negative
Phase II: Drilling & Sampling	Flora	Loss of Vegetation when clearing drilling points	12 Negative	6 Negative
	Fauna	• Loss of habitat during clearing of vegetation • Potential roadkill	21 Negative	10 Negative
	Soil	• Removal of topsoil on the drilling points • Soil disturbance from soil sampling • Soil compaction resulting from repeated use of access tracks • Oil and fuel spills from drilling equipment	14 Negative	8 Negative
	Water	• Contamination of ground water and reduction of water quantity through spills of hydrocarbons from drill rig • Contamination of surface water through the flow of contaminated storm water from site into local water streams	10 Negative	3 Negative
	Air	Generation of dust from gravel access tracks, and drilling points	8 Negative	3 Negative
	Noise	Noise emanating from drill rig	6 Negative	3 Negative
Phase II: Haul Roads	Air	Nuisance dust will be created by the prospecting equipment hauling materials and samples to and from site	8 Negative	3 Negative

	Fauna	• Where new haulage roads will be created the natural habitat of the animals will be destroyed • Potential road kills	12 Negative	4 Negative
	Flora	Where new haulage roads will be created the vegetation will be disturbed and/or destroyed	21 Negative	10 Negative
	Surface Water	• If roads are not properly maintained, water erosion after thunder storms can occur. • Possible hydrocarbon spills from equipment and vehicles.	15 Negative	4 Negative
	Soil	• Compaction of soil is expected on the roads that are used by the prospecting operation. • Possible hydrocarbon spills from equipment and vehicles.	8 Negative	3 Negative
	Visual	The haulage roads will visible to some extent from the immediate surroundings.	8 Negative	3 Negative
Phase III and IV: Decommissioning	Air quality	Dust emissions from decommissioning activities (including vehicle entrained dust)	8 Negative	3 Negative
	Noise	Noise will be created by the vehicles and equipment in this area.	8 Negative	5 Negative
	Soil	• Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established • Ripping of compacted areas	8 Negative	3 Negative
	Surface Water	Possible hydrocarbon spills by vehicles and equipment in this area.	8 Negative	4 Negative

6 ENVIRONMENTAL IMPACT STATEMENT

6.1 Summary of the key findings of the environmental impact assessment

The criteria for the description and assessment of environmental impacts were drawn from the Guidelines for EIA Regulations and in terms of the National Environmental Management Act 1998 which provides guidance for conducting impact assessments.

Activities to be undertaken in proposed development and its respective construction and operational phases, give rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into two phases from which impacting activities can be identified, namely:

a) Construction phase:
All the construction related activities on site, until the contractor leaves the site.

b) Operational phase:
All activities, including the operation and maintenance of the proposed prospecting.

The activities arising from each of these phases have been included in the tables. This is to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The criteria against which the activities were assessed are given in the next section.

6.2 Assessment Criteria

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

6.2.1 Extent

The physical and spatial scale of the impact is classified as:

a) Footprint

The impacted area extends only as far as the activity, such as footprint occurring within the total site area.

b) Site

The impact could affect the whole, or a significant portion of the site.

c) Regional

The impact could affect the area including the neighbouring properties, the transport routes and the adjoining towns.

d) National

The impact could have an effect that expands throughout the country (South Africa).

e) International

Where the impact has international ramifications that extent beyond the boundaries of South

Africa.

6.2.2 Duration

The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.

a) Short term

The impact would either disappear with mitigation or will be mitigated through natural processes in a period shorter than that of the construction phase.

b) Short to Medium term

The impact will be relevant through to the end of the construction phase.

c) Medium term

The impact will last up to the end of the development phases, where after it will be entirely negated.

d) Long term

The impact will continue or last for the entire operational life time of the development but will be mitigated by direct human action or by natural processes thereafter.

e) Permanent

This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient,

6.2.3 Intensity

The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as:

a) Low

The impact alters the affected environment in such a way that the natural processes or functions are not affected.

b) Medium

The affected environment is altered, but functions and processes continue, albeit in a modified way.

c) High

Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

6.2.4 Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length during the life cycle of the activity, and not at any given time. The classes are rated as follows:

a) Impossible

The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0%).

b) Possible

The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.

c) Likely

There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.

d) Highly likely

It is most likely that the impacts will occur at some stage of the prospecting. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.

e) Definite

The impacts will take place regardless of any provisional plans, and or mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.

6.2.5 Mitigation

The impacts that are generated by the prospecting can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

6.3 Determination of significance – Without Mitigation

Significance is determined through a synthesis of impacts as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:

a) No significance

The impact is not substantial and does not require any mitigation action.

b) Low

The impact is of little importance but may require limited mitigation.

c) Medium

The impact is of importance and is therefore considered to have a negative impact. Mitigation

is required to reduce the negative impacts to acceptable levels.

d) High

The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

6.4 Determination of significance – With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

a) No significance

The impact will be mitigated to the point where it is regarded as insubstantial.

b) Low

The impact will be mitigated to the point where it is of limited importance.

c) Low to Medium

The impact is of importance however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.

d) Medium

Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

e) Medium to High

The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.

f) High

The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

6.5 Assessment weighting

Each aspect within the impact description was assigned a series of quantitative criteria. Such criteria

are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it is necessary to weigh and rank all criteria.

6.6 Ranking, Weighting and Scaling

For each impact under scrutiny, a scale weighting Factor is attached to each respective impact (Refer to
Figure 43: Description of biophysical assessment parameters with its respective weighting), The purpose of assigning such weight serve to highlight those aspects considered most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspects criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

Extent	Duration	Intensity	Probability	Weighting Factor (WF)	Significance Rating (SR)	Mitigation Efficiency (ME)	Significance Following Mitigation (SFM)
Footprint 1	Short term 1	Low 1	Probable 1	Low 1	Low 0-19	High 0,2	Low 0-19
Site 2	Short to medium 2		Possible 2	Low to medium 2	Low to medium 20-39	Medium to high 0,4	Low to medium 20-39
Regional 3	Medium term 3	Medium 3	Likely 3	Medium 3	Medium 40-59	Medium 0,6	Medium 40-59
National 4	Long term 4		Highly Likely 4	Medium to high 4	Medium to high 60-79	Low to medium 0,8	Medium to high 60-79
International 5	Permanent 5	High 5	Definite 5	High 5	High 80-100	Low 1,0	High 80-100

Figure 43: Description of biophysical assessment parameters with its respective weighting

6.6.1 Identifying the Potential Impacts Without Mitigation (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:
Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor

6.6.2 Identifying the Potential Impacts With Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

Mitigation Efficiency (ME)
The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating

is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or WM = WOM x ME

Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

The key environmental issues listed in the following section have been determined through:

- Potential Views of Interested and Affected Parties;
- Previous Specialist Studies in the surrounding areas;
- Legislation; and
- Experience of the Environmental Assessment Practitioner (EAP).

6.6.3 Archaeological Evaluation

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act (Act No. 25 of 1999), while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

6.6.3.1 Field Ratings

All sites should include a field rating in order to comply with section 38 of the National Heritage Resources Act (Act No. 25 of 1999). The field rating and classification in this report are prescribed by SAHRA.

Table 17: Prescribed Field Ratings

Rating	Field Rating/Grade	Significance	Recommendation
National	Grade 1		National site
Provincial	Grade 2		Provincial site
Local	Grade 3 A	High	Mitigation not advised
Local	Grade 3 B	High	Part of site should be retained
General protection A	4 A	High/Medium	Mitigate site
General Protection B	4 B	Medium	Record site
General Protection C	4 C	Low	No recording necessary

*These site ratings can only be assigned following a Phase 1 AIA.

6.6.3.2 Statement of Significance & Recommendations

6.6.3.2.1 Statement of Significance

- **The study area: Portion 1 and the Remaining Extent of the Farm Lymington 423.**

As can be seen from previous research conducted in the area, the general region is significant from a heritage perspective. Heritage sites are likely to include Stone Age sites, cemeteries/burial sites and historical structures. Since heritage sites, such as burial sites, are not always clearly identifiable due to disturbed/removed surface features, care must be exercised when prospecting.

Figure 19 indicates demolished sites and sites associated with surface remains that potentially date to the Historic Period, as well as a 500 m buffer area around water sources. The 500 m buffer area is considered to be potentially sensitive from a heritage perspective since archaeological sites are often located within this zone.

Site B01 is likely to be associated with intact historical infrastructure, while Site B02 is associated with demolished historical infrastructure. These sites are likely to exceed 60 years of age. The associated demarcated areas are therefore considered to be sensitive from a heritage perspective and should building remains dating to the Historic Period be present, such buildings might be protected by the NHRA (Act No. 25 of 1999). The remaining sites, whether intact or demolished, are of contemporary origin and are unlikely to be sensitive from a heritage perspective.

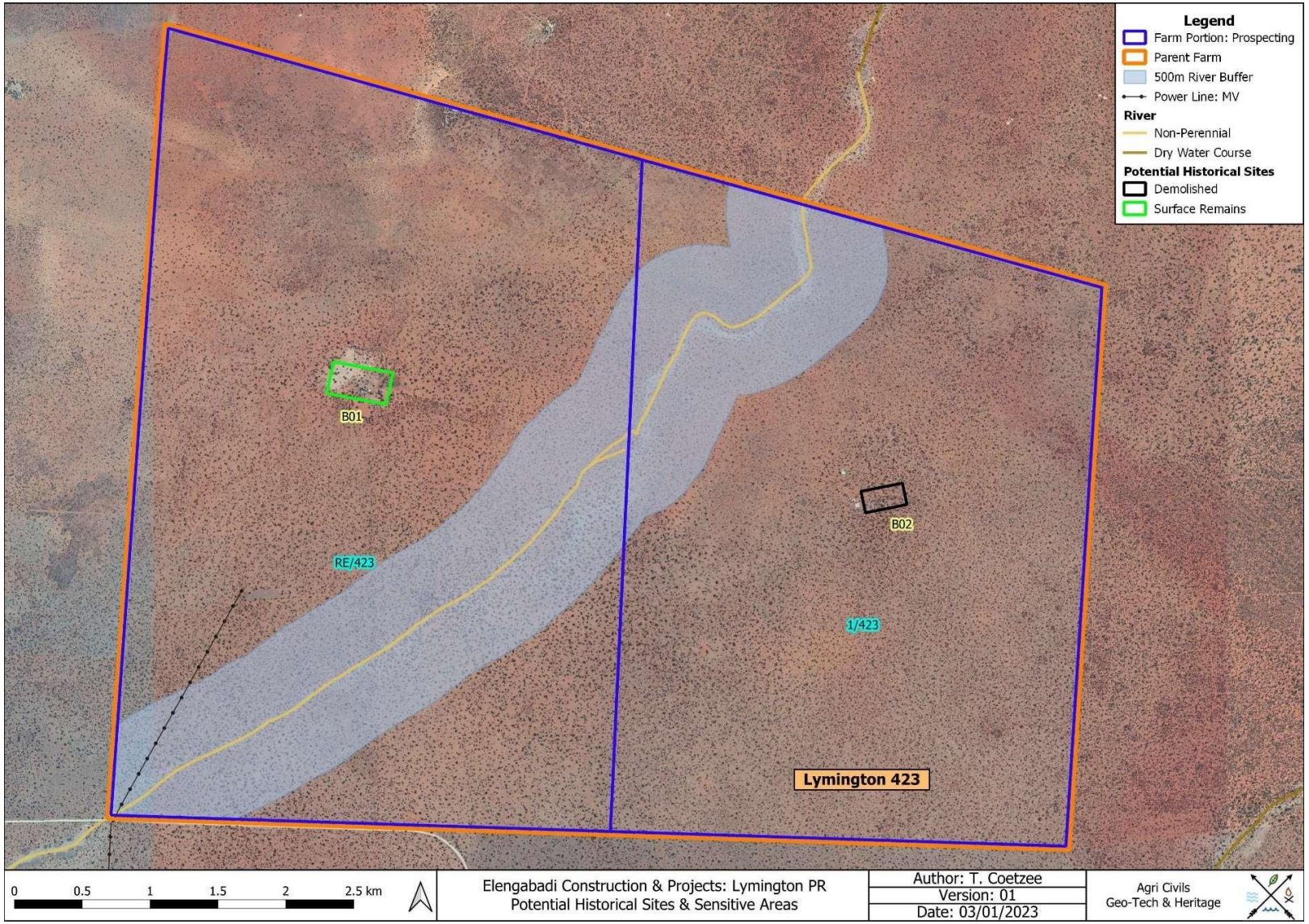


Figure 19: Potential Sites & Sensitive Areas.

6.6.3.3 Recommendations

The following recommendations are made in order to avoid the destruction of heritage remains within the area demarcated for prospecting:

- Although Site B02 appears not to be associated with historical surface remains, subsurface culturally significant material might be present. The possibility also exists that historical surface remains exceeding 60 years of age are present, but are not detectable on aerial imagery. Therefore, it is recommended that the demarcated area be avoided by the proposed prospecting activities. Should this not be possible, a qualified archaeologist should first inspect the site in order to determine the potential presence of surface remains.

- The buildings associated with Site B01 might exceed 60 years of age. These sites are likely to be significant from a heritage perspective and should be avoided by the proposed prospecting activities.

- The remaining sites (B03 – B05) do not exceed 60 years of age and are unlikely to be significant from a heritage perspective. However, should impact to the sites be unavoidable, it is recommended that a qualified archaeologist first inspect the sites.

- The 500 m buffer zone surrounding the non-perennial river is potentially sensitive from a heritage perspective and it is therefore recommended that this area be avoided by the proposed prospecting activities. Should impact to the river buffer zone be unavoidable, it is recommended that a qualified archaeologist first inspect the area.

- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.

- Should it be required, a qualified archaeologist may inspect the proposed prospecting localities once available, and provide recommendations that will aid the protection of heritage resources.

- Prospecting should not take place in the vicinity of stone cairns, potential burial sites, stone-walling, building ruins or any other heritage sites, material or structures.

- Should the prospecting outcome result in further development or construction, a full Phase 1 Archaeological Impact Assessment must be conducted on the affected area if triggered. Also, a full Phase 1 AIA must be conducted should the cumulative impact of the proposed prospecting exceed 0.5 ha.

- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the prospecting phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).

- From a heritage point of view, prospecting may proceed on the demarcated portions, subject to the abovementioned conditions and recommendations.

6.6.3.3.1 Conclusion

The proposed Elengabadi Lymington project that consists of the prospecting of manganese and iron ore on Portion 1 and the Remaining Extent of the Farm Lymington 423 covers approximately 3080.7 ha. The general area is characterised by open bushveld of which the use is unknown. The Archaeological Desktop Study examined the area using a combination of historical aerial imagery, historical topographical maps, contemporary satellite imagery, as well as written sources and previous heritage studies conducted in the area. Two potentially historical intact/demolished building sites and three areas consisting of intact contemporary buildings were noted. These areas, as well as the 500 m buffer zone, should be avoided by the proposed prospecting activities. Since Stone Age, potentially historical sites and graves have been recorded by previous heritage studies in the greater area, the study area is potentially significant from a heritage perspective.

Should the recommendations made in this study be adhered to, the proposed Elengabadi Lymington prospecting project may proceed.

6.6.3.4 Terrestrial Biodiversity Evaluation

Table 18. Impact rating scoring used for the flora impact assessment at the proposed prospecting activities.

Construction Phase	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Vehicle movement and compaction of soil minimising plant growth of indigenous flora	Vehicles should only use designated roadways to access the site
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2

Cumulative Effect:	2	1
Probability:	3	1
Total SP:	42	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Alteration of natural environment and habitat loss	Have a biodiversity protocol and rehabilitation plan in place that will be implemented upon closure.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Spreading of invasive alien plants. The altered environment will also favour species that are better adapted to disturbed/transformed areas.	Invasive plant material should be disposed by incineration, or alternatively, composting to break down seeds. If seedbank persists, invasive alien plant management and eradication measures should be implemented
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
Operation Phase	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Vehicle movement and compaction of soil minimising plant growth of indigenous flora	Vehicles should only use designated roadways to access the site
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1

Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Alteration of natural environment and loss of habitat	The ecological footprint of the proposed development should be restricted to the approved (less sensitive) area. Areas outside the area of the proposed development should not be cleared.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Spreading of invasive alien plants. The altered environment will also favour species that are better adapted to disturbed/transformed areas.	Invasive plant material should be disposed by incineration, or alternatively, composting to break down seeds. If seedbank persists, invasive alien plant management and eradication measures should be implemented
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	3	2
Total SP:	36	18
Significance rating:	Negative medium impact	Negative low impact
Decommissioning Phase	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Continuous proliferation of invasive alien plants	Effective alien invasive plant management and eradication measures should be implemented on an ongoing basis
Magnitude:	3	2
Duration:	3	2

Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Exposed disturbed area with no indigenous vegetation	Implement effective rehabilitation measures upon closure
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact

Table 19. Summary of flora impact ratings for the proposed prospecting activities.

	Average impact rating	Significance class	Average mitigated impact	Significance class
Potential impact on the current vegetation structure before and after mitigation	40.64	Negative medium impact	18.00	Negative low impact

Table 20. Animal species composition impact ratings for the proposed prospecting activities.

Construction Phase/Site Establishment	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of priority fauna species from important habitats	Reserve indigenous vegetation wherever possible.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1

Probability:	3	1
Total SP:	42	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident fauna through increased disturbance	Reserve indigenous vegetation wherever possible. Avoid vegetation clearance during the breeding season.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats.	Use designated roads to access the site. Rehabilitate unused areas with indigenous flora.
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
Operation Phase	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
	Long-term or permanent degradation and	

POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	modification of the receiving environment resulting to the loss of important habitats for fauna species.	Reserve indigenous vegetation wherever possible.
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident fauna through increased disturbance	Reserve indigenous vegetation wherever possible. Avoid vegetation clearance during the breeding season. No hunting of fauna is allowed.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
Decommissioning Phase	**Preferred Alternative**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL	Long-term or permanent degradation and modification of the	Have a biodiversity protocol and rehabilitation plan that will be

IMPACT / NATURE OF IMPACT:	receiving environment resulting to the loss of important avian habitats	implemented following the decommissioning phase
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Displacement of resident fauna species through increased disturbance	Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact

Table 21. Summary of the fauna species impact ratings for the proposed prospecting activities.

	Average impact rating	**Significance class**	**Average mitigated impact**	**Significance class**
Overall faunal impacts of the prospecting activities	42.92	Negative medium impact	20.50	Negative low impact

6.6.3.4.1 NO-GO AREAS, BUFFERS AND ALTERNATIVES

No go areas are applicable to the project site from an ecological perspective. Should the proposed activity not proceed, due to other specialist studies, the site will remain unchanged.

No other possible sites were identified on the affected property(ies) for the prospecting. This site is referred to as the preferred site. Some limited sensitive features occur on the site such as the non-perennial river and protected trees. No protected trees may be disturbed without obtaining a relevant tree permit from the department.
The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the EIA process to enable the appropriate selection of the suitable prospecting locations within the site.

6.6.3.4.2 CONCLUSION AND RECOMMENDATIONS

Although the NCCBA classifies majority of the site as being under Other Natural Areas, the on site assessment revealed that the site has a high abundance of Camelthorn trees, which are protected. This species should be avoided during prospecting activities, and where avoidance is inevitable, relevant permits should be obtained before any disturbance.

Important recommendations for the conservation of the current vegetation structure

- The proponent must be committed to a conservation approach of practice and the actual footprint of disturbance must be kept to a minimum.
- As much of the natural environment must be conserved, there should be minimal vegetation clearing.
- Relocation of important species, identification and demarcation of specimens and sub habitats not to be disturbed will have to be done beforehand by a specialist.
- Important species (flora) that will be threatened by the development must be relocated to safer habitats by suitable specialists.
- Preventative erosion control measures to be put in place. Important recommendations for the invasive alien plants

An alien management plan should be compiled by an Ecologist. The applicant can implement the alien management plan with the guide of the Ecologist.

Specific conditions recommended for the EA from a flora and vegetation perspective.

1. Implement mitigation controls during the prospecting phase as specified in the mitigation requirements. Monitor and report on their effectiveness.
2. Implement mitigation controls during the prospecting phase as specified in the mitigation. Monitor and report on their effectiveness.
3. Monitoring of implementation of mitigation controls, especially of invasive alien plants.
4. As much of the natural habitat as possible should be preserved during prospecting phase to reduce the irreversibility of impacts.
5. Effective restoration of the natural habitats that were intact before the prospecting should be implemented and reported on after decommissioning.

6.7 Final Site Map

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

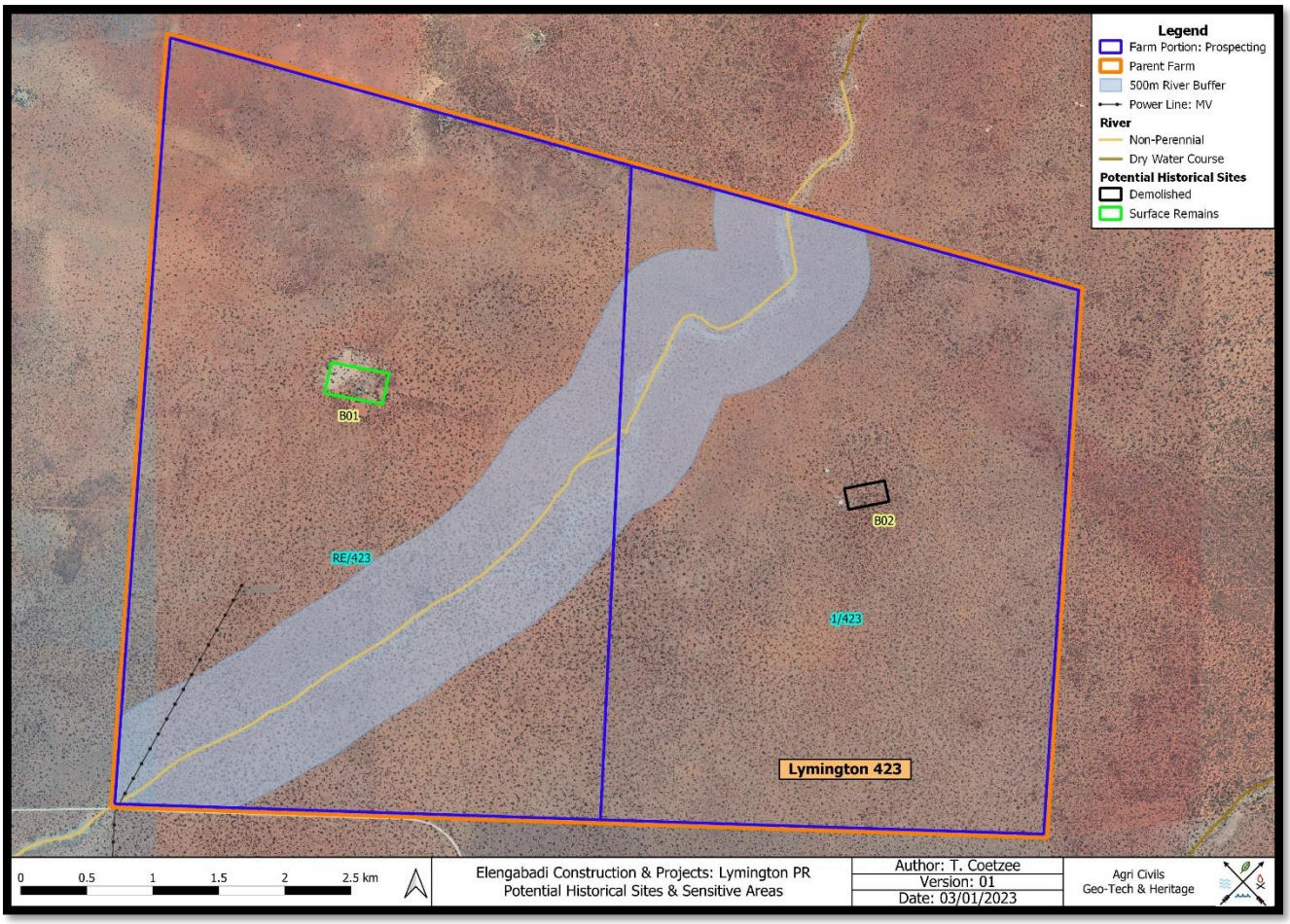


Figure 44: Layout Map

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

Loss of flora and fauna and habitats due to the drilling activities.

Increased ambient noise levels resulting from increased traffic movement during all prospecting phases as well as drilling activities.

Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on environmental resources utilized by communities, landowners and other stakeholders.

Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on ecosystem functioning.

Increased vehicle activity within the area resulting in the possible destruction and disturbance of fauna and flora.

Poor access control to farms which may impact on animal movement, breeding and grazing practices.

Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime.

Potential visual impacts caused by drilling activities. 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.

Potential impacts per activity and listed activities.

6.8.1 Construction Phase

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

6.8.2 Drilling and sampling

- Loss of flora and fauna including habitats
- Generation of fugitive dust
- Potential hydrocarbon spillage through leaking equipment
- Preparation of vehicle maintenance concrete padding
- Fugitive dust generation
- Spillage of carbonaceous material on roads or other areas

6.8.3 Decommissioning and Closure Phases

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

6.9 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 prospecting activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance
- Provide a management plan that is effective and practical for implementation.

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

- Noise impacts can be managed through consultation and trough the restriction of operating hours;
- The pollution of soil and water resources can be effectively managed through containment;
- Ecological impact can be managed through the implementation of pollution prevention measures, minimizing land clearing, restricting working hours (faunal disturbance) and concurrent rehabilitation.
- Risks associated with crime can be mitigated through avoiding recruitment activities on site, as well as monitoring and reporting.

6.9.1 Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

Granting of the prospecting right in conjunction with the environmental authorisation.

6.9.2 Description of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

As is standard practice, this Basic Assessment Report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- It is assumed that information provided by the applicant and related studies referred to is accurate;

This assessment is based largely on our understanding of the physical and ecological setting based on available literature and based on information that has been gathered in the project area.

The public consultation process will include all invited IAP's from the neighbouring areas, those that responded to the advertisement and the landowner. Comment on all aspects of the process was welcomed during the consultation including comment on the description of the environment. Comments or concerns regarding the description of the environment was raised during public consultation. Notwithstanding the above, NRK is confident that these assumptions and limitations do not compromise the overall findings of this report.

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

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

“The holder of a permit or authorization remains liable for complying with the relevant provisions of the Act until the Regional Director has issued to him a certificate to the effect that he has compiled with the said provisions” The EAP is under the opinion that the applicant has complied with these provisions.

The risks that have been identified can be mitigated. A bank guarantee has provided, indicating that provision has been made for the rehabilitation and removal of species in the proposed area.

6.9.4 Conditions that must be included in the authorisation

- The impacts associated with the invasive elements of prospecting (notably drilling and vehicular access) are likely to be medium to high negative, and of long term to permanent duration, and are not possible to mitigate to any significant degree, and the following suggested mitigation is thus designed to minimise and avoid the impacts. The primary sources of impact will be squashing and breaking of plants by the wheeled vehicles, plus compacting of the soils in these areas, plus actual physical removal of plants.

- As there are few existing tracks in the area the creation of new tracks must be minimized, and creation of the drilling grid must be designed so that turning and reversing of vehicles is minimised.

- Only all-wheel-drive vehicles may be used; this substantially reduces the impact of vehicles on the terrain.

- Prospecting should only be allowed in the dry season, when most of the plants are dormant or below ground, and when the ground is harder and less prone to erosion.

- Any excavated soils not needed for sampling must be replaced within one day of excavation, with topsoil kept aside and replaced last. The top 50cm (500mm) of any hole should be regarded as topsoil.

- Employees and all prospecting contractors must be informed about the importance and sensitivity of the natural vegetation prior to entering the area, and thereafter on an ongoing basis. The following topics should be presented to them: minimizing disturbance, avoidance of disturbance in non-target areas, erosion control, litter management, use of dedicated on site toilets, protection of all fauna and flora.

- Where possible all disturbed and displaced succulents and bulbs (where evident after drilling) should be replanted by hand within the disturbed areas, and the soil compacted by hand around their roots or bulbs.

- Whilst these mitigation measures will lessen the potential negative impacts on the vegetation, they will not entirely mitigate the damage that will be done. Of particular importance is the method of filling holes and replacing topsoil - this must be done concurrently with the drilling process i.e. holes should be filled and rehabilitated almost immediately after sampling is done at each site. It is also imperative that prospecting paths are driven only once. If existing tracks can be used and the number of drill sites and pit sites could be reduced, this would reduce the impacts further. Photographic records of each site pre- and post- drilling should be kept as proof of adequate rehabilitation.

6.9.5 Period for which the Environmental Authorisation is required.

The Prospecting Right has been applied for a period of five years. The Environmental Authorisation must be valid for the term of the prospecting right and until the closure certificate has been received by the applicant.

6.9.6 Undertaking

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

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

6.10 Financial Provision

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

The applicant must make financial provision for the rehabilitation of the environmental has been calculated at **R 137 493.00.**

6.10.1 Explain how the aforesaid amount was derived.

The financial provision was calculated based on the current master rates/ contractor rate in the quantum table noting the area that will be disturbed by the drilling and pitting and vehicle movement.

Refer to section: 1)a)ii)(1) **Determination of the amount of Financial Provision**.

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

It is hereby undertaken that the amount of **R 137 493.00.**. in the form of a bank guarantee for rehabilitation purposes as required in terms the NEMA and MPRDA acts, will be provided to the DMRE prior to the granting of the EA.

6.10.3 Specific Information required by the competent Authority

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

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

- No specific report was generated for the purposes of the socio –economic conditions. All findings are presented hereafter:
- No community landownership exists within the project area.
- Land claims request will be submitted for the study area.
- The directly and indirectly affected property owners living near the project are likely to be affected by issues relating to noise, dust and vibration from prospecting operations.
- Directly affected property owners may also be affected by visual disturbances including night lights and infrastructure. No objections or issues have been raised yet by the directly affected and adjacent landowners.

Mitigation

Elengabadi Construction & Projects will monitor impacts on affected property owners and their environment and conduct regular dialogue and consultation to identify and manage any adverse impacts. Pro-active monitoring would also assist to determine potential issues before property owners are affected.

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

A Heritage Impact Assessment will be done and consultation with the landowner regarding grave sites and cultural interest on the site which will determine drilling locations, thus activities of will not result on any historical resources being impacted on.

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

Any issues that may arise during the consultation process will be addressed and form part of the final report.

PART B

7 ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

7.1 Draft environmental management programme.

a) **Details of the EAP,** (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

Description of proposed activity has been provided in PART A, of this document

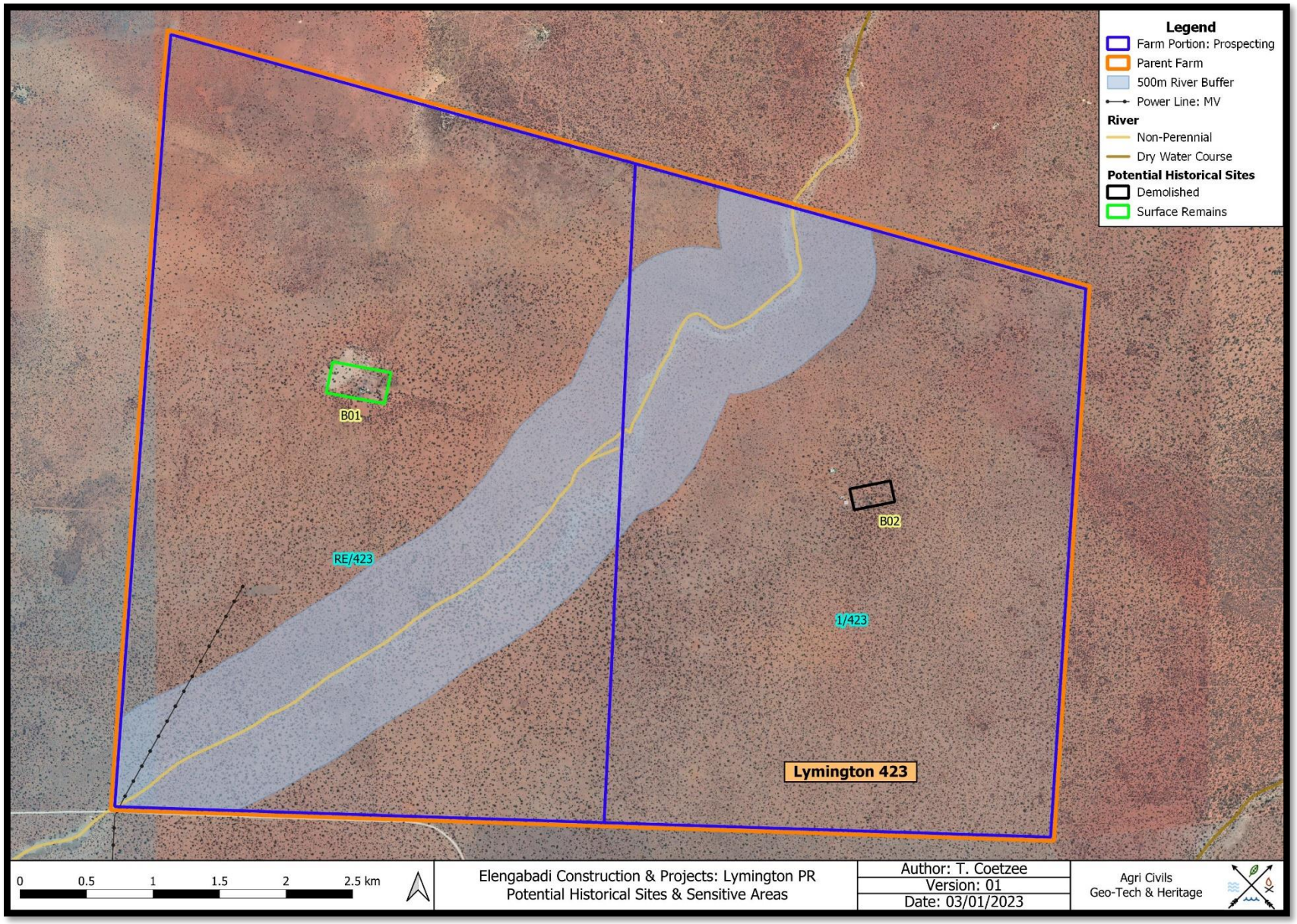
7.2 Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Description of proposed activity has been provided in PART A, of this document

7.3 Composite Map

The composite map showing rivers or dams are within 32m, 500 for wetlands of the proposed area and biodiversity of ecological sensitivity. Buffer areas should be avoided during the prospecting, should the applicant wish to drill and sample within these buffers the relevant water uses must be applied for with the Department of Water and Sanitation.


Legend
Farm Portion: Prospecting
Parent Farm
500m River Buffer
Power Line: MV
River
Non-Perennial
Dry Water Course
Potential Historical Sites
Demolished
Surface Remains
B01
B02
RE/423
1/423
Lymington 423
0
0.5
1
1.5
2
2.5 km
Elengabadi Construction & Projects: Lymington PR
Potential Historical Sites & Sensitive Areas
Author: T. Coetzee
Version: 01
Date: 03/01/2023
Agri Civils
Geo-Tech & Heritage

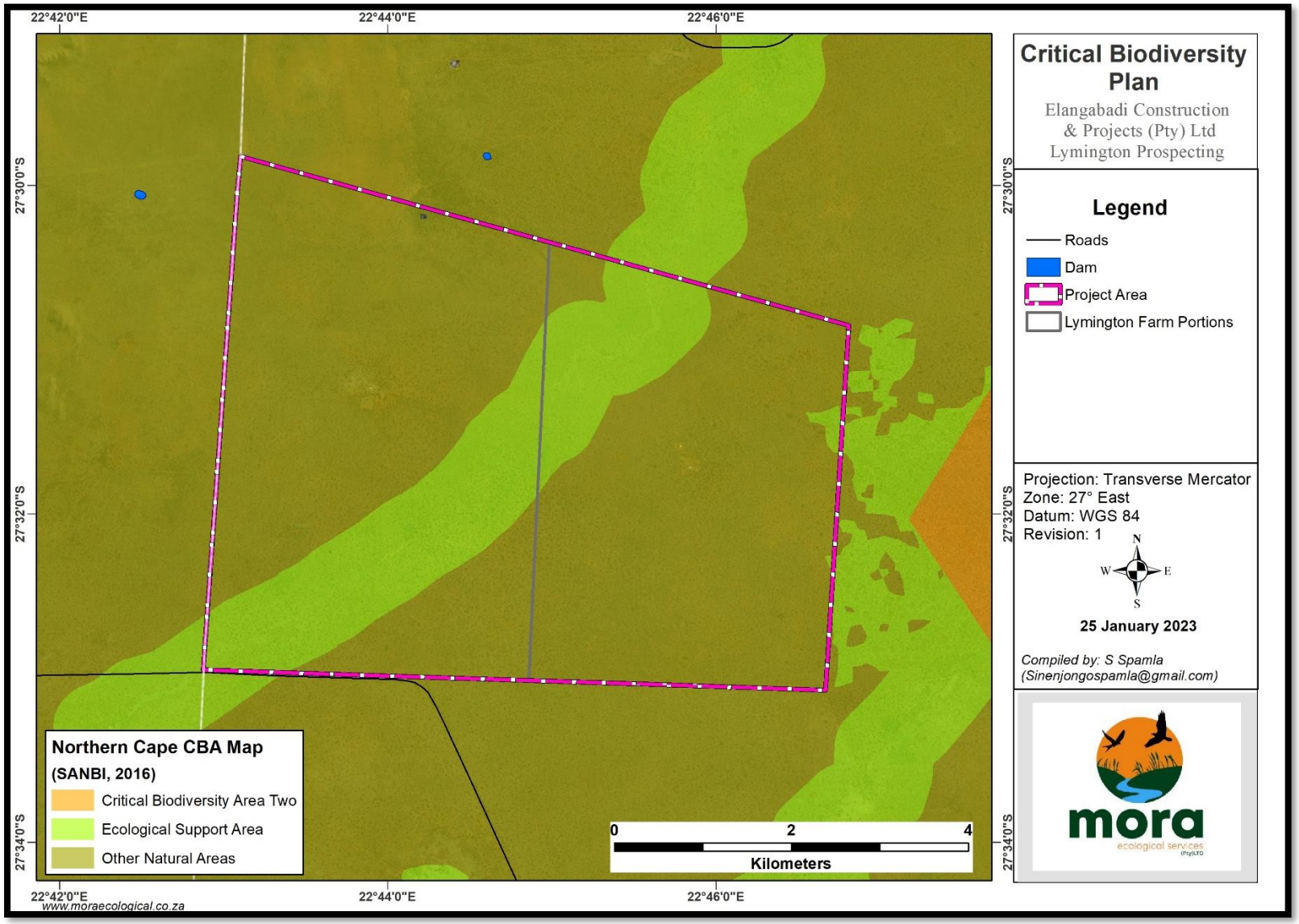


Figure 45: Composite Map

7.4 Description of Impact management objectives including management statements

Determination of closure objectives. (Ensure that the closure objectives are informed by the type of environment described)

Decommissioning and Closure Phase Activities

In broad terms decommissioning activities associated with the proposed site includes the removal of infrastructure, rehabilitation, preparation of final landforms for closure and prompting vegetation growth in order to reduce the effects of soil erosion and to re-establish landscape functionality.

After decommissioning, closure activities will include maintenance and aftercare that is required to ensure that rehabilitation is successful. In this regard, although closure objectives have not been finalised, one of the options that will be considered is rehabilitation to open veld.

The project plan includes intensive concurrent rehabilitation in conjunction with prospecting activities to ensure a minimum time period is required for final rehabilitation and aftercare once drilling has halted.

The rehabilitation plan has been developed specifically to meet the closure objectives for this project. Concurrent rehabilitation will be undertaken for the drill sites.

i) **Volumes and rate of water use required for the operation.**

Elengabadi Construction & Projects will source water from the local Municipality for drilling and portable use.

ii) **Has a water use licence has been applied for?**

A water use licence is not required for this project however consultation with DWS will be undertaken.

7.5 Impacts to be mitigated in their respective phases

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

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Establishment / construction of camp site	Construction Phase	0.2 ha	Dust suppression •Speed limits • Service equipment regularly	NEMA Air Quality Act Mine Health & Safety Act	Concurrently with the Completion of prospecting activities in an area.
Food preparation	All phases	100 cubic meter space required to Prepares 0.01 ton of food	•Restrict open fires *Maintain firebreaks	Mine Health and Safety Act National Veld and Forest Fires Act MPRDA Reg 65	Concurrently with the completion of prospecting activities in an area.
Maintenance of vehicles	All phases	200 cubic meters	Use oil trays	MPRDA Reg 68 NEMA Waste Act	Concurrently with the completion of prospecting activities in an area.
Disposal of Waste	All phases	200 litre bins	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68	Concurrently with the completion of prospecting activities in an area.
Preparation of vehicle maintenance concrete padding	Operational Phase	0.25 ha	Concurrent rehabilitation	MPRDA Regulations 61 & 62	Concurrently with the completion of prospecting activities in an area.
Drilling	Operational Phase	0.75 ha	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Prospecting.	Concurrently with the completion of prospecting activities in an area.
De-establishment and removal of infrastructure/ rehabilitation	Decommissioning and Closure Phases	0.75 ha	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure	Concurrently with the completion of prospecting activities in an area.

7.6 Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ();

ACTIVITY	**POTENTIAL IMPACT**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated	**MITIGATIONTYPE E.g.** • Modify through alternative method. • Control through noise control • Control through management and monitoring • Remedy through rehabilitation.	**STANDARD TO BE ACHIEVED** (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
Establishment / construction of camp site	Dust, Noise	Loss soil resources	Construction Phase	Dust suppression •Speed limits • Service equipment regularly	NEMA Air Quality Act Mine Health & Safety Act
Food preparation	Air pollution	Loss soil resources	All phases	•Restrict open fires *Maintain firebreaks	Mine Health and Safety Act National Veld and Forest Fires Act MPRDA Reg 65
Maintenance of vehicles	water contamination	Loss soil Resources	All phases	Use oil trays	MPRDA Reg 68 NEMA Waste Act
Disposal of Waste	dust, water contamination	Loss of Fauna and Flora	All phases	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Loss soil resources	Operational Phase	Concurrent rehabilitation	MPRDA Regulations 61 & 62
Drilling	Loss of flora and fauna, habitat, Dust, Noise, water contamination	Dust emissions. loss of flora and fauna, Loss of habitats Impacted drainage patterns	Operational Phase	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Prospecting.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	None	Decommission and Closure Phases	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure

7.7 Impact Management Actions

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Establishment / construction of camp site	Dust, Noise	Dust suppression •Speed limits • Service equipment regularly	Construction Phase	NEMA Air Quality Act Mine Health & Safety Act
Food preparation	Air pollution	•Restrict open fires *Maintain firebreaks	All phases	Mine Health and Safety Act National Veld and Forest Fires Act MPRDA Reg 65
Maintenance of vehicles	water contamination	Use oil trays	All phases	MPRDA Reg 68 NEMA Waste Act
Disposal of Waste	Dust, water contamination	Use waste Receptacles	All phases	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Concurrent rehabilitation	Operational Phase	MPRDA Regulations 61 & 62
Drilling	Flora and Fauna, soils, Dust, Noise, water contamination	Concurrent rehabilitation	Operational Phase	Procedures for Managing Significant Impacts Related to Prospecting.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	Systematic rehabilitation	Decommission and Closure Phases	Procedure for Emergency Preparedness and Response Procedure

7.8 Financial Provision

(1) Determination of the amount of Financial Provision.

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

The rehabilitation plan has been developed specifically to meet the closure objectives for this project.

Final end land use: - Natural veldt, potentially sheep grazing and aloe farming

Environmental objectives:

- After direct placement of topsoil, the area will be profiled to a free-draining landform.
- The soils will be ripped, treated and re-vegetated using a natural grass / shrub / tree mixture.
- The re-vegetation must use and indigenous seed mix which restores the land to a stable and non-erodible landform.
- The rehabilitated areas will be monitored for declared weeds and invasive plants. This will be controlled and managed as per the normal procedure.
- Grazing of rehabilitated areas will be avoided for the first 3-5 years until the desired nutritional status and vegetation coverage has been achieved.
- With proper rehabilitation and fertilisation techniques, this can be reduced to a minimum to ensure that the rehabilitated area is sustainable and will not degrade further due to erosion.
- Allowance will be made for a maintenance period of one year following rehabilitation.

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

This Basic Assessment Report and Environmental Management Plan will be made available to each registered stakeholder for review and comment. All comments will be captured in the issues and response section and will be included into the final report.

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

Rehabilitation of Camp Site - upon completion of the entire prospecting phase.

Rehabilitation of drill sites - immediately after drill completion.

Rehabilitation of Access Roads - Once the use of specific roads ceases and upon completion of the prospecting work on site
General surface rehabilitation - concurrent with prospecting activities

8 LEADING CLOSURE OBJECTIVES

8.1 Leading Closure Objectives

8.1.1 Socio Economic

Closure Management Objectives

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

Specific Performance Criteria

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

Monitoring and Reporting

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

Action Required

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

8.1.2 Traffic and Safety

Closure Management Objective

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

Monitoring and reporting

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

Action required

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

8.1.3 Topography and erosion control

Closure Management Objectives

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

Specific Performance Criteria

- Surface water bodies shall not be left in any prospecting voids unless the operations manager demonstrates there will be no significant environmental impact (such as salinization, reduction in water availability, toxicity, algal problems, attraction to pest species or a local safety hazard).

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

Monitoring and Proposed Actions

- During decommissioning, the environmental site manager together with the site manager will monitor construction activities at least weekly.
- After rehabilitation the site will be monitored for any pooling or erosion on site, especially after rainfall. This will be the responsibility of the environmental site manager.
- The area needs to be surveyed every two months to monitor differential settlement.
- The environmental site manager will ensure annual soil assessments be conducted by specialist pedologists after rehabilitation of the site.
- Monthly inspections will be conducted by the environmental site manager for any erosion which must be addressed immediately if observed, and together with the site manager will inspect all pipelines and associated dirty water channels/compartments to ensure no leaks or damage to these.

- All dirty water separation and containment facilities will also be inspected at least weekly (and after each rainfall event), to ensure adequate functioning of all systems to prevent leaks into the environment which will negatively impact on the soils.
- The environmental site manager will ensure monthly inspection of surrounding areas for soil compaction.
- Ensure surface water monitoring and action plans are implemented.
- Rehabilitated sites will be inspected for soil erosion on a monthly basis, together with the visual inspection regards to the vegetation cover abundance.
- The rehabilitated areas must be monitored for the type and depth of soil cover used.
- Monitoring of any ecologically sensitive species should they be observed on site will be done as and when required.
- The site will be monitored for alien invasive species at least every 6 months. This will, however, be dependent on the species of alien invasive species on site.

  - Floral surveys will be conducted on rehabilitated areas on an annual basis, together with the soil quality and depth monitoring.

  - All reports will be kept at the prospecting offices. All incidences and issues will be recorded, as will the actions taken to address issues. The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.

  - The site manager is responsible for ensuring that all vehicles, remaining on site during the decommission phase, are serviced on a regular basis in terms of the maintenance plans.

Action Required

- Should it be noted that designs are not being followed, construction activities will cease, and corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.
- Any pooling will be addressed by filling depression and / or grading areas and re-vegetating such sites.
- Any erosion will also be addressed utilising contour berms, gabion structures if necessary or a specialist will be consulted if necessary. Any eroded soils will be lifted and returned to the affected area.
- Any deficiencies will be corrected by placing material in these areas as per the rehabilitation plan.
- Additional material or soil will be brought in if required.
- Where topographical areas are exceeded and create storm water drainage issues, excess material will be removed, and area rehabilitated as per the rehabilitation plan.

- Any recommendations made by specialist pedologist after annual surveys of rehabilitated areas will be considered for implementation as proposed.
- Any eroded soil will be lifted and replaced to the area which has been eroded.
- The area will be rehabilitated as per the rehabilitation plan.
- Erosion control measures, such as gabion structures, will be considered at areas where erosion is persistent.
- Records of soil placement and package thickness will be kept on a monthly basis during the prospecting phase.
- Where the soil depth is compromised the areas will be filled with topsoil.
- Material will be brought in if necessary.
- Silt build-up in water management facilities / dams will be cleared and deposited in residue deposits if dirty.
- Any compacted soils will be ripped or diced and re-vegetated with indigenous flora. Vegetation will then be monitored in these areas.
- Should any erosion be observed on site, it will be reported to the site manager and environmental site manager. The issue will be addressed, and consideration given to:

➢ Increasing vegetative cover in problem areas through manual seeding/planting.
➢ Implementing erosion control measures such as contour berms or gabion baskets.
➢ Consulting specialists.

- Should soil depth be inadequate in the rehabilitated areas, then more soil will be brought in and deposited on the site.
- The area will also be inspected for erosion to determine the reason for soil loss. This will be addressed immediately.
- All recommendations made by the specialists will be implemented where deemed appropriate.
- Manual seeding or planting should vegetative cover be inadequate.
- An alien invasive management program will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised will be used responsibly. Where required DWS will be consulted with regards to the use of certain chemicals.

8.1.4 Surface Water Control

Closure Management Objectives

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

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

Specific Performance Criteria

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

Monitoring and Proposed Actions

- The environmental site manager will ensure that surface water management is adhered to during the closure phase.
- Water management features will be upgraded as necessary if water quality issues arise from these structures.
- The rehabilitated area will be monitored for ponding.
- Any areas where ponding occurs will be filled and reshaped as per the rehabilitation plan to ensure surface water runoff from the area and discourage ponding.

Water Quality Monitoring and Reporting

- Biannual water testing will be implemented
- This monitoring program will include various upstream and downstream monitoring points and various sources on site.
- Database of results will be maintained by the environmental site manager and quarterly and annual reports will be compiled and submitted to the management and will be submitted to DWS.
- All samples will be submitted to an accredited laboratory for analysis.
- The following chemical parameters are recommended for the closure phase analysis:
    - ✓ Total Dissolved Solids;
    - ✓ Electrical Conductivity;
    - ✓ pH level;
    - ✓ Alkalinity;
    - ✓ Carbonates;
    - ✓ Magnesium;
    - ✓ Calcium;
    - ✓ Sodium;
    - ✓ Potassium;
    - ✓ Sulphate;
    - ✓ Chloride;
    - ✓ Fluoride;
    - ✓ Iron;
    - ✓ Manganese;
    - ✓ Aluminium
- Water use and consumption on site must be monitored at various strategic locations on site.

8.1.5 Ecology

Closure Management Objectives

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

Specific Performance criteria

- Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems.
- The rehabilitated ecosystem will have equivalent functions and resilience as the target ecosystem.

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

Monitoring and Proposed Actions

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

  These will be filed and kept at the offices.
- Rehabilitation will be visually inspected at least monthly with regards to vegetation cover abundance.
- The rehabilitated area will be inspected monthly for general erosion and vegetative cover.
- Rehabilitated areas will be monitored for soil quality and depth annually.

Action Required

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

- Should soil depth be inadequate in the rehabilitated areas, more soil will be brought in and deposited on the site.
- The area will also be inspected for erosion to determine the reason for soil loss.
- All recommendations made by the specialists will be followed.
- Manual seeding or planting should vegetative cover be inadequate.
- An alien invasive management programme will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised must be used responsibly.
- Should it be noted that designs are not being followed, rehabilitation activities will cease, and corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.

8.1.6 Land use

Closure Management objectives

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

Specific Performance Criteria

- Soil samples will be taken from rehabilitated areas annually over the full period of closure to determine soil fertility, depth compaction, acidity and prospecting related pollution. This should be conducted by qualified specialist who will also recommend actions and remedial measures to correct any issues observed on site.
- Only after the levelled areas have been inspected and approved by the Site Manager will topsoil be placed to a depth of 0.5m (where possible the original topsoil types should be placed back into the area where it was found). The topsoil layer must be as even as possible, i.e. it must be smooth, and the depth must remain consistent throughout.
- Once the topsoil has been replaced, vehicle movement will be restricted to prevent compaction of the topsoil. All runoff from freshly top soiled areas will be channelled to pollution control structures so that eroded soil does no leave the property.
- Rehabilitated areas will be vegetated within the same growing season (before or during the rainy season). A suitable seed bed will be prepared to enhance the penetration and absorption of water, thereby giving the seed the best possible chance to germinate. The seeding depth should be very shallow to provide better germination. For most grass species seeding depth is approximately 5- 15mm.
- Rehabilitated areas will be re-vegetated with local indigenous flora as far as possible.

- Once the seed mixture has been sown the land must be rolled using to ensure consolidation around the seeds and effective moisture retention. Access to seeded areas will be restricted to protect the newly established pasture.

Monitoring and Measurement

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

8.1.7 Ground water

Closure Management Objective

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

Groundwater Quality and Quantity Monitoring and Reporting

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

  Total Dissolved Solids / Electrical Conductivity;
  - ✓ pH level;
  - ✓ Alkalinity;
  - ✓ Carbonates;
  - ✓ Magnesium;

- ✓ Calcium;
- ✓ Sodium;
- ✓ Potassium;
- ✓ Sulphate;
- ✓ Chloride;
- ✓ Fluoride;
- ✓ Iron;
- ✓ Nitrate;
- ✓ Manganese; and
- ✓ Aluminium

- Water use and water consumption on site will be monitored at various strategic areas on site.

General Monitoring and Reporting

- The environmental site manager and site manager will ensure that the integrity of the lining of all dirty water management facilities is tested at least annually.
- The environmental site manager and site manager will inspect all water management facilities and associated pipelines at least weekly to ensure there are no leaks which would result in loss of water and that they are functioning optimally.
- The groundwater flow dynamics will be calibrated every two years with updated monitoring data. This will assist with management and long-term risk prediction and management.
- The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.
- All incidences and issues will be recorded, as will the actions taken to address issues. These will be kept at the site offices.

Action Required

- Should significant changes in qualities or levels be observed then:
- All high-risk facilities will be inspected to ensure no severe problems occur in these areas which have resulted in poor quality leachate.
- Any issues observed will be reported to the environmental site manager and respective site manager.
- A geo-hydrologist will be consulted with regards to any additional mitigation or management activities which can assist in resolving potential pollution, such as cut-off drains.
- Should substantial decreases in groundwater levels or quality be observed in boreholes utilised by surrounding community then the applicant will need to find solutions in conjunction with affected parties.

- Should spikes be observed in water consumption then these will be investigated immediately, and sources identified.
- All leaks identified will be repaired.

8.1.8 Air Quality and Noise

Closure Management Objectives

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

Monitoring and proposed actions

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

Action required

- Should ambient dust levels exceed recommended standards and frequencies as per the Air Quality Act, then the management plan for dust will be re-evaluated and assessed to improve dust control on site. Actions could include:
- Use of dust binding agents in areas of high dust generation.
- Consideration of sprinkler systems in areas of high dust generation.
- More frequent spraying.
- Should ambient noise levels exceed target levels:

- Additional noise measurements will be taken at all sensitive receptors beyond the prospecting area boundary in question, initially those nearest to the area and working further away until levels are within acceptable levels.
- Should levels at sensitive receptors still exceed target levels, and it is due to prospecting activities, then the noise management plan will be re-evaluated to reduce noise at these sensitive receptors to within acceptable limits.
- Additional actions can include:
    - ✓ Utilisation of sound buffers or screens around noise sources.
    - ✓ Enclosing point sources in sound-proof enclosures if possible.
    - ✓ Utilising silencers on equipment.
    - ✓ Considering quieter equipment.

8.2 DOMAIN SPECIFIC CLOSURE CRITERIA

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

Domain 1 _ Mobile Office and Administration

- Offices will be mobile and temporary hence no demolition will be required
- It is very likely that the haul roads will remain on site. Any unnecessary haul roads traversing the site area will be rehabilitated as part of the overall rehabilitation of the prospecting area.
- Any contaminated surface material will be removed and disposed of on the co-disposal dump. Waste material will be removed to specific registered waste sites which handle that specific waste.
- Roads and infrastructure areas will be ripped down to 1m, in order to break up the severe compaction before rehabilitation proceeds. Tillage to 30cm will be needed to break up clods. The area will be contoured and seeded with local, indigenous species as per the recommendation of a specialist. Slopes must be kept as shallow as possible to reduce wind friction. The soils placed on the rehabilitated ground must be slightly compacted and not exceed a slope of 18° to ensure suitable substrate for vegetation and to reduce risk of erosion.

Domain 2 _ Waste and Water Related Infrastructure

- All pollution control structures if any will remain on site during closure to ensure the protection of the surrounding environment. These will only be rehabilitated once water runoff quality is of adequate quality to release into the environment.

- The storm water diversion trench will remain in place after decommissions to reduce run-off over the rehabilitated area and reduce erosion.

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

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

- management accountability and ownership of closure activity;
- ensure that stakeholders' needs, concerns and aspirations are considered when considering closure;
- comply with relevant or applicable legislative requirements;
- ensure the health, safety and welfare of all humans and animals are safeguarded from hazards resulting from prospecting activities that have been terminated;
- limit or mitigate adverse environmental effects to an extent that it is acceptable by all parties;
- mitigate socio-economic impacts in relation to a area in which an operation is located following decommissioning and subsequent closure as far as reasonably possible; help protect indigenous values;
- provide a reasonable basis on which the financial consequences of closure can be estimated, recognised and managed so that rehabilitation and closure is efficiently and cost effectively;
- avoid or minimise costs and long-term liabilities to the company and to the government and public;
- ensure land is rehabilitated to, as far as is practicable, its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development and;
- Ensure investment decisions include appropriate consideration of closure, including both quantitative and qualitative impacts of closure.

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

Table 22: Financial Provision Calculation

CALCULATION OF THE QUANTUM (REAL RATES)

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	**m3**	0	17,4	1	1	0
2 (A)	Demolition of steel buildings and structures	**m2**	0	238,71	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	**m2**	0	351,79	1	1	0
3	Rehabilitation of access roads	**m2**	500	42,72	1	1	21360
4 (A)	Demolition and rehabilitation of electrified railway lines	**m**	0	414,61	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	**m**	0	226,15	1	1	0
5	Demolition of housing and/or administration facilities	**m2**	0	477,42	1	1	0
6	Opencast rehabilitation including final voids and ramps	**ha**	0	242984,15	1	1	0
7	Sealing of shafts adits and inclines	**m3**	0	128,15	1	1	0
8 (A)	Rehabilitation of overburden and spoils	**ha**	0	166847,44	1	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	**ha**	0	207805,47	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	**ha**	0	603565,59	1	1	0
9	Rehabilitation of subsided areas	**ha**	0	139709,6	1	1	0
10	General surface rehabilitation	**ha**	0,5	132171,31	1	1	66085,655
11	River diversions	**ha**	0	132171,31	1	1	0
12	Fencing	**m**	0	150,77	1	1	0
13	Water management	**ha**	0	50255,25	1	1	0
14	2 to 3 years of maintenance and aftercare	**ha**	0,6	17589,34	1	1	10553,604
15 (A)	Specialist study	**Sum**	0	0	1	1	0
15 (B)	Specialist study	**Sum**	0	0	1	1	0
					Sub Total 1		**97999,259**
1	Preliminary and General		11759,91108		**weighting factor 2** 1		**11759,91108**
2	Contingencies		9799,9259				**9799,9259**
					Subtotal 2		**119559,10**
					VAT (15%)		**17933,86**
					Grand Total		**137493**

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

The financial provision will be provided as determined in the form of a bank guarantee for rehabilitation purposes as required in terms of the NEMA and MPRDA acts to the DMRE upon granting of the environmental authorisation and prospecting right. The PR will only be executed once the financial provision has been settled.

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

Including Monitoring of Impact Management Actions, Monitoring and reporting frequency, Responsible persons, Time period for implementing impact management actions, Mechanism for monitoring compliance

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities (For Monitoring Programmes)	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
Establishment / construction of camp site	Visual inspection of soil erosion and / or compaction	Dust suppression ·Speed limits · Service equipment regularly	Site Manager	Once-off upfront consultation with affected parties. As required as grievances are received. 1. Consultation to be signed off by Environmental Management. 2. All grievances to be signed-off by Environmental Management
Food preparation	Visual inspection of soil erosion and / or compaction	Restrict open fires *Maintain firebreaks	Site Manager	Weekly and after rain events
Maintenance of vehicles	Visual inspection of soil erosion and / or compaction	·Use oil trays	Site Manager	Weekly and after rain events
Disposal of Waste	Visual inspection of soil erosion and / or compaction	Use waste receptacles	Site Manager	Weekly and after rain events
Preparation of vehicle maintenance concrete padding	Visual inspection of soil erosion and / or compaction	Concurrent rehabilitation	Site Manager	Weekly and after rain events
Drilling	Visual inspection of soil erosion and / or Compaction, dust	Concurrent rehabilitation	Site Manager	Weekly during the drilling program (prior and post drilling) 1. Consultation to be signed off by Environmental Management. 2. All grievances to be signed-off by Environmental Management
De-establishment and removal of infrastructure/rehabilitation	Follow up inspections and monitoring of rehabilitation	Systematic rehabilitation	Site Manager	Monthly for a period of 6 months after rehabilitation activities are concluded. 1. Monthly monitoring reports to be signed-off by the Environmental Manager.

				2. Corrective action to be confirmed and signed-off by the Environmental Manager. 3. Consolidated monthly monitoring reports (including the corrective action taken) to be submitted to the Department of Mineral Resources. Assessment report for site closure to be submitted to the Department of Mineral Resources for approval.

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

Performance assessments must be undertaken on the EMP every two years by an external auditor. These reports must also include the assessment of the financial provision. The reports should be submitted to the DMRE.

8.3.5 Environmental Awareness Plan

An environmental awareness training manual will be developed for the prospecting project.

All employees must be provided with environmental awareness training to inform them of any environmental risks that may result from their work and of the manner in which the risks must be dealt with to avoid pollution or the degradation of the environment.

Employees should be provided with environmental awareness training before prospecting operations start. All new employees should be provided with environmental awareness training. Environmental awareness and training is an important aspect of the implementation of the EMP. The onus is on the different parties involved in the various stages of the life cycle of the project to be environmentally conscious. Hence, it is suggested that all members of the project team are familiar with the findings of the site-specific EA report and the EMP. For instance, the contractor is responsible for the lack of environmental knowledge of his/her crew members. The contractor could forward internal environmental awareness and training procedures to the project manager and environmental officer for comment prior to the commencement of the project. Likewise, the above is applicable to the programming, design, operations and maintenance, and decommissioning teams. Environmental awareness ensures that environmental accidents are minimized, and environmental compliance maximized.

All staff and contractors will be submitted to an annual training / awareness course as to inform the staff of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment.

Section 39 (3) (c) requires that an applicant who prepares an Environmental Management Programme or Environmental Management Plan must “develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from the work and the manner in which the risks must be dealt with in order to avoid pollution and degradation of the environment”. Environmental Awareness is required not only for

management and employees (as described in Section 39 (3) (c) but also for visitors to the site. the following strategies and plans will be put into place for each of the parties.

Visitor Environmental Awareness

Visitor/sub-contractor environmental awareness will be generated through the provision of a signboard describing very briefly the environmental considerations applicable to them. The signboard should contain the following information:

- Statement of the applicant's commitment to environmental principles;
- List of the "rules" to which the visitor must abide. This will include:
    - No littering. Dispose of all waste in the bins provided;
    - No fires;
    - Stay on demarcated roadways and paths only;
    - Kindly report any environmental infringements they may notice;
    - Check your vehicle/equipment for diesel/oil leaks.

Senior and Middle Management Environmental Awareness:

Achieving environmental awareness at upper levels of management is slightly different from the process at the operational level. There is often a fair level of the general value of environmental awareness, but site-specific issues will most often need to be communicated. This will be achieved by:

- Management must make themselves fully familiar with the EMP;
- Ensuring that there is a spare copy of the approved EMP at his/her disposal; management is encouraged to make notes in the document regarding the difficulty / ease of implementing the environmental management measures. These notes should be sent to the consultants to assist in future revisions of the EMP;
- The manager must ensure that the operators perform regular monitoring of their workstations / areas.

During the management's execution of their activities/being at the site, the management must be constantly be aware of and observant of especially the following:

- Dust levels - movement outside of demarcated areas;
- Litter management - general housekeeping;

- Topsoil management - fuel/oil management/leaks/changes;
- Success of operational re-vegetation; and
- Alien vegetation.

Operator / Workforce Environmental Awareness:

Achieving environmental awareness amongst the operators and labour is probably the most important because they are usually present at the place where most environmental transgressions take place or in fact cause them. It is the aim of increased environmental awareness to reduce any such environmental transgressions.

Increasing environmental awareness at these levels can be achieved through the following strategies:

- Induction environmental training must take place prior to any contract period.
- Training: Each and every employee (contractor or not) must go through an environmental training process where at least the following items area covered:
    - The oil/fuel management policy must be explained to the employees. The reason for the policy must also be explained (i.e. to not impact on groundwater, surface water, soil quality etc.);
    - The domestic and industrial waste management policy & method must also form part of the training;
    - The topsoil handling method and the reasons for preserving topsoil (i.e. post prospecting re vegetation, erosion prevention etc.);
    - Alien vegetation management: How to recognize and remove such species;
    - Protection of the natural veld by not driving/manoeuvring or walking through the demarcated protection areas. Reporting that demarcation posts/tape is broken or removed;
    - Emergency management procedures such as dealing with oil spills or fires must also be drilled; and
    - Such training will, in this case, be carried out by the site manager/resident engineer.

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

Environmental awareness training will be provided as well as ongoing awareness through the use of relevant environmental topics included in daily toolbox talks.

Basic Environmental Awareness

Management is responsible to provide training of employees and contractors on:

The importance of conformance with the environmental management plan (EMP).

The significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance.

Their roles and responsibilities in achieving conformance with the EMP, including emergency preparedness and response requirements.

The potential consequences of departure from specified operating procedures.

Comprehension Training

Comprehension training must include:

Emergency preparedness and response

Spill management

Water management

Incident reporting

Storage of chemicals

Each supervisor is responsible to ensure the above are discussed with all employees and contractors, for which attendance must also be recorded. Records must be submitted to management.

Scheduling and conducting of training

After the training needs have been identified, it is the responsibility of Management or appointed representatives to ensure that personnel attend the relevant identified training. Progress on compliance with the training program must be verified during the Management meetings.

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

The role that the Environmental Awareness Plan plays in reducing the risk of pollution or degradation of the environment is best understood in its entirety. Elengabadi Construction & Projects will implement an environmental management system to assist in the implementing and monitoring of commitments included in this BAR and EMP report.

8.3.8 Specific information required by the Competent Authority

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

- Financial statements will be declared to the competent authority annually
- Any disturbance (including driving and walking) should be prohibited during all times in restricted areas.

8.4 UNDERTAKING

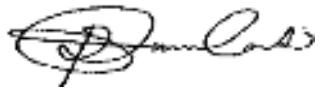
The EAP herewith confirms

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) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒



Signature of the environmental assessment practitioner:

NRK Resources

Name of company:

29 January 2023

Date:

-END-

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