mineral resources & energy

Department:
Minerals Resources and Energy
REPUBLIC OF SOUTH AFRICA

DRAFT BASIC ASSESSMENT REPORT

and

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (AS AMENDED IN 2021) 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).

FILE REFERENCE NUMBER SAMRAD: NW 30/5/1/1/3/2/1/ 13240 PR

NORTH WEST VANADIUM (PTY) LTD

17 January 2022

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ACRONYMS

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

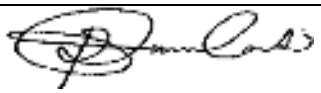
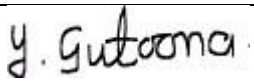
SCOPE OF ASSSSMENT AND BASIC ASSESSMENT REPORT

1 APPLICANT AND EAP DETAILS

1.1 Details of Applicant

Applicant	**North West Vanadium (Pty) Ltd**
File Reference Number SAMRAD	NW 30/5/1/1/3/2/1/ 13240 PR
Contact Person	Bertus Cilliers
Address	61 Wryneck Avenue, Ridgeway, Johannesburg, 2091
Telephone	0082 411 1058
Fax	0866955990
Email	bertus@belenosresources.com

1.2 Details of the EAP

Company:	**ARCHEAN RESOURCES (PTY) LTD**	
Author	Khuliso Ramulondi (Pr.Sci.Nat; REG. EAP)	
Reviewed by	Yvonne Gutoona (Cert.Sci.Nat)	
EAP Qualifications	**<u>Khuliso Ramulondi</u>** Bachelor of Earth Science in Mining and Environmental Geology (UV) **Membership of Professional Associations:** SACNASP, EAPASA, GSSA, & IAIASA	
CONTACT PERSON (S)	Moses Mphephu and Yvonne Gutoona	
ADDRESS	48 Kingbolt Crescent, Wapadrand, Pretoria	
CELL PHONE	067 103 2562/ 082 970 1513	
FAX NUMBER	0866955990	
EMAIL:	moses@archeanresources.com/information@archeanresources.com cc archeanresources@outlook.com	

1.3 Expertise of the EAP

The EAP's experience summary of Environmental aspects below:

- Environmental Impact Assessments
- Basic assessments, WULA reports
- Water use license application
- Waste use license application
- 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:	RE/14/420 Mamagalieskraal, 839/420 Mamagalieskraal 840/420 Mamagalieskraal. 841/420 Mamagalieskraal 842/420 Mamagalieskraal, RE/843/420 Mamagalieskraal 844/420 Mamagalieskraal, 845/420 Mamagalieskraal 846/420 Mamagalieskraal, 847/420 Mamagalieskraal 848/420 Mamagalieskraal, 849/420 Mamagalieskraal RE/850/420 Mamagalieskraal, 851/420 Mamagalieskraal 852/420 Mamagalieskraal, 896/420 Mamagalieskraal 897/420 Mamagalieskraal, 898/420 Mamagalieskraal 899/420 Mamagalieskraal, 900/420 Mamagalieskraal 421 Bokfontein (Voorspoed) 1/426 Bokfontein 3/426 Bokfontein 4/426 Bokfontein
Application area (Ha)	1,220.93 Ha
Magisterial district:	Bojanala North West province
Distance and direction from nearest town	11km northeast of Brits Town, North West province
21-digit Surveyor General Code for each farm portion	T0JQ00000000042000014; T0JQ00000000042000839 T0JQ00000000042000840; T0JQ00000000042000841 T0JQ00000000042000842; T0JQ00000000042000843 T0JQ00000000042000844; T0JQ00000000042000845 T0JQ00000000042000846; T0JQ00000000042000847 T0JQ00000000042000848; T0JQ00000000042000849 T0JQ00000000042000850; T0JQ00000000042000851 T0JQ00000000042000852 T0JQ00000000042000896 T0JQ00000000042000897; T0JQ00000000042000898 T0JQ00000000042000899; T0JQ00000000042000900 T0JQ00000000042100000; T0JQ00000000042600001 T0JQ00000000042600003; T0JQ00000000042600004

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

Brits is located roughly 7 km to the southwest of the proposed prospecting area, while Ga-Rankuwa is located 11 km to the east-southeast and Mooinooi 35 km to the southwest. The demarcated study area falls within the Madibeng Local Municipality and the Bojanala District Municipality in the Northwest Province. The Letlhabile tertiary road runs in a north-south direction approximately 1.3 km to the west of the study area, while the R566 secondary road runs in an east-west direction 5.6 km to the south and the N4 national road a further 2.9 km to the south.

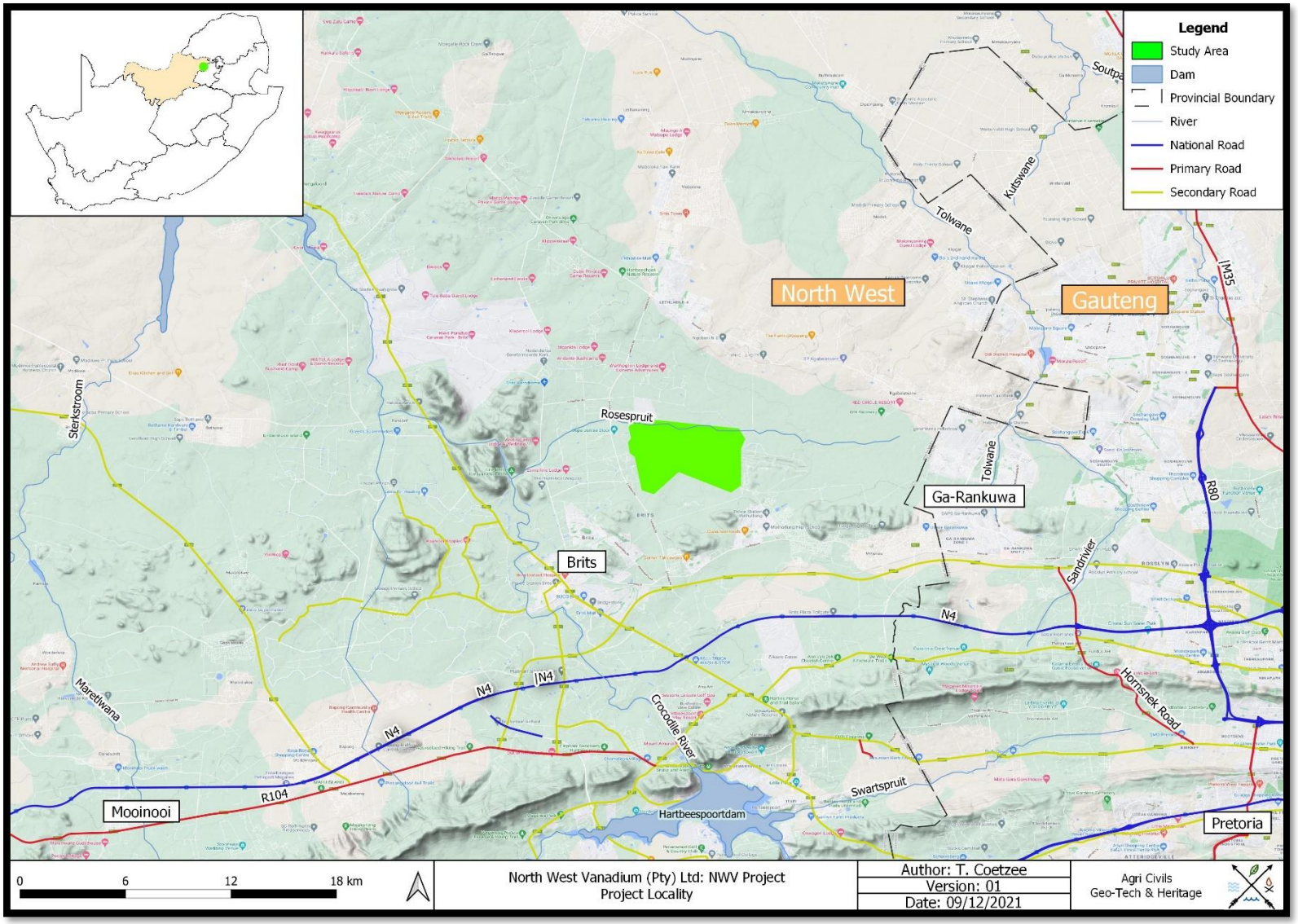


Figure 1: Nearest Towns

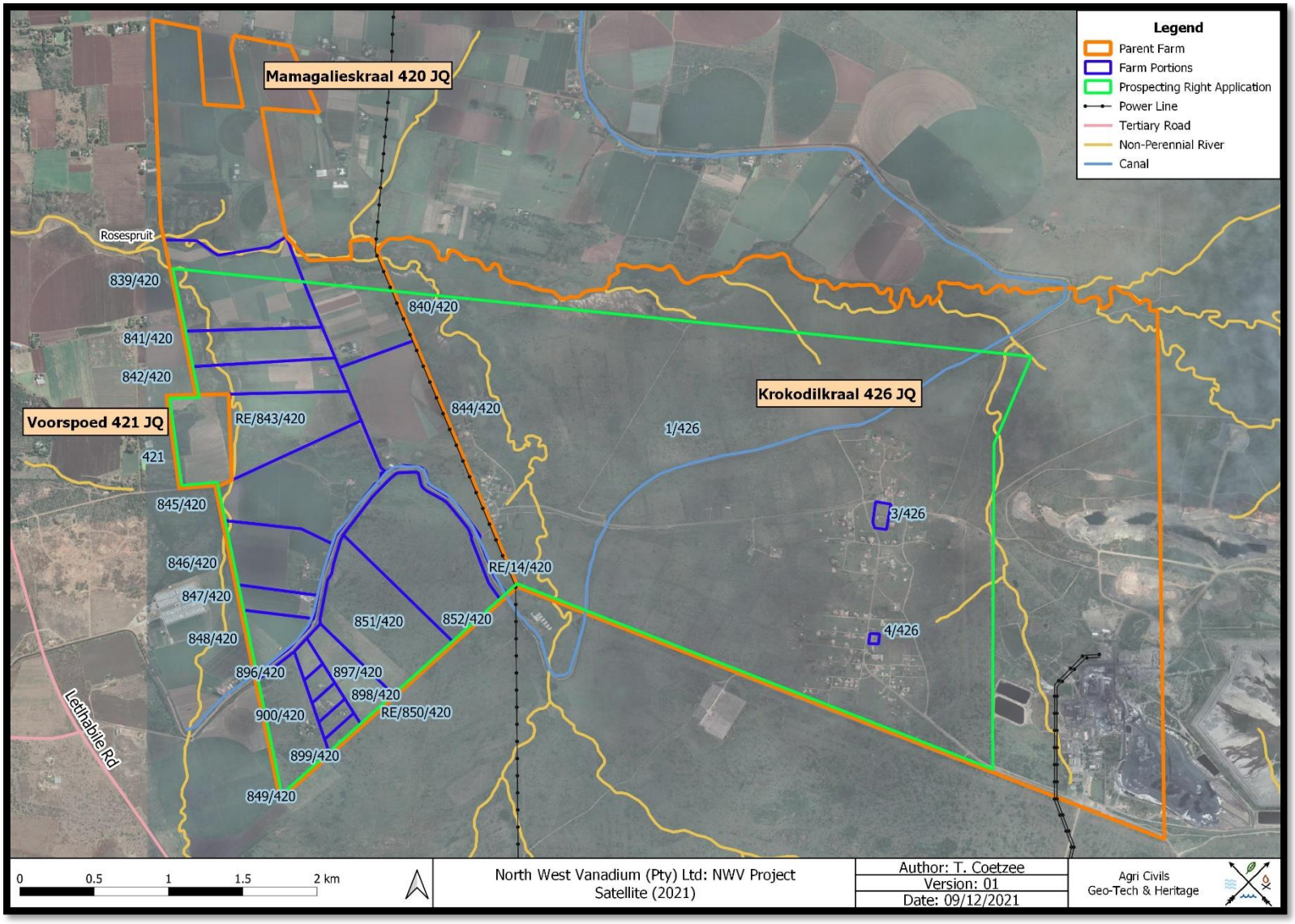


Figure 2: Locality Map

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

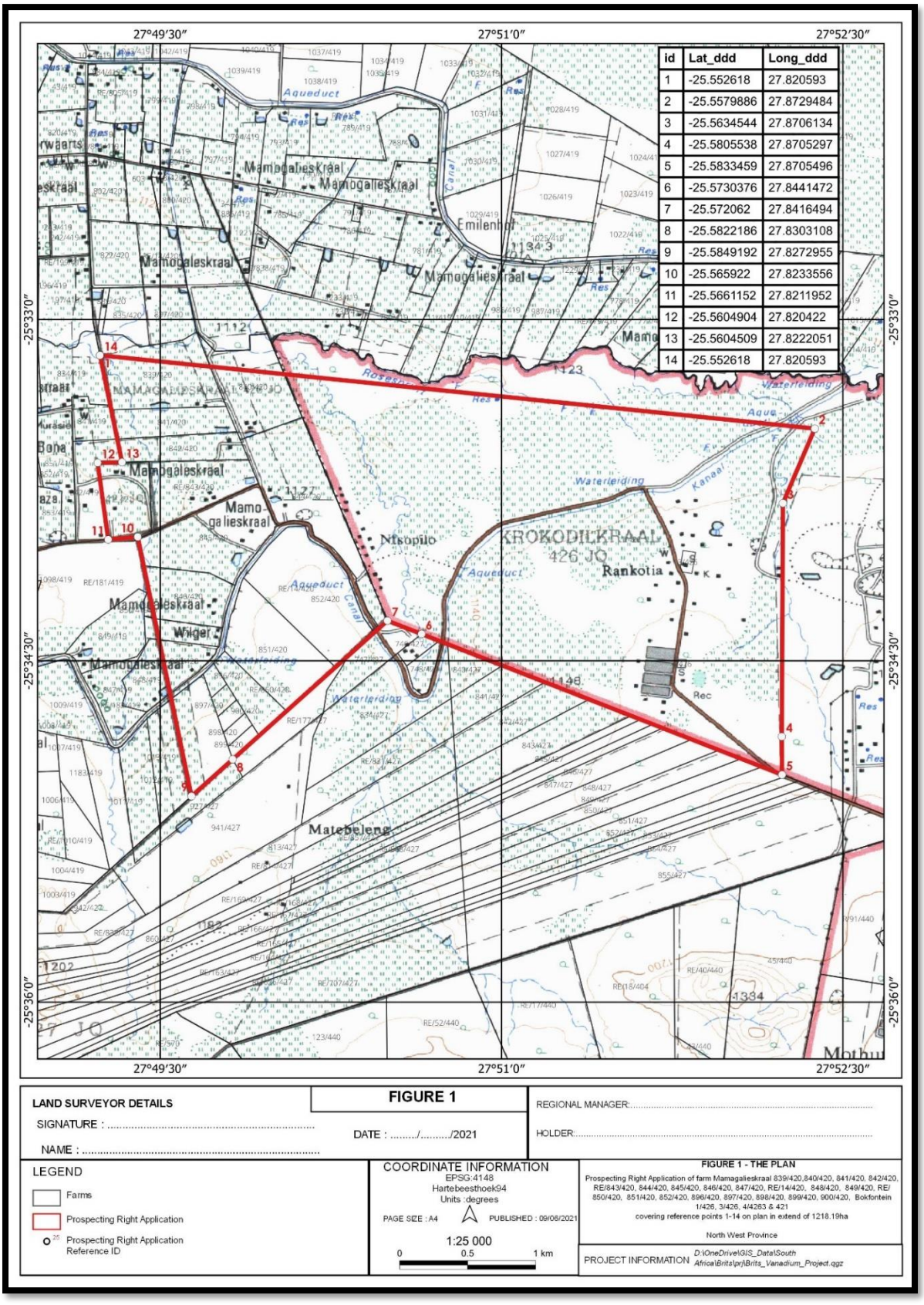


Figure 3: Regulation 2.2 Map of the Prospecting Right Application Area

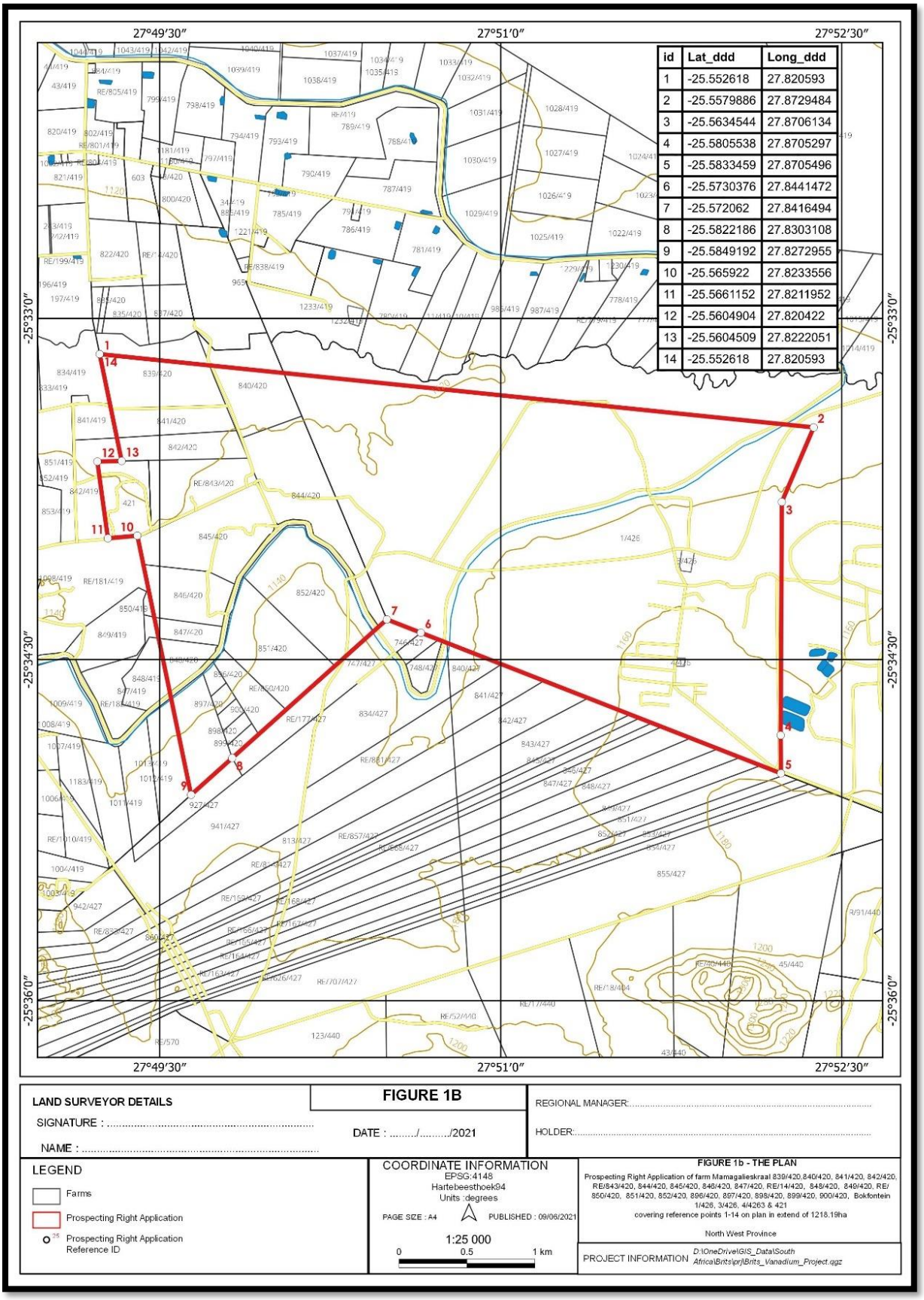


Figure 4: Map of the Prospecting Right Application Area

2.3.1 Description Prospecting Activities

2.3.1.1 Non-Invasive Activities

Consultation with landowners:

Interested and affected parties (e.g. surface right holders) will be consulted throughout the process and permission to access land will be sought prior to undertaking any field work.

The quality and quantity of primarily Vanadium and associated mineral occurrences in the application area will be determined as follows:

2.3.1.1.1 Data review and desktop studies

Data acquisition from government and private sources, and analysis of any existing/previous prospecting and drilling data, satellite (Landsat) imagery, aerial photos, and terrain data, as well as geological map interpretation. The synthesis and interpretation of such information will contribute towards providing a clearer picture of the location and characteristics of the vanadium hosted magnetite occurrences and will guide the in-field prospecting programme.

2.3.1.1.2 Mapping and surface sampling

Detailed field mapping of any outcrops to determine the orientation (strike and dip) and contact of the Bierkraal Magnetite Gabbro with the underlaying Pyramid Gabbro-Norite will be conducted by the Project Geologist and Assistants. Such mapping will encompass GPS controlled traverses and aerial photo mapping.

Sampling of any observed outcrops (rock chips) will be undertaken to assess whole rock chemistry and petrology will enable the development of the stratigraphic model. Surface soil sampling will be collected on a fixed 200m grid to further assist in the definition of the stratigraphic model and geochemical anomalies. Samples will be analysed by an appropriate laboratory certified to provide quality assured results.

Data from the mapping, sampling and sample analysis campaigns will be integrated and interpreted. Targets for follow-up during the subsequent study phase will be identified and prioritised.

2.3.1.1.3 Magnetic Survey

A ground magnetic survey with N-S traverse lines (perpendicular to the main mineralised and structural trend) will be undertaken over the identified target areas. Line spacing would initially be set at 500m and would be infilled down to 50m spacing where required. Each line would be approximately 1,000m in length.

Captured magnetic data will be integrated with observed geological and geochemical datasets and the deposit geophysical model will be developed. Targets for follow-up through core drilling will be defined.

2.3.1.1.4 Reconnaissance Drilling

The objective of the initial reconnaissance diamond drilling is to accurately define the depth and orientation (strike and orientation) of the Bierkraal Magnetite Gabbro. Samples will also be collected from recovered core for geochemical and density analysis. Results will be used to further define the stratigraphic model and develop the geochemical model for the project.

Drill hole traverses will be drilled on a N-S orientation, perpendicular to the main mineralised and structural trend. Each drill traverse will comprise two to three drill collars with the following specification:

- Collar A will be positioned 25 to 75m down-dip from the Bierkraal Magnetite Gabbro subcrop and Collar B will be positioned 25 to 75m down-dip from Collar A.
- Two holes will be drilled at each of the collars: A1 will be drilled vertically (-90 degrees inclination) and A2) will be drilled inclined at -70 degrees South.
- The main objectives of these initial drillholes will be to achieve accurate stratigraphic control of the layered intrusions and to assess the vanadium content of the magnetite bearing layers.
- This strategy will enable the calculation of the grade and true thickness of the magnetite bearing seams. It should also enable the estimation of an Exploration Target category mineral resource estimate.

A total of 15 diamond drill holes is estimated which would amount to approximately 2,000m. See below showing the drill hole orientation.

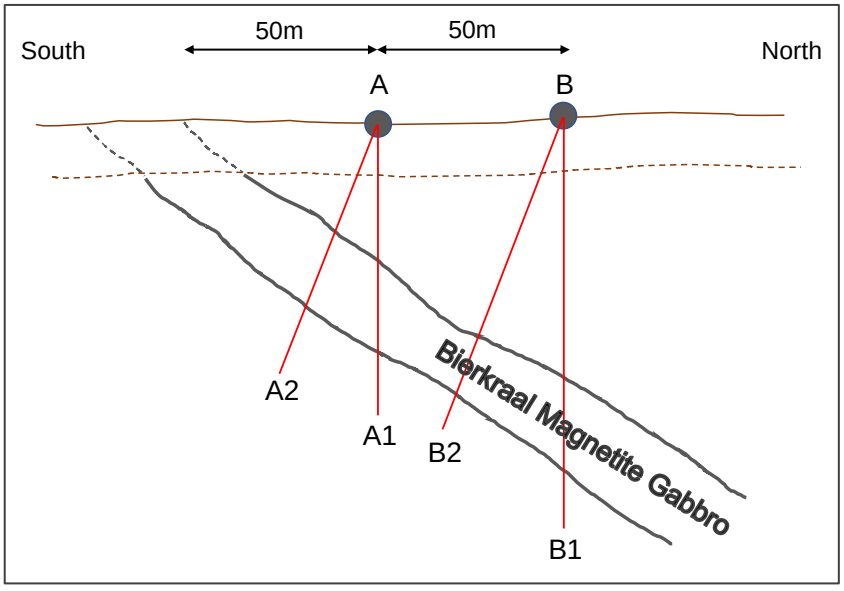


Figure 5: Drill hole orientation

2.3.1.1.5 Infill Drilling

The most anomalous areas will be follow-up with infill diamond drilling traverses and narrower spaced drill hole collars along the traverses. The objective of the infill drilling would be to illustrate geological and grade continuity and enable the reporting of Inferred and Indicated Mineral Resource Estimates (MRE).

The duration of this phase of work could be 1-2 years depending on geological model complexity.

2.3.1.1.6 Preliminary Economic Assessment (PEA)

A Preliminary Economic Assessment will be initiated once a resource has been reported. The assessment would consider all capital and operating costs associated with grade control, mining and haulage, processing, bulk services and infrastructure requirements for the project development.

2.3.2 ALL PLANNED PROSPECTING ACTIVITIES MUST BE CONDUCTED IN PHASES AND WITHIN SPECIFIC TIMEFRAMES

The prospecting will be conducted in three distinct Phases, and each Phase will be dependent on the results of the previous phase.

2.3.2.1 Phase 1: Project Set-up

The objective of this phase is to consolidate all available data and undertake reconnaissance mapping and sampling to firm up on exploration targets. The project set-up would include all activities listed in sections 5.1 Data Review and Desktop Studies and 5.2 Mapping and Surface Sampling.

These workstreams will be executed during the first 6 months from grant of prospecting permit.

2.3.2.2 Phase 2: Exploration

The objective of this phase is to effectively define and test targets generated during Phase 1 through ground geophysical surveys and drilling. This phase would include all activities listed in sections 5.3 Magnetic Survey and 5.4 Reconnaissance Drilling.

These workstreams will be executed over the subsequent 12 months following the conclusion of Phase 1.

2.3.2.3 Phase 3: Mineral Resource Estimation and PEA

The objective of Phase 3 is to define an economic resource and to undertake a preliminary financial assessment of the opportunity. This Phase would include all activities listed in sections 5.5 Infill Drilling and 5.6 Preliminary Economic Assessment.

These workstreams will be executed over the subsequent 24 months following the conclusion of Phase 2.

		Year 1				Year 2				Year 3				Year 4				Year 5			
Phase	**Timeframe**	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Phase 1: Project Set-up																					
Data Review and Desktop Studies	3 months																				
Mapping and Surface Sampling.	3 months																				
Phase 2: Exploration																					
Magnetic Survey	6 months																				
Reconnaisance Drilling	6 months																				
Phase 3: Mineral Resource Estimation and PEA																					
Infill Drilling	18 months																				
Scoping Study	6 months																				

Figure 6: Project phases and schedule

2.3.3 TECHNICAL DATA DETAILING THE PROSPECTING METHOD OR METHODS TO BE IMPLEMENTED AND THE TIME REQUIRED FOR EACH PHASE OF THE PROPOSED PROSPECTING OPERATION

2.3.3.1 Mapping and surface sampling

Mapping and sampling are undertaken by physically and systematically walking the project area and recording observations and collecting samples as defined by the work instruction and program. The work will be conducted by an appropriately experienced Geologist and Assistant as support.

Sampling of any observed outcrops (rock chips) will be undertaken to assess whole rock chemistry and petrology will enable the development of the stratigraphic model. Surface soil sampling will be collected on a fixed 200m grid to further assist in the definition of the stratigraphic model and geochemical anomalies. Samples will be analysed by an appropriate laboratory certified to provide quality assured results.

Data from the mapping, sampling and sample analysis campaigns will be integrated and interpreted. Targets for follow-up during the subsequent study phase will be identified and prioritised.

Sample preparation and analysis remains the long lead item for this workstream. It is anticipated that sample preparation and analysis would take a maximum of 3 months to be completed. This is well within the planned 6-month period for this workstream to be completed.

2.3.3.2 Magnetic Survey

The purpose of the ground magnetic survey would be to map the extent and orientation of the magnetite gabbro and to map any structures that intersects the structure.

A ground magnetic survey with N-S traverse lines (perpendicular to the main mineralised and structural trend) will be undertaken over the identified target areas. Line spacing would initially be set at 500m and would be infilled down to 50m spacing where required. Each line would be approximately 1,000m in length.

Captured magnetic data will be integrated with observed geological and geochemical datasets and the deposit geophysical model will be developed. Targets for follow-up through core drilling will be defined.

The time for engaging a service provider, undertaking the field work and processing and interpreting the data is all within the planned 6-month window for this workstream.

2.3.3.3 Reconnaissance Diamond Drilling

The objective of the initial reconnaissance diamond drilling is to accurately define the depth and orientation (strike and orientation) of the Bierkraal Magnetite Gabbro. Samples will also be collected from recovered core for geochemical and density analysis. Results will be used to further define the stratigraphic model and develop the geochemical model for the project.

Drill hole traverses will be drilled on a N-S orientation, perpendicular to the main mineralised and structural trend. Each drill traverse will comprise two to three drill collars with the following specification:

- Collar A will be positioned 25 to 75m down-dip from the Bierkraal Magnetite Gabbro subcrop and Collar B will be positioned 25 to 75m down-dip from Collar A.

- Two holes will be drilled at each of the collars: A1 will be drilled vertically (-90 degrees inclination) and A2) will be drilled inclined at -70 degrees South.

Refer to Figure 5.1 showing the drill hole orientation.

This strategy will enable the calculation of the grade and true thickness of the magnetite bearing seams. It should also enable the estimation of an Exploration Target category mineral resource estimate.

The time for engaging a service provider, preparation of access, undertaking the drilling, undertaking the sample analysis and interpreting the results is all within the planned 6-month window for this workstream.

2.3.3.4 Infill Drilling

The most anomalous areas will be follow-up with infill diamond drilling traverses and narrower spaced drill hole collars along the traverses. The objective of the infill drilling would be to illustrate geological and grade continuity and enable the reporting of Inferred and Indicated Mineral Resource Estimates (MRE).

The duration of this phase of work could be 1-2 years depending on geological model complexity.

2.3.3.5 DESCRIPTION OF PLANNED NON-INVASIVE ACTIVITIES:

Desktop Studies

Available geological literature and historic prospecting data will be reviewed and a work program will be developed. Key sources of information will be the Council for Geoscience and surrounding mining operations.

Geological Mapping

Geological mapping is a manual process carried out on foot and causing no ground disturbance. Mapping will be undertaken by a geologist using enlarged geological maps, aerial photographs, satellite imagery and topographic maps. All geological and surface features will be recorded on field maps and data capture field sheets and be integrated into the central project database.

Magnetic Survey

A ground based geophysical survey will be undertaken over the target area. The survey direction will be perpendicular to the orientation of the east-west orientation of the targeted structures. Data will be processed and modelled to identify and locate structures that would contribute to the concentration of vanadium and other mineralisation.

Data compilation, integration and interpretation

All recorded data from non-invasive and invasive prospecting techniques will be integrated into a central spatial database to ease interpretation and review. Software to be used during this exercise include Excel, Access, ArcGIS and QGis.

2.3.3.6 DESCRIPTION OF PLANNED INVASIVE ACTIVITIES:

Surface Soil and Rock Sampling

Rock outcrops and float samples observed during the mapping exercise will be collected for sample analysis. Location, type of occurrence and field lithology will be recorded on data capture field sheets and be integrated into the central project database. Samples will be send for [XRF and trace element] analysis and results will be linked to sample details and integrated into the central project database

Magnetite grains from soil will be collected with the use of a magnet along the geophysical north-south traverses. Location, type of occurrence and a description of the soil will be recorded on data capture field sheets and be integrated into the central project database. Samples will be send for [trace element] analysis and results will be linked to sample details and integrated into the central project database

Diamond Drilling

Diamond drilling will be undertaken to confirm the presence and orientation of the Bierkraal Magnetite Gabbro. Drill targets will be generated following the integration of all geological, geochemical and geophysical data collected.

Four 1,000m spaced traverses will drilled across the identified structure during the initial phase and anomalous target areas will be followed-up with infill drilling.

Drilling, logging and sampling of recovered core will be supervised by an experienced Geologist and be undertaken to best practice standards. The drill program will be tendered to pre-qualifying drilling contractors.

The bids will be reviewed on the basis of experience, past safety performance and cost. The drill program will entail the following steps:

- Access permission from surface rights holders and users;

- Drill collars will be positioned using a hand held GPS. The actual position to be within 20m of the planned collar position. The exact location can be optimise to minimise the environmental disturbance and impact;
- Preparation of drill access and collars;
- Drilling and recovering of core: [PQ] collar to be installed over first 5-20m of unconsolidated overburden and then [HQ/NQ] core drilling to advance from that depth;
- The average drillhole depth would be c 50m
- Downhole surveys will be undertaken on selected holes to quantify deflection;
- Drill core will be logged and photographed;
- Initial on-site analysis will be undertaken using a handheld XRF analyser;
- Drill core will be split: Half core will be preserved, and the other half would be available for sampling;
- Mineralised zones will be sampled for further [XRF, trace element and density] analysis at a certified laboratory;
- Drillhole collars will be capped with concrete and numbered;
- Final collar positions will be surveyed during a differential GPS to accurate X, Y and Z; and
- Core will be stored in a secured location at all times.

2.3.3.7 DESCRIPTION OF PRE-/FEASIBILITY STUDIES

The feasibility of the mineral project will be assessed on an ongoing basis throughout the prospecting program. Mineral Resource Estimation will be undertaken as soon as results are indicative of an economic mineral deposits and geological and grade continuity allows.

A Preliminary Economic Assessment will be undertaken to assess the financial feasibility of the mineral project.

2.4 Description of The Activities to Be Undertaken

The following section presents a detailed description of all the activities associated with the proposed Prospecting Application. Due to the nature of the Prospecting Works Programme, and the fact that the specific prospecting activities required are dependent on the preceding phase, assumptions are presented where required.

- ❖ Access Roads

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 existing roads.

Normal drilling practices in this region is to use existing roads and if none is available, to drive into the veld, without constructing a road, trying to miss shrubs etc. This leads to minimal damage to the area.

- Water Supply

Water requirements for the prospecting will be sourced from Brits.

- Ablution

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

- Accommodation

Meals will be provided to the staff and workers as no heating and/or cold storage facilities will be available. 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 on a daily basis. Night security staff will be employed once equipment has been established onsite.

- Storage of Dangerous Goods

No hydrocarbons (diesel) will be stored on site. Hydrocarbon spillages must be cleaned, and contaminated soil disposed of at an appropriate facility that provides a safe disposal certificate.

Table 1: Timeframes for prospecting activities

Phase	Invasive or Non-Invasive	Activity	Skill(s) required	Timeframe	Outcome	Deadline	Technical Sign-Off
1	**Non-Invasive Prospecting**	Data Review and Desktop study	Geologist	Month 1-3	Complete GIS database. Definitive mapping and sampling work program and budget.	Month 3	Geologist
	Invasive Prospecting	Geological mapping and surface sampling	Geologist Labourers (2)	Month 4-6	Mapping results. Sample results. Validated geological map. Conceptual geological model.	Month 6	Geologist
2	**Non-Invasive Prospecting**	Magnetic Survey	Geophysicist Assistant	Month 7-12	Geophysical data. Geophysical model. Geophysical targets.	Month 12	Geophysicist
	Invasive Prospecting	Reconnaissance Drilling	Geologist Assistant	Month 13-18	Drill logs. Drill samples. Drill sample analysis. Mineralised intersections. Exploration target MRE. Drilling Report	Month 18	Geologist
3	**Invasive Prospecting**	Infill Drilling	Geologist Assistant	Month 25-36	Drill logs. Drill samples. Drill sample analysis. Mineralised intersections. Inferred and Indicated MRE. Drilling Report	Month 36	Geologist
	Non-Invasive Prospecting	Preliminary Economic Assessment	Geologist	Month 43-57	Trade-off studies. Mine design and Schedule. Metallurgical sample= results. Process flow design and conceptual processing plant design. Bulk Services design. Support Infrastructure design. Preliminary Economic Assessment. Feasibility Study Design Criteria and Scope Definition.	Month 57	Geologist

2.5 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: 1,220.93 Ha hectares	**X**	GNR 327 – Listing 1: Activity No. 20	N/A

2.6 Policy and Legislative Context

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	Prospecting right was lodged with the DMR and accepted on 19 October 2021.
NEMA Environmental Impact Assessment (EIA) Regulations, 2017 (as amended in 2020)	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 DMR with the Prospecting application. The DMR Requested the submission of the Basic Assessment Report and EMP within 140 days excluding public holidays (with extension) from the date of the MPRDA acceptance.
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 management of national heritage	A Heritage report has been compiled and uploaded for comment on SAHRA.

	resources were relevant to this application.	
National Environmental Biodiversity Act The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: (2009) 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
Madibeng Municipality	Source of background demographic and socio-economic information	Utilized as a source of demographic and socio-economic information for the Madibeng Local Municipal area.
The National Environmental Management: Protected Areas Act 57 of 2003 (NEMPAA)	A portion of the application area lies within a CBA 2.	Exclusion of nature reserves from prospecting and delineation of CBA's.
Spatial Planning Land Use and Management Act, 2013 (No 16 of 2013) National Environmental Management: Waste Act, 2008; List of waste management activities promulgated in GN No. 921 of 29 November 2013 (as amended); National Waste Information Regulations promulgated in GN No. R. 625 of 13 August 2012; National Norms and Standards for the Storage of Waste promulgated in GN No. 926 of 29 November2013; and Waste Classification and Management Regulations promulgated in GN No. R. 634 of 23 August 2013.		

2.6.1 Provincial legislation

Provincial legislation

In addition to national legislation such as Protected Areas Act No. 57 of 2003, National Environmental Management: Biodiversity Act No. of 2004 and Conservation of Agricultural Resources Act No. 43 of 1983, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

2.6.1.1 North West Biodiversity Sector Plan (2015)

This Biodiversity Plan delineates on a map, commonly known as a Critical Biodiversity Areas (CBA), biodiversity priority areas called Critical Biodiversity Areas, Ecological Support Areas and Protected Areas. These areas are the portfolio of sites that are required to meet the region's biodiversity targets and need to be maintained in the appropriate condition for their category. It is highly recommended that this Conservation Plan be a primary biodiversity consideration in Environmental Impact Assessments.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

Criteria of Identifying CBA

A CBA is an area that must remain in good ecological condition in order to meet biodiversity targets for ecosystem types, species of special concern or ecological processes. CBAs can meet biodiversity targets for terrestrial or aquatic features, or both. Together with protected areas, the portfolio of CBAs identified in a biodiversity plan must collectively meet biodiversity targets for representation of ecosystem types and species of special concern, and may also meet biodiversity targets for some ecological processes Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

Criteria for Identifying ESAs

An ESA is an area that must remain in at least fair ecological condition in order to: meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or species of special concern when it is not possible to meet them in CBAs; support ecological functioning of a protected area or CBA (e.g. protected area buffers); or a combination of these. ESAs can meet biodiversity targets for terrestrial or aquatic features, or both. All ecological processes

important for the long-term persistence of ecosystems and species should be adequately included in the portfolio of protected areas, CBAs and ESAs. Sites selected to form part of ESAs could include sites in good, fair or even severely modified ecological condition, as long as the current ecological condition is compatible with fulfilling the purpose for which the ESA has been selected. The desired state/management objective for most ESAs is to maintain them in at least fair ecological condition. For ESAs that are severely modified, the management objective is no further deterioration in the current ecological condition.

Sensitivity Analysis

In terms of North West Biodiversity Sector Plan 2015, only a small fraction within the proposed project falls within Terrestrial Critical Biodiversity Area 2. Ground truthing revealed that the site has been exposed to some levels of disturbance.

2.7 Need and desirability of the proposed activities.

South African economy heavily relies on the mining sector. Successful prospecting will boost the current struggling national economy as the project will advance to mining phase.

THE STRUCTURE OF LOCAL ECONOMY

There are local economic objectives identified within Madibeng Local Municipality as follows:

- Reinforcing the current Brits economic cluster for maximizing the existing competitive advantages;
- Defining the economic development role of MLM;
- Investigating and implementing incentives for the retention and support businesses currently existing in MLM
- Identification and creation of investment opportunities;
- Ensuring that resources in mining, tourism, agro-industries and manufacturing are utilized economically as well as in an environmental sustainable manner;
- Establishment of politically and technocratic leadership that will connect the potential of the region's main economic sectors and natural resource base;
- Determining economic priorities and establish simplified, user-friendly processes to encourage economic development;
- Creation, promotion and sustaining a single economic forum which is all- inclusive;
- Marketing MLM as an attractive investment destination;
- Reforming bureaucracy and reducing regulations that affect businesses;
- Finding ways and means to invest in rural economic infrastructure and to redress development imbalances;
- Improving physical access to Madibeng by road and rail; and
- Development of various fast track programmes that stimulate short-term economic opportunities.

In order to attain this MLM SDF's objective is to identify and demarcate areas that have high potential level for economic development as well as ensuring that the required movement networks are proposed to support these Economic Activity Areas. Economic Activity Areas in MLM are divided into three categories:

- Mining;
- Economic Corridors; and
- Tourism Areas.

The Madibeng economic activity is dependent on industrial, farming, tourism and little bit on mining activities. The two key economic activities in Madibeng Local Municipality are agriculture (17.7%) and manufacturing (13.3%).

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

- ❖ General Geology.

The Bushveld Complex is seated in the central northeast portion of the Kaapvaal craton and is regarded as having been emplaced in an intra-cratonic, anorogenic setting possibly related to mantle pluming. The BIC was intruded about 2,060 million years ago into rocks of the Transvaal Supergroup along an unconformity between the Magaliesberg quartzites (Pretoria Group) and the overlying Rooiberg felsites (a dominantly felsic volcanic precursor).

The BIC is by far the most economically important of these deposits as well as the largest in terms of preserved lateral extent, covering an area of over 66,000km2. It has a maximum thickness of 8km, and is matched in size only by the Windimurra intrusion in Western Australia and the Stillwater intrusion in the USA (Cawthorn, 1996). The mafic component of the Complex hosts layers rich in PGEs, nickel, copper, chromium and vanadium. The BIC is reported to contain about 75% and 50% of the world's platinum and palladium resources respectively (Vermaak, 1995). The mafic component of the BIC is subdivided into several generally arcuate segments/limbs, each associated with a pronounced gravity anomaly. The Kaapvaal Craton covers an area of approximately 1.2 x 106 km2 and comprises predominantly granitoids interspersed with greenstone belts, covered by a variety of Neo-Archean to Mesoproterozoic sedimentary and volcano sedimentary basins (Good & De Wit, 1997). The Complex is composed of four lobes in the north, east, south and west about an east-northeast and north-north-west set of axes, and it has a long axis of approximately 470 km and a short axis of approximately 380 km

Field relationships indicate that the Rashoop Granophyre Suite (2061.8 + 5.5 Ma; Harmer & Armstrong, 2000) predates the intrusion of the Rustenburg Layered Suite (2054.4 + 2.8 Ma UPb SHRIMP; Harmer & Armstrong, 2000) and occurs as an intrusive sheet into the Rooiberg rhyolites and the Transvaal Supergroup rocks (Kleeman, 1985). The granophyres are thought to be a cogenetic, shallow intrusive equivalent of the Rooiberg Group volcanic event. The granophyrerhyolite magma is largely thought to be derived from partial melting of the lower crust, presumably with a granitic composition (Walraven, 1982). Some varieties of granophyre, however, possibly formed as a result of metamorphic/metasomatic effects related to the intrusion of the Rustenburg

Layered Suite acting on the Pretoria Group sedimentary roof rocks; or by the partial melting of Rooiberg Group rhyolites also a consequence of the hot intrusive magmas of the Rustenburg Layered Suite (Walraven, 1982).

The Rashoop Granophyre Suite comprises three units based on textural variations; the Stavoren Granophyre, the Zwartbank Pseudogranophyre and the Rooikop Granite Porphyry (SACS, 1980). Many more varieties have been proposed by extensive work by Walraven (1977, 1979, 1982).

- Technological and Site Activity Alternatives

Due to the natureof theproposed 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.

The location of intrusive drilling activities will be determined during Phase1 of the Prospecting Works Programme. All infrastructure will be temporary and/or mobile.

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

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

Brits is located roughly 7 km to the southwest of the proposed prospecting area, while Ga-Rankuwa is located 11 km to the east-southeast and Mooinooi 35 km to the southwest. The demarcated study area falls within the Madibeng Local Municipality and the Bojanala District Municipality in the Northwest Province. The Letlhabile tertiary road runs in a north-south direction approximately 1.3 km to the west of the study area, while the R566 secondary road runs in an east-west direction 5.6 km to the south and the N4 national road a further 2.9 km to the south. The area demarcated for the prospecting of copper ore, gold ore, iron ore, manganese ore, nickel ore, niobium (columbium) ore, platinum group metals, rare earths, tantalum / niobium ore, titanium, vanadium ore and zinc ore covers about 1220.93 ha. The proposed prospecting programme will include non-invasive, as well as invasive activities.

2.8.2 Minerals applied for

Copper Ore (Cu), Gold Ore (Au),Iron Ore (Fe); Manganese Ore (Mn);Nickle Ore (Ni); Niobium (Columbiam) Ore (Nb); Platinum Group Metals (Pgm); Rare Earths (Re); Tantalum / Niobium Ore (Ta); Titanium (Ti); Vanadium Ore (V) and Zinc Ore (Zn).

2.8.3 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. 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. The proposed activity is following the minimum exploration standard to find and define a mineral resource.

2.8.4 The design or layout of the activity.

The location of activities will be determined based on the location of the prospecting activities, which will only be determined during Phase1 of the Prospecting Works Programme.

2.8.5 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: All the material to bus used during drilling and sampling will be housed in the four-wheel drive vehicles.

Electricity and *Energy:* Electricity is sourced from a mobile generator. Fuel types will be investigated as well as energy conserving measures will be implemented i.e. Using solar and prospecting times will be during the day to save on using lights in the evening.

Water: Potable water at the project area will be sourced and transported to site by the contractor. Some of the water will be stored in water tanks next to the prospecting area and offices.

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 establish temporary mobile offices.

2.8.6 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 potential ore bearing 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. However, taking into context that successful prospecting leads to mining the current land uses are sustainable and will need to be assessed in further detail during the EIA phase of any mining right or permit application.

3 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

3.1 Draft 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 (2021 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.

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.

3.1.1 Landowners and landowner consent

Landowners were identified through a search conducted via online search engines accessing the Title Deed office database. In addition to landowners, other relevant organisations were 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.

No.	Farm/Portion No.	Farm Name	Area (Ha)	LPI Code	Onwer Name &Surname
1	RE/14/420	Mamagalieskraal	11.88	T0JQ00000000042000014	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA
2	839/420	Mamagalieskraal	31.34	T0JQ00000000042000839	SWANEPOEL JAN PIETER ANDRIES
3	840/420	Mamagalieskraal	24.83	T0JQ00000000042000840	NEL DANIEL JOHANNES
4	841/420	Mamagalieskraal	19.45	T0JQ00000000042000841	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA
5	842/420	Mamagalieskraal	18.90	T0JQ00000000042000842	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA
6	RE/843/420	Mamagalieskraal	30.21	T0JQ00000000042000843	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA
7	844/420	Mamagalieskraal	52.73	T0JQ00000000042000844	BOTHA DAVID PHILIP
8	845/420	Mamagalieskraal	46.01	T0JQ00000000042000845	TERBLANCHE JOHANNES HENDRIK
9	846/420	Mamagalieskraal	24.44	T0JQ00000000042000846	FOR INFO REFER TO REGISTRAR OF -
10	847/420	Mamagalieskraal	7.66	T0JQ00000000042000847	WALT PHILIPPUS ARNOLDUS VAN DER
11	848/420	Mamagalieskraal	10.36	T0JQ00000000042000848	LERM MAGDALENA MAGRIETHA
12	849/420	Mamagalieskraal	24.46	T0JQ00000000042000849	HEEVER GERT ANDRIES VAN DEN (New owner Daleen Odendaal)
13	RE/850/420	Mamagalieskraal	13.53	T0JQ00000000042000850	TRANS AFRICA RESOURCES PTY LTD
14	851/420	Mamagalieskraal	42.82	T0JQ00000000042000851	ESMARLINE'S FAMILIE TRUST (Jaco Schoeman)

15	852/420	Mamagalieskraal	55.68	T0JQ00000000042000852	ESMARLINE'S FAMILIE TRUST (Jaco Schoeman)
16	896/420	Mamagalieskraal	2.50	T0JQ00000000042000896	ALSET VUSUMUZI
17	897/420	Mamagalieskraal	2.50	T0JQ00000000042000897	O'BRIEN ELIZA JOHANNES
18	898/420	Mamagalieskraal	2.50	T0JQ00000000042000898	BEER PHILLIPUS JOHANNES DE
19	899/420	Mamagalieskraal	2.55	T0JQ00000000042000899	MAHAPE RALEMASU SOLOMON
20	900/420	Mamagalieskraal	2.50	T0JQ00000000042000900	BOTES ALEXANDER JAMES
21	421	Bokfontein	21.43	T0JQ00000000042100000	ESMARLINE'S FAMILIE TRUST (Jaco Schoeman)
22	1/426	Bokfontein	770.70	T0JQ00000000042600001	Bokfontein Trust
23	3/426	Bokfontein	1.55	T0JQ00000000042600003	Pretorius and Hennic Ferrochrome
24	4/426	Bokfontein	0.40	T0JQ00000000042600004	Mr. Kriel

Consent forms have been cicurated among the landowners and no objections have been received regarding the prospecting right application and environmental authorisation application as required form June 2021.

3.2 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) representing the following sectors of society have been identified:

- National, provincial and local government.
- Agriculture, including local landowners.
- Community Based Organisations.
- Non-Governmental Organisations.
- Water bodies.
- Tourism.
- Industry and mining.
- Commerce;
- Other stakeholders.

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

The project was announced as follows:

3.3.1 Newspaper advertisement

An advertisement in English was published on the 14th of January 2022 in the Brits Post local newspaper announcing the project, availability of the Basic Assessment report, requesting interested and affected parties to register. An amendment will be published on the 28th of January extending the commenting period to 17 February 2022.

3.3.2 Site notice placement

In order to inform surrounding communities and adjacent landowners of the proposed development, site notices need to be erected on site and at visible locations close to the site. Site Notices were placed in the vicinity of the project, at the Local Municipality, Post Office, Farms, and library on 17th of January 2022.

3.3.3 Written notification

I&AP's and other key stakeholders were notified via email and hard copy submission of the Basic Assessment report with specialist studies and consultation conducted to date. Documents were emailed and made available from the 17th of January 2022.

3.3.4 Background Information Document

A Background Information Document (BID) was distributed (by email and hand) to landowners, community and interested parties on the in November 2021 and on the 17th of January 2022. The BID provides information concerning the proposed project and invited IAPs to register. IAPs were welcome to distribute the documents to other parties who may be interested or affected by the project.

3.3.5 Public Meeting

A public meeting will be held on the 10th of February at 11am at.Rantsou Creche (Rankotea) 0250.

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

All comments and responses received and pending from commenting authorities will included in the comments and responses report of the BAR, which will be submitted to the Department of Mineral Resources.

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

Basic Assessment Report/ Environmental Management Plan will be available for review for at least 30 days from the 17th of January ending on 17th February 2020; Reports will be emailed to registered interested and affected parties and upon request, hard copies will be available at:

- Madibeng Public Library (Brits) and Damonsville Hall

Additional electronic and or hard copies were available to interested and affected parties and stakeholders who requested them.

3.3.8 Next Phases of the Public Participation Process

All comments and responses received and sent throughout the entire process will be updated and included in the comments and responses report which will be an addendum of the BAR. The C&R will be submitted to the DMR and I&AP's.

4 BASELINE ENVIRONMENT

4.1 Type of environment affected by the proposed activity.

Madibeng is classified as a category B Municipality, functioning through the Executive Mayoral System. The Municipality was recently demarcated into 41 wards, consists of several urban and rural areas, 9 000 farm portions, as well as a proper established and serviced industrial area. According to the Municipal VTSD plan there are 43 villages, 6 Townships and 7 small dorpies. The following Traditional Authorities are situated within the jurisdiction of Madibeng.

- Mmakau Tribal Office
- Baapo ba Mogale Tribal Office, Bapong
- Bakwena ba Mogopa, Jericho
- Bakwena Ba Mogopa Tribal Office, Hebron
- Batang Tribal Office Maboloka

One of the advantages of Madibeng is its central location in the North West Province, with Pretoria, Johannesburg, Rustenburg, and Krugersdorp as bordering neighbours. As the neighbouring towns are easily accessible through road networks, residents are not confined to employment in the Madibeng jurisdiction alone but can easily commute to workplaces in the cities and other towns. Furthermore, the Lanseria Airport is situated a mere 40 kilometres from Brits. Brits Town Precinct is situated within Madibeng Local Municipality north of Hartbeespoort Dam and adjacent to N4 Bakwena-Platinum Highway intersection. Brits Town occupies an area of 54,47 km2 of the total of 3,839 km2 of Madibeng Local Municipality. The town area consists of the following areas:

- Town of Brits with the inclusion of the Central Business District
- Residential neighbourhood of Elandsrand
- Primindia
- Brits Industrial Area
- The remote townships of Oukasie, Damonsville and Mothutlung; and
- The farm portions in-between these areas.

The Brits Town Area is the key economic as well as governance centre within the Madibeng Local Municipality. Brits is located in close proximity to key urban centres in Gauteng and 65 km from Rustenburg. This area is linked to both Rustenburgh and Gauteng urban centres by N4 Bakwena-Platinum Highway.

The area is physically and functionally interconnected to the northern parts of Tshwane through a group of villages, such as Mmakau, stretching eastwards from Mothutlung up to Ga-Rankuwa. Formal residential developments are found in Lethlabile located north of Brits and Mothutlung in the easterly direction of Brits town.

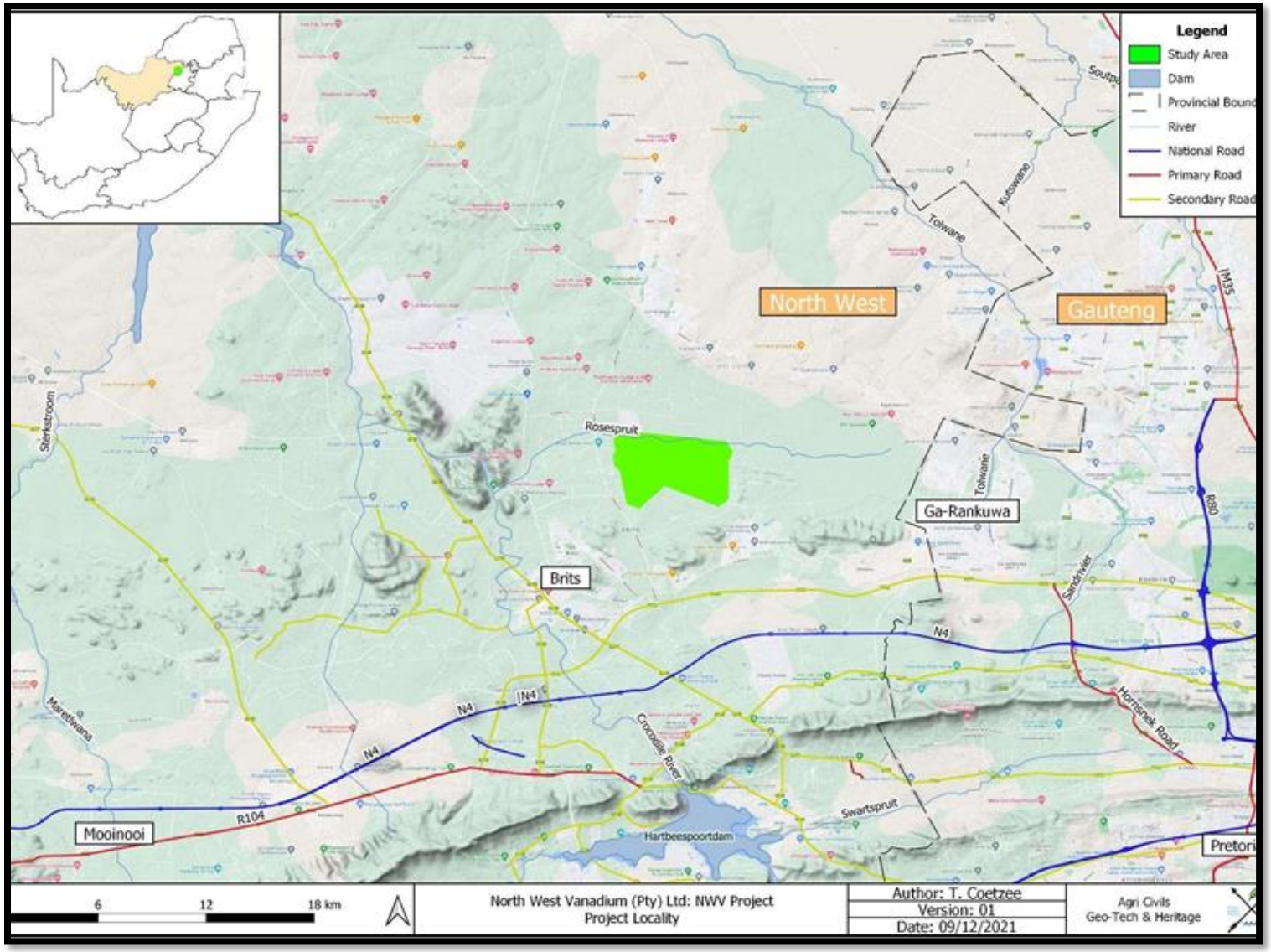


Figure 7: Regional and provincial location of the study area.

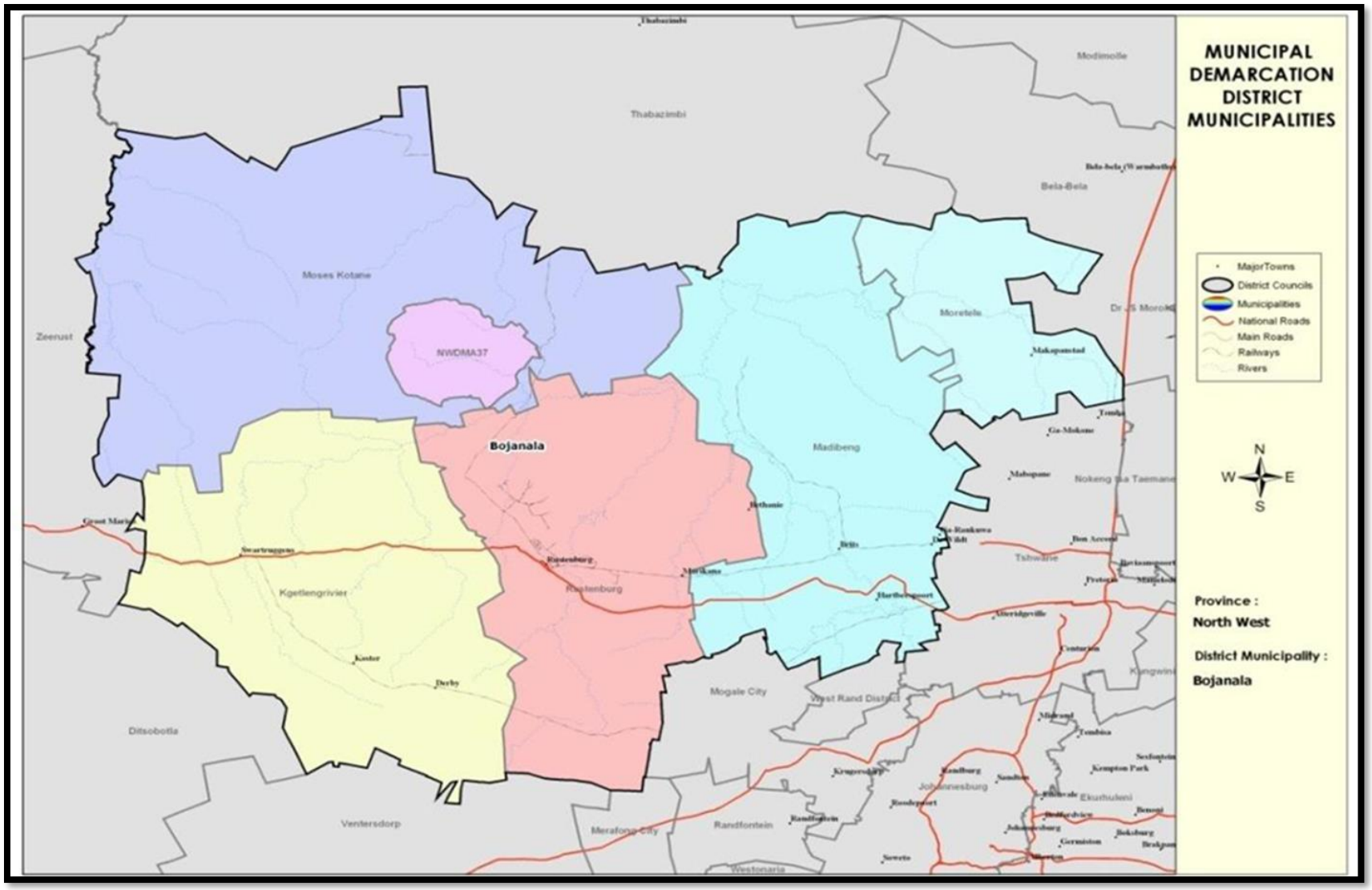


Figure 8: Municipal demarcation

4.1.1 Topography and Geography

According to (Mucina & Rutherfords 2006) the average elevation for Marikana Thornveld varies between 1050 and 1450 MASL (Metres Above Sea Level). The average elevation of the study area is 1135 MASL and slopes from the more elevated south-eastern side towards the lower north-western area.

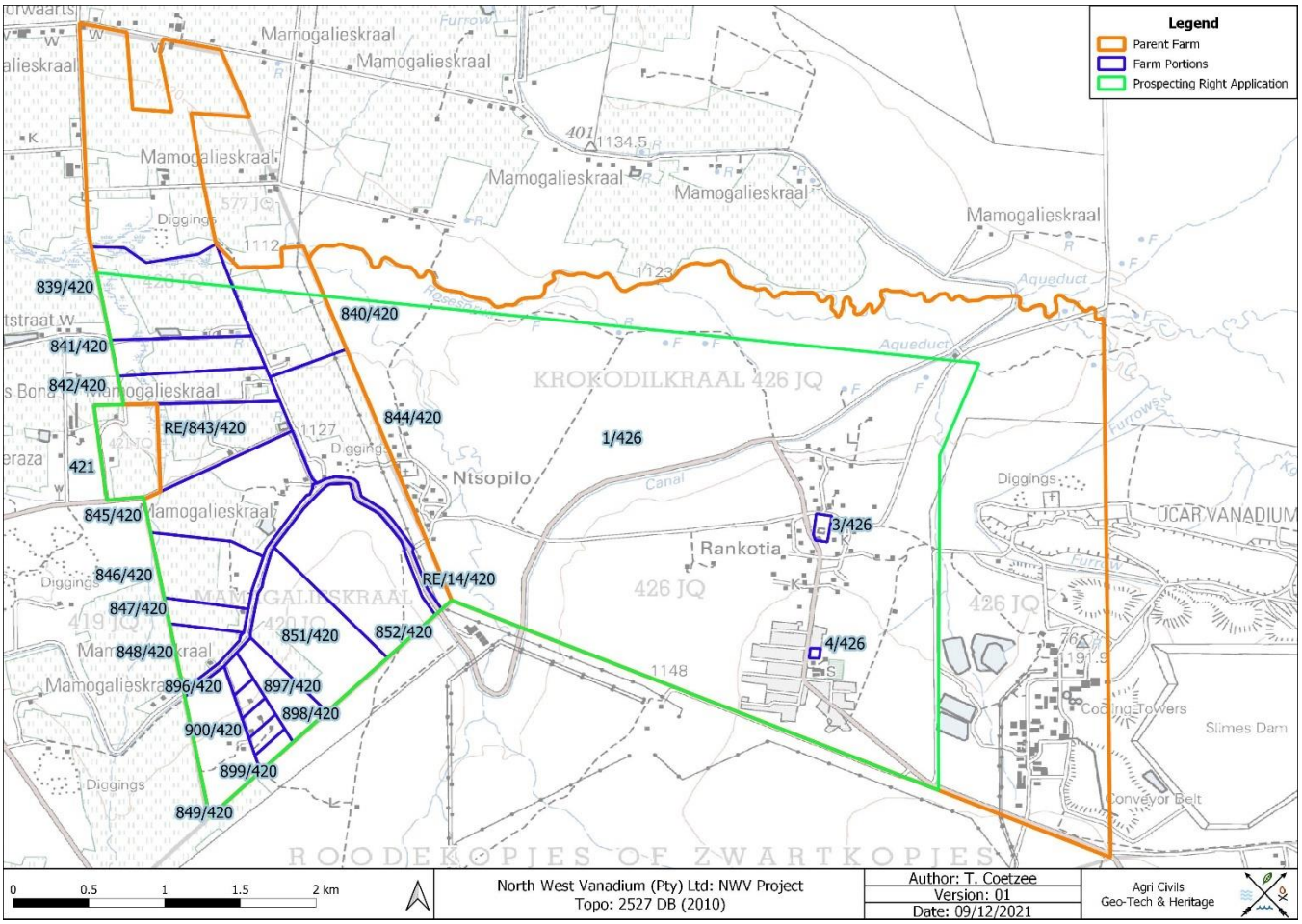


Figure 9: Terrain

4.1.2 Climate

The study area falls within the summer rainfall region and the average annual rainfall is roughly 629 mm. The average maximum temperature for the study area is recorded during January when an average of 23.5 ºC is reached. The average minimum temperature is recorded during July when an average of 12.6 ºC is reached (Climate-data.org 10/12/2021).

4.1.3 Air Quality

Existing ambient air quality for the entire district is poorly understood at present. Good quality ambient air pollution measurements have only been made over the past decade in the industrial-urban region surrounding Rustenburg. The other areas of the district have little to no ambient measurements to evaluate the current status of the air quality.

Due to this uneven distribution of measurements it was decided to firstly evaluate ambient air quality utilising dispersion modelling, in particular CALPUFF dispersion model. The measurements that are available will then be presented and provide a basis to evaluate the dispersion modelling and confirm the distribution of air pollution over the entire district as predicted by the model. The sources in the district and how they have been included in the modelling process is described first.

Baseline Emission Inventory

An emissions inventory for Bojanala Platinum District was compiled for air pollution sources where information was available or where emission factors could be applied to quantify emissions. Potential air pollution sources in Bojanala have been identified as:

- Industrial operations,
- Mining activities,
- Agricultural activities,
- Biomass burning (veld fires),
- Domestic fuel burning (particularly, coal),
- Vehicle tailpipe emissions,
- Waste treatment and disposal (landfills and incineration**),**
- Vehicle entrainment of dust from paved and unpaved roads,
- Other fugitive dust sources such as wind erosion of exposed areas.

Particulate and gaseous emissions from industrial operations, domestic fuel burning and vehicle tailpipe emissions were quantified for this assessment, due to the availability of Bojanala Platinum District Municipality AQMP 82 data for these sources. Ambient pollutants that were assessed include the criteria pollutants, SO2, and PM10 (Eco Elementum 11487PR Air Quality Assessment 2016).

The air quality of the study area is mostly influenced by activities from mining operations, farming activities, domestic fires, vehicle exhaust emissions and dust entrained by vehicles. These emission sources vary from activities that generate relatively coarse airborne particulates (such as farmland preparation, dust from paved and unpaved roads) to fine PM such as that emitted by vehicle exhausts, diesel power generators and dryers.

Emissions from unpaved roads constitute a major source of emissions to the atmosphere in South Africa. Dust emissions from unpaved roads are a function of vehicle traffic and the silt loading on the roads. Emissions generated by wind erosion are dependent on the frequency of disturbance of the erodible surface. Every time that a surface is disturbed e.g. by mining, agriculture and/or grazing activities, its erosion potential is restored.

4.1.4 Hydrology

The aquatic systems associated with the proposed prospecting is situated within the Limpopo Water Management Area (WMA)(WMA 1) in the Rosespruit Sub Quaternary Reach (SQR) and an unnamed SQR. Three (3) sampled sites were identified and inspected. General locations of the assessed sites are listed in **Error! Reference source not found.**.

Table 4: General location of the assessed sample sites

Sample site	Description	GPS co-ordinates	
		Latitude	Longitude
RS1	Sample site located in the proposed prospecting area, primarily thought a river which was a channel upon inspection located to the south.	25°34'22.49"S	27°50'27.46"E
RS2	Sample site located in the proposed prospecting area, primarily thought a river which was a channel upon inspection located downstream of RS1 in the North prior to the confluence with the Rosespruit.	25°33'58.15"S	27°50'30.25"E
RS3	Sample site located upstream of the proposed prospecting area in the Rosespruit.	25°33'18.07"S	27°52'47.01"E
RS4	Sample site located downstream of the proposed prospecting area in the Rosespruit.	27°48'27.54"E	27°48'27.54"E

*

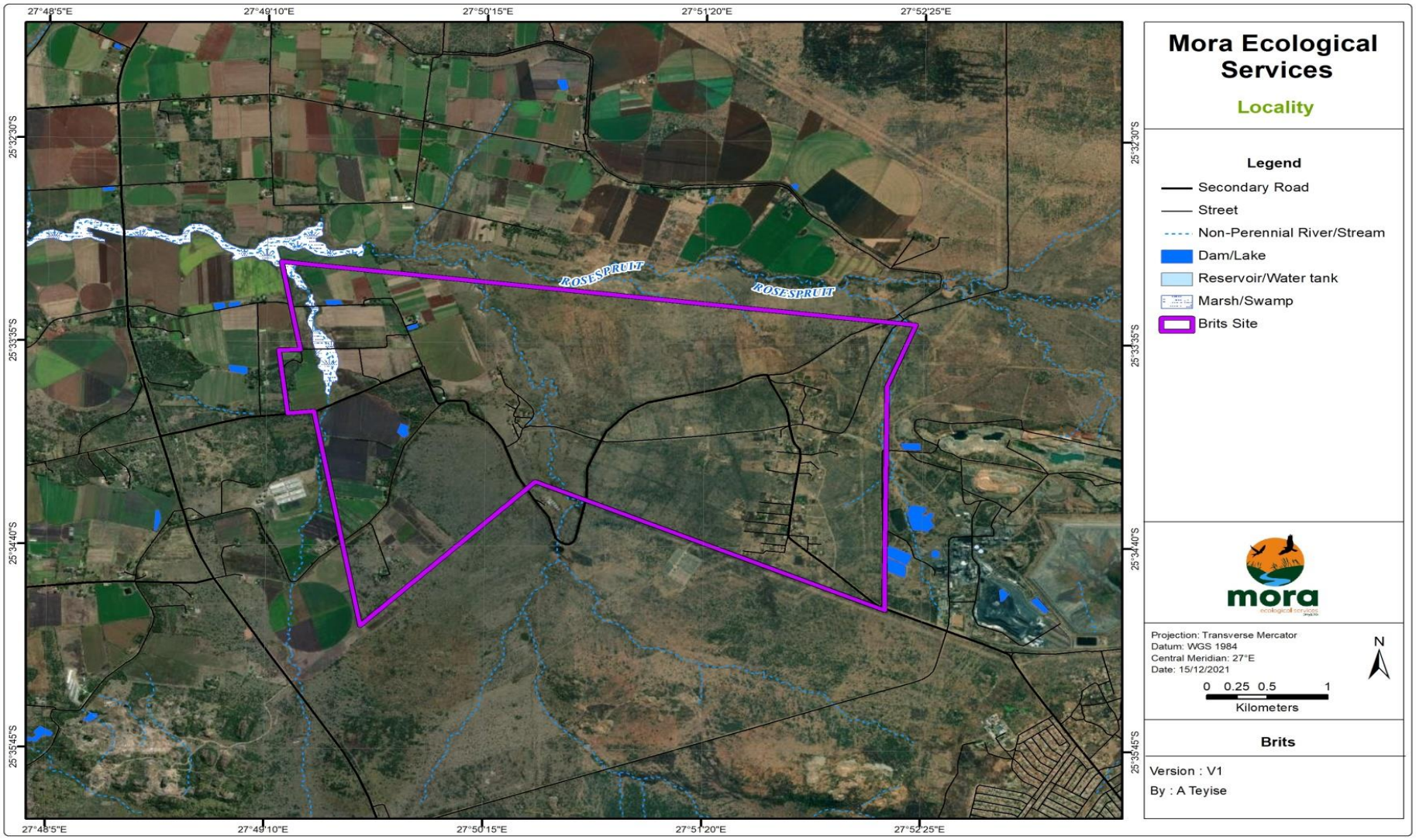


Figure 10: Location of the proposed prospecting area

4.1.4.1 Present Ecological State (DWS, 2014)

The sampled sites associated with the proposed prospecting are is located in three Sub Quaternary Reaches (SQRs) located in an unnamed and Rosespruit SQR A21J. Based on data obtained from the DWS (2014), the Present Ecological State of this section of the associated watersheds are classified Largely Modified (Category D) to Largely Natural (Category B) Anthropogenic activities that have been recorded historically by the DWS within the watershed includes:.

The Rosespruit SQR located upstream of the proposed prospecting area (A21J-00980) is classified moderately modified (Category C) with a moderate Ecological Importance and Sensitivity. The following impacts/activities were identified LARGE: Abstraction, MODERATE: Agricultural fields, Algal growth, Low water crossings, Erosion, Alien vegetation, Mining, Runoff/effluent: Mining, Runoff/effluent: Urban areas, Grazing (land-use), Vegetation removal, SMALL: Small (farm) dams, Overgrazing/trampling, Inundation, Irrigation, Roads, Runoff/effluent: Irrigation, Sedimentation, Urbanization.

The watershed situated in the center of the proposed prospecting area (A21J-00999) is classified largely natural (category B) with a moderate Ecological Importance and Sensitivity. The following impacts/activities were identified: CRITICAL:None, SERIOUS:None, LARGE: Bed and Channel disturbance, MODERATE: Agricultural fields, Low water crossings, SMALL: Abstraction, Algal growth, Canalization, Chicken farms, Small (farm) dams, Alien vegetation, Overgrazing/trampling, Inundation, Natural areas/nature reserves, Roads, Sedimentation, Grazing (land-use), Vegetation removal.

The watershed associated with potential downstream impacts situated in the Rosespruit (A21J-00972) is classified largely modified (Category D) with a moderate Ecological Impportance and High Ecological Sensitivity. The following impacts/activities were identified: CRITICAL: Agricultural fields, Irrigation, SERIOUS: Runoff/effluent: Irrigation, LARGE: Algal growth, MODERATE: Abstraction, Bed and Channel disturbance, Erosion, Alien aquatic macrophytes, Alien vegetation, Vegetation removal, SMALL: Overgrazing/trampling, Natural areas/nature reserves.

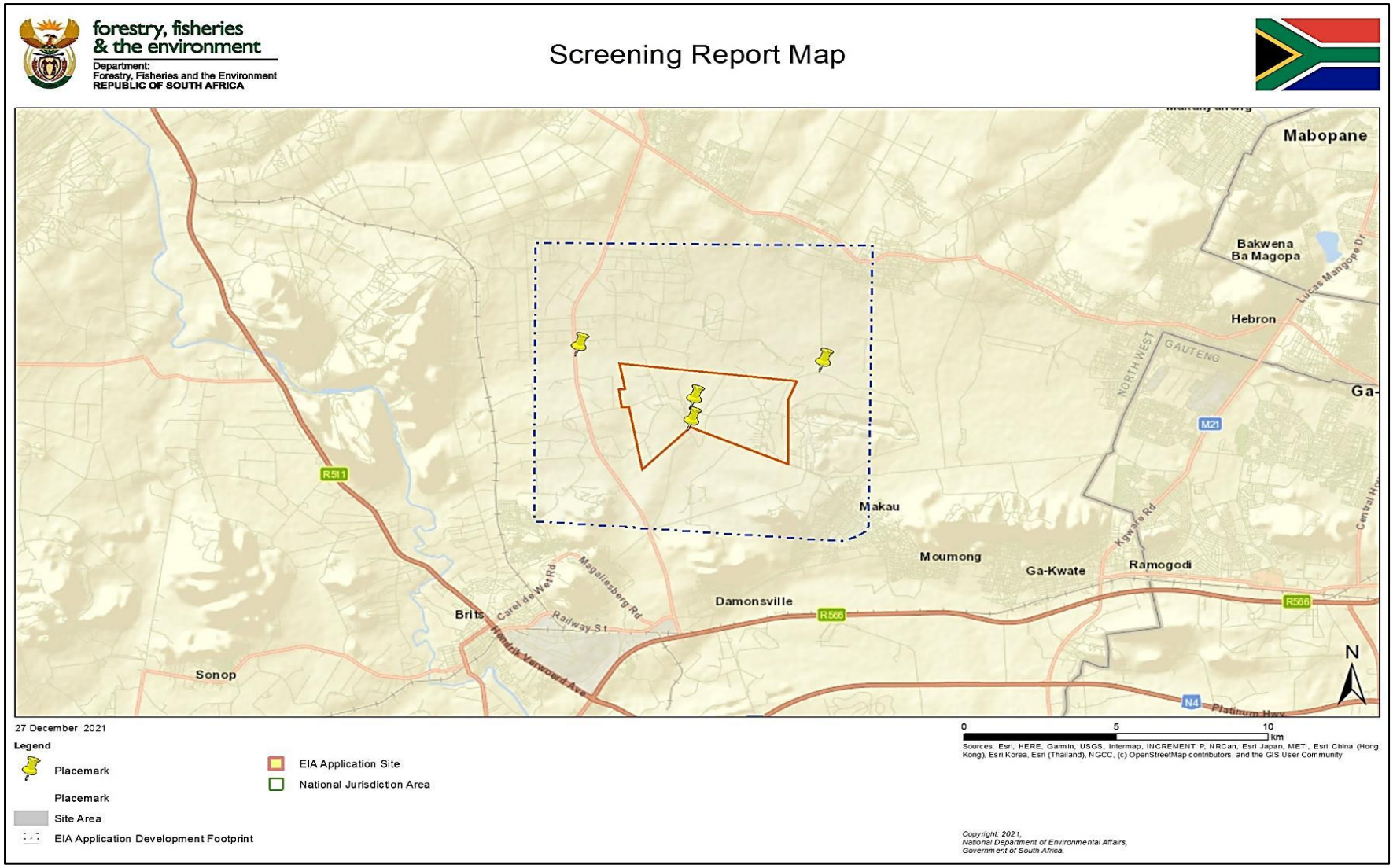


Figure 11: Combined aquatic sensitivity of the sampled site and surrounding areas

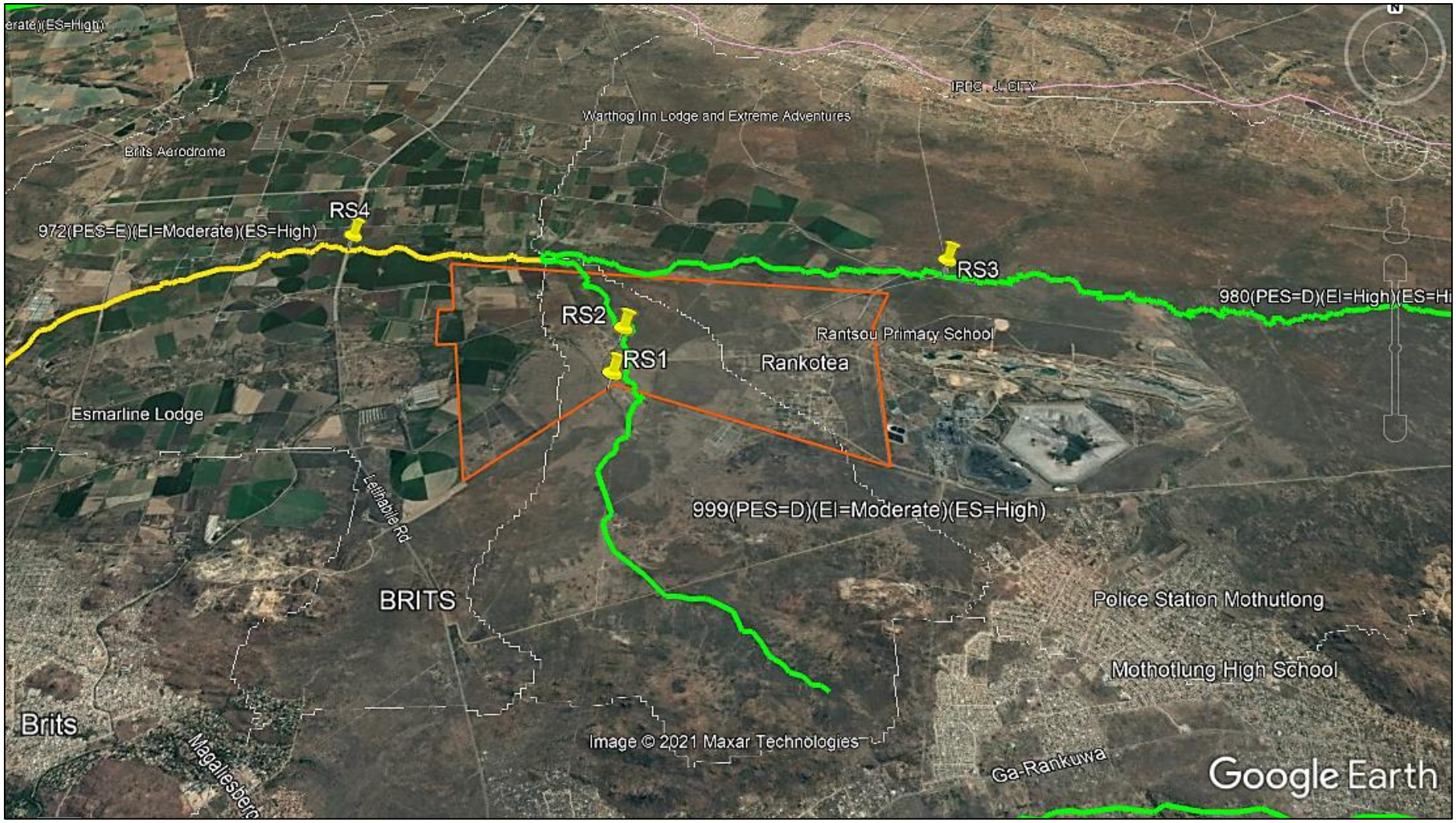


Figure 12: Sub Quaternary Reach associated with the sampled sites

Table 5: Present Ecological State, Ecological Importance and Sensitivity associated with the Rosespruit SQR A21J-00980 (DWS, 2014)

Present Ecological State		**Ecological Importance**				**Ecological Sensitivity**	
Instream Habitat Continuity Modifications	Small	Fish species /SQ	4	Invertebrate taxa / SQ	31	Fish physico-chemical sensitivity description	Low
Riparian/Wetland zone continuity modifications	Moderate	Fish average confidence	1	Invertebrate average confidence	2.81	Fish no-flow sensitivity description	Moderate
Potential instream habitat modifications	Moderate	Fish representatively per secondary class	Very Low	Invertebrate representatively per secondary class	Moderate	Invertebrate physico-chemical sensitivity description	Moderate
Riparian-wetland zone modifications	Moderate	Fish rarity per second class	Very Low	Invertebrate rarity per second class	Moderate	Invertebrate velocity sensitivity	Very High
Potential flow modifications	Large	Habitat diversity class	Low	Ecological importance riparian-wetland instream vertebrates	High	Riparian-wetland instream vertebrates (excluding fish) intolerance water level/ flow changes description	High
Potential physico-chemical modification activities	Moderate	Riparian-wetland natural vegetation rating based on % natural vegetation in 500m	Very High	Habitat Size Class	Low	Stream size sensitivity to modified flow/water level changes description	High
		Riparian-wetland natural vegetation importance based on expert rating	Low	Instream Migration Link Class	Very High	Riparian-wetland vegetation intolerance to water level changes	High
		Riparian-Wetland Zone Migration Link	High	Riparian -Wetland Zone habitat integrity class	High		
		Instream Habitat integrity Class	High				

Table 6: Present Ecological State, Ecological Importance and Sensitivity associated with the unnamed SQR A21J-00999 (DWS, 2014)

Present Ecological State		**Ecological Importance**				**Ecological Sensitivity**	
Instream Habitat Continuity Modifications	Small	Fish species /SQ	4	Invertebrate taxa / SQ	31	Fish physico-chemical sensitivity description	Low
Riparian/Wetland zone continuity modifications	Small	Fish average confidence	1	Invertebrate average confidence	2.81	Fish no-flow sensitivity description	Moderate
Potential instream habitat modifications	Moderate	Fish representatively per secondary class	Very Low	Invertebrate representatively per secondary class	Moderate	Invertebrate physico-chemical sensitivity description	Moderate
Riparian-wetland zone modifications	Small	Fish rarity per second class	Very Low	Invertebrate rarity per second class	Moderate	Invertebrate velocity sensitivity	Very High
Potential flow modifications	Moderate	Habitat diversity class	Low	Ecological importance riparian-wetland instream vertebrates	Low	Riparian-wetland instream vertebrates (excluding fish) intolerance water level/ flow changes description	Low
Potential physico-chemical modification activities	Small	Riparian-wetland natural vegetation rating based on % natural vegetation in 500m	Low	Habitat Size Class	Very Low	Stream size sensitivity to modified flow/water level changes description	High
		Riparian-wetland natural vegetation importance based on expert rating	Low	Instream Migration Link Class	Very High	Riparian-wetland vegetation intolerance to water level changes	High
		Riparian-Wetland Zone Migration Link	Very High	Riparian -Wetland Zone habitat integrity class	Very High		
		Instream Habitat integrity Class	High				

Table 7: Present Ecological State, Ecological Importance and Sensitivity associated with the Rosespriuit SQR A21J-00972 (DWS, 2014)

Present Ecological State		**Ecological Importance**				**Ecological Sensitivity**	
Instream Habitat Continuity Modifications	Small	Fish species /SQ	9	Invertebrate taxa / SQ	35	Fish physico-chemical sensitivity description	High
Riparian/Wetland zone continuity modifications	Moderate	Fish average confidence	1.44	Invertebrate average confidence	3.97	Fish no-flow sensitivity description	High
Potential instream habitat modifications	Large	Fish representatively per secondary class	Low	Invertebrate representatively per secondary class	Moderate	Invertebrate physico-chemical sensitivity description	Moderate
Riparian-wetland zone modifications	Moderate	Fish rarity per second class	Low	Invertebrate rarity per second class	High	Invertebrate velocity sensitivity	Very High
Potential flow modifications	Large	Habitat diversity class	Low	Ecological importance riparian-wetland instream vertebrates	High	Riparian-wetland instream vertebrates (excluding fish) intolerance water level/ flow changes description	High
Potential physico-chemical modification activities	Large	Riparian-wetland natural vegetation rating based on % natural vegetation in 500m	Moderate	Habitat Size Class	Very Low	Stream size sensitivity to modified flow/water level changes description	Low
		Riparian-wetland natural vegetation importance based on expert rating	Low	Instream Migration Link Class	Very High	Riparian-wetland vegetation intolerance to water level changes	High
		Riparian-Wetland Zone Migration Link	High	Riparian -Wetland Zone habitat integrity class	High		
		Instream Habitat integrity Class	Moderate				

Table 8: Expected species historically recorded at the sub quaternary reaches (DWS, 2014)

Scientific Name	Common Name	IUCN Status			
Aplocheilichthys johnstoni	Johnstons topminnow	Least Concern			X
Clarias gariepinus	Sharptooth Catfish	Least Concern	X	X	X
Enteromius paludinosus	Straightfin Barb	Least Concern	X	X	X
Enteromius unitaeniatus	Longbeard barb	Least Concern			X
Labeo cylindricus	Redeye Labeo	Least Concern			X
Labeo molybdinus	Leaden Labeo	Least Concern			X
Labeobarbus marequensis	Lowveld Largescale Yellowfish	Least Concern			X
Pseudocrenilabrus philander	Southern Mouthbrooder	Least Concern	X	X	X
Tilapia sparmanii	Banded Tilapia	Least Concern	X	X	X
Total number of species		**9**	**4**	**4**	**9**

1.1.1 Ecoregion

The study area is located in the Bushveld Basin Ecoregion (Ecoregion 8), the ecoregion is generally characterised by plains of low relief with mixed bushveld being the definitive vegetation type. Perennial rivers associated with the ecoregion includes the Marico, Elands (West), Crocodile (West), Pienaars and Olifants Rivers.
The main characteristics associated with this ecoregion are listed in Table 9, the dominant types are illustrated in **bold**.

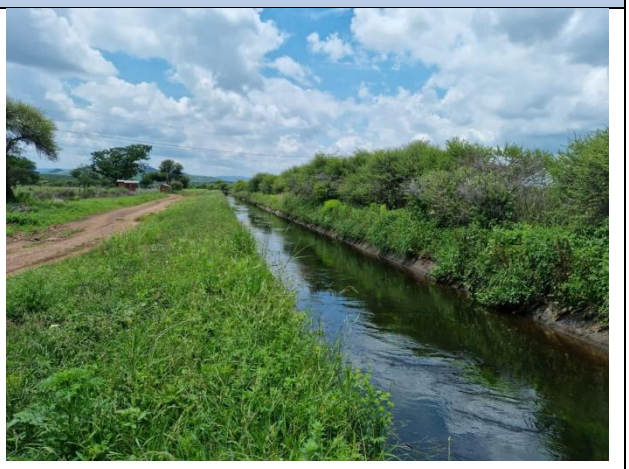
Table 9: Main attributes associated with the Highveld Ecoregion (Ecoregion 11)

Attribute	**Highveld**
Terrain Morphology: Broad division	**Plains; Low Relief;** Plains: Moderate Relief; Lowlands, Hills and Mountains; Moderate and High Relief; Open Hills: Lowlands Mountains; Moderate to High Relief; Closed Hills. Mountains; Moderate and High Relief
Vegetation Types	**Mixed Bushveld ;** Clay thorn Bushvekd; Waterberg Moist Moutain Bushveld (Limited)
Altitude (m.a.m.s.l)	700-1700
Mean annual precipitation	400 to 600
Coefficient of Variation (% of annual precipitation)	25 to 35
Rainfall concentration index	55 to >65
Rainfall seasonality	Early to mid Summer
Mean annual temperature	14 to 22

4.1.4.2 Field Assessment

4.1.4.2.1 Sampled Sites

Table 10: Description of associated aquatic systems

Sample Site	**RS1 (Sampled 19/12/2021)**
	
Located in the proposed prospecting area upstream, a river converted into a channel for irrigation purposes. The reach has been completely transformed.	
Sample Site	**RS2 (Sampled 19/12/2021)**
	
Located downstream of point RS1 which was once a river transformed into a channel for irrigation puroses. The reach has been completely transformed	
Sample Site	**RS3 (Sampled 19/12/2021)**
	

Located upstream of the proposed prospecting area, serious changes in the natural flow regime has occurred within the reach, where flow would only occur at times of heavy rains. The wetland upstream was inspected for approximately a 100 meters from the point where gravel sand and mud was the main biotope. Vegetation was restricted to inundated grasses.	
Sample Site	**RS4 (Sampled 19/12/2021)**
	
Located downstream of the proposed prospecting area, the reach was characterised by wetland properties with no defined channel observed at the time of sampling. Which was dry at the time of the assessment, the reach was inspected for approximately 100 meters up and downstream of the point. Gravel, sand and Mud was the dominant biotope observed throughout the reach with vegetation restricted to reeds.	

4.1.4.3 Water Quality

4.1.4.3.1 In situ Water Quality

This section provides the In situ measurements observed at the time of sampling, although this does not represent the permanent water quality of the sampled sites, it does provide context of potential issues which may be present within the sampled reach (Table 11). In situ water quality assessment could only be performed at sample sites RS1-RS3.

Table 11: In situ measurements observed during the sample period (19/12/2021)

Parameter	**Target Water Quality Range Aquatic Ecosystems (DWAF, 1996)**	**Sample Site**		
		RS1	**RS2**	**RS3**
Temperature (°C)	5-30	22.7	23.1	22.8
pH	6.5-9.0	8.23	8.02	7.64
Dissolved Oxygen (mg/l)	5-12	7.20	7.06	5.42
Dissolved Oxygen Saturation (%)	80-120	83.0	90.7	90.7

Electrical Conductivity (*µs*/cm)	No change more than 15%	475	528	525

Based on the measurements observed at the time of sampling no exceedances of the target water quality ranges as set out by the DWS (DWAF, 1996) were observed, and is not deemed to be a limiting factor to aquatic biota at the time of the assessment.

4.1.4.3.2 Biotic assessments

No macroinvertebrate or fish community assessment could be conducted at the time of the assessment due to the seriously transformed state of the aquatic systems observed and the reach being dry at sample site RS4.

4.1.4.3.3 Habitat Assessment

The instream integrity of the associated reaches have undergone severe modifications due to the installation of the irrigation channel used for agricultural activities. The riparian integrity of the unnamed tributary was also classed seriously modified due extensive clearing for agricultural lands.

Table 12: Instream IHI scores associated with the sampled sites

Modification	RS1-RS4
Water abstraction	25
Flow modification	25
Bed modification	25
Channel	25
Physico-chemistry	5
Inundation	10
Alien macrophytes	0
Alien aquatic fauna	10
Rubbish dumping	10
IHI score[1]	**37.8**

Table 13: Riparian IHI scores associated with the sampled sites

Modification	RS1-RS4
Vegetation removal	25
Invasive vegetation	15
Bank erosion	0
Channel modification	25
Water abstraction	25
Inundation	10
Flow modification	25
Physico-chemistry	5
IHI Score[1]	**35.8**

4.1.5 Geology

Vanadium mineralisation occurs in vanadium-bearing titaniferous magnetite-rich layers that occur within the Upper Zone of the Rustenburg Layered Suite of the Bushveld Complex. The magnetite- rich layers are part of the layered sequence and are concordant, continuous along strike and down-dip, although thickness variability occurs.

The Bushveld Complex intruded Pretoria Group meta-sedimentary rocks of the Transvaal Supergroup approximately 2,060 million years ago. The layered sequence of mafic rocks, known as the Rustenburg Layered Suite, comprises five distinct zones:

1. the Marginal Zone,
2. the Lower Zone,
3. the Critical Zone,
4. the Main Zone, and
5. the Upper Zone.

Both the Main Zone and the Upper Zone of the Rustenburg Layered Suite sub-crop in the Project area. The Upper Zone is identified from the underlying Main Zone by the occurrence of cumulus magnetite. The Main Zone in this area is comprised of gabbro-norite, pyroxenite and anorthosite layers. The lithologies in the Upper Zone include massive magnetite layers, magnetite–bearing gabbro, olivine-diorite and lesser anorthosite layers. The magnetite layers are east-west striking with an average dip of 19° to the north. Groups of magnetite-rich layers are separated into three seams, namely the Upper, Intermediate and Lower Seams. The seams occur above a distinct anorthosite layer near the contact of the Upper Zone with the underlying Main Zone.

The mineralization is clearly shown on the 1:250,000 Council for Geoscience geological map of the area (shown below):

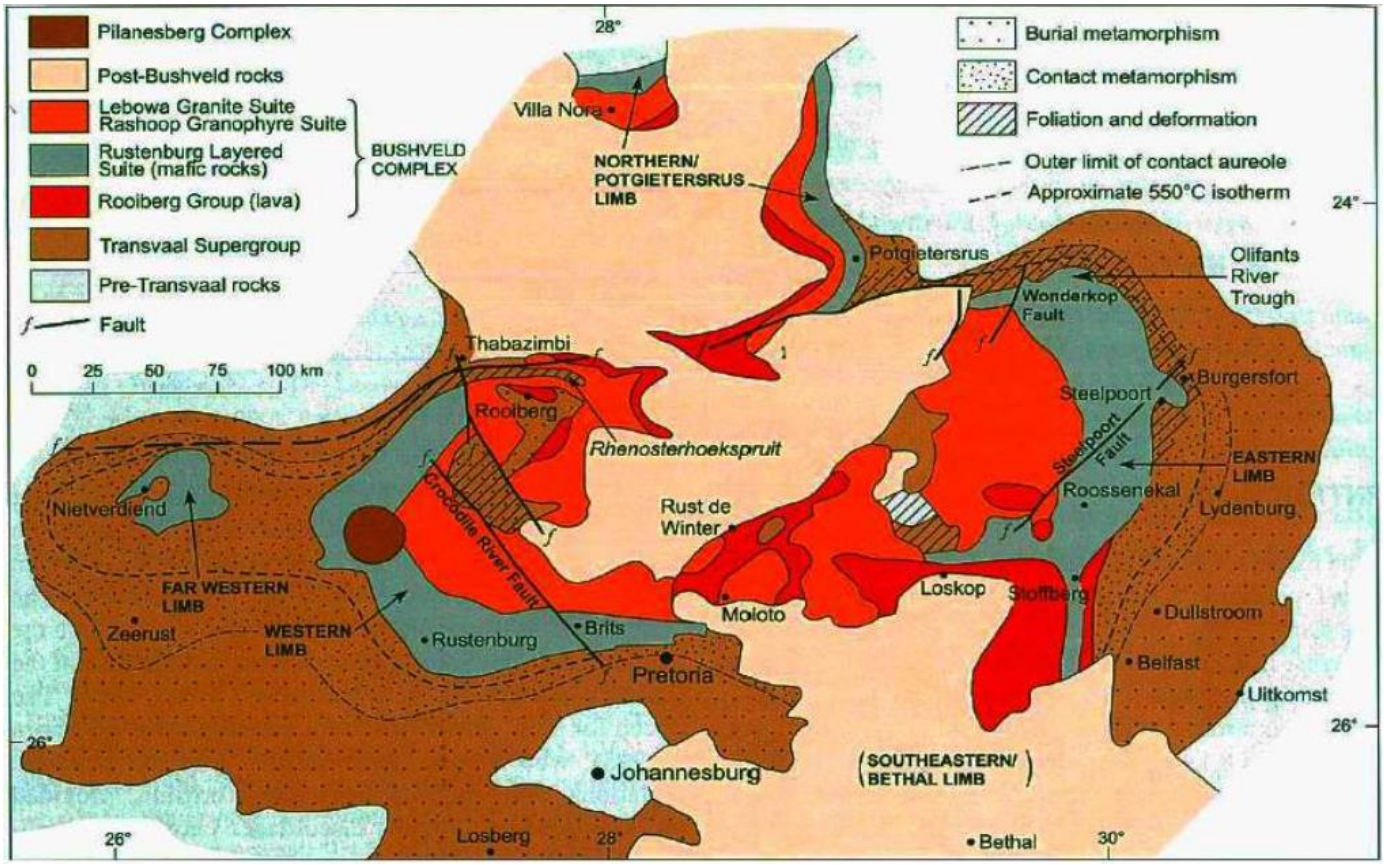


Figure 13: Simplified Geology Map

The Bushveld Complex is a geologically unique igneous complex endowed with deposits of PGEs, chromium, vanadium and magnetite. The area of interest is located on the western limb of the Bushveld Complex.

The mafic component of the Bushveld Complex (known as the Rustenburg Layered Suite) has been subdivided into five zones, from the base, the Marginal, Lower, Critical, Main and Upper Zones respectively.

The Upper Zone comprise the Bierkraal Magnetite Gabbro and the Pyramid Gabbro Norite. Both of these units outcrop in the project area.

The vanadium bearing titaniferous magnetite bands are located in the Upper Zone of the Bushveld Complex. The Upper Zone comprise layered mafic rocks carrying approximately 8% magnetite disseminated in gabbroic rocks, plus a further cumulative 20m of pure magnetite distributed in 25 discrete magnetite layers. The magnetite layers are concordant and of different thicknesses, V_2O_5 and TiO_2 grade, but with persistence over considerable distances, both along strike and down dip.

4.1.6 Land Capability

With regard to land capacity, the two important aspects to be considered are the grazing capacity and soil potential within Madibeng Local Municipality. Most of the land in Madibeng comprises of turf, a highly agricultural potential soil.

The Local Municipality of Madibeng is characterized by a variety of fertile soil types, pleasant climate and numerous water sources. As a result of these favourable conditions, the area is suitable for producing a variety of agricultural products. Another great advantage for agricultural activities is that the area is part of one of the

largest irrigation schemes in the country. According to agriculture sources in the area, approximately 20 % of agricultural land with access to canalized water is not utilized for agricultural purposes at this moment. Irrigated vegetable farmlands cover about 130 km² around Brits, with canalized water from Hartbeespoort Dam. Approximately 18 000 ha of land is under irrigation with about 16 000 ha from the Hartbeespoort Dam irrigation Scheme and 4 000 ha from the Crocodile River.

Land with favourable soil conditions and the listed irrigation properties with access to water from irrigation canals is found along the Crocodile River which runs on the South western parts of Madibeng. As much as the majority of land in Madibeng is suitable for agricultural activity, some areas are under threat. This is attributed to fact that these areas are sensitive, as this land cannot be replaced once lost. Thus high potential agricultural land should be protected from development and mining activity.

Development and Management directives for high potential agricultural land:

- No activities or developments other than agriculture and agricultural related activities shall be permitted on high potential agricultural land.
- No township establishment shall be permitted on high potential agricultural land.

The proposed prospecting area has a moderate to high agricultural land use capability. The area is suitable for arable farming.

Figure 14: Map of Relative Agriculture Theme Sensitivity

4.1.7 Biodiversity

The proposed prospecting area is situated in the Marikana Thornveld Vegetation Type, which is distributed within the North West and Gauteng Provinces. Generally associated with open *Vachelia karroo* woodland occurring in valleys ad slightly undulating plains with scattered lowland hills. The vegetation type is characterised by summer rainfall with very dry winters and a mean annual precipitation of 600 to 700 mm. This vegetation type is rated endangered with less than 1% of the vegetation type statutorily conserved in the Magaliesburg and De Onderstepoort Nature reserves.

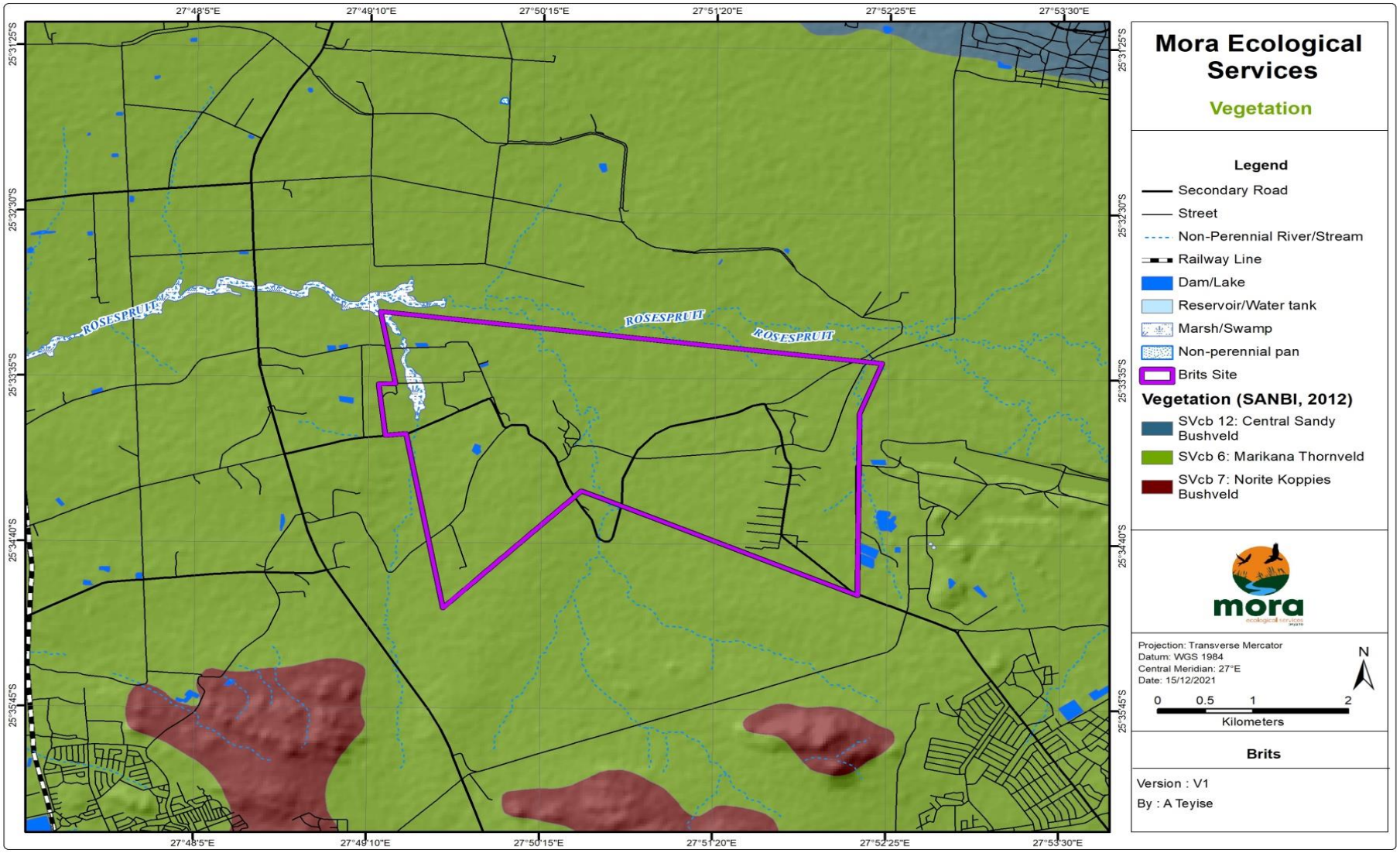


Figure 15: Vegetation the associated with the proposed prospecting area

4.1.7.1 Vegetation of the study site

The vegetation units of Mucina and Rutherford (2006) were used as references but where necessary communities are named according to the recommendations of a standardised South African Syntaxonomic nomenclature system. By combining the available literature with the survey results, stratification of vegetation communities was possible. Selected sites within the area were also searched for important species and the potential for Red Data Listed (RDL) and other important species were established, and cross referenced with New Plants of South Africa (POSA) database. The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The veld types are described on a local level. The study site is covered, predominantly by graminoids and woody species (mostly alien), with few shrubs. This type of vegetation has the potential to support a variety of faunal species including birds, but due to farming and human settlements, very few animals remain.

4.1.7.1.1 Vegetation & Landscape Features

Open Vachellia karroo woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are more dense along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire.

Biological diversity everywhere is at great risk as a direct result of an ever-expanding human population and its associated needs for energy, water, food and minerals. Landscape transformation that is needed to accommodate these activities inevitably leads to habitat loss and habitat fragmentation, resulting in the mosaical appearance of undisturbed habitat within a matrix of transformed areas. These remaining areas of natural habitat are frequently too small to support the biodiversity that previously occupied the area, and the region loses its ecological integrity (Kamffer 2004). Conservation of the remaining ecosystem is vital and beneficial in the long run.

The assessment results half of the site has been severely transformed due to agricultural activities, human settlements and alien invasion. Areas that have been moderately modified are mainly associated with watercourses. Historical records of flora and faunal species previously recorded around the study area is listed in the appendices.

Concrete canal within the site

Aerial view of the canal

Natural vegetation near low density farmhouses

Crop fields located west of the site

Ntsopile village

Rubble dumping

Figure 16: View of the site.

4.1.7.1.2 Plants

Table 2: List of plant species recorded at the study site.

Species	Common Name	Growth Form	IUCN Conservation Status
Ziziphus mucronata	Buffalo Thorn Tree	Tree	LC
Vachellia karroo	Sweet thorn	Tree	LC
Asparagus laricinus	Bergkatbos	Shrub	LC
Aloe greatheadii var davyana	Spotted aloe	Succulent	LC
Gomphocarpus fruticosus	Milkweed	Shrub	LC
Cynodon dactylon	Bermuda Grass	Grass	LC
Eragrostis curvula	Weeping Love Grass	Grass	LC
Hyparrhenia hirta	Common Thatching Grass	Grass	LC
Setaria sphacelata	Common Bristle Grass	Grass	LC
Aristida congesta subsp. Congesta	Tassel Three-awn	Grass	LC

4.1.7.1.3 Weeds and Invasive Plants

The presence of several weeds and poor-quality species strongly reflects the transformed and degraded nature of the study site. The infestation of the listed invasive plants is high and require intervention. The following weeds and invasive plant taxa were recorded within the study site.

Table 3: List of weeds and invasive species for the study area

Species	Common Name	Growth Form	IUCN Conservation Status
Acacia mearnsii	Black Wattle	Tree	Declared Category 2
Eucalyptus camaldulensis	River red gum	Tree	Declared Category 1b
Verbena bonariensis	Tall Verbena	Herb	Declared Category 1b
Solanum mauritianum	Bug Weed	Herb	Declared Category 1b
Morus alba	Mulberry	Tree	Declared Category 3
Argemone mexicana	Yellow-flowered Mexican poppy	Herb	Declared Category 1b
Opuntia ficus-indica	Sweet prickly pear	Tree	Declared Category 1b
Agave americana	Century plant	Succulent	Category in Western Cape. Not listed elsewhere.
Robinia pseudoacacia	Black Locust	Tree	Declared Category 1b

4.1.7.1.4 Birds

Birds are regarded as one of the most useful bioindicators, and they have been used extensively as models to determine ecosystem function (see review Koskimies 1989; Potts et al. 2014; Bregman et al. 2016). High levels of human disturbance as well as habitat transformation and degradation on the study site and adjacent

areas would result in the disappearance of the more elusive bird species. Majority of the birds recorded around the study site are generalists.

Table 4: List of bird species recorded at the study site.

Species	Common Name	IUCN Conservation Status
Vanellus armatus	Blacksmith Lapwing	LC
Ardea melanocephala	Black-headed Heron	LC
Spilopelia senegalensis	Laughing Dove	LC
Bostrychia hagedash	Hadeda Ibis	LC
Streptopelia capicola	Cape Turtle-Dove	LC
Passer domesticus	House Sparrow	LC
Passer melanurus	Cape Sparrow	LC
Corvus albus	Pied Crow	LC
Numida meleagris	Hlemeted Guineafowl	LC
Cinnyris talatala	White-bellied Sunbird	LC
Trachybhonus vainnantii	Crested barbet	LC
Tockus leucomelas	Southern Yellow-billed Hornbill	LC
Dicrurus adsimilis	Fork-tailed Drongo	LC
Spilopelia senegalensis	Laughing dove	LC

4.1.7.1.5 Mammals

No mammal species were observed during the survey. The area is near an existing mine, farming area and villages.

4.1.7.1.6 Reptiles

Herpetofauna do occur in human modified landscapes, so encouraging appropriate matrix land uses could contribute to their conservation. No reptiles were recorded during the survey.

4.1.7.2 Conservation Status

4.1.7.2.1 North West Biodiversity Sector Plan (2015)

This Biodiversity Plan delineates on a map, commonly known as a Critical Biodiversity Areas (CBA), biodiversity priority areas called Critical Biodiversity Areas, Ecological Support Areas and Protected Areas. These areas are the portfolio of sites that are required to meet the region's biodiversity targets and need to be maintained in the appropriate condition for their category. It is highly recommended that this Conservation Plan be a primary biodiversity consideration in Environmental Impact Assessments. Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

4.1.7.2.2 Criteria of Identifying CBA

A CBA is an area that must remain in good ecological condition in order to meet biodiversity targets for ecosystem types, species of special concern or ecological processes. CBAs can meet biodiversity targets for terrestrial or aquatic features, or both. Together with protected areas, the portfolio of CBAs identified in a biodiversity plan must collectively meet biodiversity targets for representation of ecosystem types and species of special concern, and may also meet biodiversity targets for some ecological processes Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

4.1.7.2.3 Criteria for Identifying ESAs

An ESA is an area that must remain in at least fair ecological condition in order to: meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or species of special concern when it is not possible to meet them in CBAs; support ecological functioning of a protected area or CBA (e.g. protected area buffers); or a combination of these. ESAs can meet biodiversity targets for terrestrial or aquatic features, or both. All ecological processes important for the long-term persistence of ecosystems and species should be adequately included in the portfolio of protected areas, CBAs and ESAs. Sites selected to form part of ESAs could include sites in good, fair or even severely modified ecological condition, as long as the current ecological condition is compatible with fulfilling the purpose for which the ESA has been selected. The desired state/management objective for most ESAs is to maintain them in at least fair ecological condition. For ESAs that are severely modified, the management objective is no further deterioration in the current ecological condition.

4.1.7.2.4 Sensitivity Analysis

In terms of North West Biodiversity Sector Plan 2015, only a small fraction within the proposed project falls within Terrestrial Critical Biodiversity Area 2 (Fig. 4). Ground truthing revealed that the site has been exposed to some levels of disturbance.

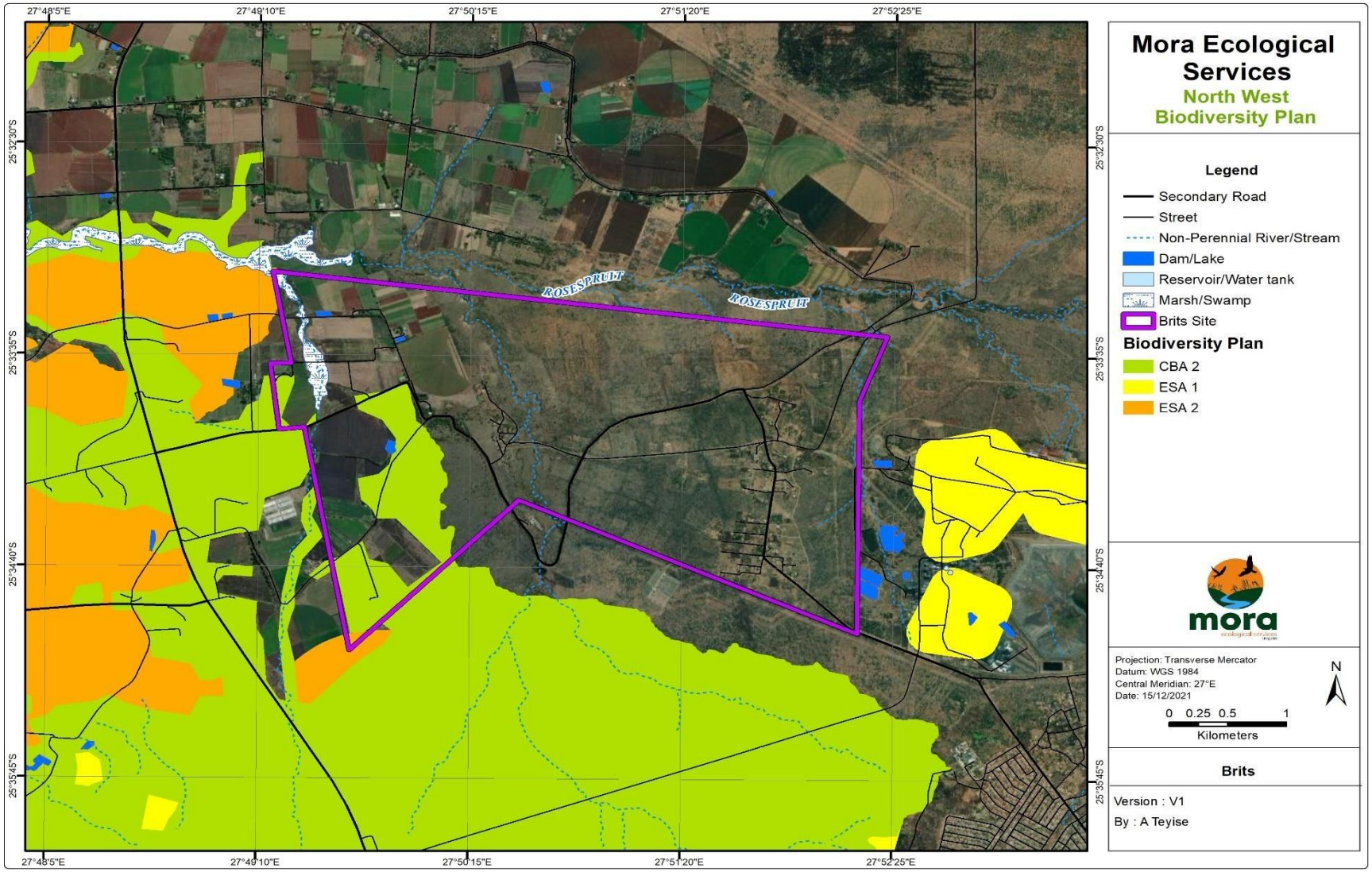


Figure 17:: North West Biodiversity Sector Plan Map.

4.1.8 Heritage Resources

4.1.8.1 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.

4.1.8.2 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).

4.1.8.3 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. In terms of the general project area, the region is well known for LIA sites. According to Pistorius (2011), the Central Bankeveld, a narrow strip of land between the northern bushveld savannah and the centrally situated Highveld, proved to be a suitable living environment for the first Tswana, who practised herding, agriculture, metal working and trading. Accordingly, they settled the region between AD 1600 and AD 1840.

The early Tswana settlements, characterised by an elaborate stone-built environment, populate the norite hills between Onderstepoort and the Pilanesberg. The most formidable of these chiefdoms were the Fokeng, Kwena Môgale (Bapô), Kwena Môgôpa and the Bakgatla. Several of the Kgatla spheres emerged in the Brits area, while the Fokeng were located further to the west near Rustenburg. Mzilikazi subjugated the Kgatla, who were used as labourers to build one of the Ndebele villages that was likely known as emHlalandlela (Pistorius 2011).

The Bapô, people who descended from the Amambô Nguni from KwaZulu-Natal, settled in the Magaliesberg during the 16th or 17th Century. Thlôgôkgôlô (Wolhuterskop) was one of their capitals and several of the chiefs

were known by the name of Môgale, from where the name Magaliesberg (Pistorius 2011).

During the difaqane a large number of Tswana were displaced between the last quarter of the 18th Century and the first quarter of the 19th Century. During August 1827 Mzilikazi's Ndebele arrived from the Vaal River region and defeated the Kwena Môgôpa, the Kgatla and what remained of the Bapô after an earlier defeat by the Pedi of Thulare. Following the conflict, the Ndebele established several settlement complexes in the general area from where they maintained a grip on the local population. Four of these Zulu/Nguni residences (imisi) and military kraals (amakhanda) have been discovered by archaeological surveys (Pistorius 2011).

According to Van Vollenhoven (2006), Mzilikazi settled at Kungwini, present day Wonderboom in Pretoria North, and were attacked by the Zulu king Dingane in 1832. Accordingly, the Sotho-Tswana groups are the largest Bantu language speaking people who are formed by the Northern and Southern Sotho, as well as the Tswana.

Pistorius (2011) states that from the latter half of the 18th Century, internal strife between various Tswana chiefdoms seems to have increased and resulted in the splintering of the existing chiefdoms into independent spheres of influence. During the early 19th Century, travellers, traders and missionaries encountered and noted the devastated Tswana chiefdoms. These travellers include traders such as Robert Schoon and William McLuckie in August 1829, followed by the missionary Robert Moffat who visited Mzilikazi in an umusi near present day Pretoria. During June 1835, Charles Bell and several members of Andrew Smith's expedition visited a Ndebele village near Rustenburg. Charles Bell subsequently painted the village. In December 1836, Cornwallis Harris visited and painted emHlalandlela near Madibend (Brits). Numerous Tswana chiefdoms unfolded during the last decades of the 18th Century and the first decades of the 19th Century. The causes were complex, multidimensional and included ecological potential, social and political formation and expansion of different spheres of influence, the establishment of short- and long-distance trade relations and local and regional wars. The causes and events not fully recorded in oral traditions or other records and therefore indicate further research potential.

The earliest Voortrekkers who moved across the Magaliesberg in the early 19th Century settled in the Rustenburg area, as well as further to the east. Main activities eventually included tobacco and citrus farming, as well as cattle herding. British blockhouses dating to the Anglo Boer War are found along the Magaliesberg between Pretoria in the east and Rustenburg in the West. Several of these structures are located to the south of the project area in Kommandonek and Pampoennek. With the discovery of the Merensky Reef in 1929, the area's economy gradually changed from farming to platinum, chrome and granite mining (Pistorius 2011).

4.1.8.4 Historical aerial Imagery and topographical maps

Historical images and topographical maps dating to 1943, 1949, 1964, 1968, 1980, 1985, 1996, 2001 and 2010 (Appendix A) were used to determine the location and relative age of the structures and buildings associated with the demarcated portions (Table 2), as well as the historical land uses.

The topographical map dating to 1943 (Appendix A: Figure 48) indicates the presence of 12 areas associated with buildings or structures (Sites K01 – K12), several roads, footpaths, cultivated areas and a canal. Seven of these sites (K03, K05, K06, K07, K08, K11, K12) appear to have been demolished as no surface indications are visible on contemporary satellite imagery. Four of the sites are still associated with surface remains (K01, K02, K04, K09). Should these buildings / structures, or parts thereof, form part of the original structure, it would at least be 78 years old. One of the sites (K10) appears to presently consist of a building ruin. Sites K11, K12 (hut) and the majority of the buildings associated with Site K07 appear to have been demolished by 1949 (Appendix A: Figure 49), while site K03 was demolished by 1964 (Appendix A: Figure 50). Sites K05 and K08 are no longer visible on the 1968 aerial image (Appendix A: Figure 51) or the 1968 topographical map (Appendix A: Figure 52), suggesting that they have been demolished by this time. The last building associated with Site K07 appears to have been demolished by 1985 (Appendix A: Figures 54 & 55) and the building at Site K06 by 1996 (Appendix A: Figure 56). Building ruin K10 seems to have been partially demolished between 1985 and 1996 (Appendix A: Figures 55 & 56).

The aerial image dating to 1949 (Appendix A: Figure 49) indicates the presence of three areas associated with buildings or structures (Sites K14, K16, K21) not previously identified. All three sites are still associated with surface remains. Should these buildings / structures, or parts thereof, form part of the original structure, it would at least be 72 years old.

The 1964 aerial image (Appendix A: Figure 50) shows the presence of an additional 5 sites consisting of buildings or structures (Sites K15, K18, K19, K23, K24), two of which appear to have been demolished. Site K19 appears to have been demolished by 1985 (Appendix A: Figures 54 & 55) and Site K24 sometime after 2010 (Appendix A: Figure 58). Based on contemporary satellite imagery, Sites K15 and K18 are still associated with intact buildings. These buildings/structures could have been constructed between 1949 and 1964 and could therefore exceed 60 years of age. The building associated with Site K23 seems to have partially been demolished after 2010 as the building currently appears to be a ruin.

Four sites (Sites K13, K17, K20, K22) consisting of buildings/structures were identified on the 1968 aerial image (Appendix A: Figure 51) and the 1968 topographical map (Appendix A: Figure 52). Three of these sites, K13, K17 and K20, however, have been demolished by 1985 (Appendix A: Figures 54 & 55), while Site K22 appears to a have been demolished by 1996 (Appendix A: Figure 56). It should also be noted that since these buildings/structures were constructed between 1964 and 1968, they do not exceed 60 years of age. The 1968 topographical map is also the first map to indicate the names of the two villages: Ntsopilo and Rankotia.

Although several additional buildings are indicated on more recent topographical datasets, these structures are of contemporary origin. One cemetery (Site K25), however, was identified on the 2010 topographical map (Appendix A: Figure 58). The majority of the agricultural activities, especially on the Krokodilkraal 426 JQ section, seem to have ceased between 1985 and 1996 (Appendix A: Figures 55 & 56).

4.1.8.5 Examples of Heritage Sites

Figures 33 – 43 are examples of heritage sites often encountered. Such sites are may be associated with water sources, rocky outcrops and hills and should be avoided by the prospecting activities.

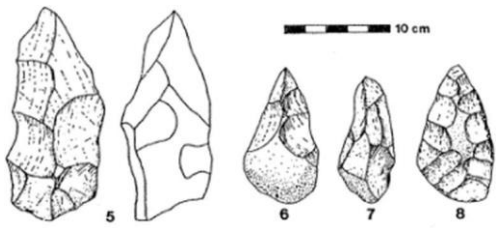


Figure 33: ESA artefacts from Sterkfontein (Volman 1984).

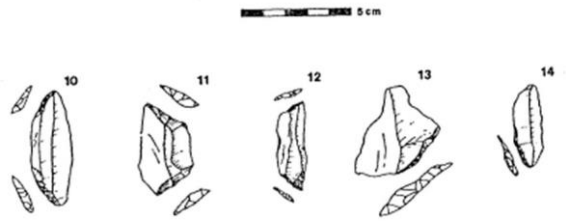


Figure 34: MSA artefacts from Howiesons Poort (Volman 1984).

Figure 35: LSA scrapers (Klein 1984).

Figure 36: Example of undecorated potsherds.

Figure 37: Example of a decorated potsherd.

Figure 38: Example of a potential granary base.

Figure 39: Example of a stone-walled site.

Figure 40 : Example of a broken lower grinding stone.

Figure 41: Example of a dilapidated stone-walled site.

Figure 42: Example of a historical building.

Figure 43: Example of a potential informal grave.

4.1.8.6 Previous Heritage Studies

Buffelsfontein East & West Expansion Project

A Heritage Impact Assessment was conducted by Pelser & Van Vollenhoven (2008) for the initial Buffelsfontein East and West mining expansion on the Farm Buffelsfontein 465 JQ. The study recorded one angular stone-walled enclosure and an extensive LIA stone-walled site. It was assumed that the angular enclosure was likely to relate to recent quarrying and mining activities and was considered to be of low significance. The site was subsequently demolished. The LIA stone-walled site was determined to be highly significant as this site appears to form part of a larger complex that was identified by Dr Julius Pistorius. Accordingly, the site is associated with the ancestors of the Tswana and dates from the 17th Century onwards. Material culture observed during their survey included hut enclosures, middens etc. Due to the site already being impacted and the possibility of future expansion, the HIA proposed a detailed mapping and drawing of the site, as well as archaeological excavations. An alternative consisting of the fencing-off of the site and compiling a management plan was proposed as well. The Buffelsfontein Project area is located 27 km to the southwest of

the NWV prospecting area.

4.1.8.6.1 Kgabalatsane Solar PV 2 Facility

The HIA survey conducted for the development of the Kgabalatsane Solar PV 2 Facility on the Farm Syferfontein 430 JQ, located 6.6 km east-northeast of the proposed NWV prospecting area, revealed no heritage sites. However, it is noted that Bakwena-ba-Mogapa owned the farm, as well as several surrounding farms, from at least the late 1800's. According to research, the prospecting and mining of iron ore commenced on the farm during the 1950's. The farm also became part of the Bophuthatswana homeland in the late 1970's (Van der Walt 2014).

4.1.8.6.2 Evraz Vametco Operation

Pistorius (2011) conducted a Phase 1 Heritage Impact Assessment for the Evraz Vametco operation directly to the east of the proposed NWV prospecting area. The HIA recorded a historical house, stone-walled sites dating to the Late Iron Age, as well as two cemeteries dating to the Historic Period that was still in use at the time of the survey. The historical house was deemed to be of low heritage significance due to its dilapidated state. It was also noted that such remains are common in the area. The 14 LIA sites consist of stone-walling. Two of the sites are well preserved and are therefore of high significance, while the remaining 12 sites vary between medium and high significance based on the level of preservation. According to Pistorius (2011), the LIA sites can contribute to a better understanding of the regional Tswana pre-history since the sites fall within the sphere of influence of the Kgatla and Bakwena Bamôgôpa who were subjugated by Mzilikazi's Ndebele between 1827 and 1832. A phase 2 archaeological impact assessment consisting of the documentation and excavation of the remains was recommended, and that the cemeteries be fenced-off.

4.1.8.6.3 Granite prospecting on Roodekopjes of Zwartkopjes 427 JQ and Mamagalieskraal 420 JQ.

A Cultural Heritage Assessment was conducted by Coetzee (2016) for the prospecting of granite on several portions of the Farms Roodekopjes of Zwartkopjes 427 JQ and Mamagalieskraal 420 JQ. It should be noted that the study area is located directly to the south of the proposed NWV prospecting area and also include two mutual portions: Portions 849 and 851 of the Farm Mamagalieskraal 420 JQ. The study recorded nine LIA stone-walled sites, two historical farm workers house complexes and two cemeteries. The workers house complexes were graded to be of low significance, the cemeteries to be of high significance, while the LIA sites were assigned grades varying between medium and low significance. It should be noted that six of the LIA sites appear to be individual wards (family units) and may constitute a single large settlement. Recommendations for the LIA sites and historical farm workers house complexes include a Phase 2 survey, mapping and the application for destruction permits, while exhumation, reburial and a permit application were recommended for the cemeteries. It should also be noted that none of these sites are located on the two mutual portions.

4.1.8.7 Archaeological and Historical Remains

This section serves as an indication of heritage material to be expected during a Phase 1 heritage study of the

study area based on previous research, as well as historical aerial images and topographical maps.

4.1.8.8 Stone Age Remains

Although Stone Age sites are scattered along the Magaliesberg, the heritage studies conducted in the vicinity of the study area did not locate any such remains. Because such sites are often associated with water sources, stone age material are more likely to be encountered within the 500 m river buffer zone of the study area. Stone Age sites are also not likely to be detectable on aerial imagery and are generally discovered during pedestrian surveys.

4.1.8.9 Iron Age Farmer Remains

Archaeological studies done in the surrounding areas located numerous stone-walled sites dating to the LIA (Pistorius 2011 & Coetzee 2016). These sites area associated with the ancestors of the Tswana and the Ndebele and are generally found between Rustenburg in the West, Pretoria in the East, and between the norite hills in the north and the Magaliesberg in the south. According to Pistorius (2011), the stone-walled enclosures located directly to the east of the study area might be associated with the regional Tswana pre-history since the sites fall within the sphere of the influence of the Kgatla and Bakwena Bamôgôpa who were subjugated by Mzilikazi's Ndebele between 1827 and 1832. It was also noted that the stone-walled sites represented a typical Tswana village or kgoro. The observed sites consist of centrally located cattle enclosures that are surrounded by outer scalloped walls. The scallops indicate the various dwellings (malapa) that were occupied by different family groups (masika), while the enclosures were used to shelter large and small stock and also served as the kgotla area that held the formal court. The possibility also exists that the sites observed by Coetzee (2016) to the south of the study area form part of the LIA sites recorded by Pistorius (2011).

Although stone-walled sites are often detectable on satellite imagery, none were observed within the demarcated NWV prospecting area. Due to the recorded LIA sites in relatively close proximity of the study area, a strong possibility exists that the undisturbed open areas associated with the NWV study area might be associated with LIA sites. Although not visible on satellite imagery, their presence might be obscured by dense vegetation and poor preservation.

4.1.8.10 Historical Remains

Figure below illustrates a typical building ruin associated with the study area and is likely to exceed 60 years of age. It should also be noted that the canal and the associated historical bridges are likely to exceed 60 years of age.

The archaeological studies conducted in the surrounding areas noted the presence of several buildings/structures dating to the Historic Period (Pistorius 2011 & Coetzee 2016). These include a dilapidated stone and mud house, and farm workers house complexes. Based on historical aerial imagery and topographical maps, 20 areas associated with historical infrastructure likely to exceed 60 years of age were identified. Nine of these sites appear to have been demolished (K03, K05 – K08, K11, K12, K19, K24), while nine consist of surface remains (K01, K02, K04, K09, K14 – K18) and two of building ruins (K10, K23).

Figure 44: Building Ruin.

4.1.8.11 Contemporary Remains

Evidence from satellite imagery and topographical maps indicate the presence of several buildings and structures. Figure 45 illustrates typical modern buildings associated with the villages Ntsopilo and Rankotia. Archaeological studies done in the surrounding areas (Pistorius 2011 & Coetzee 2016) did not record contemporary buildings or structures. Four building sites identified on the 1968 topographical map (Appendix A: Figure 52) appear to have been constructed between 1964 and 1968, but seem to have been demolished (K13, K17, K20, K22). These sites also do not exceed 60 years of age.

Figure 45: Contemporary buildings.

4.1.8.12 Graves

Cemetery K25 (Figure 46) was identified on the 2010 topographical map and visited (Appendix A: Figure 58). The cemetery is fenced-off and is still in use. It is unclear whether additional burial sites are located within the demarcated study area.

The heritage study conducted by Pistorius (2011) recorded two cemeteries. One of the cemeteries consists of

17 graves, while the other of several hundred. The larger cemetery was still in use at the time of the study. The heritage study conducted by Coetzee (2016) recorded two cemeteries as well. It was noted that the cemeteries are likely associated with farm workers. One of the cemeteries consists of approximately 15 graves and the other of approximately 75 graves. Both cemeteries appear to consist of formal and informal graves, some of which exceed 60 years of age. Due to the small size of burial sites and often poorly preserved surface features, such sites are rarely visible on satellite imagery and are generally detected during pedestrian surveys. Graves and cemeteries are also not always indicated on topographical maps.

Figure 46: Cemetery K25.

4.1.8.13 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, 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.

4.1.8.13.1 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 14: 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

Table 15: Individual Site Ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2527-K01	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K02	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K03	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K04	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K05	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K06	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K07	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K08	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K09	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K10	Building Ruin	Local	Grade 3 A	High	Mitigation not advised
2527-K11	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K12	Hut Demolished	General Protection B	4 B	Medium	Record site
2527-K13	Building Demolished	General Protection C	4 C	Low	No recording necessary
2527-K14	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K15	Building Intact	Local	Grade 3 A	High	Mitigation not advised

2527-K16	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K17	Building Demolished	General Protection C	4 C	Low	No recording necessary
2527-K18	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K19	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K20	Building Demolished	General Protection C	4 C	Low	No recording necessary
2527-K21	Building Intact	Local	Grade 3 A	High	Mitigation not advised
2527-K22	Building Demolished	General Protection C	4 C	Low	No recording necessary
2527-K23	Building Ruin	Local	Grade 3 A	High	Mitigation not advised
2527-K24	Building Demolished	General Protection B	4 B	Medium	Record site
2527-K25	Cemetery Intact	Local	Grade 3 A	High	Mitigation not advised

*Note – These ratings are based on the sites and their age as identified on historical aerial imagery and topographical maps. Should any of the sites proposed to be impacted, an inspection of the specific site by a qualified archaeologist must first be conducted. It should also be noted that additional heritage sites might be located within the demarcated study area.

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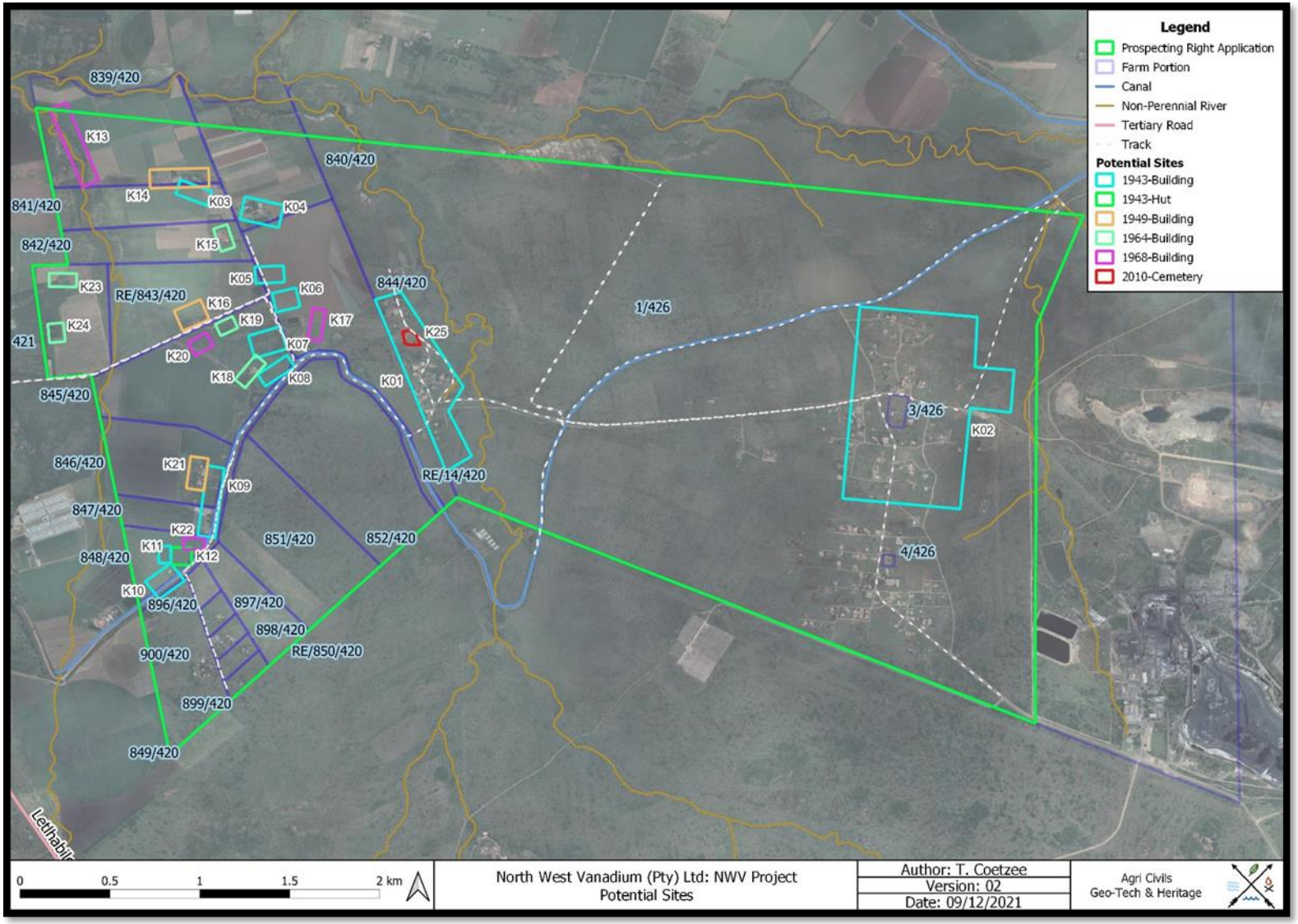


Figure 18: Potential Sites & Sensitive Areas.

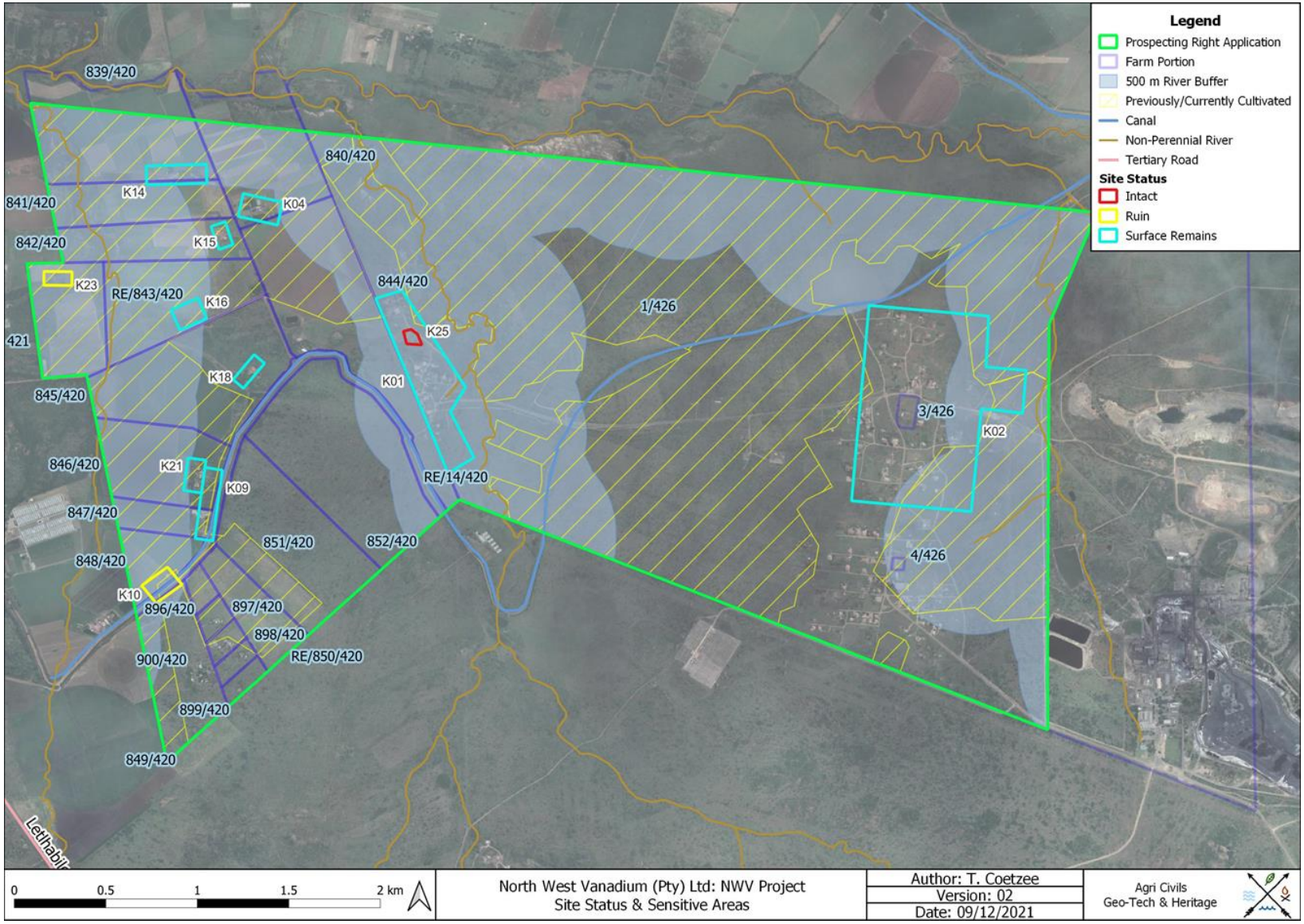


Figure 19:Site Status

4.1.9 Regional Socio-Economic Structure

4 . 1 . 9 . 1 Primary Economy

Agriculture, Tourism and mining are the main primary economies. The Agricultural sector, which produces food, is the biggest primary economy. It is categorized into four classifications, namely, extensive farming (44% of the Municipal area), intensive agriculture (18%), game farming (10%) and subsistence farming. Tourism also plays a major economic role as it is based on the natural systems (11%). Scenic routes, heritage sites, resorts and nature reserves are some of the main attractions in the tourism sector.

The mining sector is dominated by platinum and chromium mining as well as quarrying activity. Platinum mining activity is located on the south eastern side of the side of Brits while quarrying is spread around the municipal area. The primary economic activities have to be managed in such a manner as to make sure that their impact on the natural environment and resources is controlled.

4.1.9.2 Secondary Economy

Secondary economy refers to activities involved in the manufacturing of finished goods. The secondary sector is understood to include all manufacturing, processing, and construction. Activities associated with the secondary economy include metal working, smelting, automobile production, textile production, chemical industries, engineering industries, manufacturing, energy utilities, breweries, bottlers, and construction.

Secondary economic activities are normally linked to the primary economic activity. Thus secondary activity in Madibeng Local Municipality is in alignment with agricultural processing without the exclusion of manufacturing and construction. These activities are located in Brits, along the N4 Highway as well as a lesser activity scale in Lethlabile.

4.1.9.3 Tertiary Economy

The tertiary sector of the economy is largely associated with service industries. This sector provides services to both the general population and businesses. Activities that are commonly associated with tertiary economy include retail and wholesale sales, transportation, distribution, entertainment, restaurants, clerical services, media, tourism, insurance, banking, healthcare and law.

In most developed and developing countries, a growing proportion of workers are devoted to the tertiary sector. The N4 Highway plays a significant role within the transport, logistics and distribution activities within the municipal area. The N4 facilitates transport linkages between Rustenburg, Tshwane and Johannesburg.

Brits is the administrative capital of the municipality, bearing the bulk of municipal and government services. The Pelindaba nuclear facility also forms part of the government services. It is located on the south eastern side on the municipal area.

4.1.9.4 Demographic Indicators

The ability of individuals to contribute to production is largely dependent on their level of human capital development. This level of development is indicated by demographic indicators such as education, housing, employment and income levels.

Education and formal training play an important role in the overall value of people. Increased value of Madibeng Local Municipality's residents can improve their living conditions. Further Education Training (FET) colleges, which concentrate on economic sectors present in the Municipality, will improve the human capital in Madibeng. This will reduce unemployment rate in the Municipality.

4.1.9.5 Rural Development

The north eastern quadrant of the Municipality is composed of rural settlements (villages). These villages are characterised by subsistence farming and indigenous knowledge systems. Rural development can be assessed by investigating rural livelihoods, access to income, access to land and access to services. This will inform the manner in which basic services are provided and the rural landscape is retained.

Rural areas are characterized by relatively high logistical costs and high per capita service costs. Therefore the provision of government services such as the municipal office, clinic, schools, become costly. Thus in cases where services are provided, the recurrent costs of all but the most basic services must be met by those who use them. It is essential for Madibeng to recover costs in the peril- urban and rural areas through the pro-active debt collection policies.

The process of formalising settlements in rural areas is essential. This process helps to unlock the economic potential of the area, facilitate appropriate regulation of land use as well as enable the municipality to implement cost recovery. This will ensure sustainable rural settlements.

4.1.9.5.1 STATISTICAL OVERVIEW

4.1.9.5.1.12017 IHS MARKIT REGIONAL EXPLORER VERSION 1417

According to the statistical information received from IHS Market, Madibeng Local Municipality housed approximately 1.0% of the country's total population in 2017. The Municipal growth rate between 2007 and 2017 was 3.14% in comparison to the 1,56% of South Africa as a whole. The following two Population graphs were based on the official STATS SA figures and those submitted by IHS Markit: (draft Madibeng IDP 2022)

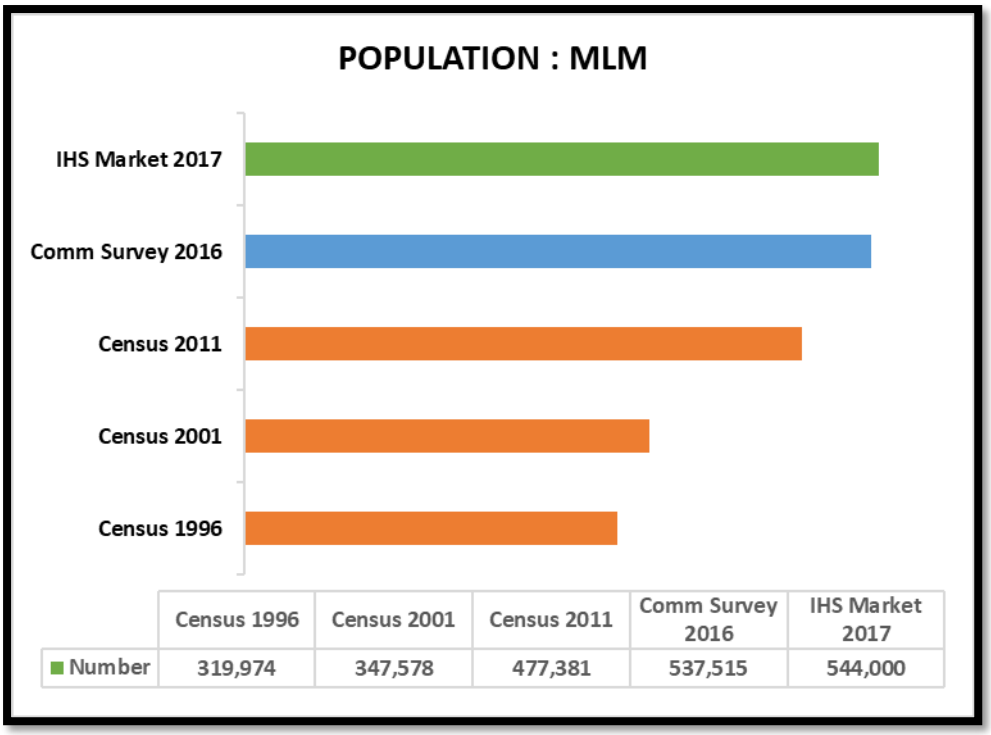


Figure 20: Population

Madibeng Local Municipality has significantly more males than females with a population split of 113.2 males per 100 females.

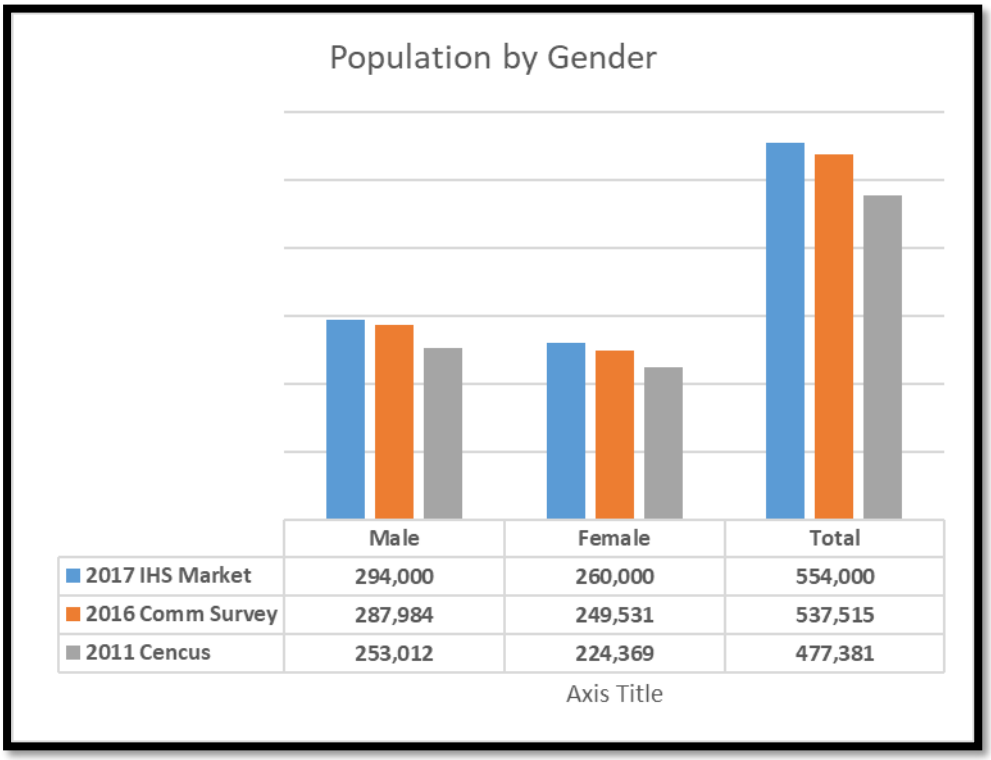


Figure 21: Population by gender

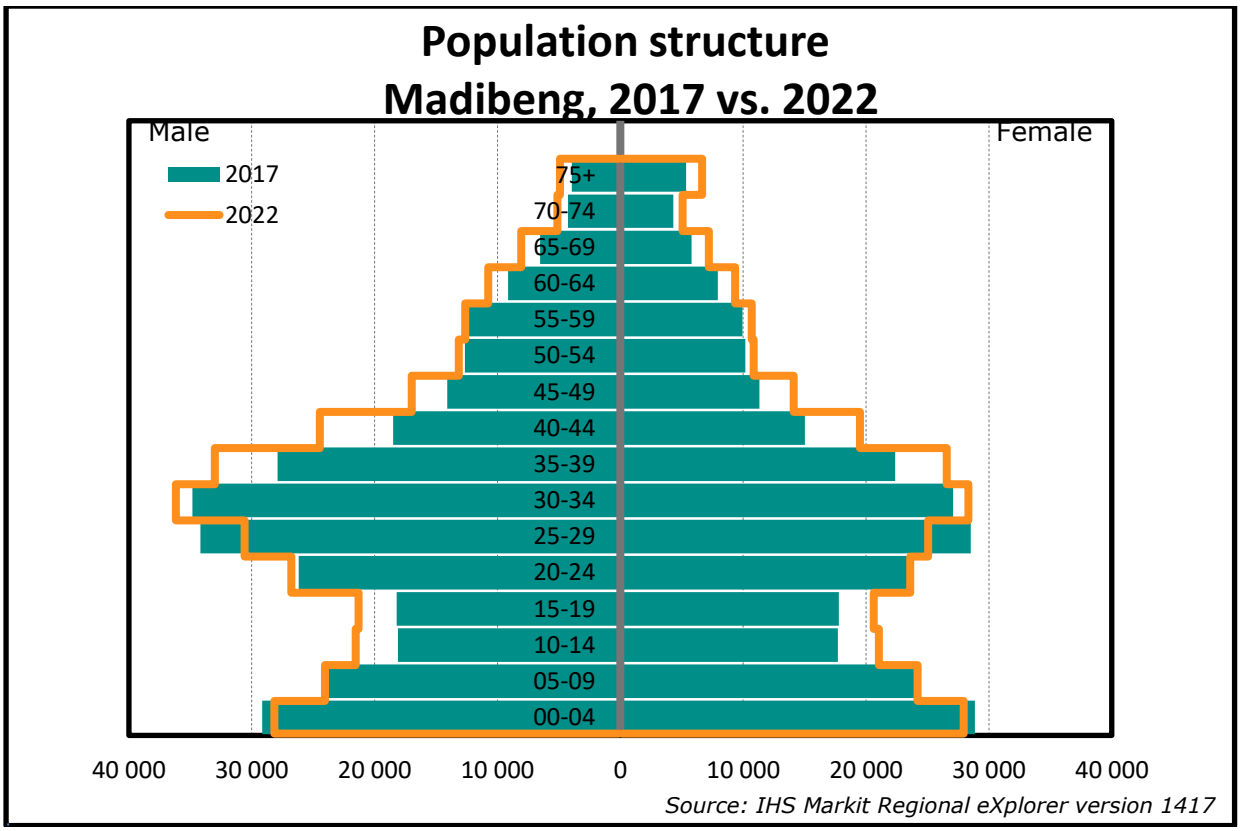
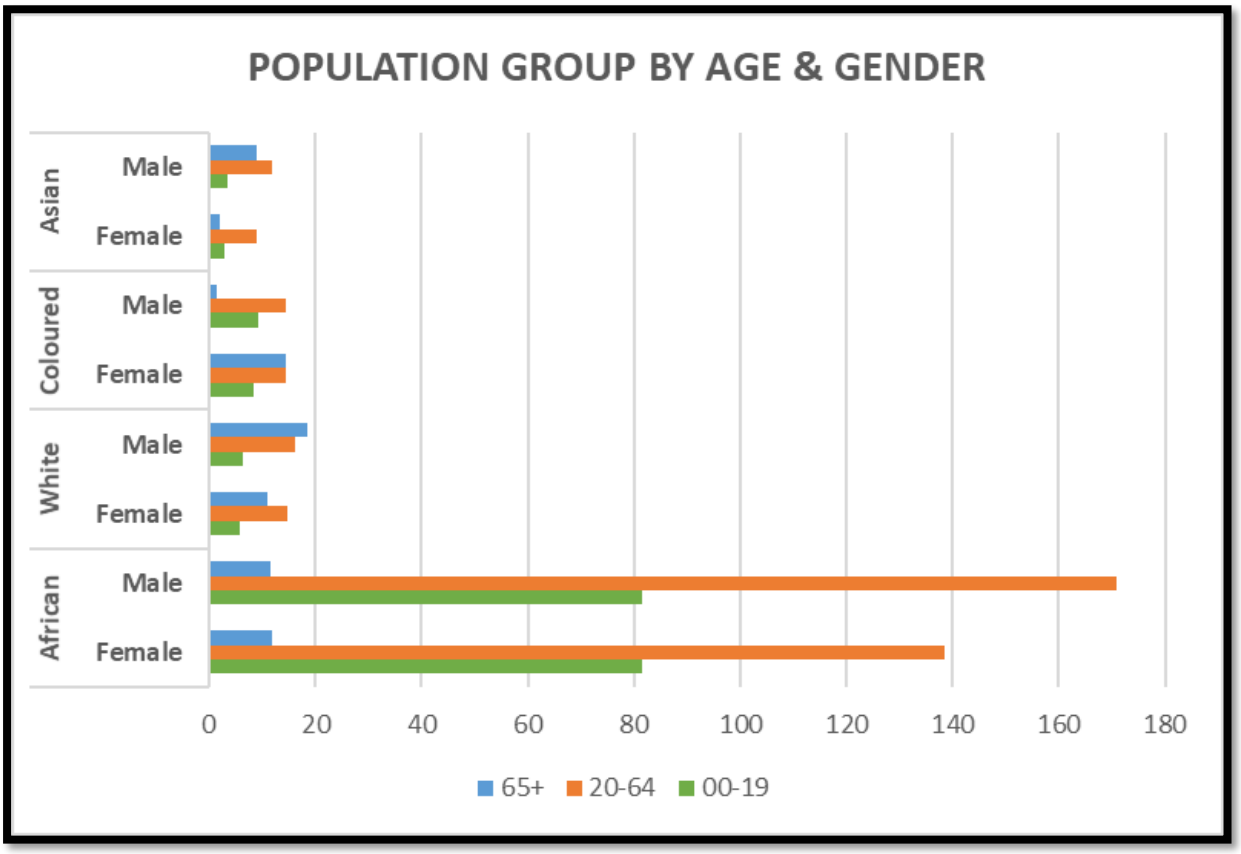


Figure 22*: Population Structure*



Source: IHS Markit Regional eXplorer version 1417
Figure 23:Population group by age and gender

4.2 Description of the current land uses.

The general area surrounding the study area consists of agricultural activities, mining development and urban built-up areas. Mining development is found directly to the east of the study area, agricultural activities to the north and west, and urban built-up to the southwest, south and southeast.

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

The study area falls within the A21J Quaternary Catchment within the Crocodile West and Marico Water Management Area. The closest perennial river to the study area is the Crocodile River that flows approximately 7.4 km to the west of the proposed North West Vanadium (Pty) Ltd Prospecting Project. Another perennial river, the Sand River, flows approximately 16 km to the east. A non-perennial river, Rosespruit, flows along the northern boundary of the study area, while several smaller non-perennial offshoots intersect the study area as well.

Access to the demarcated study area is through a dirt road turning from the Letlhabile tertiary road. The western section of the study area is associated with crop cultivation and agricultural activities, while the larger eastern section is associated with disused agricultural fields and two villages: Ntsopilo and Rankotia. Buildings and infrastructure are visible on all of the Farm Portions, except Portions 841, RE/843, 848, 851, 852, 896 and 899 of the Farm Mamagalieskraal 420 JQ, and the Farm Voorspoed 421 JQ. It should also be noted that a canal intersects the study area.

Figure 24: Canal associated with RE/14/420.

Figure 25: Powerlines intersecting 844/420.

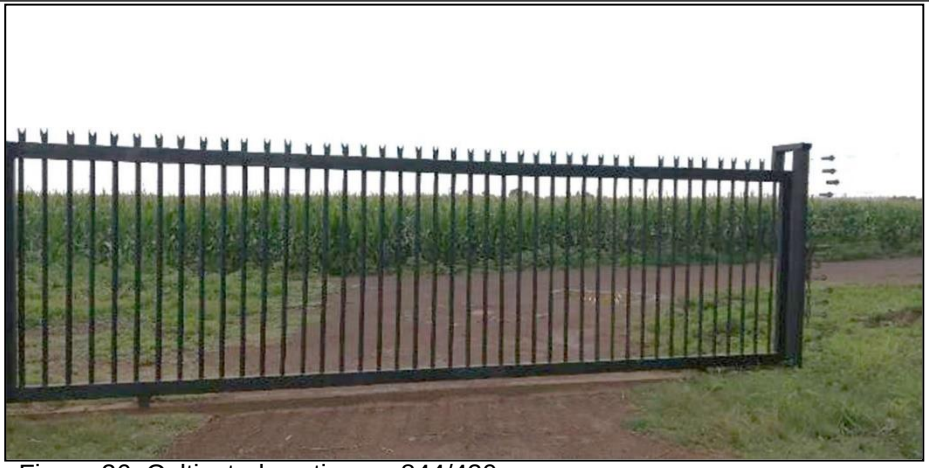


Figure 26: Cultivated section on 844/420.

Figure 27: Dense vegetation on 844/420.

Figure 28: Fenced-off section on 845/420.

Figure 29: Access road and dense vegetation on 846/420.

Figure 30: Agricultural activities on 847/420.

Figure 31: Cultivated section on 848/420.

Figure 32: Cultivated section on 849/420.

Figure 33: Open veldt on 849/420.

Figure 34: Previously cultivated field on RE/850/420.

Figure 35: Dense vegetation on 851/420.

Figure 36: Environment on 852/42.

Figure 37: Previously cultivated field on 896/420.

Figure 38: Entrance on 897/420.

Figure 39: Fenced-off section on 898/420.

Figure 40: Open veldt on 899/420.

Figure 41: Infrastructure on 900/420.

Figure 42: Cultivated land on 421.

Figure 43: Infrastructure on 1/426.

Figure 44: Open veldt on 1/426.

Figure 45: Dense vegetation on 1/426.

Figure 46: Environment on 1/426.

Figure 47: Infrastructure on 3/426.

Figure 48: Infrastructure on 4/426.

Figure 49: Mining in the general surroundings.

Figure 50: Disused agricultural fields.

Figure 51: Existing agricultural fields.

4.4 Environmental sensitivity verification

(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 16*:*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**			

4.4.1.1 Environmental Management Frameworks relevant to the application

Olifants EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf
No intersection	

4.4.1.2 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	14/12/16/3/3/1/1297	Solar PV	Approved	27.6
2	14/12/16/3/3/1/491	Solar PV	Approved	3.6
3	14/12/16/3/3/1/492	Solar PV	Approved	3.6
4	12/12/20/2172	Solar PV	Approved	9.6

Table 17*:*Specialist Studies Identified

No	Specialist assessment	Assessment Protocol	Recommended Studies

1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf	Information collated from previous studies and SANBI as a portion of the application area is within CBA 2.
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf	Assessed
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf	Assessed
4	Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf	Assessed
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf	Watercourses have been identified and buffer zones implemented.
6	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.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/Gazetted_General_Requirement_Assessment_Protocols.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/Gazetted_Plant_Species_Assessment_Protocols.pdf	Assessed and Information collated from previous studies and SANBI
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf	Assessed and Information collated from previous studies and SANBI

4.5 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 18: Potential Impacts

ACTIVITY	ASPECT	TYPE OF IMPACT	IMPACT DESCRIPTION
Reconnaissance site visit	No Impact		
Desktop Study	No Impact		
Mapping & Surveying	Vegetation	Medium	Clearing of Vegetation for access to the site
Drilling and sampling	Flora	Medium	Clearing of Vegetation for Access tracks and Clearing of Drilling and pitting sites
	Fauna	Medium	The natural habitat of the animals will be disturbed and/or destroyed.
			Potential roadkill
	Soil	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	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	Low	Generation of dust on the access tracks and drilling points
	Noise	Low	Noise from the drill rig
Access Road	Air quality	Low	Nuisance dust will be created by the prospecting vehicles to and from site
	Fauna	High	Where new temporary tracks will be created the natural habitat of the animals will be disturbed and/or destroyed. Road kills.
	Flora	High	Where new temporary tracks will be created the vegetation will be disturbed and/or destroyed.
	Soil	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	Low	If roads are not properly maintained, water erosion after thunder storms can occur. Possible hydrocarbon spills from equipment and vehicles.
	Visual	Low	The temporary tracks will visible to some extent from the immediate surroundings.
Decommissioning	Air quality	Low	Dust emissions from decommissioning activities (including vehicle entrained dust)
	Ground Water	Low	Possible hydrocarbon spills by vehicles and equipment in this area.
	Noise	Low	Noise will be created by the vehicles and equipment in this area.
	Soil	Medium	Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established Ripping of compacted areas
	Surface Water	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 19: 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
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.

4.5.1 Potential impact on heritage resources

The study area: Portions RE/14, 839-842, RE/843, 844-849, RE/850, 851, 852, 896-900 of the Farm Mamagalieskraal 420 JQ; Portions 1, 3 and 4 of the Farm Krokodilkraal 426 JQ and the Farm Voorspoed 421 JQ, North West Province.

As can be seen from previous research done in the area, the general region is significant from a heritage perspective. Heritage sites are likely to include LIA sites, cemeteries and historical structures. Although not identified by the previous studies, the possibility of stone age sites exists as well, especially in the vicinity of water sources. Since heritage sites, such as graves, are not always clearly identifiable as it might consist of disturbed surface indications, care must be exercised when prospecting.

Figure 47 of the Heritage report indicates the potential sites associated with surface remains, as well as a 500 m buffer area around rivers. The 500 m buffer area is considered potentially sensitive from a heritage perspective since archaeological sites are often located within this zone. Areas previously/currently associated with cultivated fields are indicated as well. These areas are considered to be less sensitive from a heritage perspective due to the areas being disturbed. The least sensitive areas are therefore areas that are located more than 500 m from a water source, fall within previously/currently cultivated fields and are not located within close proximity of potential heritage sites or contemporary infrastructure. From a heritage perspective, these areas are considered to be more favourable for the proposed prospecting activities. Although the previously/currently cultivated areas that intersect the 500 m river buffer are also disturbed, the potential for subsurface cultural material is slightly higher compared to areas falling outside of the buffer zone. Apart from the identified potential sites, open areas falling outside of the previously/currently cultivated areas are considered to be the most sensitive areas from a heritage perspective, especially due the presence of LIA stone-walled sites directly to the south and east of the demarcated study area. The possibility also exists that culturally sensitive sites, such as burial sites, might have been created after some of the cultivated fields fell into disuse, meaning that burial sites might be located on disturbed areas as well.

Contemporary buildings that appear not to exceed 60 years of age are also associated with the study area. These buildings and structures do not exceed 60 years of age and are therefore not protected under the NHRA (25 of 1999). The sites identified on the 1968 topographical maps, although demolished, fall into this category as well. These sites are K13, K17, K20 and K22 on Portions 839, 844, 845 and 848 of the Farm Mamagalieskraal 420 JQ.

Portions 849, RE/850, 851, 852, 896 – 900 of the Farm Mamagalieskraal 420 JQ

No sites of potential heritage remains were observed on historical aerial imagery and topographical maps. Contemporary buildings and structures, however, are visible on Portions 849, 897, 898, 900. The 500 m river buffer zone also intersects portions 849, 896 and 852. It should also be noted that the open areas associated with Portions 849, 851 and 852 are considered to be sensitive from a heritage perspective since these areas are likely to be associated with LIA stone-walled sites.

Remaining Extent of Portion 14 of the Farm Mamagalieskraal 420 JQ

The farm portion appears to exist for the exclusive use of a section of the canal. Since the canal appears on the earliest historical dataset available (1943), the canal and the associated bridges should be considered significant from a heritage perspective.

Portions893, 840, 841, 842, RE/843, 844, 845, 846 and 847 of the Farm Mamagalieskraal 420 JQ; The Farm Voorpsoed 421 JQ

These farm portions are associated with intact and demolished historical infrastructure, areas falling within 500 m of a river, previously/currently cultivated fields, as well as small sections of open veldt. The open areas are considered sensitive from a heritage perspective since these areas are likely to be associated with LIA stone-walled sites. The indicated potential sites are also considered to be sensitive from a heritage perspective. Should the buildings and structures associated with these sites form part of the original structures, it would exceed 60 years of age and would therefore be protected under the NHRA (25 of 1999).

Although the demolished sites are considered less sensitive from a heritage perspective, a possibility exists that subsurface culturally significant material might be associated with the sites.

Portions 1, 3 and 4 of the Farm Krokodilkraal 426 JQ

These farm portions are associated with two villages (Ntsopilo & Rankotia), a cemetery, potentially historic buildings, areas falling within 500 m of a river, modern infrastructure, a small section of open veldt, and disused agricultural fields. The open and undisturbed areas are considered to be sensitive from a heritage perspective since these areas are likely to be associated with LIA stone-walled sites. The indicated potential sites are also considered to be sensitive from a heritage perspective. Should the buildings and structures associated with these sites form part of the original structures, it could exceed 60 years of age and would therefore be protected under the NHRA (25 of 1999). The cemetery is still in use and significant from a heritage perspective as the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply. The 500 m River Buffer is considered potentially sensitive from a heritage perspective and care should be exercised when prospecting within the boundary. A full Phase 1 AIA (Archaeological Impact Assessment) must be done should any development that triggers an AIA result from the prospecting project, including if the cumulative impact of the proposed prospecting exceeds 0.5 ha.If any resource of heritage significance is encountered during prospecting SAHRA should be notified.

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

4.5.2.1 Positive Impacts (Advantage)

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 is presented and measures to manage the potential impact on heritage resources

The fact that the prospecting activities will be undertaken in a phased approach will provide the opportunity to the prospecting team to demarcate areas of cultural and/or heritage significance (such as graves and stone kraals). With the early identification of these the impact on these will be avoided.

4.5.2.2 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 prospecting activities;

- Directly affected, adjacent landowners and farms in proximity to the site will be informed of the planned dates of the surveys and a grievance mechanism will be made available.
- Farms owners must be consulted and informed of any low fly overs which may affect livestock, with a view to prevent possible injury or damage as a result of animals being startled by increased noise.
- 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 cattle 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 ENVIRONMENTAL IMPACT STATEMENT

5.1 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 20: 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 21: 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.	

5.2 Summary of the key findings of the environmental impact assessment

5.2.1 ASSESSMENT OF LIKELY IMPACTS

Vegetation disturbance through compaction and trampling; Increased dust.

Noise pollution during exploration: and

Introduction and spread of declared weeds and alien invasive plants: This may occur in disturbed areas and/or where propagules of these plants are readily available.

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

Table 22: 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 -IV: 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 road kill	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 -IV: Access Road	Air	Nuisance dust will be created by the prospecting vehicles to and from site	1	2	1	2	8 Negative
	Fauna	• Where new temporary tracks will be created the natural habitat of the animals will be destroyed • Potential road kills	2	3	2	3	21 Negative
	Flora	Where new temporary tracks 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 thunder storms 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 temporary tracks will visible to some extent from the immediate surroundings.	1	2	1	2	8 Negative
Phase V: 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

5.2.3 Assessment of Potential Cumulative Impacts

Table 23: 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

Table 24: 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 of open excavations. • No hunting (snares) will be allowed at the application area.
Flora	Loss of Flora	• No trees or shrubs will be felled or damaged for the purpose of 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 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 inland and site from offshore	• 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.

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

- Views of Interested and Affected Parties;
- Comments to be received from commenting authorities;
- Legislation; and

- Experience of the Environmental Assessment Practitioner (EAP).

5.2.3.1 Biodiversity Impact Assessment

Impacts on the vegetation in the study areas are assessed for the clearing of vegetation of small areas of vegetation (each less than 10 m^2) where prospecting samples would be obtained. The movement of drilling machinery could cause some damage to the vegetation, but this could be mitigated by careful planning. Routes through the vegetation to the drilling sites should be predetermined on foot and the most open routes selected. Such routes would cause least damage.

The 'No Go' alternative is also assessed.

5.2.3.1.1 'No Go' Alternative

In the case of the **"No Go" alternative** where there would be no change to the *status quo*. The land would remain as is with no prospecting and the natural vegetation would persist. Depending on the future use of the properties for grazing, the 'no development' alternative or 'No Go' alternative could have further negative impacts (dependent on stocking rates) on the natural vegetation, but the magnitude of that potential impact is difficult to predict. The 'No Go' alternative is included.

5.2.3.1.2 Direct Impacts

Localized geological / soil samples would be obtained during prospecting, and in some cases, drilling would be required to obtain required subsoil samples. The impacts would thus be at the sampling / drilling sites and from the movement of vehicles and machinery over the site, there would be no 'Operational Phase'. The latter would only be applicable should the area be mined at some future date.

5.2.3.1.3 Impact Assessment and Mitigations

Impact Phase: Exploration							
Potential impact description: Introduction of alien invasive plants Cleared areas which are not rehabilitated are likely to be invaded by aliens and pioneer plants.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	M	Negative	M	H	H

With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?	This impact can be prevented through appropriate mitigation measures such as eradication.						
Will impact cause irreplaceable loss of resources?	No. If this impact is correctly addressed, then no loss of resources will occur.						
Can impact be avoided, managed or mitigated?	Yes. This impact can be avoided if appropriate mitigation measures are followed.						
Mitigation measures: • Any cleared areas that are no longer or not required for drilling activities should be re-seeded with locally sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion.							

Impact Phase: Exploration							
Potential impact description: Impacts on watercourses The major impact during this phase may result from infilling and impediment of watercourses if drilling occurs near the watercourse and canal that traverse the site.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	M	Negative	M	H	H
With Mitigation	L	M	L	Negative	M	M	H
Can the impact be reversed?	Yes, Watercourses can be rehabilitated.						
Will impact cause irreplaceable loss of resources?	No.						
Can impact be avoided, managed or mitigated?	Yes. All watercourses should be avoided.						
Mitigation measures: • No drilling is to be allowed within 100 m of all watercourses.							

Impact Phase: Exploration							
Potential impact description: Impacts on vegetation The major impact during this phase will result from vegetation clearance for drilling purposes							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	M	Negative	M	H	H

With Mitigation	L	H	M	Negative	M	M	H
Can the impact be reversed?	No, once vegetation is cleared, it would not be possible to return it to its previous state.						
Will impact cause irreplaceable loss of resources?	No. No Red Data plants were encountered.						
Can impact be avoided, managed or mitigated?	Yes. Although mitigations will be provided, vegetation loss would be inevitable.						
Mitigation measures: • All natural vegetation not required to be removed should be protected against damage.							

Impact Phase: Exploration							
Potential impact description: Direct and indirect avifauna and faunal Impacts The exploration phase will result in habitat loss, noise and disturbance on site. This will lead to direct and indirect disturbance of fauna. Slow-moving species such as the tortoises are likely to be killed by machinery.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	M	Negative	M	H	H
With Mitigation	L	L	M	Negative	M	M	H
Can the impact be reversed?	Yes, This impact can be prevented through appropriate mitigation measures.						
Will impact cause irreplaceable loss of resources?	No. No Species of Conservation Concern are likely to be impacted by the activities.						
Can impact be avoided, managed or mitigated?	Yes. Contractors should be informed about slow moving species that are likely to be crushed by construction vehicles.						

Mitigation measures:

- No animal may be hunted, trapped, snared or captured for any purpose whatsoever.
- Speed of vehicles should be limited to allow for sufficient safety margins.

5.2.3.1.3.1 REHABILITATION

The traditional definition of rehabilitation aims at returning the land in a given area to some degree of its former state after a particular process has resulted in its damage.

Rehabilitation requires that there is an attempt to imitate natural processes and reinstate natural ecological driving forces in such a way that it aids the recovery (or maintenance) of dynamic systems so that, although they are unlikely to be identical to their natural counterparts, they will be comparable in critical ways so as to function similarly (Jordan et al.1987). Rehabilitation should be based on an understanding of both the ecological starting point and on a defined goal endpoint and should accept that it is not possible to predict exactly how the disturbed vegetation is likely to respond to the rehabilitation interventions.

During this exploration phase, all disturbed areas should be rehabilitated. This should be done using indigenous vegetation.

5.2.3.1.3.2 CONCLUSION AND RECOMMENDATIONS

There are several habitats within the proposed site that have been exposed to high levels of disturbance resulting from farming activities and human settlements.

The following are recommended:

- Watercourses must be avoided at all times expect when moving across the sites. This should be done on existing crossings.
- All temporary stockpile areas including litter and dumped material and rubble must be removed on completion of exploration.
- No painting or marking of vegetation shall be allowed. Marking shall be done by steel stakes with tags, if required.
- Only necessary damage must be caused: for example, unnecessary driving around in the site should not take place.

The impacts associated with the proposed prospecting activities are likely to be from Low to Very Low after implementation of mitigation measures. As a result, it is the opinion of the specialist that this proposed prospecting application be considered provided that the recommendations stipulated in this study are adhered to. It should be noted that should the applicant reach the mining right stage, a full terrestrial biodiversity and aquatic studies are recommended.

5.2.3.2 Aquatic Identified Impacts

The impact assessment for the proposed prospecting prior to mitigation was classified as Medium. Largest impacts arise from potential clearing for the prospecting which may destabilise banks and lead to an element of sedimentation downstream of the Rosespruit. These impacts will likely only take place during and post drilling activities. A buffer of 100 m has been applied to all water resources (see figure 5 below), in order to protect these water resources from further deterioration.

With the implementation of the proposed rehabilitation measures all impacts associated with the rehabilitation process will be lowered to Low significance, attributing positive change in thelong term when rehabilitation is completed.

Table 11: Impact ratings associated with the proposed rehabilitation

POTENTIAL ENVIRONMENTAL IMPACT	APPLICABLE AREA	ACTIVITY	Significance Before Mitigation								Significance After Mitigation							
			S	P	F	SE	I	D	Total	Rating	S	P	F	SE	I	D	Total	Rating
Removal of indigenous vegetation	Unnamed tributary	Earthworks and drilling	-1	3	0.5	2	3	4	-12.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)
Disturbance of the natural soil profile resulting in the proliferation of invasive alien plant species	Unnamed Tributary	Earthworks and drilling	-1	4	0.5	2	2	1	-9.5	Medium	-1	2	0.2	1	1	1	5.2	Low(-)
Potential sedimentation due to drilling	Unnamed Tributary	Earthworks and drilling	-1	3	0.5	2	3	4	-12.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)
Potential sedimentation due to drilling	Rosespruit	Earthworks and drilling	-1	3	0.5	2	2	1	-8.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)
	Unnamed Tributary	Earthworks and drilling	-1	3	0.5	2	2	1	-8.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)
Change in species composition due to potential sedimentation	Unnamed Tributary	Earthworks and drilling	-1	3	0.5	2	3	1	-9.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)
Physiochemical changes in water quality because of changes in flow-water quality relationships such as increase in salts and other chemical concentrations due to runoff	Unnamed tributary and Rosespruit	Earthworks and drilling	-1	3	0.5	2	2	4	-11.5	Medium	-1	1	0.2	1	1	1	4.2	Low(-)

5.2.3.2.1 Proposed Rehabilitation Mitigation

Herewith follows the key rehabilitation aims of the proposed prospecting sand recommended mitigation.

- To control the proliferation of alien invasive plant species;
- To manage stormwater and reduce the extent of soil erosion; and
- To promote continued water flow throughout the rehabilitated area.

5.2.3.2.2 Rehabilitation specifications

Emphasis must be placed towards potential impacts of construction activities within the riparian area to promote the success of the rehabilitation plan. It is required that a method statement be provided by the contractors involved for approval by the appointed Environmental Control Officer (ECO) and engineer.

- A suitably qualified professional registered scientist must be appointed prior to any activities taking place where potential plants of conservation importance to undertake a plant rescue if protected species are present;
- Vegetation to be stripped should be restricted to the rehabilitation footprint area to reduce the risk of erosion during times of heavy rain, this should additionally be undertaken in phases to limit the total area of exposed soil on site;
- When soils are removed, topsoil and associated sub soil must be stockpiled appropriately in low heaps as recommended by the appointed engineers;
- Spoiled or stockpiled materials should not be placed within riparian areas;
- The location of appropriate toilet facilities should be present, chemical toilets must be provided which should be serviced and spaced as per the occupational health and safety regulations. These chemical toilets should be located outside the 1 :100 year flood line or 50 meters from the unnamed tributary;
- Spill kits should be kept on site, in the event of accidental oil/petroleum or other chemical spillage. Absorbent materials should be available to ensure quick remediation of potential spills;
- Plant machinery should not be stored or left unattended within close proximity of the unnamed tributary;
- Frequent inspections of the unnamed tributary should be undertaken to ensure no harmful practices occur on site; and
- Fixed point photographic monitoring should take place to record any improvement or potential impact to the unnamed tributary.

5.2.3.2.3 Alien Invasive Plant Management

Before clearing commences, it is important to understand that when an alien invasive plant management programme starts it must be implemented until completion. Failure to do so will have no value to the status of the area. According to the Conservation of Agricultural Resources Act (CARA), invasive alien vegetation must be removed from environmentally sensitive areas with the least amount of damage to indigenous vegetation. Herewith follows best practice management actions:

- The extent of proliferation should be mapped with density and approximate height specified;
- Costs and priorities should be determined and a plan for initial operations , follow up control, and maintenance of the area should be drafted;
- Clearing should be prioritized in areas that are minimally proliferated first;

- Emphasis should be placed that all alien invasives are removed before blocks can be burnt;
- Follow up clearing must be practiced in the first wet season after the initial burn;
- Restoration of the rehabilitated areas can then take place; and
- Record should be kept of clearing operations and stands. When using herbicides during clearing:
- A registered pest control officer must be appointed to oversee and conduct the removal of alien invasive species with herbicides;
- Plants should be sprayed when actively growing;
- The appropriate personal protective equipment should be worn whenever handing herbicides;
- The application area must be established prior to any use of herbicides;
- Herbicides must be stored in a drip sheet in a demarcated area in the veld out of direct sunlight;
- A wetting agent should be added to the herbicide to allow for better absorption;
- Herbicides should not be used during strong winds or rain events to limit potential drift; and
- All storage facilities should comply with the Association of Veterinary and Crop Associations of South Africa (AVCASA) requirements.

5.2.3.2.4 Recommendation

Four sample sites were established., however due to the largescale transformation of the unnamed tributary and the changes in natural flow regimes the biotic integrity could not be assessed at the time of sampling

No exceedances of the target water quality guidelines as set out by the Department of Waterand sanitation was observed at the time of sampling (DWAF, 1996).

The habitat analysis of the unnamed tributary and Rosespruit, associated with the proposed prospecting area was classed seriously modified. Large-scale instream modifications have occurred with the construction of the channel within the unnamed tributary and within the flowpath of the wetland associated with the RS3 sample site.

The impact assessment for the proposed prospecting calculated the impact to the unnamed tributary and Rosespruit prior to mitigation as Medium. This is primarily due to the potential sedimentation and clearing of the riparian. Although no fish species of conservation concern is expected within the reach, impacts to aquatic biota, the riparian characteristics and water quality will likely occur if mitigation is not appropriately applied as recommended.

5.2.3.2.5 Heritage with Palaeontology Conclusions and Recommendations

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

- Although the nine demolished sites dating to 1943 and 1964 appear not to be associated with surface remains, subsurface culturally significant material might be present (Sites K03, K05, K06, K07, K08, K11, K12, K19, K24). Therefore, it is recommended that these areas be avoided by the proposed prospecting activities.

- The four demolished sites dating to 1968 (K13, K17, K20, K22) appear not to be associated with surface remains and also do not exceed 60 years of age. These sites are therefore not protected under the NHRA 25 of 1999. However, subsurface culturally significant material might be associated with these sites and care should therefore be exercised should these sites be impacted by the proposed prospecting activities.
- The nine sites associated with surface remains might date to 1943 and 1964 (K01, K02, K04, K09, K14, K15, K16, K18, K21). The possibility therefore exists that the associated buildings and structures exceed 60 years of age. It is therefore recommended that these areas be avoided by the proposed prospecting activities.
- The two building ruins might date to 1943 and 1964 (K10, K23). The possibility therefore exists that the associated ruins exceed 60 years of age. It is therefore recommended that these areas be avoided by the proposed prospecting activities.
- Cemetery K25 is significant from a heritage perspective. Therefore no prospecting activities should take place within a 50 m radius of the cemetery or any other burial site.
- The remaining buildings and infrastructure associated with the demarcated study area appear to be of contemporary origin and are therefore not regarded to be significant from a heritage perspective. However, the potential presence of graves at some of the modern buildings should be considered.
- The area demarcated as previously/currently cultivated is considered to be less sensitive from a heritage perspective. The least sensitive areas are therefore areas that are located more than 500 m from a water source, fall within previously/currently cultivated fields and are not located within close proximity of potential heritage sites or contemporary infrastructure. It is therefore recommended that these areas be considered for the proposed prospecting activities.
- Although the previously/currently cultivated areas that intersect the 500 m river buffer are also disturbed, the potential for subsurface cultural material is slightly higher compared to areas falling outside of the buffer zone. Care should therefore be exercised when prospecting within these areas.
- Apart from the identified potential sites, open and undisturbed areas falling outside of the previously/currently cultivated areas are considered to be the most sensitive from a heritage perspective, especially due the presence of LIA stone-walled sites directly to the south and east of the demarcated study area. These areas should therefore be avoided by the proposed prospecting activities.
- Prospecting should not take place in the vicinity of stone cairns, potential burial sites, stone-walling, building ruins or any other heritage material or structures.
- Should it not be possible to adhere to the abovementioned recommendations, a qualified archaeologist should be present on-site during the proposed prospecting. Alternatively, once the prospecting localities have been identified, a qualified archaeologist can inspect the proposed sites and produce recommendations that will aid the protection of heritage resources. Also, a qualified archaeologist must be contacted whenever uncertainty regarding potential heritage remains exists.
- 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 done 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 portion, subject to the abovementioned conditions and recommendations.

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

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 cattle 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.

5.3.1 Construction Phase

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

5.3.2 Drilling and sampling

- 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

5.3.3 Decommissioning and Closure Phases

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

5.4 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 rehabilitation.
- Risks associated with crime can be mitigated through avoiding recruitment activities on site, as well as monitoring and reporting.

5.4.1 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.

5.4.2 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 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 land owner. 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, Archean is confident that these assumptions and limitations do not compromise the overall findings of this report.

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

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

Section 12 of the MPRDA 2002 states "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.

5.4.4 Conditions that must be included in the authorisation

- As there are existing roads on the site, no new roads will be constructed without prior NEMA approval/.
- 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: minimising disturbance, avoidance of disturbance in non-target areas, erosion control, litter management, use of dedicated on site toilets, protection of all fauna and flora.
- 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. Photographic records of each site pre- and post- drilling should be kept as proof of adequate rehabilitation.

5.4.5 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.

5.4.6 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.

5.5 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.**

5.5.1 Explain how the aforesaid amount was derived.

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

Refer to section:**Determination of the amount of Financial Provision**.. The applicant is further required to make a determination of the financial provision which must include cost for premature mission and financial closure and post closure management of the environmental impacts.

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

It is hereby undertaken that the amount of **R 137 493.** in the form of a bank guarantee for rehabilitation purposes as required in terms the NEMA and MPRDA acts, will be provided to the DMR upon granting of the requested prospecting right.

5.5.3 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 socio-economic report was generated however comments from affected landowners and the directly affected community of Rankothini have been highlighted and taken into consideration:

- 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.
    - Changes to local amenity.
    - Impacts of dust.
    - Quality of lifestyles as a result of noise and dust.

Mitigation

North West Vanadium 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.

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

Consultation with the landowner regarding grave sites and cultural interest on the site will be done prior to drilling, thus the prospecting activities will not result on any historical resources being impacted on.

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

No alternative area has been considered in terms of the application area and minerals due to the potential resources normally associated with the geology.

PART B

6 ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

6.1 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

6.2 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

6.3 Composite Map

6.3.1.1 Aquatic Buffer Zones

Aquatic buffer zones are designed to act as barriers between human activities and sensitive water resources in order to protect them from adverse negative impacts. Buffer zones associated with water resources have been shown to perform a wide range of functions and have therefore been adopted as a standard measure to protect water resources and associated biodiversity.

An aquatic impact buffer zone is defined as a zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels (Macfarlane and Bredin 2016). When mapping a buffer zone, note that the buffer is only applicable to the land use / activity being assessed. The recommended buffer zones within this report are based upon prospecting activities only, not mining.

A final composite map showing rivers or dams are within 32m, 500 for wetlands of the proposed area and biodiversity of ecological sensitivity.

The site was observed to be of **Low-Medium Ecological Function**. Most of the habitats were transformed by crop farming. Sensitive areas are associated with watercourses which are tributaries of Rosespruit river. In addition, there is also a concrete canal traversing the site, which is used for irrigation purposes. These watercourses should be avoided during all phases of the project

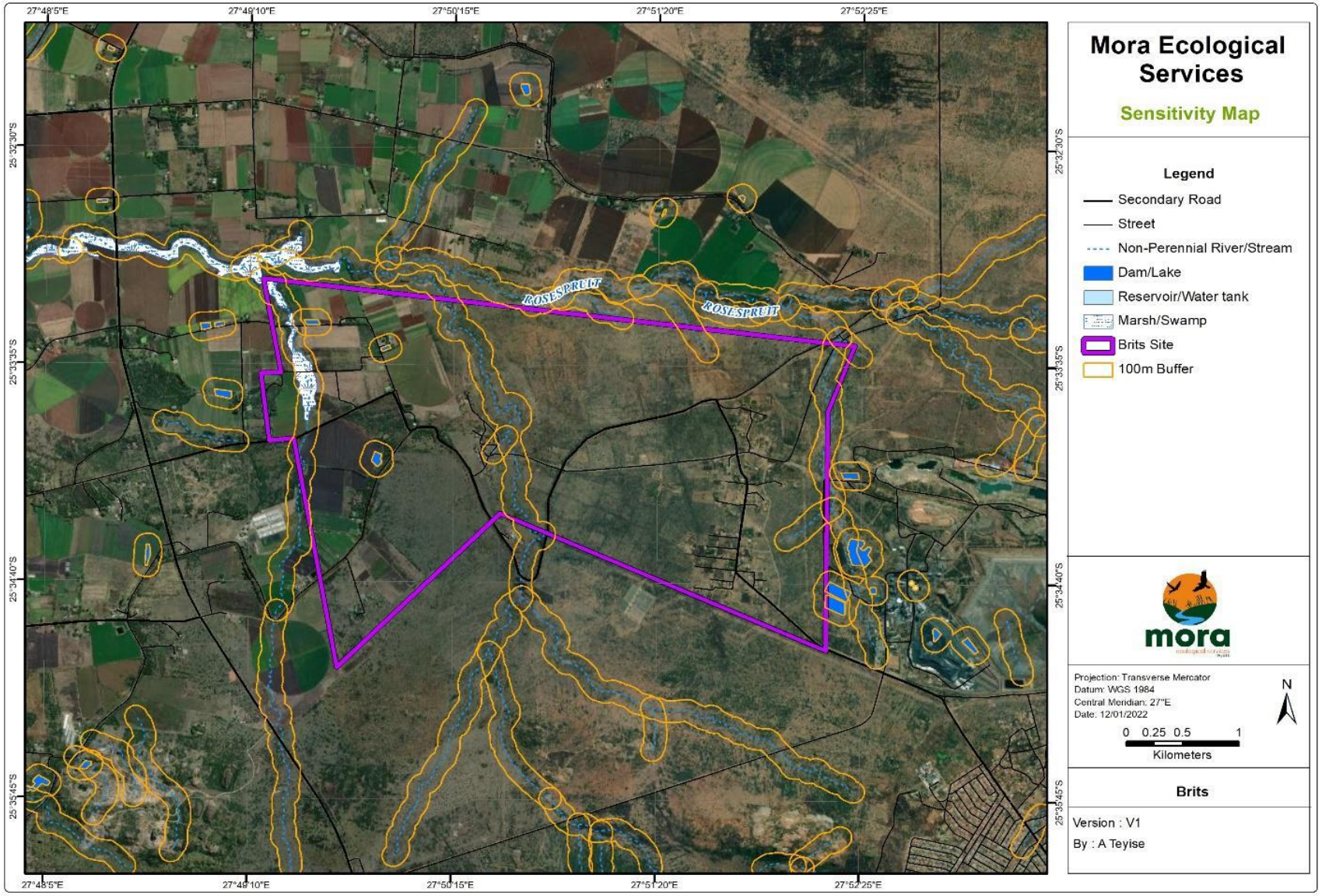


Figure 52: Composite Map

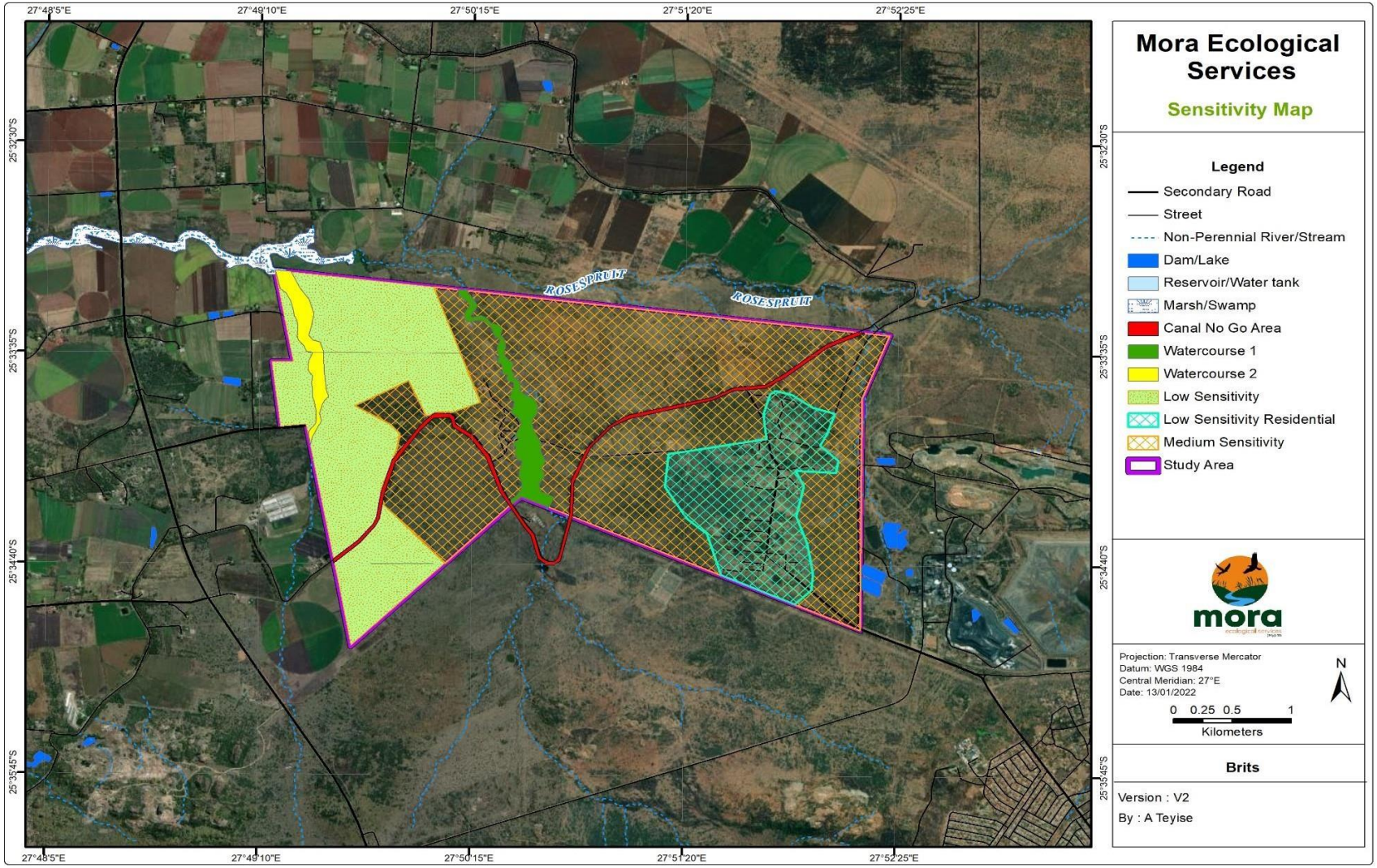


Figure 5: Site Sensitivity Map.

6.4 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 arable land. 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.

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

North West Vanadium will source water from the local municipality for drilling and portable use. The quantities are approximated at 2000-3000 litres a month during active drilling.

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

A water use licence is not required for this project

6.5 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
Movement of Prospecting vehicles	All Phases	Temporary tracks	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.
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 and sampling	Operational Phase	0.5 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	1 ha	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure	Concurrently with the completion of prospecting activities in an area.

6.6 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.
Movement of Prospecting vehicles	Dust, Noise	Loss soil resources	Construction Phase	Dust suppression •Speed limits • Service equipment regularly	NEMA Air Quality Act Mine Health & Safety Act
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 and sampling	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

6.7 Impact Management Actions

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Movement of Prospecting vehicles	Dust, Noise	Dust suppression •Speed limits • Service equipment regularly	Construction Phase	NEMA Air Quality Act Mine Health & Safety Act
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 and sampling	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

6.8 Financial Provision

(1) Determination of the amount of Financial Provision.

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 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.

6.9 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.

6.10 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 cease and upon completion of the prospecting work on site

General surface rehabilitation - concurrent with prospecting activities

7 LEADING CLOSURE OBJECTIVES

7.1 Leading Closure Objectives

7.1.1 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 land owner). Fences erected to cordon-off dangerous excavations will remain in place and will be maintained as required.

Monitoring and Reporting

- Commitments made by North West Vanadium 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 North West Vanadium .

7.1.2 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.

7.1.3 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 contouring, and soil vegetated in rehabilitated areas should be implemented. 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.
- 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.

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.
- 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 contouring, 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.
    - 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.

➢ 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.

7.1.4 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.

- 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;
- 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.
- 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.
- 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

- Bi Annual 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;

- ✓ Aluminum
- Water use and consumption on site must be monitored at various strategic locations on site.

7.1.5 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.

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 bio-monitoring 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 should be implemented.
- 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.

7.1.6 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.

7.1.7 Ground water

Closure Management Objective

- Monitoring will continue to detect and report on changes in round water regime

7.1.7.1 Groundwater Quality and Quantity Monitoring and Reporting

The monitoring can be done through monitoring of existing boreholes during the invasive prospecting phase

- Up slope and down slope groundwater monitoring will be conducted on a bi annual basis during the closure phase;
- 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 bi annual 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 all disturbed areas are free draining.
- 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.

7.1.8 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 on a monthly basis 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.

7.2 Domain Specific Closure Criteria

- It is very likely that the new temporary tracks will remain on site. Any unnecessary new temporary tracks 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.

7.3 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 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 taken into account 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 particular 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.

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

Table 25: 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**

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 NEMA and MPRDA prior to the granting of the environmental authorisation.

7.3.2 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 and pitting	Visual inspection of soil erosion and / or Compaction, dust	Concurrent rehabilitation	Site Manager	Weekly during the drilling and pitting program (prior and post drilling and pitting) 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.

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

Internal Audits must be conducted annually, and external Performance assessments must be undertaken on the EMP every 2 years. These reports must also include the assessment of the financial provision. The reports should be submitted to the DMRE.

7.3.4 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.

7.3.5 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.

7.3.6 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. North West Vanadium will implement an environmental management system to assist in the implementing and monitoring of commitments included in this BAR and EMP report.

7.3.7 Specific required information and recommendations required by commenting Authority (Among others, confirm that the financial provision will be reviewed annually).

- Buffer zones and no-go areas to be implemented.
- Concurrent rehabilitation to be implemented.
- Monitoring should be implemented as per the recommendations.

7.4 UNDERTAKING

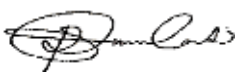
The EAP herewith confirms

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:

Archean Resources (Pty) Ltd

Name of company:

17 January 2022

Date:

-END-