mineral resources

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

NAME OF APPLICANT: Razorbill Properties 12 (Pty) Limited
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FILE REFERENCE NUMBER SAMRAD: FS30/5/1/1/2/10532PR

Contents

1. Important Notice

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

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

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

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

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

2. Objective of the basic assessment process

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

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives,

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

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

  (ii) the degree to which these impacts —

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be managed, avoided or mitigated;

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

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

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

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

3. PART A Scope of assessment and Basic Assessment Report

3.1 Details of EAP

3.1.1 Details of the EAP

Name of The Practitioner: N.J. van Zyl
Tel No.: 082 8898696;
Fax No.: 086 6562942
e-mail address: klaaskraalbos@gmail.com

3.1.2 Expertise of the EAP.

The qualifications of the EAP

Current qualifications in this field were obtained through formal studies at the Cape Town Technicon, Nelson Mandela Metropolitan University and the University of the Orange Free State, which is the following:

- National Diploma Nature Conservation (1986)
- National Higher Diploma (B-Tech) Nature Conservation (1992)
- Master's Degree Environmental Management (MOB 750) (2001)

Further qualifications in this field were also obtained through short courses at the University of the Orange Free State, which is the following:

Environmental Impact Assessment (2001)
Wildlife Management through Veld Management (2001)
Resource evaluation and game ranch management (2003)
Arc GIS (2009)

Summary of the EAP's past experience.

With the implementation of the Mineral and Petroleum Resources Development Act 28 of 2002 Mr. van Zyl has started assisting small scale miners with all facets of applications for mining permits in terms of section 27 and prospecting rights in terms of section 16 of the MPRDA. Mr van Zyl has an excellent knowledge of the relevant acts applicable to the mining sector including the following:

- Mineral and Petroleum Resources Development Act 28 of 2002
- Mineral and Petroleum Resources Development Amendment Act 49 of 2008
- Mineral and Petroleum Resources Regulations 2004
- National Environmental Management Act 107 of 1998 as amended
- National Environment Laws Amendment Act 25 of 2014 as amended
- NEMA: Environmental Impact Assessment Regulations, 2014
- NEMA: Financial Provisioning Regulations, 2015
- NEMA: Waste Act 59 of 2008 as amended
- NEMA: Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015
- National Water Act 36 of 1998 as amended (with special attention to section 21 water uses)

Since 2002 Mr. van Zyl completed more than 150 applications for mining permits and more than 100 applications for prospecting rights. The mineral regulations and environmental management for most of these projects were managed throughout the life of the project including:

- Applications – manual and Samrad
- Prospecting work programs including financial and technical competence
- Public participation process
- EIA and EMP's now BAR and EMPR's
- Annual Rehabilitation Plans
- Final Rehabilitation, Decommissioning and Mine Closure Plans including Risk Assessment Reports

- Execution and registration of rights including sec 42 diagrams for MPTRO
- Performance audits including reviews of Annual Closure Plans and Rehabilitation, Decommissioning and Mine Closure Plans together with financial quantum reviews.
- Application for closure certificate

Although Mr. van Zyl specializes in small scale mining operations and prospecting operations that requires investigation, assessment and communication according to the procedure as prescribed in regulations 19 and 20 of the EIA Regulations he also assists 5 mining rights with environmental management. Other sections of the MPRDA that Mr. van Zyl has experience in is:

- Section 102 applications and Section 20 applications
- Section 53 Applications and Section 11 Applications

3.2 Location of the overall Activity.

Farm Name:	Remainder Rietkuil 21 - T14/1962 Portion 1 Rietkuil 21 - T5960/1973 Remainder Vlakfontein 1173 - T6724/1989 Portion 1 Vlakfontein 1173 - T4429/1982
Application area (Ha)	4481 Ha
Magisterial district:	Xhariep District Municipality and Kopanong Local Municipality
Distance and direction from nearest town	3 Km East of Jagersfontein
21-digit Surveyor General Code	F01100000000002100000 F01100000000002100001 F01100000000117300000 F01100000000117300001

3.3 Locality map (show nearest town, scale not smaller than 1:250000).

The proposed Prospecting Area is located on the following properties:

Property 1

Remainder of the Farm Rietkuil 21 in extend 1712.4074Ha. Registered in the name of LOUW DESIREE-ADMINISTRATORS by virtue of Title deed T14/1962. LPI Code F01100000000002100000.

Property 2

Portion 1 of the Farm Rietkuil 21 in extend 121.6275Ha. Registered in the name of KOPANONG LOCAL MUNICIPALITY by virtue of Title deed T5960/1973. LPI Code F01100000000002100001.

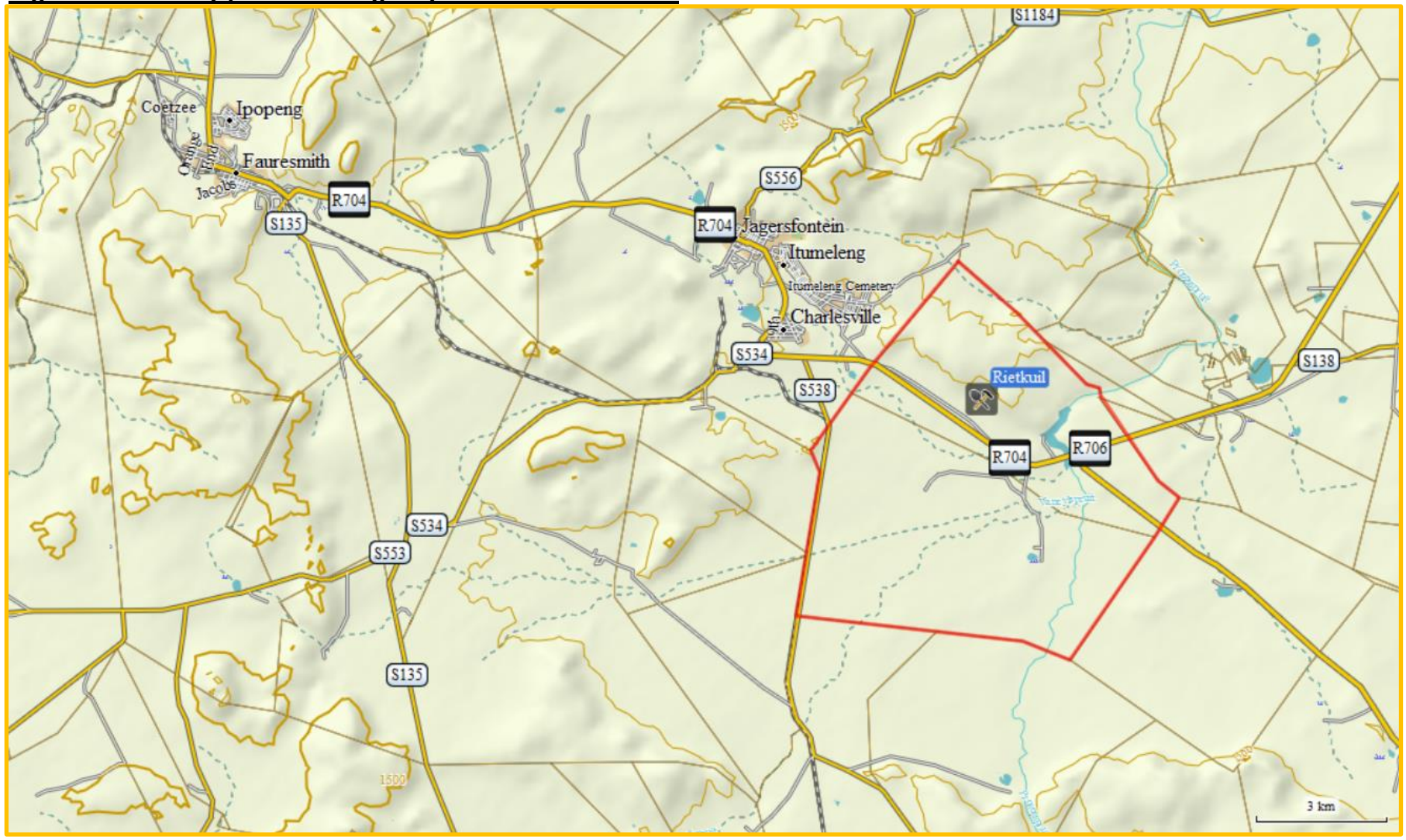
Property 3

Remainder of the Farm Vlakfontein 1173 in extend 1248.5212Ha. Registered in the name of CORNELIUS JOHANNES LOUW TESTAMENTERE TRUST OOK BEKEND AS DENNIS JOHANN by virtue of Title deed T6724/1989. LPI Code F01100000000117300000.

Property 4

Portion 1 of the Farm Vlakfontein 1173 in extend 1376.0000Ha. Registered in the name of CORNELIUS JOHANNES LOUW TESTAMENTERE TRUST OOK BEKEND AS DENNIS JOHANN by virtue of Title deed T4429/1982. LPI Code F01100000000117300001.

Figure a: Locality plan showing major routes and towns



3.4 Description of the scope of the proposed overall activity.

The applicant, Razorbill Properties 12 (Pty) Limited., wishes to undertake prospecting without bulk sampling activities for diamonds (kimberlite). Prospecting for kimberlite is a dynamic and result-driven operation which proceeds in phases, the outcome of which cannot be predicted or predetermined. The program could be stopped at any stage during the prospecting operation if the results are negative or noneconomical. Prospecting activities to be undertaken include non-invasive (i.e. desktop studies and ground geophysical surveys) and invasive (i.e. drilling) techniques.

3.4.1 Phase 1: Review of historical prospecting and production records:

Literature Study and Imagery Analysis

In order to direct the exploration program in an efficient manner, there will be a review of all information and data gathered by previous exploration in the surrounding area. A desktop study will also be undertaken of the diamond potential of the total area based on historical data and data from surrounding diamond mining. A site investigation of the target areas will be undertaken to identify infrastructure and determine any potential problems that may need to be addressed if this operation advances to a mining right phase.

Aerial photographs and satellite images will be studied to ascertain additional target areas. The aerial photographs will also be used to structurally and geologically map the prospecting area and surrounds.

Geological Mapping

Any anomalous features identified from the air will be mapped in detail. The various rock types and their contacts will also be mapped.

Geophysical Survey

A one-kilometer magnetic survey will be undertaken using a proton-5-magnetometer. This study will result in identifying potential cross-cutting dykes where diamonds could be trapped or the presence of potential pipes. The detailed magnetic survey is proposed as the initial investigation method and on a grid of 5m X 5m. The detail generated by this study will allow for the investigation of kimberlite fissures as well.

3.4.2 Phase 2: Scout Percussion Drilling:

Percussion drill holes (usually up to 165mm in diameter) will be positioned at targets identified during geological mapping and the geophysical surveys. About 20 boreholes are planned during this phase with an average depth of 100 m. The collar position of all boreholes will be surveyed. During this drilling program samples will be collected every meter and logging will be done by a qualified geologist who will record the lithology. Apart from gravel resources calculations the drilling information will be used to construct gravel thickness, overburden thickness and bedrock elevation contour plans. After logging of the results, the drill platforms will be rehabilitated and the drill holes filled with drill chips and covered with topsoil.

The environmental footprint for drilling is limited to less than 160m^2 per site, twenty (20) drill sites are anticipated to be carried forward to drilling. During site setup shrubs and grass will be cleared to make space for the rig. It must be noted that no roots of both grass and shrubs are reduced to minimise erosion. Consequently, the site will rapidly recover following completion of exploration activities.

The estimated volume of material to be extracted from each drill hole is 1.8m^3 (based on a diameter of drill hole of 165mm, and depth of drill hole of 100m). This total ±36m^3 of material that will be extracted from the drill holes, and thereafter replaced during rehabilitation of the drill holes.

Water is only required when drilling activities commence. Drilling water requirements fall within the “small industrial user” where the use of water is less than twenty cubic meters per day for prospecting. The water that will be used for the prospecting activities will be sourced on agreement from an existing authorized water user which could be either the land owner or local municipality. The department responsible for water resources shall be consulted with regards to any water related agreement with either the land owner or local municipality prior to drilling. No water will be abstracted in terms of section 21(a) of National Water Act, 1998 (Act no. 36 of 1998).

Drilling may take a few days to two months to complete per site depending on the geology of the area, technical challenges and other factors.

3.4.3 Phase 3: Detailed Percussion Drilling:

The second phase of drilling will be large diameter (18 inch) percussion drilling at potential kimberlite pipe systems where positive results are encountered during the scout drilling phase. Two (2) drill sites are anticipated to be carried forward to detailed large diameter drilling and would give a good idea of the grade and morphology of any pipes discovered. A resource calculation would then be completed following a detailed analysis of the chip samples. It is important to test for G10 garnets and to obtain an idea as to what standard the pipe is mineralized.

3.4.4 Phase 4: Analytical Desktop Studies:

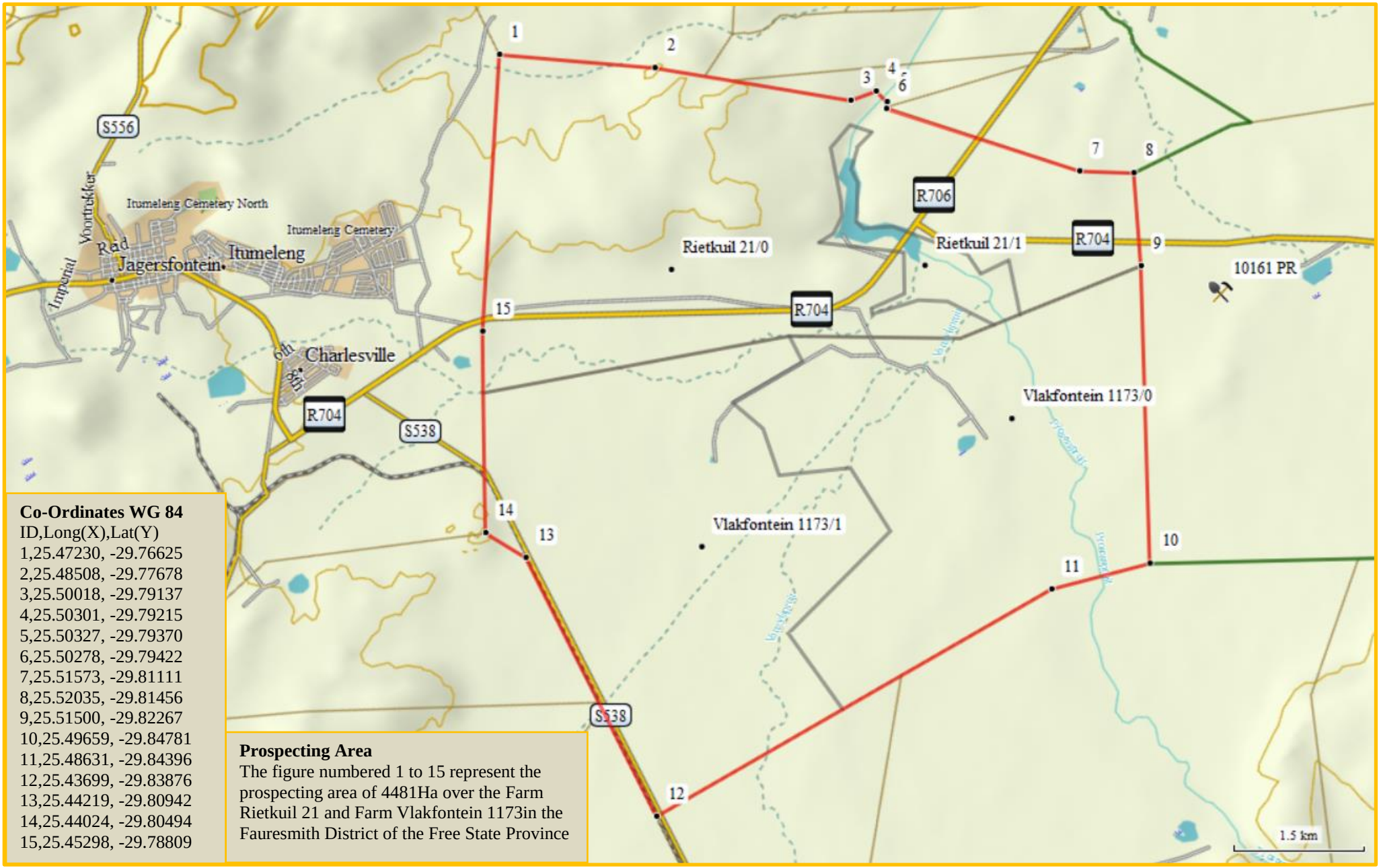
The project geologist monitors the program, consolidates and processes the data and amends the program depending on the results. This is a continuous process throughout the program and continues even when no prospecting is done on the ground.

Each physical phase of prospecting is followed by desktop studies involving interpretation and modelling of all data gathered. These studies will determine the manner in which the work program is to proceed in terms of activity, quantity, resources, expenditure and duration. A GIS based database will be constructed capturing all exploration data.

The first and fourth phases consist of non-invasive prospecting activities and therefore no infrastructure would be developed. The second and third phase consists of the physical prospecting work (invasive), i.e. drilling approximately 20 holes in order to test the geological modelling.

Figure b indicates the proposed prospecting area and the location of the 20 holes. The location of the holes will be refined based on the outcomes of the geological mapping and modelling.

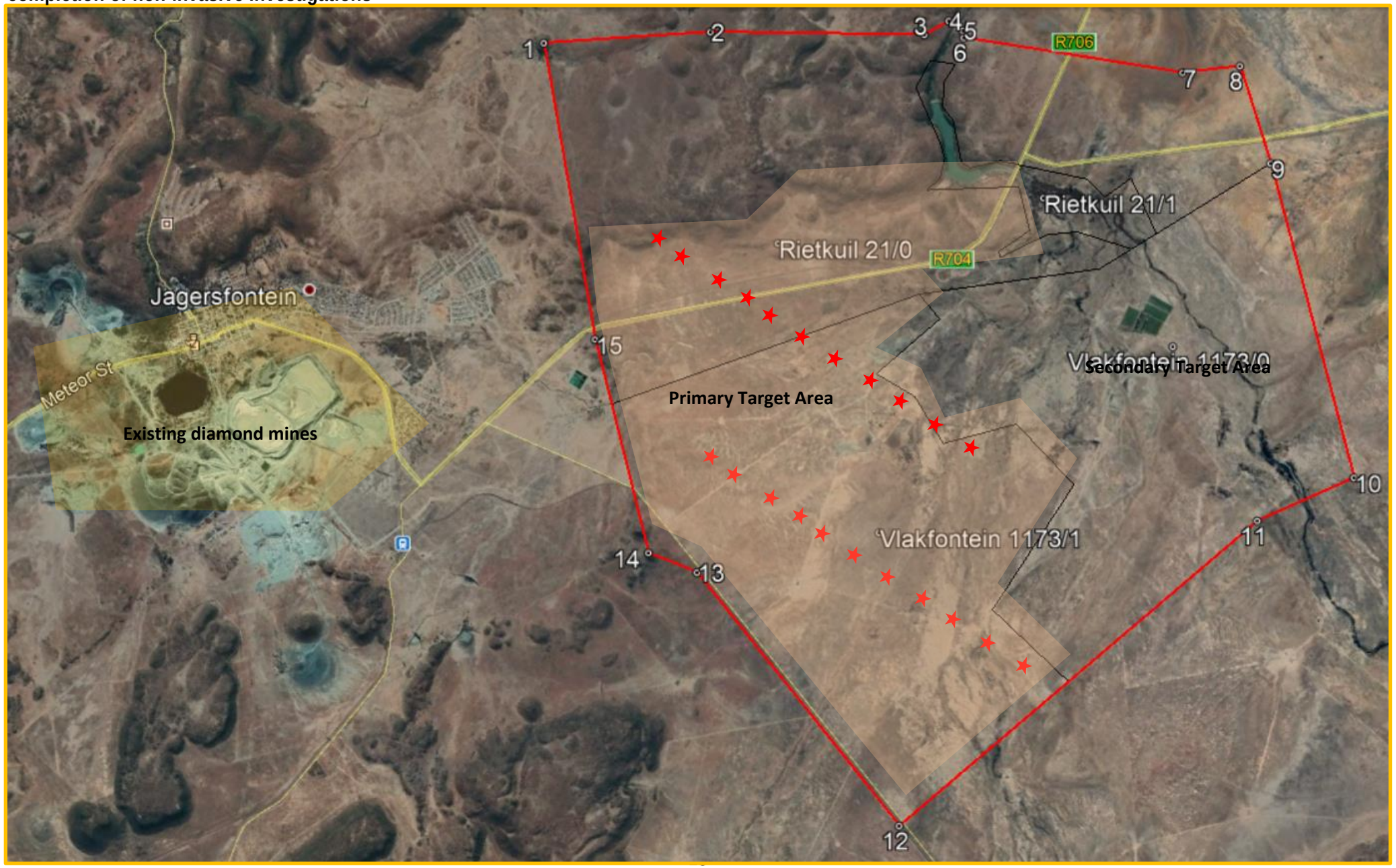
Figure b1: Location, and area (ha) of all the aforesaid main and listed activities, and infrastructure to be placed on site



Co-Ordinates WG 84
ID,Long(X),Lat(Y)
1,25.47230, -29.76625
2,25.48508, -29.77678
3,25.50018, -29.79137
4,25.50301, -29.79215
5,25.50327, -29.79370
6,25.50278, -29.79422
7,25.51573, -29.81111
8,25.52035, -29.81456
9,25.51500, -29.82267
10,25.49659, -29.84781
11,25.48631, -29.84396
12,25.43699, -29.83876
13,25.44219, -29.80942
14,25.44024, -29.80494
15,25.45298, -29.78809

Prospecting Area
The figure numbered 1 to 15 represent the prospecting area of 4481Ha over the Farm Rietkuil 21 and Farm Vlakfontein 1173in the Fauresmith District of the Free State Province

Figure b2: Site Plan showing landscape and existing agricultural and diamond mining activities - the two proposed drill traverses can only be determined after completion of non-invasive investigations



3.4.5 Listed and specified activities

NAME OF ACTIVITY	Aerial extent Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	462Ha	X	GNR 983, Activity 20[1]
Desktop studies, Further feasibility study investigations and mineral resource estimation	462Ha	NA	Not listed
Drilling Activities (invasive) 2 including Core drilling and Large diameter drilling	± 3 200 m²	X	GNR 983, Activity 20
Chip Sampling Activities[3]	±18m³	X	GNR 983, Activity 20[4]
Drill traverses (temporary, jeep track roads less than 4m wide)[5]	± 2 600 m²	NA	Not listed
Site clearance and removal of vegetation (the minimum area required for the equipment laydown area and drilling area will be cleared)	Less than 1ha	NA	Not listed
Sludge from drilling activities	Less than 5m³	NA	Not listed
Hydrocarbon storage	Less than 30m³	NA	Not listed
Sanitation requirements (Chemical toilets)	Less than 1ha	NA	Not listed

[1] Any activity including the operation of that activity which requires a **prospecting right** in terms of section 16 of the MPRDA, including associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the MPRDA.

[2] Each drill pad is estimated to be 160m² in total.

[3] The estimated volume of material to be extracted from each drill hole is 1.8m³ (based on a diameter of drill hole of 165mm, and depth of drill hole of 100m). This total ±36m³ of material that will be extracted from the drill holes, and thereafter replaced during rehabilitation of the drill holes

4 Calculated as follows: drill profile AM1: 400m track x 3.5m wide; drill profile AM2: 350 track x 3.5m wide.

4.1.1 Description of the activities to be undertaken

The following activities will be undertaken in a phased approach, whereby the results of each phase determine whether the subsequent phases will be undertaken:

Desktop Studies

In order to direct the exploration programme in an efficient manner, there will be a review of all geological and related information, relevant to prospecting for diamonds hosted in kimberlites information and data gathered by previous exploration in the surrounding area. A desktop study consisting of geological interpretation of all available geological data including any historic data as well as all airborne geophysical and remote sensing data will be undertaken of the diamond potential of the total area based on historical data and data from surrounding diamond mining. A site investigation of the target areas will be undertaken to identify infrastructure and determine any potential problems that may need to be addressed if this operation advances to a mining right phase.

Aerial photographs and satellite images will be studied to ascertain additional target areas. The aerial photographs will also be used to structurally and geologically map the prospecting area and surrounds. Any anomalous features identified from the air will be mapped in detail. The various rock types and their contacts will also be mapped.

A detailed geological and elevation map using topographic maps, aerial photography, geophysical data and satellite imagery will be compiled supported by field mapping. Surface geological mapping is not carried out routinely but will be required in the course of ground-truthing of remote sensing and historical geophysical results.

The detailed information is modelled three-dimensionally to determined subsurface topography. This information is then assessed by the geologist and other specialists (such as a geophysicist) as required, in order to determine the best prospecting techniques to be used in order to discover and subsequently test any kimberlites on the property.

Note that this activity is repeated at the end of each phase of prospecting, by the interpretation and integration of new prospecting information with the existing information set, in order to inform a decision on whether further work is warranted and if so, the specific scope of this additional work.

Ground Geophysical Surveys

Ground geophysical surveys involve the systematic measurement of magnetic, gravitational and electromagnetic fields over target areas of interest within the property, using appropriate instruments. The individual survey areas vary between 500 x 500 m to 1 x 1 km depending on the inferred size of any target. Magnetic survey lines are spaced at a maximum of 50 m apart and readings will be taken at a minimum of 5 m intervals along the lines.

Electromagnetic and gravity survey lines are spaced at a maximum of 100 m apart with readings taken at a maximum of 50 m along the lines using a proton-5-magnetometer. After data collection has been completed, data processing and visualization is carried out to allow the interpretation of the survey.

Drilling

Core drilling will be carried out on geophysical anomalies to test for the presence of kimberlite. If kimberlite is discovered, the primary objective for core drilling is for geological logging. The exploration drilling holes may be vertical or inclined, usually at a maximum angle of 60 degrees (from the horizontal). The borehole depth will be

determined by the geologist and will depend on the type of anomaly and the geological conditions, including overburden (the thickness of material that overlies the target kimberlite). Ten (10) boreholes are anticipated to be drilled per target. It is anticipated that no more than 2 targets will be present giving a total of 20 boreholes.

The size of core drilled will be determined by such factors as cost, proposed core sampling, the degree of logging required and proposed geotechnical investigations. Sizes commonly used are HQ (63.5 mm diameter core) and NQ (47.6 mm diameter core) or variations on these. The orientation and depth of core holes will vary depending on the drilling objective. In the case of delineation or scout drilling, angled core holes will be drilled to establish accurate kimberlite / country rock boundaries at depth (in other words, where the edge of the kimberlite is at depth). Vertical holes will be drilled for geological modelling and / or sampling of the core.

Core holes are also used as pilot holes for large diameter holes. The geological information provided by the core holes greatly reduces the risk of selecting inappropriate Reverse Circulation Large Diameter Drilling (RC LDD) hole locations. Core holes allow for maximum control on information such as overburden thickness, density, country rock dilution and likely kimberlite intersections, and therefore allow more accurate determinations of the position of likely RC LDD holes for diamond recoveries.

Material derived from i.e. core will be examined on site for logging purposes and sampled for a variety of analyses.

RC LDD currently up to 610 mm diameter provides good geological and especially grade data. RC LDD will be conducted when grade assessment is one of the primary objectives of the exercise. The sizes of the boreholes drilled will be determined by such factors as proposed sampling, availability of drilling equipment, cost and the volume of sample required. RC LDD will take place after pilot core drilling. The pilot hole will also be used as a guide for geological control and sample planning.

The proposed invasive prospecting activities will include the following:

- The percussion drilling of approximately 10 holes per target area for the extraction of sand, calcrete and gravel chips; It is anticipated that no more than 2 targets will be present giving a total of 20 boreholes.
- The drill material (sand and stone chips) will be analysed on site i.e. the drill material is laid out next to each hole in heaps to indicate the sequence and drilling depth (samples are taken every meter drilled);
- Access to the drill site will be via existing farm tracks. If no tracks area available, ‘twee-spoor’ tracks will be made by driving the drilling rig (4 x 4) to such a site. This should be done under the supervision of an ECO;
- The area of each drill pad which will be disturbed (total surface area) is approximately 160m² (Refer to **Figure c** for a layout of a typical drill site);
- Water required for drilling purposes (which may be required if drilling through soft clays are required) will be brought to site;
- Only where necessary will existing vegetation be removed. The topsoil will be kept aside for later rehabilitation around each drill pad to prevent contamination.

The associated infrastructure that would be required includes the following:

- Equipment laydown/storage area: The temporary equipment laydown area will form part of the drill pad (Figure c), where the drill rig will be parked when not in use and will include an equipment/ materials laydown (storage) area and a chemical toilet. Diesel will be contained in a mobile bowser.
- Accommodation will be provided off-site in one of the nearby towns, and not at the drill site.

- Access Roads: Equipment will be transported to site via the existing roads (including gravel and jeep track). No new roads will be required. Any new tracks created by driving the drill rig to the drill site will be rehabilitated by means of raking and/or scarifying trampled surfaces (tracks).

Drilling Method

- The reverse circulation drilling machine is a modified percussion compressed air rig. The compressor that supplies the compressed air is a 900 cfm Atlas Copco.
- The 6m rods that are used have an inner barrel so they can handle two directions of flow. The air is forced down between the outer and inner barrel to the hammer. The hammer pulverises the rock and the particles are forced up the inner barrel to the cyclone where the air is removed out the top and the sample falls in to the bag at the bottom of the cyclone.
- The reason for using the reverse circulation technique is to collect representative samples at meter intervals drilled for on-site visual analysis.
- Each drill pad will be constrained to an area of about 160m², i.e. the total disturbed area will be about 160m² (refer to **Figure c** which shows the typical layout of a drill site).
- Should any clay horizons be intersected in the drilling of boreholes, it may be necessary to use water mixed with a drilling lubricant to assist with removing the clay and rock chips from the borehole. Such drilling lubricants comprising non-polluting, biodegradable chemicals thicken the water to assist with the sealing off of the sidewalls of the borehole and the removal of mud generated by drilling through the clay horizons.
- If such drilling is required, a drill sump will be excavated at each drill pad where clay is intersected and will be approximately 2.5m x 2.5m x 1.7m in extent and will be used to store and manage drilling fluid used during the drilling process (recycling of water).
- Each sump will be lined with a thick plastic liner to prevent seepage of the drilling water into the subsurface layers. The plastic liner will be reused at the other drill sites. The sumps will be demarcated with red and white tape or by other appropriate means. Each site will be rehabilitated directly after drilling.
- The drilling mud captured in the sumps will be dried and stored in leak proof receptacles and drill spoils will be removed from site and disposed of at a suitably licensed Municipal waste disposal facility.
- The limited amount of water required for drilling purposes will be transported to site and stored in bowsers in the immediate area of prospecting. Vehicle routes between the water source and the prospecting drilling site will be along existing vehicle tracks and/or the limited ‘twee-spoor’ tracks that may be required to drive the drilling rig to the drill site.

Drilling Equipment

- The drilling equipment consists of a drill rig mounted on a truck chassis with compressor, water tank and all other drilling ancillaries such as compressor pipes, drill rods, etc.

Drilling Layout

- Figure b indicates the proposed prospecting area and the location of the drill holes. The location of the holes will be refined based on the outcomes of the geological mapping and modelling.

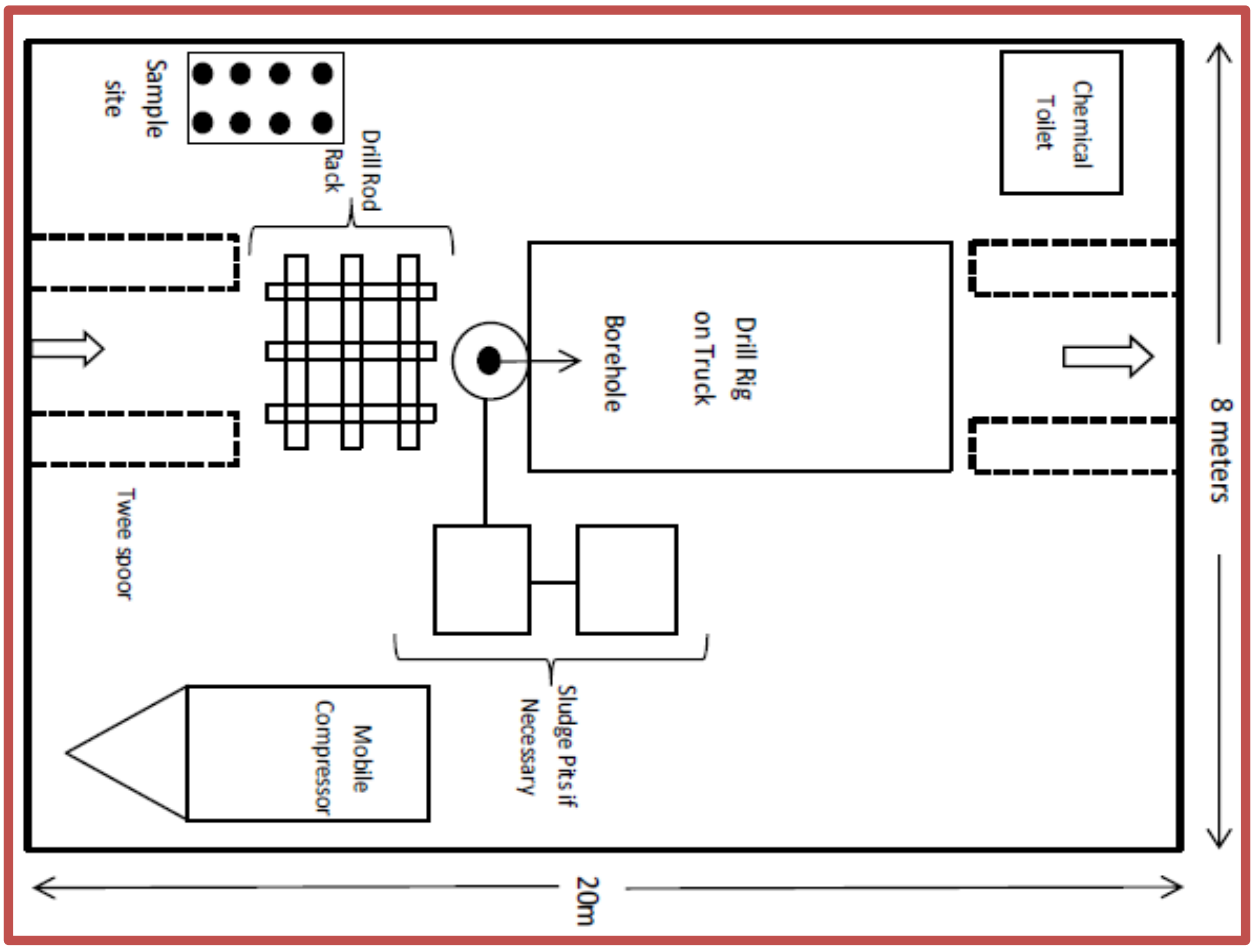
Drilling Programme

- Drilling will take place over a period of approximately 24 months.

Rehabilitation

- Rehabilitation is carried out on a continuous basis as work progresses. It consists mostly of backfilling drill holes with the drill chips, removing of drill spoils from possible sumps, backfilling and profiling of sumps and ripping and cleaning up of drill pads and tracks used for drilling.
- Such rehabilitation is undertaken manually by raking over the disturbed site (scarifying) and placing topsoil over the raked area. This will be monitored continuously to ensure effective rehabilitation of disturbed areas. The rehabilitation work will be conducted in-house under the supervision of an ECO.

Figure c Typical layout of a drill platform



4.2 Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Legislation		
Constitution of South Africa, specifically everyone has a right; a. to an environment that is not harmful to their health or wellbeing; and b. to have the environment protected, for the benefit of present & future generations, through reasonable legislative and other measures that: i. prevents pollution and ecological degradation; ii. promote conservation; and	Prospecting activities	The prospecting activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated in order to protect the environmental right of South Africans.
Minerals and Petroleum Development Resources Act, Act 28 of 2002 (MPRDA) section 16 (as amended)	Application to the DMR for a prospecting right in terms of Section 16	A prospecting right application has been accepted by the DMR. The conditions and requirements attached to the granting of the prospecting right will apply to the prospecting activities.
National Environmental Management Act, No 107 of 1998 (as amended) (NEMA) Listing Activity 20 of Listing Notice 1 in terms of Regulation 983 of 2014	Application to the DMR for Environmental Authorisation in terms of the 2014 EIA Regulations	An Application for Environmental Authorisation must be submitted to the DMR The appropriate EA will be obtained before proceeding with any prospecting activities. Measures will be implemented to prevent any pollution occurring during the drilling activities. The disturbed area shall be rehabilitated in such a way that is stable, non-polluting, non-eroded, free from alien invasive species and suitable for agreed post closure land use.
National Water Act (Act 36 of 2008)	NA	A Water Use Authorisation (Licence or GA) is only required for drilling within or within 500m of any drainage channels. No water use license is required for this application. Any water required for drilling activities will be obtained from a legal source within the area or brought in via a mobile water tanker.

National Environmental Management: Waste Act, Act 59 of 2008 (NEMWA)NEM: WA (as amended)	Management measures as part of environmental awareness plan	The generation of potential waste will be minimized through ensuring employees of the drilling contractor are subjected to the appropriate environ awareness campaign before commencement of drilling. All waste generated during the drilling activities will be disposed of in a responsible legal manner. Proof of legal disposal will be maintained on site.
National Heritage Resources Act, 25 of 1999 ("NHRA")	Management measures	Phase 1 Heritage and Archaeological Impact Assessment shall be conducted prior to drilling to ensure that significant impacts on heritage artefacts, heritage site and graves. No drilling activities will take place within 50m of any identified resource such as a grave.
Municipal Plans and Policies		
Xhariep District Municipality IDP 2018/2019	Relevant consideration	Used to identify relevant socio-economic background information as well as spatial development information.
Kopanong Local Municipality IDP, 2014/2015		
Standards, Guidance and Spatial Tools		
Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria	Baseline environmental description	Used during desktop research to identify sensitive environments within the prospecting rights area.
Free State Province – Provincial Spatial Development Framework - 2013		
Free State Province – Climate change Vulnerability assessment - 2015		
Free State Province – State of the Environment Report – Heritage Resources		
Free State Province - State of the environment Report		
BGIS (www.bgis.sanbi.org)		
SANS 10103:2008 The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and to Speech Communication	Management / Monitoring measures	Used to set the standard allowable for noise generation and control during drilling.
SANS 1929:2005 Edition 1.1 – Ambient Air Quality Limits for Common Pollutants		Standard for dust fallout. The activity in question for this application is driving on gravel roads.

4.3 Need and desirability of the proposed activities.

The aim of the prospecting activities is to locate and evaluate diamond deposits hosted in, or locally derived from kimberlite, which as an igneous rock can in theory be found within any other older host rocks. As the peak ages of kimberlite intrusion in northern South Africa were at roughly 1100 Ma and 500 Ma, any rocks older than these dates can host kimberlites. In addition, it has been well established that diamonds are most commonly present in economic concentrations in kimberlites found within cratonic regions and related tectonic blocks. The area applied for falls within the Kaapvaal Craton and thus has the generic potential to host diamondiferous kimberlites.

Numerous kimberlites, including the diamond alluvial fields, are thus found in quite close proximity to the area applied for. Kimberlites are known to occur in clusters, and hence the reason for applying for this prospecting right as it occurs in close proximity to known diamond mines. Prospecting activities are therefore needed to:

- Confirm and obtain additional information concerning potential targets through non-invasive activities (desktop studies and ground geophysical surveys) and invasive (drilling) activities.
- Assess if the resource can be extracted through future mining in an environmentally socially and economically viable manner.

The prospecting activities themselves would not directly lead to job opportunities. Should prospecting activities prove that a feasible diamond resource mineral is present to allow for mining, a new mine may be developed which would generate extensive employment opportunities in an area where employment is needed.

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

No site or technology alternatives have been considered for this prospecting application. The areas included in the prospecting rights application were identified through historical prospecting and production records for the area and from designated research. Diamond exploitation and exploration in the general area has been ongoing for many years, and kimberlites typically occur as clusters within larger kimberlite fields. The area applied for is located within close proximity to known diamond mines, which is therefore considered highly prospective.

Geophysical methods have been proven to be very useful in detecting potential kimberlite targets and will therefore be used to identify optimal locations of potential bodies of economic interest within the prospecting area prior to drilling. Subsequent core drilling has been proven to be a suitable technique for sampling and recovering material from kimberlites to test for economic potential.

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

4.5.1 Details of the development footprint alternatives considered.

With reference to the site plan provided as figure b and the location of the individual activities on site, details of the alternatives considered with respect to the property on which, or location where activity is proposed to undertaken, the type of activity to be undertaken, the design or layout of the activity, the technology to be used in the activity, the operational aspects of the activity and the option of not implementing the activity is discussed below.

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

As discussed above, the prospecting location has been informed by historical prospecting and production records. As such the applicant believes there is a possibility of encountering further diamond reserves on the property subject to this prospecting right application. The prospecting site has therefore been informed by the locality of other kimberlite field in the area. Until such time that the non-invasive activities have been completed the exact location of the drill sites cannot be confirmed. However, the following restrictions will be applied to the final site selection:

- No drill site will be positioned within 500m of a structure.
- No drill site will be positioned within 100m of a water course.
- Where possible existing access roads will be utilised to access the drill sites.

The type of activity to be undertaken;

No activity (project) alternatives were considered, as the subject of this prospecting application is for diamonds, and has been informed by the locality of the surrounding kimberlite field and existing diamond mines.

The technologies that will be used to undertake the prospecting activities are based on the refinement of techniques employed previously by the company to explore and discover kimberlites. The prospecting activities proposed in the Prospecting Work Programme (PWP) follow a phased approach, whereby the preceding phase determines if further work is warranted and as a result no alternatives are available to complete the proposed prospecting activities.

The design or layout of the activity;

The proposed location of the drill holes is shown in Figure b. The outcomes of the noninvasive Phase 1 prospecting activities will inform Phase 2 and 3 and the layout of the drill sites may therefore be refined based on the detailed findings of the ongoing desktop review and mapping exercises

Site establishment is done with closure in mind to ensure that only the required size is disturbed. No camp site will be erected on site, as existing establishments will be used for accommodation in the nearby town(s). The exact location of the drill pads with temporary infrastructure on site (i.e. equipment laydown area) will be refined/ finalised based on the findings of Phase 1 as well as a site visit to be undertaken by the ECO together with the landowner to identify the most suitable area and the exact location on site will be finalised at a later stage.

The technology to be used in the activity;

The non-invasive and invasive prospecting methodologies have been chosen based on the applicant's past experience with diamond prospecting, and is considered to be standard practice for such diamond prospecting. The reason for using the reverse circulation drilling technique is to collect representative samples at meter intervals during drilling. The depth of the boreholes is anticipated to be on average 100 meters deep.

The operational aspects of the activity;

The non-invasive prospecting component will enable the applicant to clearly delineate areas which are regarded as suitable for further investigation without unnecessarily disturbing the prospecting area through invasive means.

During the invasive prospecting component of the project, the following key site activities related to drilling will be undertaken:

- Accommodation will not be provided on site but in one of the nearby towns.
- Establishment of the drill pads with equipment laydown area.
- Establishment of access for drill rig (e.g. drive the drill rig along the alignment

of the proposed drill holes twee spoor track and parking area)
- Drilling operations (e.g. refueling and rock-chip sampling)
- Rehabilitation activities (e.g. scarifying disturbed areas and redistribution of topsoil)

Alternative time frames can be made to ensure that the impact on the day to day running of the inherent land use are minimised, for example drilling on cultivated land can be rescheduled post harvesting or not to coincide with breeding or hunting seasons or during raining season due to access problems.

Prospecting activities will be conducted during daylight hours to minimize exposure to light and noise pollution. If necessary certain drill sites can be timed to occur during school terms or holidays as may be required in certain instances by stakeholders. The time of implementing drilling activities during the course of the day may also be reconsidered in consultation with landowners. Ideally drilling activities will occur continuously until such time that a hole is completed, with no drilling occurring during the night.

At present, no feasible alternatives to drilling are available and impacts associated with the drilling operation will be monitored and managed in terms of the EMPr.

<u>The option of not implementing the activity.</u>

The no-go alternative will mean that no prospecting activities are undertaken.

Drilling is required in order to investigate the potential and feasibility of a resource and also to generate a SAMREC compliant mineral resource statement. There is no potential for any future investment in a mine without the confirmation of the mineral resources which can only be obtained through drilling activities.

Should the prospecting right be refused, effectively a potential diamond resource will be sterilised. The socio-economic benefit and most notably the future employment potential of a mine development will also be lost if the prospecting activities are not implemented in order to determine the feasibility of any diamondiferous deposit that may occur within the area. This will mean that the possible existence of economically exploitable diamonds will not be known, and in turn none of the benefits associated with the project will be realised (e.g. job creation and stimulation of the local economy). The applicant would also not have the opportunity to utilise (exploit) the possible diamond reserves. Should the prospecting activities not be permitted, then the potential environmental impacts associated with site establishment and drilling would not occur, and the status quo would be maintained.

4.5.2 Details of the Public Participation Process Followed

The formal public participation process, which meets the requirements of the NEMA EIA Regulations and the MPRDA has been followed and include the following activities:

- Potential I&APs were notified about the project and of commencement of the Basic Assessment (BA) process and invited to registration as stakeholders by means of:

  i. Letters of notification to directly affected landowners;

  ii. Written notifications to other stakeholders including neighbors, Local and District Municipalities (including traditional authorities where applicable); and

  iii. Media advertisements and site notices.
- Circulation of a Background Information Document (BID) with the notification letter to the landowner, neighbouring landowners and potential I&APs;
- Registered I&APs including the Relevant Government Department were given

the opportunity to review and comment on the Draft Basic Assessment Report.

- Registered I&APs will be notified of the outcome of the environmental authorisation, with copies of the relevant documents and if required the appeal process to be followed.

(Appendix 3 Public Participation Process to be completed as part of the Final BAR & EMPr)

4.5.3 Summary of issues raised by I&Aps

The table below regarding the Public Participation Process to be completed as part of the Final BAR & EMPr and after completion of the PPP.

Interested and Affected Parties Names of persons or institutions consulted	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Landowner/s				
Lawful occupier/s of the land				
Landowners or lawful occupiers on adjacent properties				
Municipality				
Communities				
Traditional Leaders				
Organs of state				

FSPG (2007). Free State Provincial Growth and Development Strategy. Bloemfontein, South Africa

DTEEA (2004). Draft Statement of the Environment Report for Free State, Bloemfontein, South Africa

4.5.4 The Environmental attributes associated with the alternatives.

The information regarding the baseline environment were obtained from several sources as indicated in table 4.2.

Regional setting

The proposed Prospecting Area is located on the following properties:
Remainder of the Farm Rietkuil in extend 1712.4074Ha.
Portion 1 of the Farm Rietkuil 21 in extend 121.6275Ha.
Remainder of the Farm Vlakfontein 1173 in extend 1248.5212Ha.
Portion 1 of the Farm Vlakfontein 1173 in extend 1376.0000Ha.
All of the properties are located in the Xhariep District Municipality and Kopanong Local Municipality of the Free State Province.
The prospecting area is located approximately 3km east of Jagersfontein (**Refer figure d**).

Regional Geology and soil

The area is situated on the Karoo Supergroup. The geology is mainly of the Tierberg Formation of the Ecca Group. This lithology is intruded by an extensive Karoo dolerite sill. The Tierberg Formation is made up of blue-grey to dark grey shale with carbonate concentrations, subordinate sandstone and siltstone in the upper part.
The Tierberg Formation of the Ecca Group is underlain by basement rocks and Phanerozoic deposits (calcrete, clastic sediments and sand of Carboniferous and

Permian age) that form part of the Karoo Supergroup. The regional geology of the area is characterised by metasediments (pelitic gneiss, amphibolite, grey biotite gneiss, calc-silicate gneiss, marble and thin lenses of quartzite) of the Tierberg (Pt) Formation of the Ecca Group (**Figure e**).

The kimberlite pipes generally have breccia necks that form small depressions with thick calcrete edges. Some of these pipes are filled with sediments up to 300m thick. Most kimberlites occur in clusters and the Jagersfontein province is no exception to that rule, as it consists of the Jagersfontein pipe centered on a group of kimberlite dykes and possibly small blows along those dykes.

Land capability

Approximately 74 % of the District comprises of Extensive Agriculture that is used for livestock farming, especially sheep and cattle which, respectively, produce wool and meat. Intensive Agriculture in the Xhariep District makes up 21% of the main land uses. The areas adjacent to the Orange River in the south mainly consist of irrigated land where maize, wheat and Lucerne are produced. About 15% of the cultivated fields (45 223 ha) is indicated as irrigated land or agricultural production regarding livestock production.

According to the land cover of the Free State (see **figure f**) there are four different types of agriculture highlighted and these are cultivated subsistence, cultivated orchards, cultivated commercial pivots and cultivated commercial fields. The low shrub lands areas to the south of map are mainly reserved for sheep farming, while some of the grass land areas are reserved for cattle farming (Free State Province, 2012).

The southern parts of the province including the Xhariep DM are mostly dry areas where sheep farming is the most prominent. Irrigation schemes, such as the one at Jacobsdal, allow for the production of grapes, with Landzicht and Wilreza Cellars being two of the main wine producers. Potatoes and Walnuts are also farmed in this region.

Landscape - Topography

The topography is broken by numerous dolerite capped hills, ridges and plateaus (figure b-2). These form prominent features in the landscape. In the mining area several dolerite hills and ridges occur. The most prominent of these occur in the northern portion of the prospecting area. These hills are relatively intact and have not been subjected to significant mining impacts.

Areas in between hills and ridges consist of plains. These plains are grass dominated with a large component of dwarf karroid shrubs. The dominance of these shrubs differs with the degree of disturbance. Due to the uneven topography these plains commonly contain drainage lines and seasonal streams (**Figure n**).

Air Quality

The Jagersfontein area has, save for the Tailings Operation, no major industrial facilities with atmospheric emissions, the overall air quality is good. The surrounding area is mainly associated with agricultural activities.

Figure d: Regional setting and location

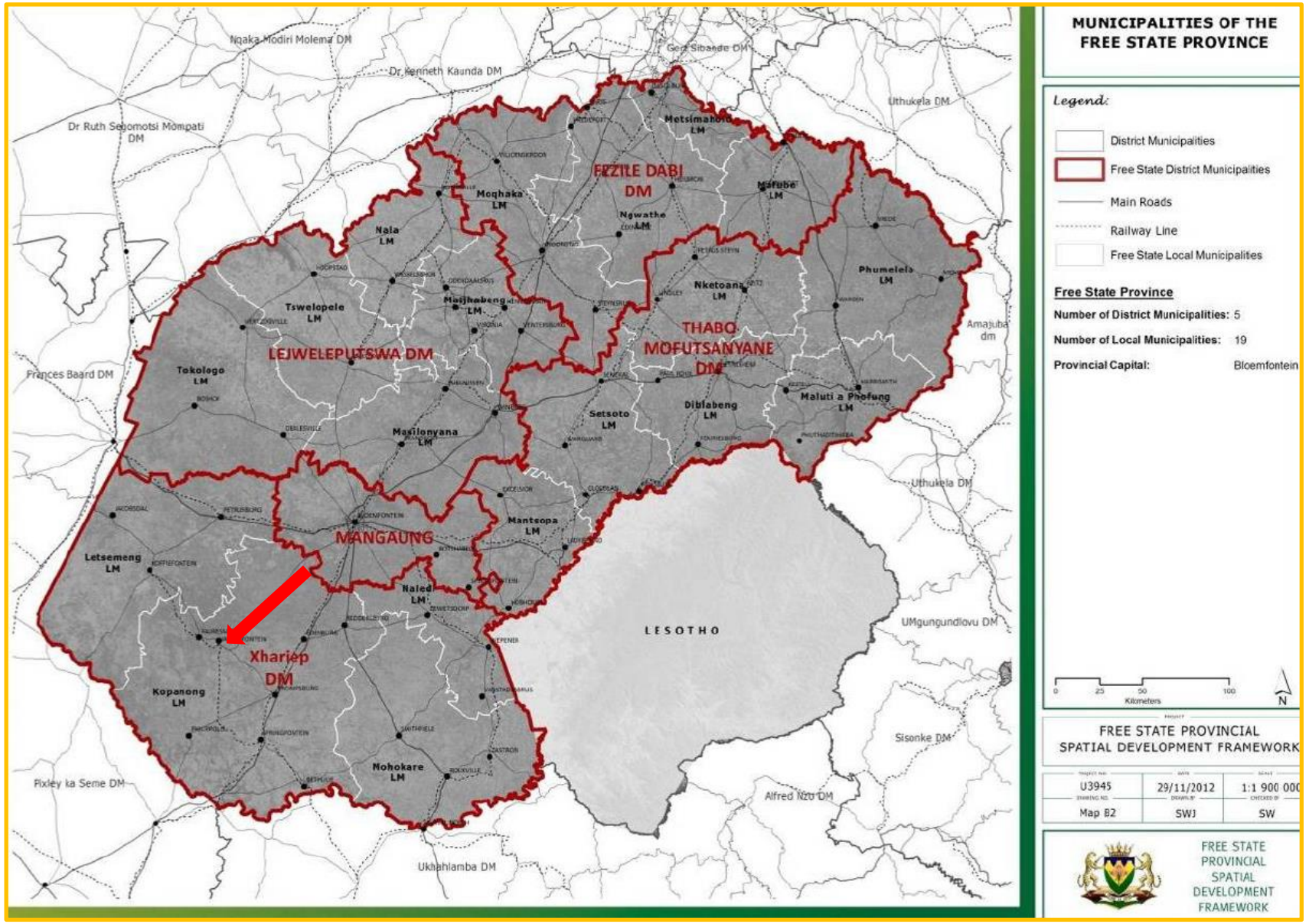


Figure e1: Geology and Lithology

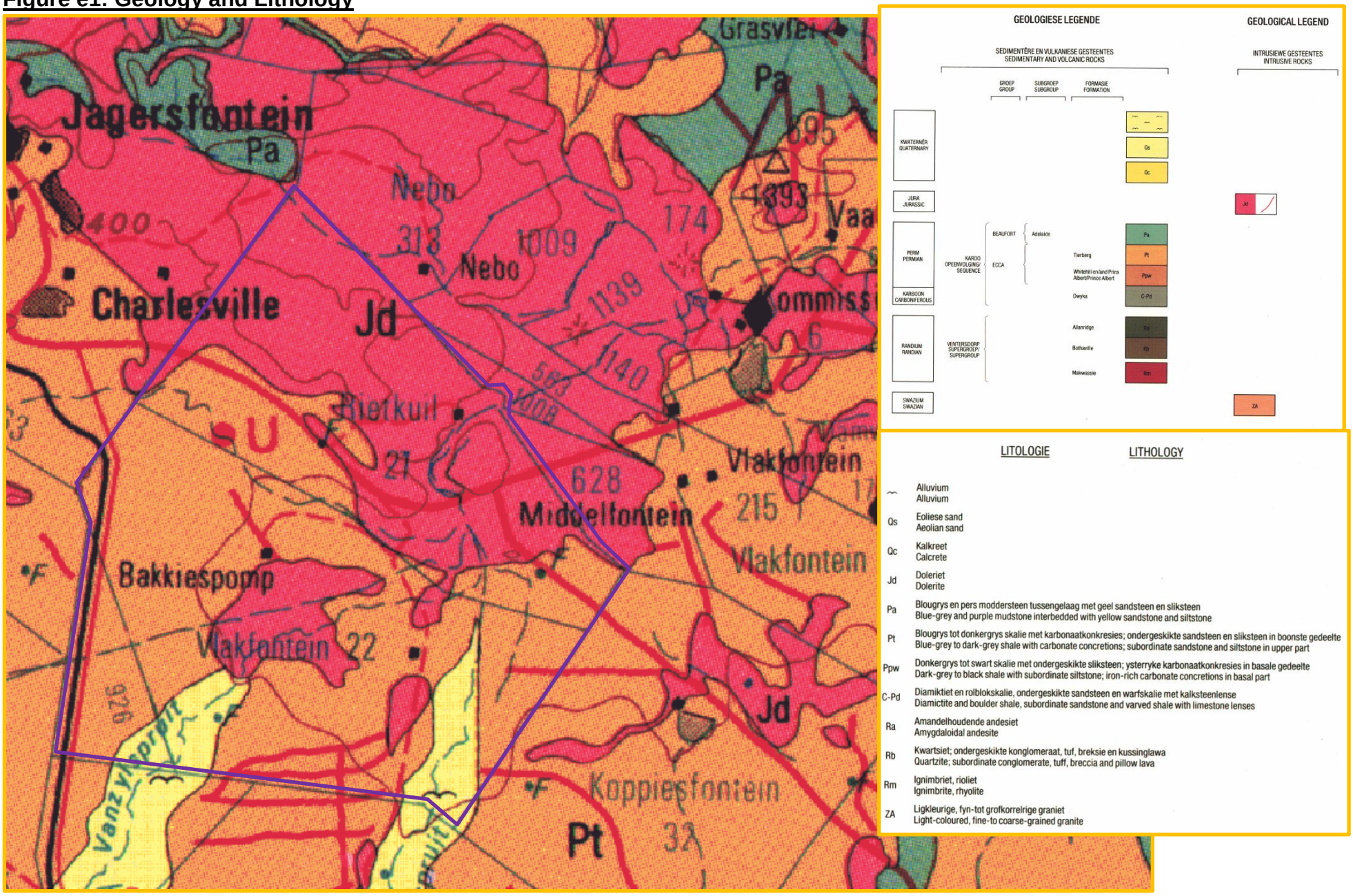


Figure e2: Distribution of mineral resources and mining operations in the Free State

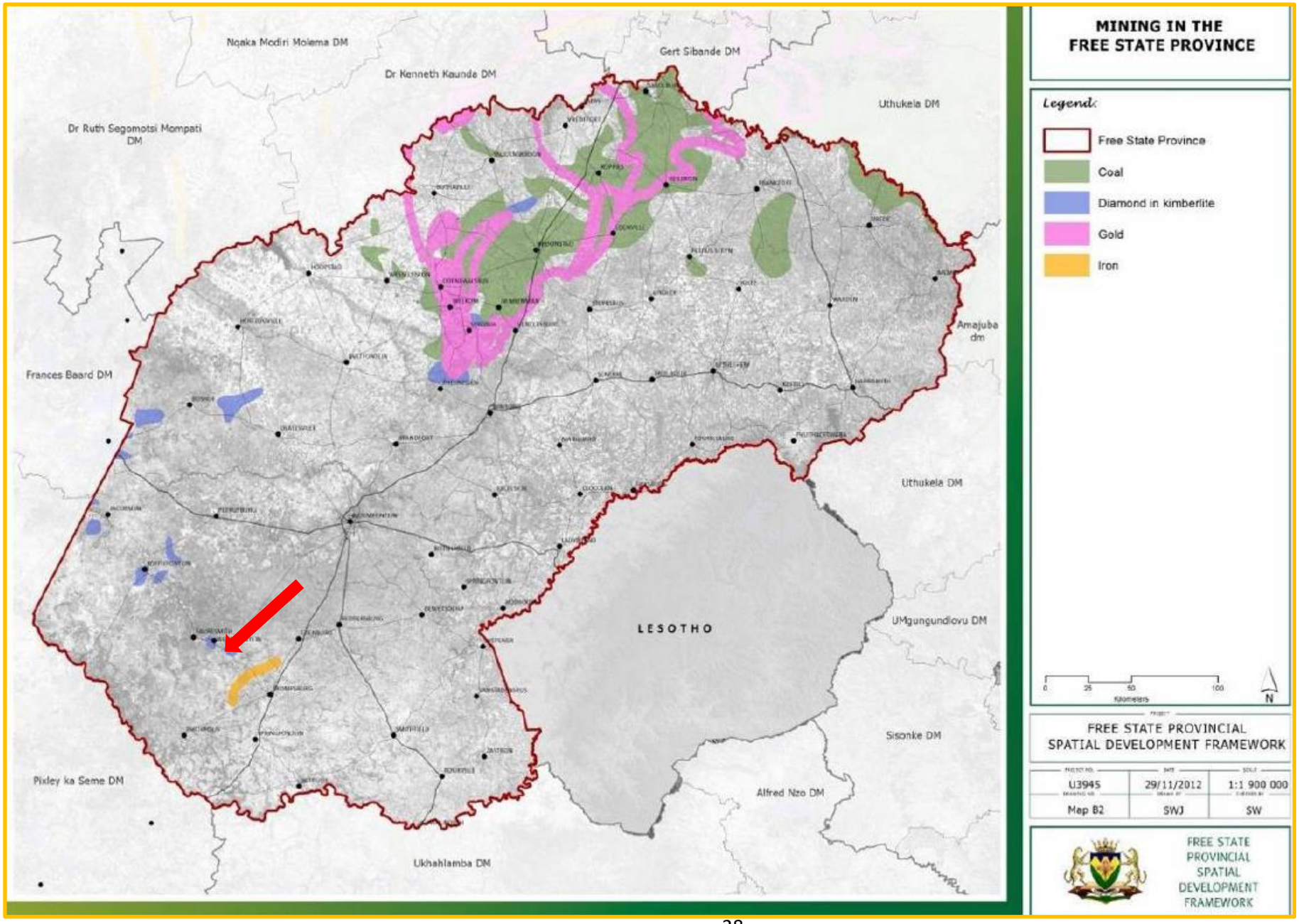
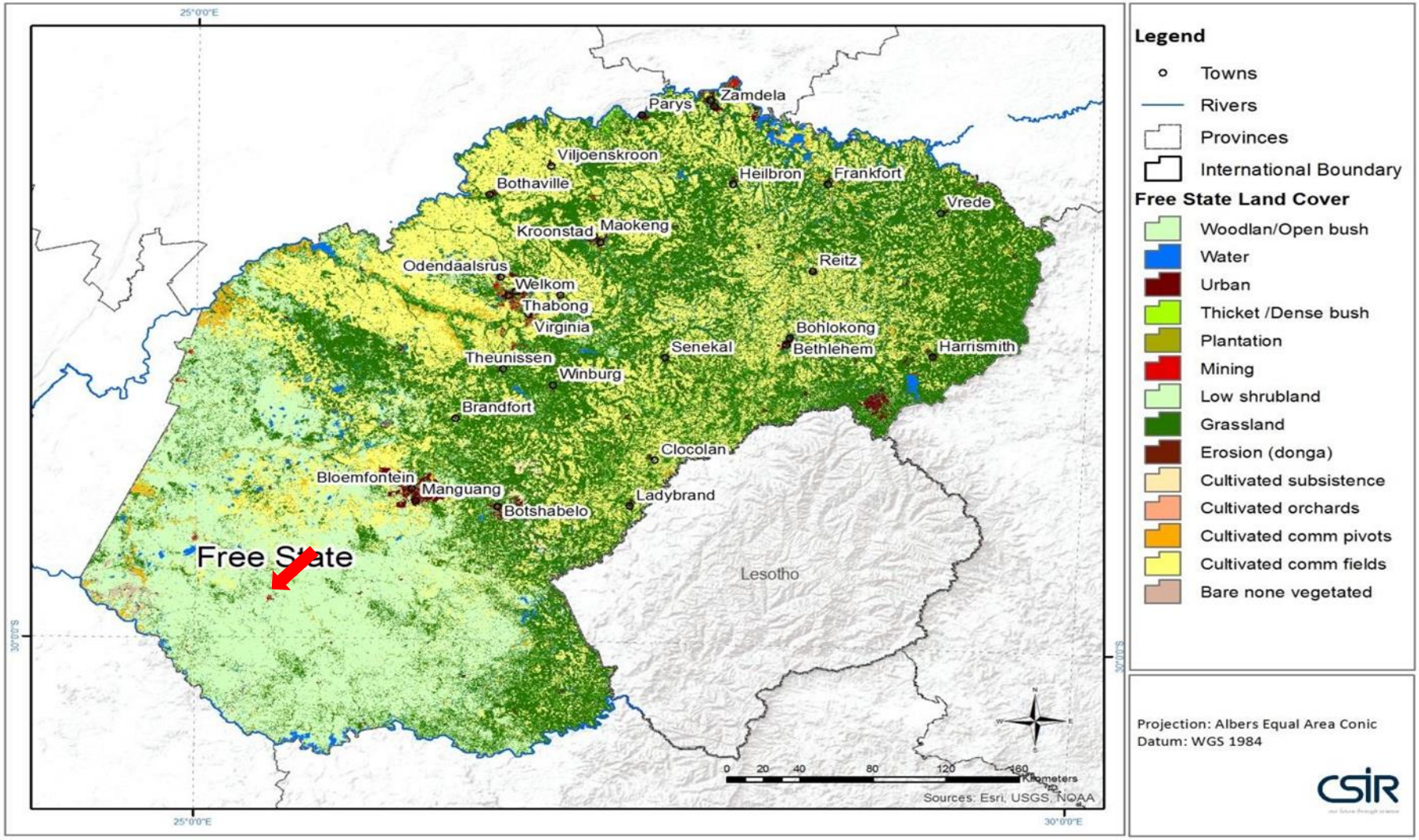


Figure f: Land Capability



Climate

Most of the Free State is situated approximately 1 300 m above sea level and has a continental climate, characterised by warm to hot summers and cool to cold winters.

The Free State is a summer rainfall region. Aridity increases towards the west of the province.

Rainfall figures average between 600 mm and 750 mm in the east to less than 300 mm in the west.

Frost occurs throughout the province (particularly in the higher-lying areas) usually from May to early September in the west up to early October in the east. Annual temperatures range from a maximum of approximately 35°C in mid-summer to a minimum of -5°C in mid-winter, with mean temperatures ranging between 15-30°C in summer and 0-15°C in winter.

The town of Jagersfontein receives most of its rainfall from October to March. Temperatures also fluctuate accordingly with December being the hottest month at a mean temperature of 22.6°C and July being the coldest at a mean temperature of 7.2°C. The temperature trend follows the rainfall pattern to a large extent **figure g.**

Water Resources

Jagersfontein is situated in the C51H quaternary drainage region of the Upper Orange Catchment. The main surface water features on the Operational Site is a dam within the Process stream. The Process Stream is mostly dry, however, almost the entire catchment of the seasonal stream drains into the dam which essentially acts as a sediment trap.

The Orange River and the Vaal River together with their tributaries, are the main sources of surface water in the province.

The prospecting area is situated within the Upper Orange WMA that lies predominantly within the Free State, but also occupies portions of the Eastern and Northern Cape Provinces. The Caledon River is the largest tributary to the Orange River within the Upper Orange WMA. Other sizable tributaries are the Kraai and Riet Rivers **figure h**.

Of the twenty dams located in this WMA, the main ones are the Gariep, Vanderkloof, Kalkfontein, Krugersdrift, Rustfontein and Knellpoort dams. Hydropower for peaking purposes is generated at the Gariep and Vanderkloof Dams.

The Prosesspruit a non-perennial stream drains out of the property to the south-east. The tributaries of these originate on the high ground within or just outside the property and have been channelised and dammed on a small scale in places.

Ground water fulfils an important function, especially in settlements far removed from the major rivers. Groundwater is currently used for rural domestic supplies, stock watering and water supply to several towns where surface water supply is inadequate or bulk water supply is not financially feasible (DETEA 2009). The total availability of groundwater in the WMA is estimated as 65 million m³ per annum.

The geology of the Jagersfontein area consists mainly of sediments from the Karoo Supergroup. These are predominantly sandstone, shale and mudstones formations of the Dwyka-, Ecca- and Beuafort group, with intrusion of post Karoo dolerite sills and dykes along weak contact zones between different formations or fault zones.

The Karoo sediments are characterised by low permeability; groundwater movement mainly occurs along jointed and fractured zones caused by faults or on the contact zones with dolerite intrusions.

Based on the water levels of sources in the area and the variability in water quality, it is evident that there are two aquifer systems in the study area. At the top is a shallow aquifer with a rest water level (water table level) of approximately 5m below ground level ("mbgl"). At the bottom is a deeper aquifer with a current drawdown water level

at 379mbgl and a rest water level at approximately 160mbgl. The two aquifer systems are separated by an impermeable dolerite sill. This is based on early geological maps that indicate a dolerite sill from surface to depth of approximately 300m.
It is very likely that the dolerite sill is a major geological feature due to its thickness, the large area it covers over the Site and Operational Site and the important role it plays in the movement of groundwater in the study area. The shallow aquifer will most probably be very recently recharged by rain water and will move along the weathered zone of the dolerite sill and / or fractures along the contact with the Karoo sediments that can be associated with the dolerite sill intrusion.
The aquifer systems are, to a large extent, independent of each other because of the impermeable sill that separates them. There may however be some isolated zones of connectivity between the two aquifer systems. The surrounding groundwater users in the Jagersfontein Town abstract water from the shallow aquifer, as it is not feasible to drill boreholes to the depths required to abstract from the deeper aquifer. The shallow aquifer is not affected by the drawdown created in the deep aquifer. Abstraction from the deeper aquifer therefore has an insignificant impact on the shallow aquifer's water levels.
No large porous aquifers occur in this WMA. Relatively large quantities of groundwater can be abstracted from fracture zones along dolorite intrusions. However, recharge rates and therefore sustainable yields are low. Higher recharge occurs in localised areas, e.g. where lime bogs are found.
In drier parts, groundwater constitutes the main and often the only source of water for rural domestic supplies and stock watering. Groundwater is severely overexploited in certain semi-urban areas, notably at the Bainsvlei smallholdings near Bloemfontein, and at Petrusburg, where irrigation occurs from groundwater.
(The quality of groundwater is naturally good in the eastern high rainfall parts, becoming more mineralised and brackish in the drier areas and in the vicinity of salt pans. Groundwater in the Riet/Modder catchment is polluted at specific sites partly due to the use of pit latrines (DETEA, 2009) **figure i**.

Figure g-1: Average annual Temperatures

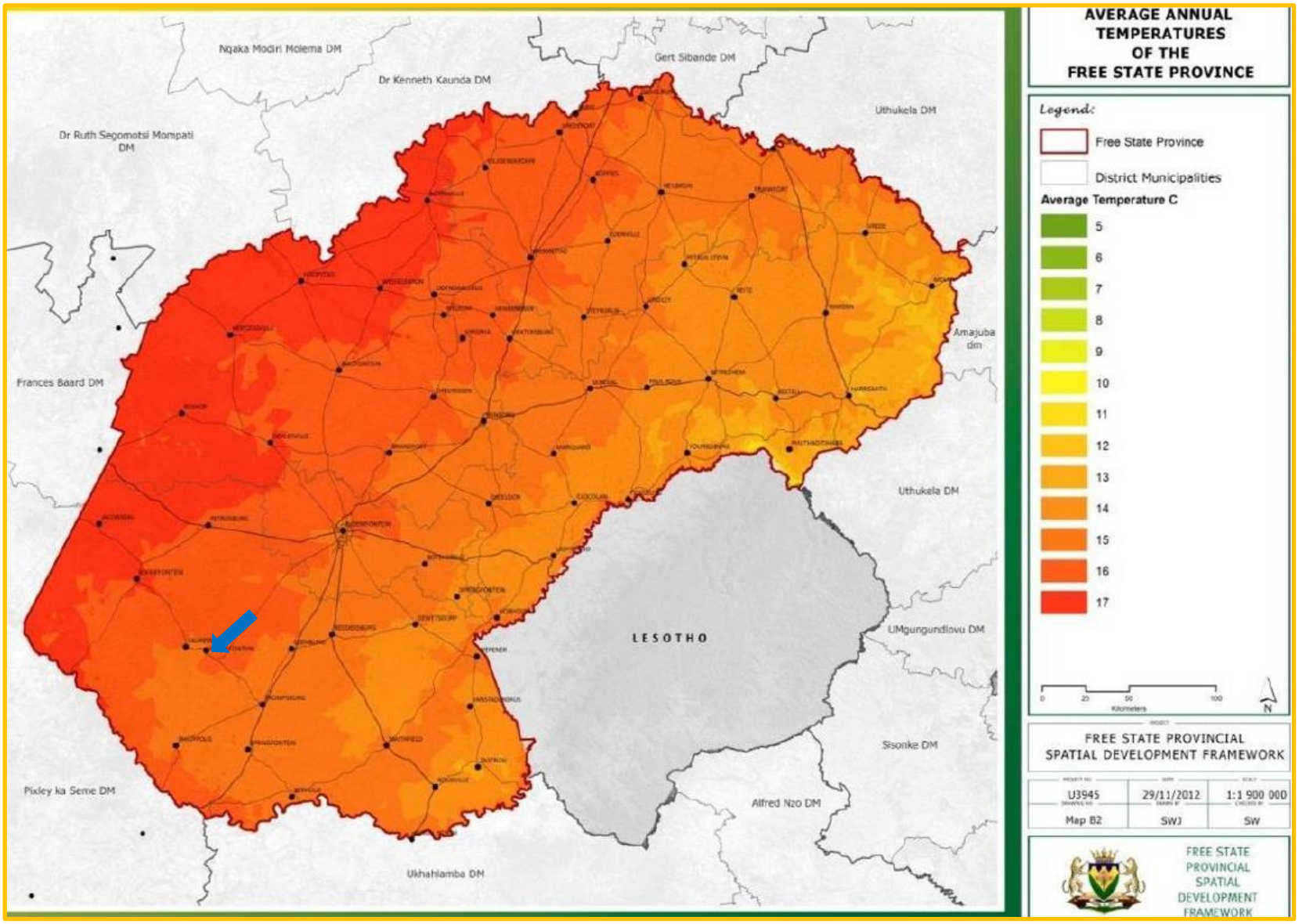


Figure g-2: Mean annual rainfall

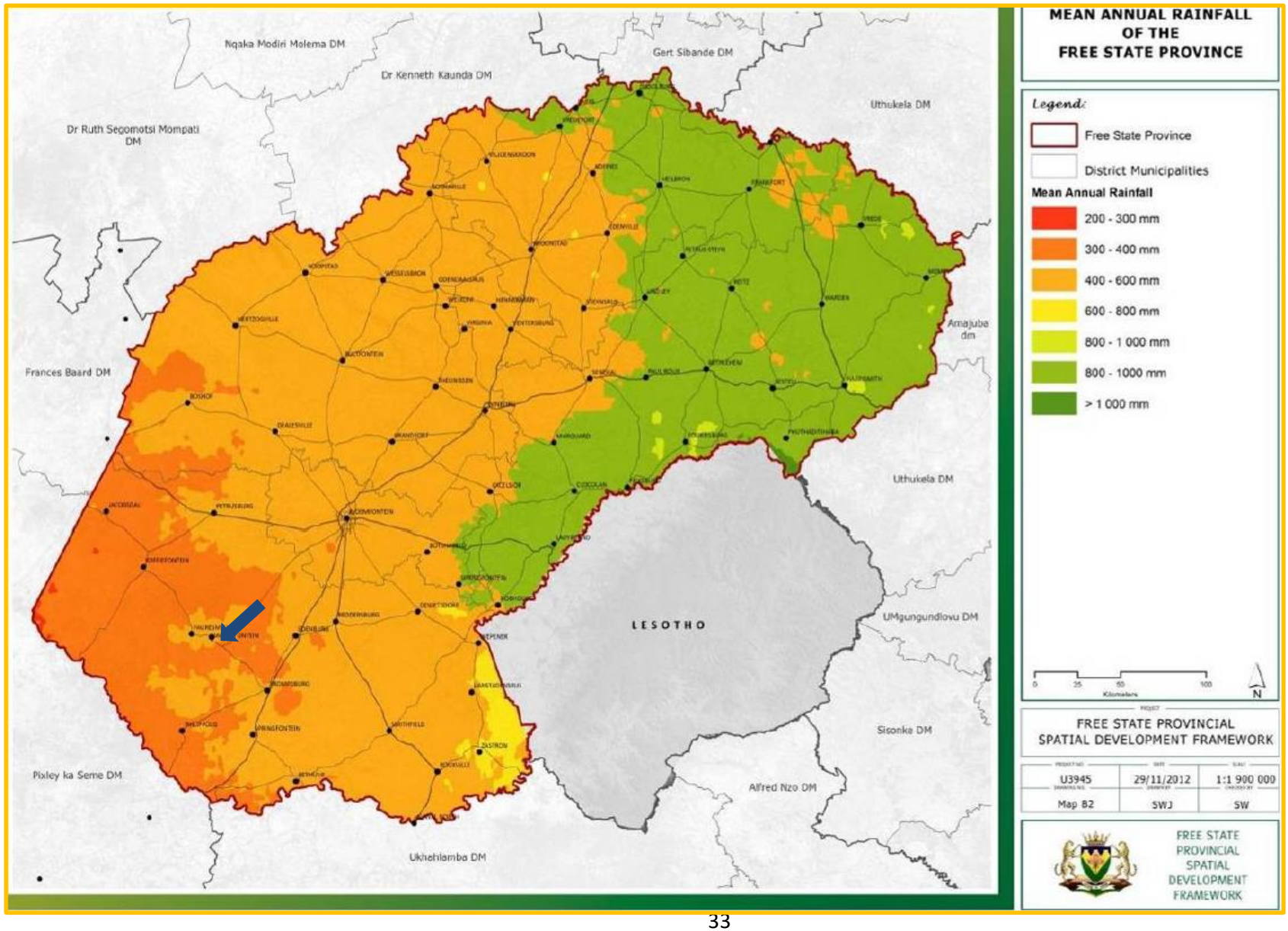


Figure h: Rivers of the Free State Province

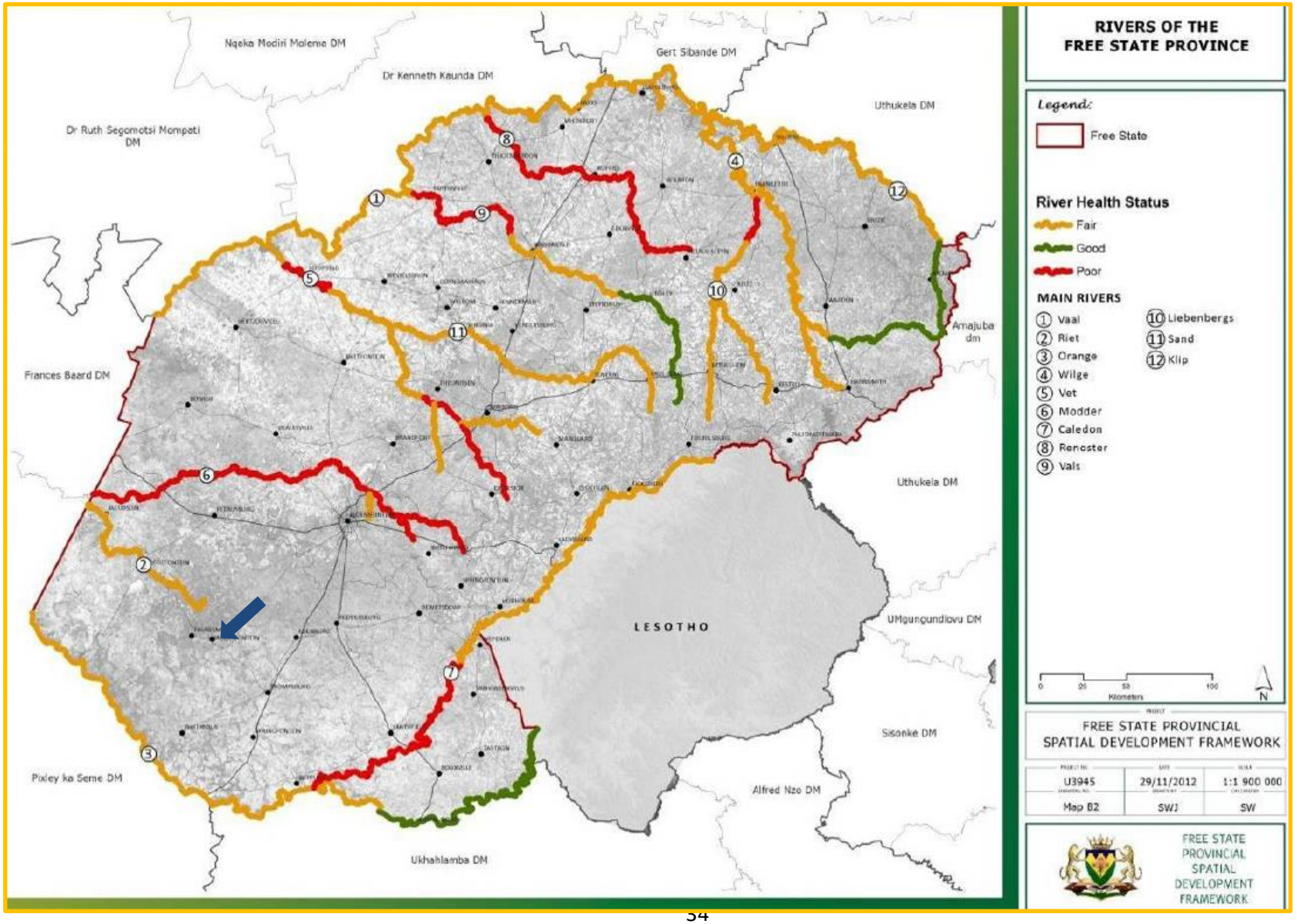
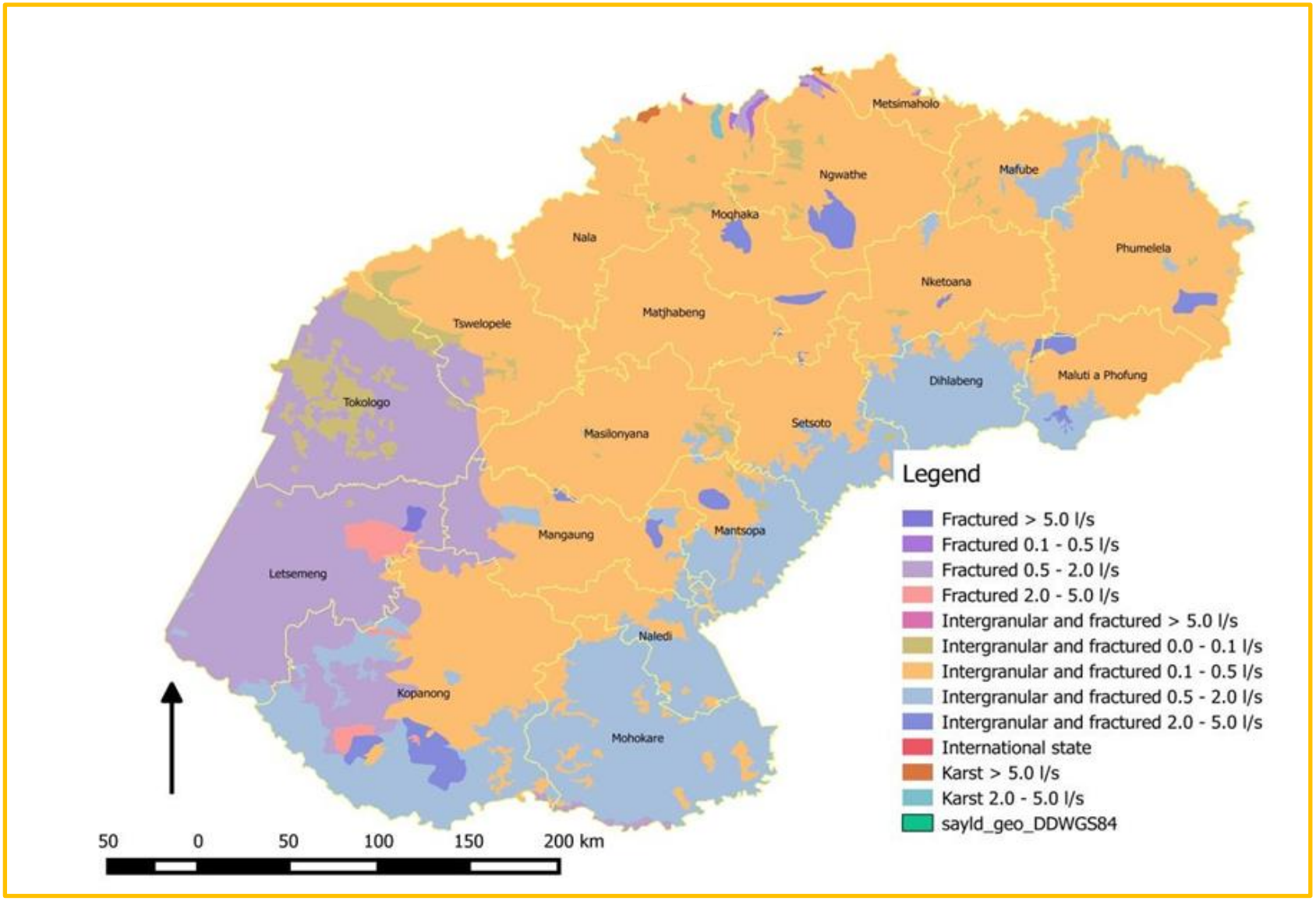


Figure i: Ground water Aquifer Type of the Free State Province



Biodiversity (Flora and Fauna)

No specific guidelines are given for the Free State Province in terms of habitat sensitivity mapping. The 2015 Free State Biodiversity Plan (http://bqis.sanbi.org), however, provides a map of Critical Biodiversity Areas (CBA's) and Ecological Support Areas (ESA's), which has conservation guidelines of different land-use areas in the province in mind.

Three main biomes are represented in the Free State and the prospecting are falls within the Grassland Biome which are represented by 25 vegetation units in the province **figure j.**

Eight Grassland are endemic to the Free State, namely Xhariep Karroid Grassland, Bloemfontein Dry Grassland, Central Free State Grassland, Winburg Grassy Shrubland, Western Free State Clay Grassland, Eastern Free State Clay Grassland, Frankfort Highveld Grassveld and Northern Free State Shrubland (Free State DETEA, 2009). The South African National Biodiversity Institute (SANBI) has instituted the 'Grasslands Programme' to help conserve biodiversity and ecosystem services of the Grassland Biome. An assessment of conservation priorities in the Grassland Biome identified broad biodiversity priority areas (36.7% of the biome). These priority areas are to be conserved to ensure adequate representation of biodiversity patterns and processes **figure k**. A key challenge to be addressed is that the Critical Biodiversity Areas as indicated by SANBI primarily occur on private and communal land.

The vegetation on the site consists of Xhariep Karroid Grassland (Gh 3) and Besemkaree Koppies Shrubland (Gh 4) (Mucina & Rutherford 2006).

Besemkaree Koppies Shrubland (Gh 4) is confined to the dolerite capped hills and ridges on the site (**Figure l**). These hills are scattered throughout the site but the highest concentration of these occur in the western portion of the site. These hills often from prominent features in the landscape. Due to the topography, hydrology, soil properties, etc. these hills contain vegetation differing markedly from that of the surrounding plains. In this region these hills are often the only landscape features able to sustain trees. Due to the above characteristics of these hills they also sustain a faunal component distinct from that of the surrounding plains. As a result, these hills are often considered sensitive as a result of a higher diversity, distinct species composition and prominent visual landscape forms.

The vegetation consists of a strong dominance of shrubs/small trees and grasses. Dominant trees and large shrubs include *Searsia burchellii, S. erosa, S. ciliata, Olea europea subsp. africana, Ehretia rigida, Buddleja saligna, Osyris lanceolata, Tarchonanthus minor, Gymnosporia buxiifolia and Cussonia paniculata*. This assemblage of species is diverse but all these species are widespread. However, two of these species are protected in the Free State Province. These species are the Wild Olive (*Olea europea subsp. africana*) and the Cabbage Tree (*Cussonia paniculata*). These species are common on the hills and rocky ridges on the site but are excluded from the plain's habitats. Many of these trees are old and large. These species are considered of moderate conservational importance.

Dominant grasses on the hills and rocky ridges include *Tragus koelerioides, Themeda triandra, Hyperhenia hirta, Cymbopogon plurinodis, Elionurus muticus, Aristida diffusa, Heteropogon contortus, Eustachys paspaloides and Pogonathria squarrosa*. These grass species indicate a system in a good condition. These hills and ridges also contain a high diversity of herbs and dwarf shrubs. Although these species never dominate, they are common between grasses, under trees, in rock fissures and other micro habitats occurring on these hills. Exotic weeds and invaders are not common on these hills and this also substantiates the relatively good condition of the vegetation.

Weeds that were observed on these hills include *Opuntia ficus-indica, Nicotiana glauca and Conyza bonariensis*. These hills and ridges contain several succulent species. These include *Aloe broomii, A. calviiflora, Chasmatophyllum mustellinum, Crassula corallina and Anacampseros filamentosa*. Of these *Aloe broomii, A. claviiflora and Anacampseros filamentosa* are protected species. It is not foreseen that these species will be affected by prospecting activities as long as these hills and ridges are treated as no-go areas.

Xhariep Karroid Grassland (Gh 3) is confined to the plains on the site (Map 2). Due to the scattered hills on the site the plains contain a slight slope over most of the site. Due to these hills and sloped plains, drainage lines and seasonal streams are common on the site. The plains are characterised by a strong dominance of grass species with dwarf karroid shrubs common. The plains are usually devoid of shrubs and trees and this should be the natural condition of the plains. However, during the late 19th century the miners of the Jagersfontein Pit used large portions of the plains to weather the excavated kimberlite before processing. Large areas of these plains still contain kimberlite boulders and small kimberlite heaps litters the plains and strewn boulders are also common on the plains. The plains on the site occur on deep soils with surface rock absent. This is due to the sediment eroded from the surrounding hills being deposited on the plains. The grass dominated vegetation has also adapted to these deep soils devoid of any surface rock. As a consequence of the remaining kimberlite rubble the vegetation has also been altered to some extent. The kimberlite rubble has formed suitable habitat for the establishment of large shrubs and trees as well as dwarf shrubs. The vegetation on large portions of the plains has therefore been altered to some extent by previous dumping of kimberlite rubble, however, since this occurred such a long time ago the vegetation has stabilised and although transformed it is not disturbed.

The diversity of species and growth forms on these plains are much lower than the surrounding hills. This is in part due to the uniform habitat available on the plains. As a consequence, the species are few and most possess the same growth form.

Dominant grasses on the plains include *Themeda triandra, Tragus koeleioides, Eragrostis lehmanniana, Cynodon dactylon, Chloris virgata, Aristida congesta and Digitaria eriantha*. Many of these species, i.e. *Tragus koeleioides, Eragrostis lehmanniana, Cynodon dactylon, Chloris virgata and Aristida congesta*, indicate disturbance and vegetation that is not in a climax stage. This can be attributed to the overgrazing by domestic and introduced game, previous kimberlite strewn rubble and inadequately constructed roadways.

Dwarf karroid shrubs and herbs include *Geigeria fillifolia, Rosenia humilis, Nenax microphylla, Pentzia incana, Lycium horridum, Tallinum caffrum, Hertia pallens Lotononis laxa, Conyza bonariensis, Wahlenbergia nodosa and Chrysocoma ciliata*.

Several specimens of small trees have become established on the plains. Although these are not natural to the species composition and vegetation structure of the plains they have established as a result of previous kimberlite rubble weathering done by miners. These tree species include *Diospyros lycioides and Searsia pyroides*.

The bulbous species *Brunsvigia radulosa and Ammocharis coranica* are rare on the plains. These species are widespread but are protected in the Free State Province and are listed as being of Least Concern under the National Red List. As long as mining activities do not occur on the plain's areas in good condition the impact on these species are anticipated to remain low.

The distribution of vegetation types in different conservation categories is shown in **figure I**.

There are no Centers of Endemism that occur near to the proposed prospecting area. Approximately 3.4% of the land surface of the Free State is formally conserved (SOER 2009). There are currently 18 provincial nature reserves, which represents only 1.6% of the province. The SOER (2009) states that the reserves are fragmented areas throughout the province and were not necessarily selected for their importance with regard to biodiversity or cultural heritage. No protected areas are located within a 10Km radius of the prospecting area **figure m**. According to the Free State Biodiversity plan most of the prospecting area is covered by ecological support areas **figure n**.

Heritage/ cultural and palaeontological resources

The Stone Age is particularly evident along rivers, pans and valleys in the province. The archaeological sites at Fauresmith include stone tools such as blades, points and prepared core technology dating back to at least 420 000 years ago. The world-famous skull remains discovered at Florisbad, north of Bloemfontein, which date back to more than 260 000 years, is widely considered an archaic form of Homo sapiens (Free State Tourism, 2011 and Erasmus, 2004).

Late Stone Age (the past 20 000 years) remains are associated with the Bushman or San huntergatherers, and tend to be preserved mostly in the foothills and rocky outcrops. Late Stone Age deposits in the Free State are often found in conjunction with rock art. The significance of archaeological remains can fluctuate depending on the context of the deposits and the degree of preservation.

The Free State has for thousands of years been inhabited by the San. Small groups of these hunter-gatherers traversed the landscapes, collecting plants, hunting animals etc. Their most important legacy is their rock art. The Free State has some of the most valued San rock art in South Africa.

Other historical sites and buildings are of relevance to many facets of the South African history, including Jagersfontein that was established in 1870 and is South Africa's oldest mining town. Eight of the 24 biggest diamonds ever found in the world came from this very productive diamond mine. The mine is reputed to be one of the largest, man-made, vertical-sided open diamond mines in the world.

The Free State is very rich in palaeontological sites, with some 4000 fossil specimens curated in the collection of the National Museum in Bloemfontein. The Eastern and Southern Free State areas are the prime collecting areas, with particular emphasis on the Clarens and Elliot Formations of the Beaufort Group.

Figure j: Biomes of the Free State Province

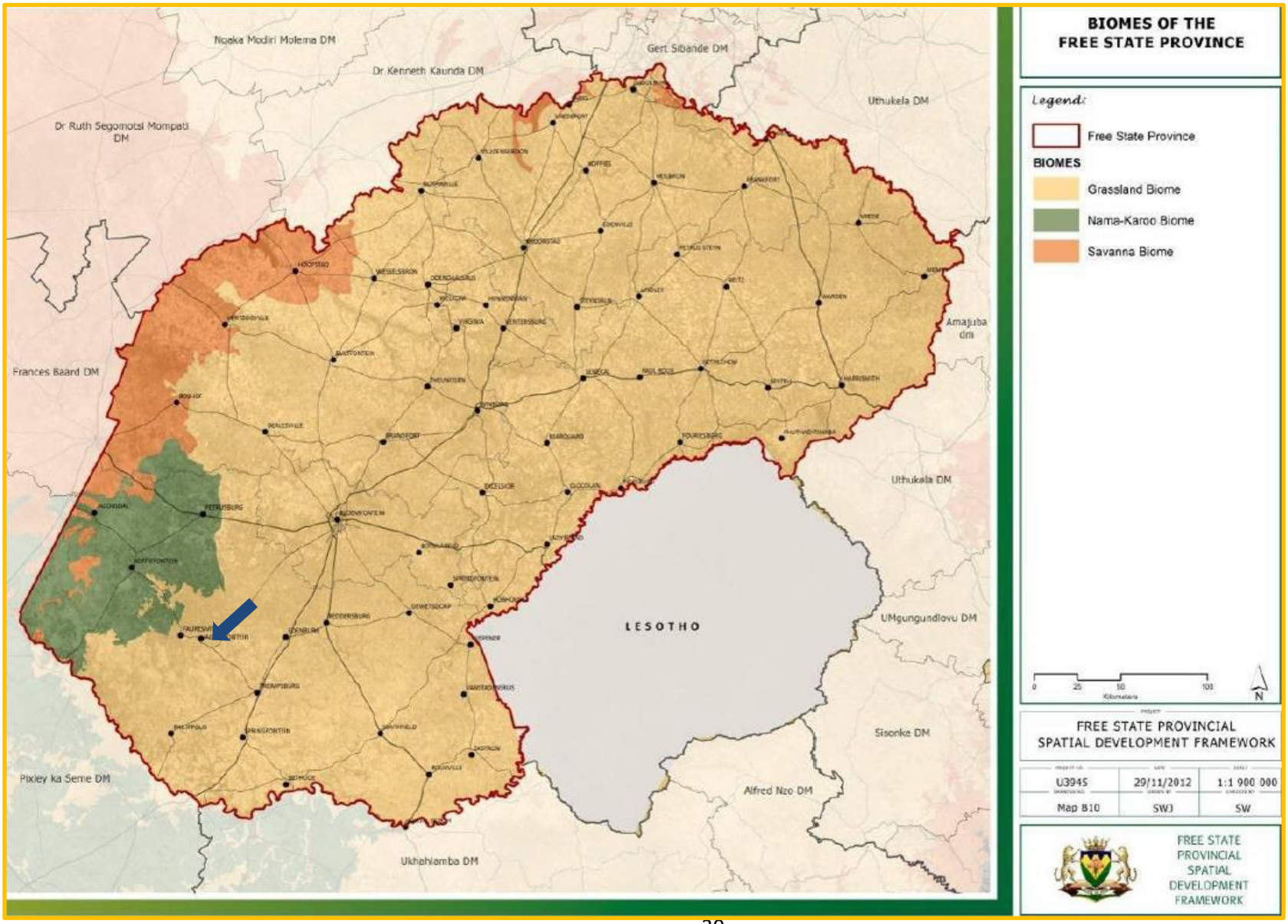


Figure k: Critical Biodiversity Areas

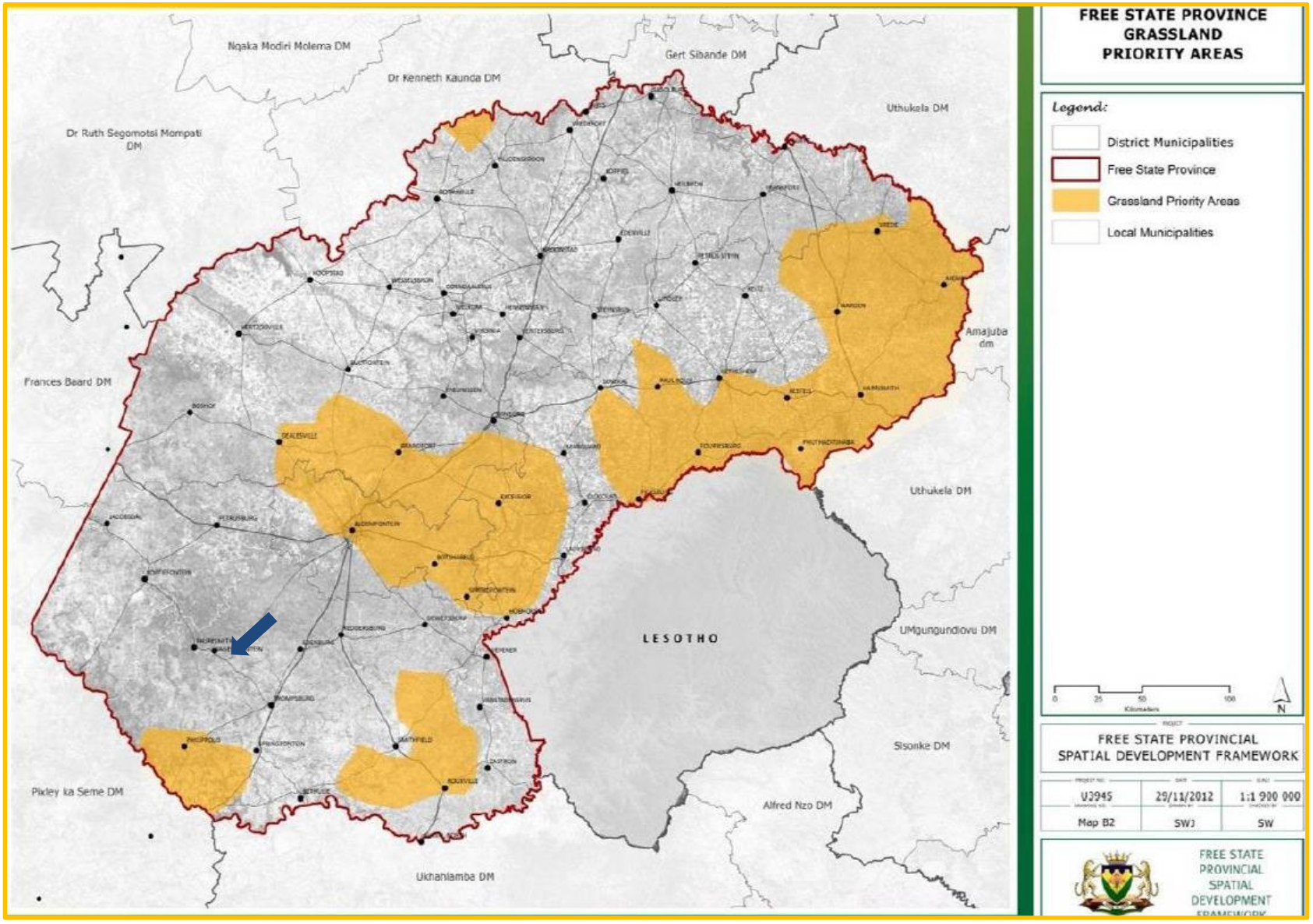


Figure I: Vegetation units

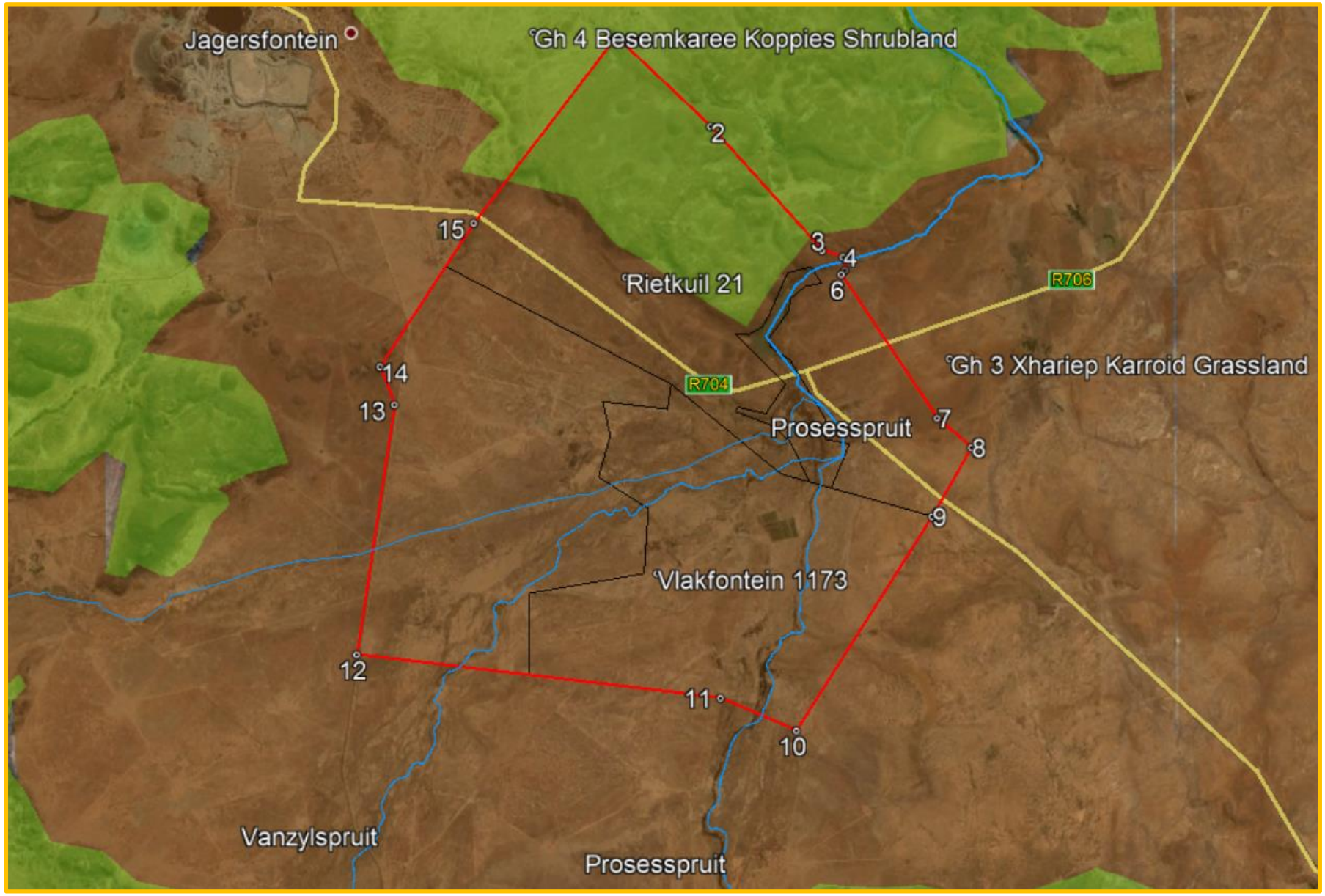


Figure m: Protected areas

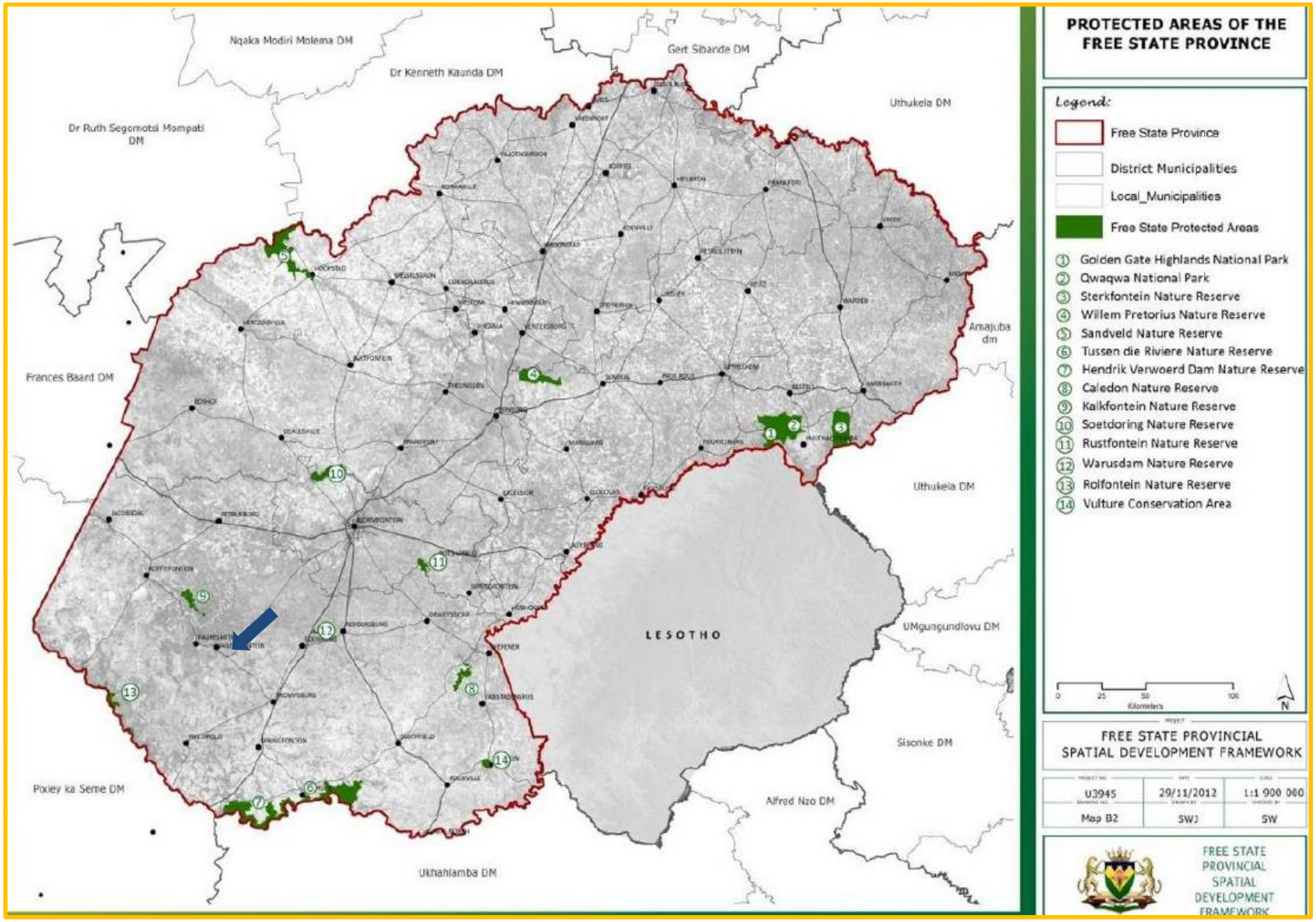
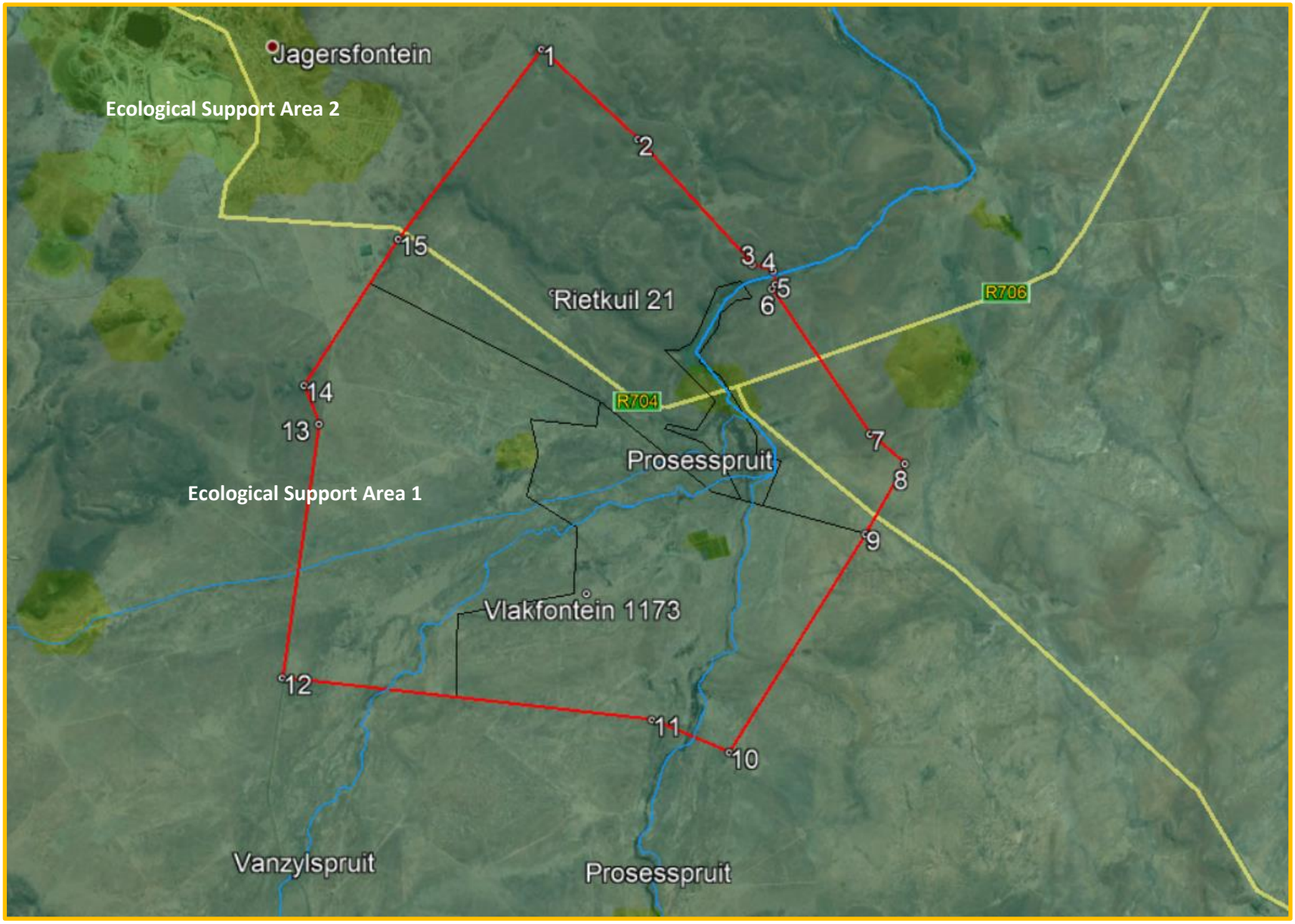


Figure n: Threatened Ecosystems



Socio-economic

The Free State has the second lowest population density of all provinces with an estimated population of 2 759 644 (Stats SA, 2011). The population grew by approximately 0.14% since the 2001 census. The Black population are the largest group, representing 46% of the Free State's population. The male/female ration is almost equal with approximately 51% (1 427 642) of the total population being female and approximately 49% (1 332 002) being male.

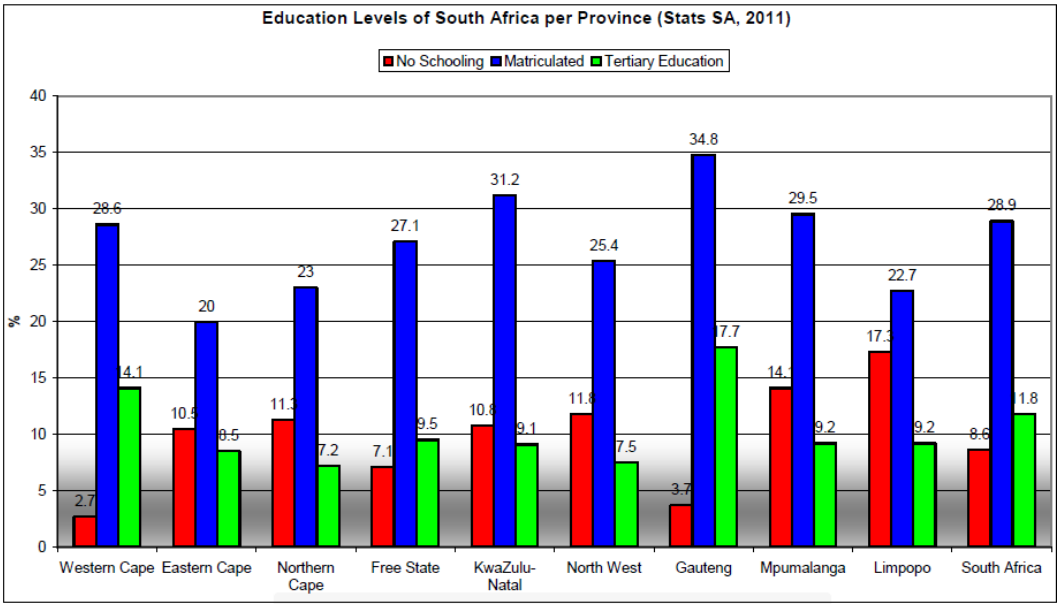
The Free State has experienced a change in its economic sectors over the recent decades specifically in the primary sectors of agriculture and mining. This presented many challenges for the Free State economy of which unemployment is one of the most concerning. Over the last 15 years (prior to 2012) 200 000 jobs in the primary and secondary sectors were lost (FSGDS 2012).

Over the past decade there has been little to no variance in the Human Development Index (HDI) figures for the Free State, indicating no increase or decrease in the overall standard of living. This trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, the decline of the primary sector and the consolidation of the economic base in the relatively better-off areas, and the increase in HIV and AIDS. The estimated HDI for the Free State is 0.54 (2010) almost equal to the South African figure of 0.56 (2010).

As with most of South Africa, poverty is a major problem in the Free State with a high number of households living below the poverty line. At the national level, 48% of households live on less than R322 a month. Approximately 50% of South Africa's population lives on 8% of national income. The Gini coefficient has increased from 0.59 in 1996 to 0.64 in 2010, which implies that income distribution has deteriorated (FSGDS, 2012).

Education and literacy levels

In the Free State, the educational profile from pre-1994 years has significantly improved. Functional literacy has increased from 64% in 1994 to approximately 80% in 2010. The Grade 12 pass rate has increased from 56% to 71% in 2010. Notwithstanding these improvements, only 23% of the Free State population have a Grade 12 qualification and only 8% a tertiary qualification.

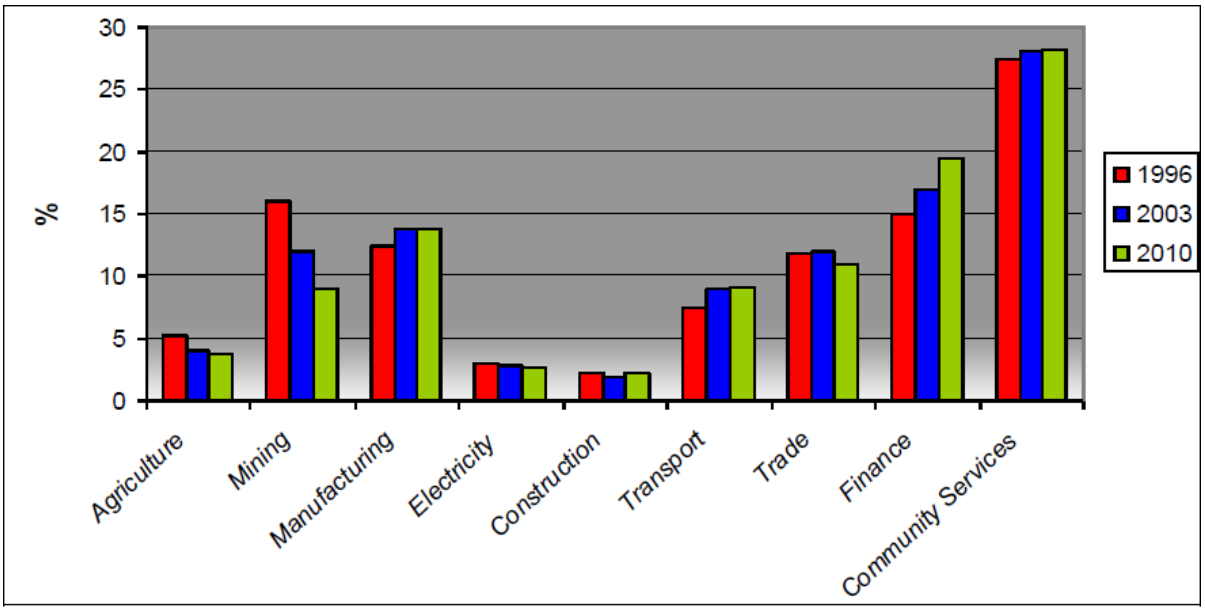


Economic profile

Historically, the Free State's economic sector was essentially based on the agricultural and mining sector, contributing more than 50% to the Free State's economy. In the period between 1997 and 2012, the Free State's economy has experienced profound structural changes in the mining and agriculture sector. The overall decline in the agriculture and mining sector is an indication of a maturing economy and of the basic trends currently visible throughout all of South Africa's provinces, namely growth in financial industries, expansion of technological and information-based enterprises, increase of tourism industries, etc. This trend however holds many challenges for the Free State, such as:

- Increasing levels of unemployment in the primary sector.
- Economic growth has been occurring in knowledge-based sectors (secondary and tertiary) meaning the unemployed population in the primary sector finds it hard/or virtually impossible to find jobs.
- Due an increasing secondary and tertiary sector, coupled with aspects of deregulation and improvements in general of infrastructure (i.e. transport), has placed enormous pressure on small towns which where historically linked to agricultural production and services.
- The decrease of the economic viability of the agricultural and mining production has led to changing demographic patterns, especially pertaining to migration of people in the province. Unemployed population groups migrate from commercial farms and/or mining areas to the nearest urban areas and settlements. Furthermore, an increase has occurred of the unemployed people in the Free State migrating to neighbouring provinces such as Gauteng and Mpumalanga.

The combined figure below illustrates the economic contribution of the various sectors to the Free State in 1996, 2003 and 2010.25 As indicated by the figure, the mining sector's contribution to the province decreased from 16% to 9%, and agriculture's economic contribution decreased from 5.3% in 1996 to below 4% in 2010. The finance sector is the only economic sector in the Free State that has shown a significant increase from 1996 to 2010, whilst the community services sector had a slight increase over the last 14 years. Furthermore, moderate increases, stagnant positions or a moderate decline were reported for manufacturing, construction, electricity and trade (FSGDS, 2012).



Description of specific environmental features and infrastructure on the site.
Based on the outcomes of the initial prospecting phases (non-invasive activities), the location of any invasive activities such as drilling will be determined and the impacts on the identified water courses will subsequently be determined. It is expected that for the invasive activities (drilling), only localised clearing of grass and shrubs are required in order to prepare a drill pad. The farmstead dwellings and other farm infrastructure will be avoided as far as possible.
The area also has a number of roads that traverse the sites, from the R518 and R519 and secondary roads as well as farm tracks. The invasive activities will seek to use existing roads in order to access the property and it is not expected that any new access roads will be opened up. The map **Figure b** above gives an overview of the site and the main settlements and roads that traverse the site.

4.5.5 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be avoided, managed or mitigated

As described earlier in this report, the prospecting activities will comprise of desktop and geophysical activities and dependant on the outcome of these phases, targets will be selected for drilling activities. The impact assessment therefore focuses only on the invasive aspects (drilling and associated activities) as these will have the potential to impact on the biophysical and social environment. The impact assessment is furthermore separated into three distinct phases, namely:

- Construction phase (Site establishment);
- Operational phase (Drilling), and.
- Decommissioning

The potential environmental and social impacts

Phase	Activities	Potential Impacts	Reversible	Irreplaceable Damage	Can impact be avoided
Construction Phase Site establishment	Site Access	Disturbance of onsite flora and fauna	Yes	No	No
		Soil compaction from repeated use of access track to drill sites (twee-spoor)	Yes	No	No
	Site Establishment Activities (including: topsoil stripping and stockpiling (if necessary), erection of temporary equipment laydown area, waste generation and management)	Impact on heritage artefacts, heritage sites and grave yards	No	Yes	Yes
		Noise Generation	Yes	No	No
		Visual intrusion	Yes	No	No
		Dust fall & nuisance from activities, dust emission from top soil stripping (if necessary)	Yes	No	No
		Wildlife and Vegetation disturbance from drill pad preparation	Yes	No	No
		Surface water and groundwater use and contamination from hydrocarbons	Yes	No	Yes
		Contamination and disturbance of soil from drill pad preparation, compaction and soil disturbance due to topsoil stockpiling	Yes	No	No
		Socio- economic impact on existing land use practices	Yes	No	No
Operational Phase Drilling	Drilling and Sample Analysis (including: refueling, soil/ rock-chip sample analysis, drill fluid collection, storage and evaporation, waste generation and management)	Disturbance or damage to cultural and heritage resources such as graves or historic ruins	No	Yes	Yes
		Noise caused by the drilling rig travelling to and being established on each site, the diesel engine driving the drill, vehicles going to and from the drilling site	Yes	No	No
		Visibility of the drilling rig	Yes	No	No
		Dust emissions from drilling and general site activities (vehicle entrained dust)	Yes	No	No
		Wildlife and Vegetation disturbance from drilling	Yes	No	No
		Impact on limited water resources abstraction	Yes	No	Yes

Operational Phase Drilling	Drilling and Sample Analysis (including: refueling, soil/ rock-chip sample analysis, drill fluid collection, storage and evaporation, waste generation and management)	Surface- and groundwater use and contamination from drill fluids, hydrocarbon spills and drill maintenance activities (if necessary)	Yes	No	Yes
		Contamination and disturbance (compaction) of soil due to drilling activities	Yes	No	No
		Socio- economic impact on existing land use practices	Yes	No	No
Decommissioning Phase	Removal of excess drilling mud, soil rock chips and rehabilitation of the drill site by scarifying compacted areas and vehicle tracks, spreading topsoil and borehole capping)	Dust emission from decommissioning activities (vehicle entrained dust)	Yes	No	Yes
		Soil erosion of topsoil	Yes	No	Yes

4.5.6 Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

Evaluating the impact of a risk is to determine the probability, severity, frequency and duration of the risk. These are all valuated separately and then combined to produce a risk impact; insignificant (1, green), medium (2, yellow) or significant (3, red). In some instances, the impact of a risk will be classified as uncertain due to lack of information.

For a risk with a rating of 3 (i.e. significant), strategies are put in place to reduce the risk to 1 (insignificant) or 2 (medium, provided that the risk can be controlled with management actions).

To maintain the rating at 1 or 2, monitoring is implemented for a period of time to enable the confirmation of the risk as insignificant or as medium and under control.

At the time of final mine closure an application will be made to DMR for a mine closure certificate only when all risks have been confirmed as insignificant or medium and under control via management actions.

Evaluating the probability

There are no standard methods of evaluating the probability of occurrence. All methods used rely on some form of subjective judgment and, therefore, agreed criteria have to be used in the evaluation. Values are assigned for the probability of occurrence of the relative strength of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for unlikely, 2 for could be/could happen/unknown, and 3 for definite/has happened/highly likely.

Evaluating the severity

In evaluating the severity of a potential impact there are various criteria that can be applied to determine the level of risk associated with the consequences of an action occurring. These are the quantity of material/substance released and the probable size of the covered area or possible spread of impact. Combinations of descriptions for what are considered to be different levels of importance for the criteria can be integrated.

Values are assigned for the severity of the relative strength of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for insignificant, - natural and social functions and processes are not affected or minimally affected, 2 for medium significance - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way and 3 for high significance - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Evaluating the frequency

When evaluating the frequency of a potential impact any repetitive, continuous or time-linked characteristics of the impacts are taken into account. Values are assigned for the frequency of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for once off, 2 for intermittent, and 3 for ongoing/continuing/usually.

Evaluating the duration

The duration of a potential impact is based on the duration of the impact should the risk realise, i.e. the duration could be short-term, medium-term, long-term or permanent. Values are assigned for the duration of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for an

instant/point in time, 2 for temporary/ intermittent, and 3 for forever.
Values are calculated, as a function of the probability, severity, frequency and duration for different risks. The individual scores are added and a risk impact is assigned. The calculated sums of the possible permutations of probability, severity, frequency and duration range from 4 to 12. Combinations with a sum total of 6 and less were rated as insignificant, while those rating 10 and higher were defined as significant. Risks with ratings in between 6 and 10 have medium outcomes.

Environmental Significance rating of **insignificant** (combined score 0-6)

An insignificant impact is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.

Environmental Significance rating of **medium** (combined score 7-9)

If left unmanaged, an impact of medium significance could influence a decision about whether or not to proceed with a proposed project. Mitigation measures should be implemented.

Environmental Significance rating of **significant** (combined score 10-12)

A significant impact could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.

4.5.7 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

Refer to **Appendix 1** for the impact assessment tables.

Positive Impacts

This application is for prospecting activities which fall under the mining sector and would therefore make a contribution to one of the main employment sectors of the Waterberg District. Mining is the most contributing economic sector for the municipality at 59.21%. The prospecting activities themselves would not directly lead to job opportunities. Should the prospecting activities however prove to be financially viable, then mining activities would generate employment opportunities

Negative Impacts (Refer table section 3.8.5)

The key potential negative impacts associated with the prospecting activity are those typically associated with drilling activities, which include the following:

- Site Access
  - Disturbance of onsite flora and fauna
  - Soil compaction from repeated use of access track to drill sites (twee-spoor) and soil disturbance due to topsoil stockpiling
- Site Establishment Activities (including: topsoil stripping and stockpiling (if necessary), erection of temporary equipment laydown area, waste generation and management)
  - Impact on heritage artefacts, heritage sites and grave yards
  - Noise Generation
  - Visual intrusion
  - Dust fall & nuisance from activities, dust emission from top soil stripping (if necessary)
  - Wildlife and Vegetation disturbance from drill pad preparation
  - Soil, surface water and groundwater use and contamination from hydrocarbons

- Socio- economic impact with regard to overlapping activities of other mining activities on the same property, existing land use impact on game farming, hunting and tourism and friction between local resident's land owners and construction personnel

- Drilling and Sample Analysis (including: refueling, soil/ rock-chip sample analysis, drill fluid collection, storage and evaporation, waste generation and management)
  - Noise caused by the drilling rig travelling to and being established on each site, the diesel engine driving the drill, vehicles going to and from the drilling site
  - Impact on limited water resources abstraction
  - Water and soil pollution from drill fluids, hydrocarbon spills and drill maintenance activities (if necessary)
  - Dust emissions from drilling and general site activities (vehicle entrained dust)
  - Disturbance of soil from drill pad preparation and compaction
  - Visibility of the drilling rig
  - Disturbance or damage to cultural and heritage resources such as graves or historic ruins
  - Socio- economic impact with regard to overlapping activities of other mining activities on the same property, existing land use impact on game farming, hunting and tourism and friction between local resident's land owners and construction personnel
- Removal of excess drilling mud, soil rock chips and rehabilitation of the drill site by scarifying compacted areas and vehicle tracks, spreading topsoil and borehole capping)
  - Dust emission from decommissioning activities (vehicle entrained dust)
  - Soil erosion of topsoil

4.5.8 The possible mitigation measures that could be applied and the level of risk.
Refer to **Appendix 1** for the impact assessment tables.
The key measures taken to mitigate the key potential impacts are as follows:

Site Access

- Disturbance of onsite wildlife and vegetation on access track

The impacts of access on wildlife and vegetation have been assessed as being of **insignificance** even before mitigation. The impact can be reduced by only using existing farm roads and tracks. Vehicles speed must take into account the possibility of collisions with fauna.

Where new access tracks (twee-spoor) are required to get the drill rig to the drilling site the activity will be limited to the smallest area that is necessary and by rehabilitating the disturbed area immediately after completion of the activity. Furthermore, no clear scraping (dozing) will be carried out unless absolutely necessary. Rather that surface vegetation be cleared to make way for the drilling rig leaving the roots intact so that vegetation can coppice and regrow.

- Soil compaction from repeated use of access track to drill sites

The impacts of access on soil compaction have been assessed as being of **insignificance** even before mitigation. The impact can be reduced by the mitigating measure above and where new access tracks are required to get the drill rig to the drilling site, such compacted tracks must be scarified immediately after completion of the activity. All tracks and drill traverses (twee-spoor) will be scarified and any topsoil

stockpiled removed to be spread over the disturbed area. Duel use access roads must be handed back to the landowner in a good state of repair.

Site Establishment

- Cultural and Heritage Resources

This stage entails clearing a maximum of 260m² per site to cater for the drill rig setup including associated equipment. This activity has the potential to impact on heritage artefacts, heritage sites and grave yards. The impacts could potentially be **significant.** The following mitigation measures will be implemented to **reduce the potential impact to insignificant:**

- Heritage Impact Assessment shall be conducted by an independent competent specialist prior to the drilling site establishment. This will ensure that all impacts on artefacts, heritage sites and graveyards in order to establish and implement mitigation measure to avoid significant impacts, where such significant impact cannot be avoided be minimised and mitigated.
- All personnel including contractors involved in the construction activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them (once drill sites have been identified, these sites will be screened by a qualified archaeologist/cultural heritage specialist);
- Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed;
- A safe distance of at least 50 metres will be maintained between the identified heritage resource and the construction activities. The heritage feature should be cordoned off with stakes and Chevron tape; and
- If any heritage resources are discovered as a result of the construction/set-up activities, such activities will cease with immediate effect and a qualified archaeologist will be commissioned to assess their significance and determine appropriate mitigation measures. This may include obtaining authorisation (permits) from SAHRA to conduct mitigation measures if any heritage resources have been affected. Authorisation must be obtained from SAHRA before any mitigation measures are implemented.

- Noise

Typical noise levels generated by various types of construction equipment are listed in the table below. Conservative attenuation conditions, related to intervening ground conditions and screening, have been applied.

Typical noise levels generated by construction equipment

Equipment	Typical operational Noise level at given offset (dBA)							
	5m	10m	25m	50m	100m	250m	500m	100m
Air compressor	91	85	77	71	65	57	51	46
Crane (mobile)	93	87	79	73	67	59	53	47
Dozer	95	89	81	75	69	61	55	49
Pump	86	80	72	66	60	52	46	40
Rock Drill	108	102	94	88	82	74	68	62
Trucks	87	81	73	67	64	60	57	54

In South Africa, the noise impact on human receptors is evaluated in terms of the SANS 10103 guidelines for sound pressure levels as listed in the table below.

Noise level standards for various districts

Type of District	Equivalent continuous rating level L_{ReC}|T for ambient noise - dBA					
	Outdoors			Indoors with windows open		
	Day-night	Daytime	Night	Day-	Daytime	Night-
Rural districts	45	45	35	35	35	25
Suburban district	50	50	40	40	40	30
Urban traffic	55	55	45	45	45	35
Urban districts	60	60	50	50	50	40
Central business district	65	65	55	55	55	45
Industrial district	70	70	60	60	60	50

Daytime and night-time refer to the hours from 06h00 to 22h00 and 22h00 to 06h00 respectively

Taking into account the existing background noise levels of the general area which is rural in nature, the significance of the noise caused by the drilling rig travelling to and being established on each site, vehicles going to and from each drilling site and the voices of the drilling crew, the impact is assessed as being ***insignificant*** before mitigation. Although mitigation measure is put in place the significance rating remains the same at ***insignificant*** by limiting the site establishment activities to daylight hours (06h00 to 18h00) and not undertaking such activities at all on Sundays and public holidays, as well as by applying a separation distance of a minimum 500m, but preferably 1000m between drill sites and any dwellings. The vehicles on site are limited to three LDVs and one water truck. It must be noted that the speed limit for driving within a community and prospecting right shall be limited to 40Km/h.

- Visual

The visual impact of the construction / setup activities is assessed as being of **Medium s*ignificant*** significance before mitigation. The impact can be reduced to one of **insignificance** by taking into account available vegetation screening, the locations of visual receptors on the prospecting areas and adjacent properties and locating the drilling rig in a way that it is screened from points of visual reception wherever possible.

- Dust fall

Acceptable dust fall rates in terms of the National Dust Control Regulations (GN R. 827 of 1 November 2013) are presented in the table below. In terms of these regulations, the local air quality officer may prescribe a dust fall monitoring programme, the implementation of dust control measures and continuous ambient air quality monitoring for PM10.

Acceptable dust fall rates

Restriction Areas	Dust fall rate (D) (mg/m^2/Day, 30- day average)	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1 200	Two within a year, not sequential months

The method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739: 1970, or equivalent method.
It is important to note that people experience dust deposition as a nuisance effect, and that there are no direct human health implications because the dust is not inhaled. Heavy dust deposition can have detrimental effects on plants if the leaves are smothered to the extent where transpiration and photosynthesis are affected.

The proposed operation falls within the boundaries of the Waterberg District Municipality's and the company may be required to operate within the air quality requirements of the Municipality's Air Quality Management Plan.
The impact of dust generation by vehicles travelling over unpaved areas is assessed as being of **in*significance*** even before mitigation. The impact can be reduced by wet suppression and enforcement of low vehicle speeds. Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings will also reduce the impact of dust fall.

- Disturbance of wildlife and vegetation

The impacts of drilling (drill pad clearing and compaction) have been assessed as being of ***medium* significance** before mitigation. The impact can be reduced to ***insignificant*** by limiting the activities and clearance to the smallest area that is necessary and rehabilitating the disturbed area as soon as possible. Furthermore, no clear scraping (dozing) will be carried out unless absolutely necessary to establish a level drill pad. Rather that surface vegetation be cleared to make way for the drilling rig leaving the roots intact so that vegetation can coppice and regrow.

- Surface water and groundwater use and contamination

The impact of contamination with hydrocarbons and disturbance of water resources is assessed as being of **medium *significant*** before mitigation. The impact can be reduced to one of ***insignificant*** by ensuring that measures are put in place to prevent any drilling activities within 100m from a water course. Maintaining all equipment as per supplier specification and lining under the drill rig and diesel bowser with PVC plastic lining to contain any spillages, should it occur including having oil spill kit as a recovery measure.

- Contamination and disturbance of soil from drill pad preparation, compaction and soil disturbance due to topsoil stockpiling

The impacts of soil compaction have been assessed as being of **insignificance** even before mitigation. The impact on contamination can be reduced by the mitigating measure above and by limiting the activities and clearance of the drill pad to the smallest area that is necessary. Furthermore, no clear scraping (dozing) will be carried out unless absolutely necessary to establish a level drill pad. All drill pads will be scarified and any topsoil stockpiled removed to be spread over the disturbed area immediately after completion of the activity.

- Socio- economic impact

The prospecting sites are located in a rural farming area with farm dwellings and tourism activities including hunting. Some landowners cherish the peaceful and quiet lifestyle of the area and friction between local residents and a crew of strangers is very possible. Conflict with other mining companies on the same property is also a possibility. The potential for conflict is assessed as being ***significant***, but it can be reduced to one of ***medium significance*** by taking appropriate social management measures. Non-invasive activities that will be completed off-site. During field-investigations a maximum of three specialists will require access. All access will be arranged beforehand with landowner and the project manager will be present at all times and will report to the landowner when accessing and leaving the property. Indemnity will be signed by all mining personnel entering the property.
Any other mining companies operating legally will be listed as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed. Agreements between current mining operations and landowner will be respected and adopted as part of this operation. Co-ordinate invasive activities with existing mining activities to reduce the time of disturbances Landowner will be updated with regard to

the progress of implementing the PWP and any invasive operation and concurrent rehabilitation will be planned in consultation with landowner.

Operational Phase

- Cultural and Heritage Resources

Drilling shall only be conducted on the target in which the heritage impact assessment was conducted and mitigation measures implemented. Therefore, the impact could be of insignificance. The significant rating will remain the same after mitigation measures at **insignificant**.

- Drilling equipment moving on site will, where ever possible, be confined to established roads and tracks. Where this is not possible, access routes will be walked prior to entry of equipment to ensure that there are no graves present.
- Should graves be identified, the access route will be realigned to avoid such heritage resources, which will then be clearly marked with stakes and Chevron tape to minimise risk of accidental damage.
- Efforts to achieve satisfactory prospecting results will employ appropriate methodologies aimed at the protection and conservation of heritage resources;
- All contractors and personnel involved in the prospecting activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them;
- Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed.
- A safe distance of at least 50 metres will be maintained between the identified heritage resource and drilling rig or any other infrastructure associated with the prospecting activities; and
- Where necessary, directional drilling will be practised to assess ore reserves situated below identified heritage resources, without affecting such resources;
- If any heritage resources are discovered as a result of the prospecting activities, such activities will cease with immediate effect and a qualified archaeologist will be commissioned to assess their significance and determine appropriate mitigation measures. This may include obtaining authorisation from SAHRA to conduct mitigation measures if any heritage resources have been affected. Authorisation must be obtained from SAHRA before any mitigation measures are implemented.

- Noise

The noise impact caused by the operation of the drilling rig, vehicles travelling to and from each drilling site and the voices of the drilling crew is assessed as being of ***medium* significance**. The impact can be reduced to one of ***insignificant*** by limiting the prospecting activities to daylight hours (07h00 to 18h00) and not undertaking such activities at all on Sundays and public holidays. Furthermore, a separation distance of minimum 500m, but preferably 1000m should be maintained between drill sites and dwellings as far as possible.

- Visual

The visual impact of the prospecting activities is assessed as being of **Medium Significance**. It can be reduced to one of **insignificance** by appropriate location of the drilling rig and other visually prominent items on the site and placement in consultation with the landowner. Existing vegetation must be use as far as possible to

screen the prospecting operations from view. If necessary, the operations can be screened from view by erecting a shade cloth barrier.

- Dust fall

The impact of dust generated by vehicles travelling over unpaved areas is assessed as being of **insignificance**, but it can be readily mitigated further by enforcement of low vehicle speeds, as well as by applying a separation distance of a minimum 500m, but preferably 1000m between drill sites and any dwellings.

- Disturbance of wildlife and vegetation

Disturbance of wildlife and vegetation in areas where drilling is done is rated as being of ***medium significance***. The impact can be reduced to ***insignificant*** by prior delineation of the drill site area via geophysical characterisation and drilling in order to minimise the area that needs to be cleared. Furthermore, no clear scraping (dozing) must be carried out unless absolutely necessary to establish a level drill pad. Rather that surface vegetation be cleared to make way for the drilling rig leaving the roots intact so that vegetation can coppice and regrow. Areas where vegetation has been transformed will have priority for establishment of drill pad and where necessary, directional drilling will be practised to assess ore reserves situated below identified virgin vegetation, without affecting such sensitive areas.

Invasive drilling activities will be aligned in consultation with landowner not to coincide with the breeding or hunting season.

- Surface- and groundwater contamination and use

Water will only be required for mineral processing if the work programme advances to the phase where large diameter drill sampling is undertaken. In this event, water will be required for the initial de-sliming of drill chip samples as the remainder of the sample treatment will take place away from the drill site (see Appendix 1). The amount of water required is unknown and is dependent on whether the drill holes intersect water. However, it is estimated that c 50001 of water will be required per large diameter drill hole to initiate the water recycling process. Each large diameter drill hole will take several days to complete. The water will be obtained from existing boreholes with the landowner's/occupier's permission or from a municipal source with the landowner's/occupier's permission.

The potential contamination of surface and groundwater with hydrocarbons is assessed as an impact of ***Medium*** significance. The impact can be reduced to one of ***insignificant*** by implementing the measures recommended for the construction phase.

Should any clay horizons be intersected in the drilling of boreholes, it may be necessary to use water mixed with a drilling lubricant to assist with removing the clay and rock chips from the borehole. Such drilling lubricants comprising non-polluting, biodegradable chemicals thicken the water to assist with the sealing off of the sidewalls of the borehole and the removal of mud generated by drilling through the clay horizons. Sealing off of the sidewalls of the borehole will also prevent interconnectivity of aquifers.

If such drilling is required, a drill sump will be excavated at each drill pad where clay is intersected and will be approximately 2.5m x 2.5m x 1.7m in extent and will be used to store and manage drilling fluid used during the drilling process (recycling of water). Each sump will be lined with a thick plastic liner to prevent seepage of the drilling water into the subsurface layers. The plastic liner will be reused at the other drill sites. The sumps will be demarcated with red and white tape or by other appropriate means. Each site will be rehabilitated directly after drilling and the drilling mud captured in the

sumps will be dried and stored in leak proof receptacles and drill spoils will be removed from site and disposed of at a suitably licensed Municipal waste disposal facility.
The limited amount of water required for drilling purposes will be transported to site and stored in bowsers in the immediate area of prospecting. Vehicle routes between the water source and the prospecting drilling site will be along existing vehicle tracks and/or the limited 'twee-spoor' tracks that may be required to drive the drilling rig to the drill site.
Drilling water requirements fall within the "small industrial user" where the use of water is less than twenty cubic meters per day for prospecting. The water that will be used for the prospecting activities will be sourced on agreement from an existing authorized water user which could be either the land owner or local municipality. The department responsible for water resources shall be consulted with regards to any water related agreement with either the land owner or local municipality prior to drilling. No water will be abstracted in terms of section 21(a) of National Water Act, 1998 (Act no. 36 of 1998).

- Contamination and disturbance of soil from drill pad preparation, compaction and soil disturbance due to topsoil stockpiling

The impacts of soil compaction have been assessed as being of **insignificance** even before mitigation. The impact on contamination can be reduced by the mitigating measure applicable to water contamination and by limiting the activities and clearance of the drill pad to the smallest area that is necessary. Furthermore, no clear scraping (dozing) will be carried out unless absolutely necessary to establish a level drill pad. All drill pads will be scarified and any topsoil stockpiled removed to be spread over the disturbed area immediately after completion of the activity.

- Socio- economic impact

The prospecting sites are located in a rural farming area with farm dwellings and tourism activities including hunting. Some landowners cherish the peaceful and quiet lifestyle of the area and friction between local residents and a crew of strangers is very possible. Conflict with other mining companies on the same property is also a possibility. The potential for conflict is assessed as being ***significant***, but it can be reduced to one of ***medium significance*** by taking appropriate social management measures.
Most of the time will be spend on non-invasive activities that will be completed off-site. During field-investigations a maximum of three specialists will require access. All access will be arranged beforehand with landowner and the project manager will be present at all times and will report to the landowner when accessing and leaving the property. Indemnity will be signed by all mining personnel entering the property.
Any other mining companies operating legally will be listed as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed. Agreements between current mining operations and landowner will be respected and adopted as part of this operation. Co-ordinate invasive activities with existing mining activities to reduce the time of disturbances
Invasive drilling activities will be aligned in consultation with landowner not to coincide with the breeding or hunting season. Limiting the invasive activities to daylight hours (06h00 to 18h00) and not undertaking such activities at all on Sundays and public holidays.
Applying a separation distance of a minimum 500m, but preferably 1000m between drill sites and any tourism infrastructure and dwellings.
Available vegetation to be used as screening of the locations of visual receptors on the prospecting areas and tourism activities.

Locating the drilling rig in a way that it is screened from points of visual reception (tourism infrastructure, access roads) wherever possible.
Most of the time will be spend on non-invasive activities that will be completed off-site. During field-investigations a maximum of three specialists will require access. All access will be arranged beforehand with landowner and the project manager will be present at all times and will report to the landowner when accessing and leaving the property. Indemnity will be signed by all mining personnel entering the property.

Decommissioning phase:
Decommissioning of borehole sites will take place immediately after each borehole has been completed and the drilling rig is moved to the next site.

Assessment of potential cumulative impacts
The cumulative impact assessment considers a scenario where more than one drilling rig and drill site is in operation at any point in time throughout the duration of the prospecting programme.

- The cumulative noise impact of the proposed prospecting operations on the above sensitive receptors is assessed as being of significant significance before mitigation. The impact can be reduced to one of Medium significance by limiting the construction/setup activities to daylight hours (06h00 to 18h00) and not undertaking such activities at all on Sundays and public holidays;
- The cumulative visual impact on the above sensitive receptors is assessed as being of Significant significance prior to mitigation;
- Without mitigation, the potential cumulative impact of dust generation on the above sensitive receptors is assessed as being of Medium significance;

A total of 10 boreholes per target will potentially be drilled with a combined footprint area of <1hectares maximum at the end of the prospecting programme once all holes have been drilled and then rehabilitated.

- Without mitigation, the potential cumulative impact of soil, surface water and groundwater contamination, as experienced by the sensitive receptors, is assessed as being of medium significance.

4.5.9 Motivation where no alternative sites were considered.
As discussed in previous sections, the proposed prospecting right area holds potential because of the presence of known kimberlite occurrences in the area as well as the diamond mining activities. The prospecting location has been informed by historical prospecting and production records for the area, as well as the most likely position of potential kimberlites within the kimberlite field. As such the applicant believes there is a possibility of encountering further diamond reserves within the prospecting area. The area included in this prospecting application is therefore regarded as the preferred site and alternative sites are not considered. The preferred site is informed by the most likely location of diamond deposits.

4.5.10 Statement motivating the alternative development location within the overall site. (Provide a statement motivating the final site layout that is proposed)
As discussed in previous sections, each of the prospecting phases is dependent on the results of the preceding phase. The location and layout of drill sites will be determined based on information derived from the desktop and geophysical surveys (non-invasive activities). Proposed drill sites will be selected so as to avoid known heritage sites, water courses, dwellings and infrastructure where practicable. Since

the invasive prospecting phase (drilling) is the dependent on the outcomes of Phases 1, the final site layout will be finalised on completion of Phases1. The conceptual site layout is provided in **Figure c**.

4.6 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.

This BAR and EMPr were compiled through a detailed desktop investigation in order to determine the environmental setting in which the project is located. Input from stakeholders during the public participation process also assist the EAP in the identification of any additional impacts associated with the proposed prospecting activities. The methodology described above was used to assess the significance of the potential impacts of the prospecting activities. The assessment of impacts is based on the experience of the EAP with similar projects. The applicant also has practical experience through exploration geologists and therefore the identification of impacts and assessment of their significance is informed by first-hand experience of drilling activities. The mitigation measures proposed are considered to be reasonable and based on the location of the prospecting area and must be implemented in order for the outcome of the assessment to be accurate.

4.7 Assessment of each identified potentially significant impact and risk

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFI-CANCE Without mitigation	MITIGATION TYPE	SIGNIFI-CANCE With mitigation
Site Access	Disturbance of onsite flora and fauna	Loss of/ disturbance to flora and fauna	Construction	In-significant	• Existing farm roads and tracks must be used as far as possible; • Where new access tracks are required to get the drill rig to the drilling site, such tracks must be scarified during decommissioning; • Vehicles speed must take into account the possibility of collisions with fauna.	In-significant
	Soil compaction from repeated use of access track to drill sites	Loss of soil resources	Construction	In-significant	• All compacted roads and drill sites will be scarified and any topsoil stockpiled to be spread over the disturbed area. • Duel use access roads must be handed back to the landowner in a good state of repair.	In-significant
Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary structures such as drill rod racks, waste generation and management)	Cultural and Heritage	Destruction and/or loss of Cultural and Heritage Resources	Construction	Medium	• A heritage survey by qualified archaeologist is required prior to any site activities on undisturbed land or access routes. • If any heritage resources are discovered as a result of the prospecting activities, such activities will cease with immediate effect and a qualified archaeologist will be commissioned to assess their significance and determine appropriate mitigation measures. • All personnel and contactors will be made aware of the locations of all identified heritage resources and the necessity of avoiding them. • Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites.	In-significant

Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary structures such as drill rod racks, waste generation and management)	Cultural and Heritage - continues				• A safe distance of at least 50 metres will be maintained between the identified heritage resource and prospecting activities. • Where necessary, directional drilling will be practised to assess ore reserves situated below identified heritage resources.	
	Noise	Noise Generation	Construction / Set-up	In-significant	• Construction/setup, operational and decommissioning activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays. • Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings. • Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition. • If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, or it will be placed in an acoustic enclosure, or an acoustic barrier will be erected between the source and the recipient.	In-significant
	Visual	Visual intrusion	Construction / Set-up	Medium	• The drilling rig and other visually prominent items on the site will be located in consultation with the landowner. • Make use of existing vegetation as far as possible to screen the prospecting operations from view. • If necessary, the operations can be screened from view by erecting a shade cloth barrier.	In-significant
	Dust fall	Dust fall & nuisance from activities	Construction / Set-up	In-significant	• Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings. • Low vehicle speeds will be enforced on unpaved surfaces.	In-significant

Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary structures such as drill rod racks, waste generation and management)	Wildlife and Vegetation disturbance from drill pad preparation	Vegetation and fauna disturbance from drill pad preparation	Construction / Set-up	Medium	• The soil disturbance and clearance of vegetation at drill pad areas will be limited to the absolute minimum required. • Rather that surface vegetation be cleared to make way for the drilling rig leaving the roots intact so that vegetation can coppice and regrow. • No clear scraping (dozing) or removal of topsoil will be carried out unless absolutely necessary to establish a level drill pad. • If dozing of drill pad are required topsoil must be stored separately and drill sites must be rehabilitated by scarifying disturbed and compacted areas and spreading topsoil • Disturbed areas will be revegetated with locally indigenous species as soon as possible. • Where new access tracks are required to get the drill rig to the drilling site, such tracks must be raked and revegetated during decommissioning. • Vehicles speed must take into account the possibility of collisions with fauna. • The design of the drill fluid sump must be such that it prevents fauna from gaining access to site and becoming trapped.	In-significant
	Surface water and groundwater	Soil, surface water and groundwater contamination from hydrocarbons	Construction / Set-up	Medium	• To ensure that measures are put in place to prevent any drilling activities within 100m from a water course. • A lined sump (with sufficient capacity) will be constructed to receive drill fluids and allow for evaporation should clays be intersected in the borehole. • If a drill pad needs to be levelled by dozing topsoil must be stripped from the area immediately surrounding the drill area and stockpiled. • Storm water must be diverted around the drill site topsoil stockpile to prevent erosion, if necessary. • Oils and lubricants must be stored within sealed containment structures.	

Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary structures such as drill rod racks, waste generation and management)	Surface water and groundwater - continues				• Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevents spills/ leaks onto the soil. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Machinery must be kept in good working order and regularly inspected for leaks. • A spill kit will be available on each site where prospecting activities are in progress. • Any spillages will be cleaned up immediately. • Drilling muds will contain in lined drill sumps and this material will be removed from site and disposed in a licensed disposal facility. • Storm water must be diverted around the drill site to prevent ingress of storm water. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken if practical for recycling.	
	Soil	Contamination and disturbance of soil from drill pad preparation, compaction and soil disturbance due to topsoil stockpiling	Construction / Set-up	Medium	• Same mitigating measures as for surface water and groundwater contamination from hydrocarbons • Limiting the activities and clearance of the drill pad to the smallest area that is necessary. No clear scraping (dozing) will be carried out unless absolutely necessary to establish a level drill pad. • All drill pads will be scarified and any topsoil stockpiled removed to be spread over the disturbed area immediately after completion of the activity	In-significant

Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary structures such as drill rod racks, waste generation and management)	Socio - economic impact	Conflicting land use	Construction / Set-up	Significant	Non-invasive activities will be completed off-site. • During field-investigations a maximum of three specialists will require access. • All access will be arranged beforehand with landowner and the project manager will be present at all times and will report to the landowner when accessing and leaving the property. • Indemnity will be signed by all mining personnel entering the property. • Any other mining companies operating legally will be listed as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed. • Agreements between current mining operations and landowner will be respected and adopted as part of this operation. • Co-ordinate invasive activities with existing mining activities to reduce the time of disturbances • Landowner will be updated with regard to the progress of implementing the PWP and any invasive operation and concurrent rehabilitation will be planned in consultation with landowner. • All operations will be carried out under the guidance of strong, experienced manager with proven skills in public consultation and conflict resolution. • All personnel will be made aware of the local conditions and sensitivities in the prospecting area and the requirements of the local residents. • There will be a strict requirement to treat local residents with respect and courtesy at all times.	Medium

Exploration drilling - Drilling - Drill maintenance & refueling - Core sample collection & storage - Vehicle movements - Waste generation & management	Cultural and Heritage	Destruction or loss of Cultural and Heritage Resources	Operations	In-significant	• If any heritage resources are discovered as a result of the prospecting activities, such activities will cease with immediate effect and a qualified archaeologist will be commissioned to assess their significance and determine appropriate mitigation measures. • All personnel and contactors will be made aware of the locations of all identified heritage resources and the necessity of avoiding them. • Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. • A safe distance of at least 50 metres will be maintained between the identified heritage resource and prospecting activities. • Where necessary, directional drilling will be practised to assess ore reserves situated below identified heritage resources.	In-significant
	Noise	Noise Generation	Operations	Medium	• Construction/setup, operational and decommissioning activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays. • Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings. • Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition. • If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, or it will be placed in an acoustic enclosure, or an acoustic barrier will be erected between the source and the recipient.	In-significant

Exploration drilling - Drilling - Drill maintenance & refueling - Core sample collection & storage - Vehicle movements - Waste generation & management	Visual	Visual intrusion	Operations	Medium	• The drilling rig and other visually prominent items on the site will be located in consultation with the landowner. • Make use of existing vegetation as far as possible to screen the prospecting operations from view. • If necessary, the operations can be screened	In-significant
	Dust fall	Dust fall & nuisance from activities	Operations	In-significant	• Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings. • Low vehicle speeds will be enforced on unpaved surfaces.	In-significant
	Wildlife and Vegetation disturbance from drilling	Vegetation and fauna disturbance from drilling	Operations	Medium	• The drill sites will be informed by the findings of non-invasive prospecting. • The disturbance and clearance of vegetation at drill pad areas will be limited to the absolute minimum required. • The drill sites must be clearly demarcated, and no activities may take place outside of demarcated areas. • Drill holes must be backfilled as soon as is practically possible after drilling is completed. • Drill sites must be rehabilitated by scarifying disturbed and compacted areas and spreading topsoil. • Disturbed areas will be revegetated with locally indigenous species as soon as possible. • The design of the drill fluid sump must be such that it prevents fauna from gaining access to site and becoming trapped. • Invasive drilling activities will be aligned in consultation with landowner not to coincide with the breeding or hunting season.	In-significant

Exploration drilling - Drilling - Drill maintenance & refueling - Core sample collection & storage - Vehicle movements - Waste generation & management	Surface water and groundwater	Surface water and groundwater use and contamination from hydrocarbons	Operations	Medium	• Proper vehicle maintenance. • Refuelling will be done with care to minimise the chance of spillages. • A spill kit will be available on each site where prospecting activities are in progress. • Any spillages will be cleaned up immediately. • Drilling muds will contain in lined drill sumps and this material will be removed from site and disposed in a licensed disposal facility. • Storm water must be diverted around the drill site to prevent ingress of storm water; • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken if practical for recycling. • Drilling water requirements will be less than twenty cubic meters per day for prospecting. • The water will be sourced on agreement from an existing authorized water user. • The department responsible for water resources shall be consulted with regards to any water use related agreement prior to drilling. • No water will be abstracted in terms of sec 21(a) of National Water Act, 1998.	In-significant
	Soil	Contamination and disturbance of soil from drill pad preparation, compaction and soil disturbance due to topsoil stockpiling	Operations		• The impact on contamination can be reduced by the mitigating measure applicable to water contamination. • Limiting activities and clearance of the drill pad to the smallest area that is necessary. • No clear scraping (dozing) will be carried out unless absolutely necessary to establish a level drill pad. • All drill pads will be scarified and any topsoil stockpiled removed to be spread over the disturbed area immediately after completion of the activity.	

Exploration drilling - Drilling - Drill maintenance & refueling - Core sample collection & storage - Vehicle movements - Waste generation & management	Socio- economic impact	Conflicting land use and friction between local resident's land owners and construction personnel	Operations	Significant	• Non-invasive activities will be completed off-site. • During field-investigations a maximum of three specialists will require access. • All access will be arranged beforehand with landowner and the project manager will be present at all times and will report to the landowner when accessing and leaving the property. • Indemnity will be signed by all mining personnel entering the property. • Any other mining companies operating legally will be listed as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed. • Agreements between current mining operations and landowner will be respected and adopted as part of this operation. • Co-ordinate invasive activities with existing mining activities to reduce the time of disturbances • Landowner will be updated with regard to the progress of implementing the PWP and any invasive operation and concurrent rehabilitation will be planned in consultation with landowner. • All operations will be carried out under the guidance of strong, experienced manager with proven skills in public consultation and conflict resolution. • All personnel will be made aware of the local conditions and sensitivities in the prospecting area and the requirements of the local residents. • There will be a strict requirement to treat local residents with respect and courtesy at all times.	Medium

Assessment of Potential Cumulative Impacts					
Noise	Noise generation	Construction / set-up and operation	Medium	As above	Medium
Visual	Visual intrusion	Construction / set-up and Operation	Medium	As above	Insignificant
Dust fall	Dust fall & nuisance from activities	Construction / set-up and Operation	Medium	As above	Insignificant
Wildlife and vegetation	Soil and vegetation disturbance from drill pad preparation	Construction / set-up and Operation	Medium	As above	Insignificant
Surface water and groundwater	Soil, surface water and Groundwater contamination from hydrocarbons	Construction / set-up and Operation	Medium	As above	Insignificant

The supporting impact assessment conducted by the EAP is attached as **Appendix 1** at the end of this document

4.8 Summary of specialist reports.

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with anX where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
No specialist studies have been undertaken. A desktop analysis has been followed that informs the compilation of this assessment. The EMPr does however include the commitment that an independent Heritage and Paleontologist professional be appointed to conduct a screening assessment. This will only be undertaken once non-invasive early exploration activities have been completed and, should the findings of those investigations determine that there is a need to progress to exploration drilling. It is only at that stage that the potential areas of drilling interest will be known.	NA		

4.9 Environmental impact statement

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

The majority of the prospecting activities are non-invasive and hence will have no environmental or social impact. The invasive activities will entail the drilling of approximately 10 exploration holes; which will have a minimal environmental and social impact as each drill pad will be confined to an area of approximately 160m² per site. The total anticipated area for disturbance is anticipated at less than 1 Ha which need to be viewed in the context of the entire prospecting license area under application which covers more than 1433.4049 hectares. The assessed impact ratings after implementation of the mitigation measures described above are as follows:

- Cultural and heritage – **in*significant***;
- Noise – **insignificant**;
- Visual impact – ***medium significance,*** *reducing to* ***insignificant***
- Dust fall – insignificant;
- Disturbance of wildlife and vegetation – ***medium significance***, reducing to **insignificant**;
- Contamination of surface water and groundwater – ***medium significance***, reducing to **insignificant**;
- Soil – ***medium significance***, reducing to **insignificant**; and
- Socio - economic impact – **significant** impact reducing to ***medium significance***.

All of the identified impacts will occur for a limited period and the extent of the impacts will be localised. All of the identified impacts can be suitably mitigated with the residual impact ratings being of insignificant.

The conservation status of the vegetation types in the area is regarded as “Least Threatened”; and no threatened ecosystems are present (Refer to **Figure I & j**).

The main impacts associated with the drilling activities (site disturbance) can be suitable mitigated.

After drilling activities have been completed and the drill pads rehabilitated to predrilling status, the impacts will cease to exist

4.9.2 Final Site Map

Please refer to figures above for the Environmental Sensitivities Maps including the area of interest (AOI) for proposed prospecting activities

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

<u>Positive Impacts</u>

This application is for prospecting activities. Should favourable results be obtained from exploratory drilling, and it is believed that diamond mining will be economically viable; such mining would contribute to one of the main employment sectors of the Local Municipality. The prospecting activities themselves would not directly lead to job opportunities.

<u>Negative Impacts</u>

- Possible destruction or loss of Cultural and Heritage Resources during the construction/set-up phase as well as during the operational phase as drilling commencing;
- Noise Generation from construction / set-up and operational activities of drilling;
- Visual intrusion caused by the drilling activities in the largely rural setting;
- Dust fall & nuisance from construction / drill site set-up;

- Wildlife and vegetation disturbance from drill pad preparation during the construction / set-up and operational phase as contractors rehabilitate one site and move to the next site and prepare it;
- Surface water and groundwater contamination from hydrocarbons during the construction/set-up and operational activities which include drill rig operation and use of vehicles on site; and
- Socio-Economic impact due to conflicting land uses during the construction / set-up and operational phase.

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

- 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: Heritage/cultural resources can be managed by avoidance of known resources and through consultation with landowners/stakeholders. Contractor personnel will also be briefed of these sensitivities and consequences of any damage/removal of such features; Should the exploration program advance to the drilling stage, a Phase 1 Heritage Assessment will be undertaken prior to identification of drill sites, once areas of drilling interest have been determined
- Noise generation can be managed through consultation and restriction of operating hours and by maintaining equipment and applying noise abatement equipment if necessary;
- Visual intrusion can be managed through consultation with landowners /stakeholders and by suitable siting of drill pads and use of screens (natural vegetation or shade cloth etc);
- Dust fall can be managed by reducing driving speeds when driving on unpaved roads and the use of water during drilling;
- Wildlife disturbance and clearance of vegetation at drill pad areas will be limited to the absolute minimum required and disturbed areas will be re-vegetated with locally indigenous species as soon as possible;
- Surface water and groundwater contamination by hydrocarbons can be managed by conducting proper vehicle maintenance, refuelling with care to minimise the chance of spillages and by having a spill kit available on each site where prospecting activities are in progress;
- Socio - economic impact can be managed by employing strong, experienced personnel with proven skills in public consultation and conflict resolution during stakeholder consultation phases. All prospecting personnel will be made aware of the local conditions and sensitivities in the prospecting area and that they treat local residents with respect and courtesy at all times.

4.11 Aspects for inclusion as conditions of Authorisation.

It is the opinion of the EAP that the following conditions should form part of the authorisation:

- Maintain a buffer of 100m from a water course;
- Maintain a minimum 500m (preferably 1000m) buffer from any farm infrastructure or dwelling;
- Conduct a heritage survey of the identified drill sites once these are known and prior to any activities being undertaken at these sites;
- Landowners and land occupiers should be engaged (re-consulted) at least 1 month prior to any site activities being undertaken once drill sites are known.

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

This report has been completed to the best of the EAPs ability, based on his experience and on information currently available to the EAP as well as provided by the applicant.

Comment received on the draft BAR were reviewed and incorporated into the final BAR and EMPr. As such, the public perception of the proposed activity is known. In addition, comments and inputs received from the authorities and public provided additional information which has been considered.

Mitigation measures are proposed which are considered to be reasonable and must be implemented in order for the outcome of the assessment to be accurate.

The location of drill sites is not yet known and will be identified through the phased approach of the prospecting programme. This assessment is therefore based on a desktop approach at a broad scale and assuming that drilling could occur anywhere around the anomalies identified for this programme.

Two drill sites are anticipated, then specific focus will be given to Cultural Heritage and Paleontological screening and assessment along possible access routes and at potential drilling sites in order to ensure that Heritage resources and artefacts as well as Palaeontological resources are not inadvertently damaged.

In addition, landowners will be re-engaged at this stage to communicate the company's intent to progress to drilling and to discuss the proposed drilling activities and identified locations with the landowner at that point in time.

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

4.13.1 Reasons why the activity should be authorized or not.

It is the opinion of the EAP that the proposed prospecting activities should be authorised. In reaching this conclusion the EAP has considered that;

- Based on historical prospecting results, there is a good possibility of encountering diamond deposits in the area.
- The exploration program will be developed in a stepwise manner commencing with non-invasive activities to bring refinement to understanding of the geological anomaly.
- Should the exploration program advance to include the need for exploration drilling, the environmental impacts associated with the limited drilling activities are deemed to be minimal provided that the proposed mitigation is implemented;
- The spatial extent of the physical impact is less than 1Ha over a prospecting right license area of 462 Ha hectares;
- With appropriate care and consideration, the impacts resulting from drilling can be suitably avoided, minimised or mitigated;

- With implementing the appropriate rehabilitation activities, the impacts associated with the drilling activities can be reversed.
- Without implementation of prospecting activities, the knowledge concerning the potential mineral resource within the prospecting right area will not be confirmed.

4.13.2 Conditions that must be included in the authorisation

It is the opinion of the EAP that the following conditions should form part of the authorisation:

- Maintain a buffer of 100m from a water course;
- Maintain a 500m (preferably 1000m) buffer from any farm infrastructure or dwelling;
- Conduct a heritage and palaeontology survey of the identified drill sites and access routes across undisturbed land once these are known and prior to any activities being undertaken at these sites;
- Landowners and land occupiers should be engaged (re-consulted) at least 1 month prior to any site activities being undertaken once drill sites are known

4.14 Period for which the Environmental Authorisation is required.

The authorisation is required for the duration of the prospecting right which is an initial 5 years plus a potential to extend the right by an additional 3 years. Normally there is also a time delay in the granting of applications for renewal therefore a total period of 10 years may be required.

4.15 Undertaking

An undertaking is provided at the end of this report.

4.16 Financial Provision

With the repeal of Section 41 of the MPRDA (Act 28 of 2002) that requires that the owner of a mine must make financial provision for the remediation of environmental damage, regulations pertaining to the financial provision for prospecting, exploration, mining or production operations under section 44, read with sections 24 of the National Environmental Management Act, 1998 (Act No.107 of 1998) were issued in 2015.

According to regulation 7 of the NEMA Financial Regulations (2015) the applicant or holder of a right or permit must ensure that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report contemplated in regulation 6 and regulation 11(1). In terms of regulation 11(1) of the NEMA Financial Regulations 2015 the holder of a right or permit must ensure that a review is undertaken of the requirements for (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

Financial provision in terms of regulation 6(c) of the NEMA Financial Regulations (2015) are covered by the requirements for the actual costs of implementation of the measures required for final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in the final rehabilitation, decommissioning and mine closure plan in terms of regulation 6(b) and attached as appendix 2.

4.16.1 Explain how the aforesaid amount was derived.
With the repeal of regulations 53 and 54 relating to financial provision in the Mineral and Petroleum Resources Development Regulations, 2004 determining the financial provision through the use of a standard rate or standard rehabilitation cost calculator is no longer applicable and replaced by regulation 6 of the NEMA Financial Regulations (2015). According to regulation 6 of the NEMA Financial Regulations (2015) an applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for— (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

4.16.2 Confirm that this amount can be provided for from operating expenditure.
The amount determined by the competent authority needed for the implementation of the final rehabilitation, decommissioning and closure plan will be provided to DMR in the form of a bank guarantee and the plan will be revised on an annual basis in terms of regulation 11(1) of the Nema Financial Regulations 2015.
Provision for implementation of annual rehabilitation plan to be provided as part of the environmental audit report in terms of Regulation 34 (1)(b) of the NEMA EIA Regulations (2014) will be provided as part of the operational budget and proof of access to the necessary fund were provided as part of the PWP together with proof of access to the necessary financial resources.

4.17 Specific Information required by the competent Authority

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

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

A full consultation process has been implemented during the environmental authorisation process. The purpose of the consultation is to provide affected persons the opportunity to raise any potential concerns. Concerns raised are captured and addressed within the public participation section of this report to inform the decision-making process. As the final positioning of the drill sites cannot be confirmed without completion of phase 1 of the prospecting work programme, a recommendation has been made to ensure that the directly affected landowners are re-consulted a minimum of 1 month prior to drilling. The purpose of the re-consultation is to allow for socio-economic impacts on directly affected persons to be raised and where possible addressed.

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

A Phase 1 Heritage Impact Assessment inclusive of a Paleontological Impact Assessment will be conducted by a suitably qualified archaeologist and palaeontologist respectively of the drill sites prior to drilling in order to identify any resources of significance. No drill site will be located within 50m of any identified site.

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

A motivation for not investigating reasonable and feasible alternatives is provided in **Section h paragraph (ix)** above. The prospecting location has been informed by historical prospecting and production records for the area. The proposed prospecting activities requested as part of this authorisation is the only current viable manner in which a mineral resource can be evaluated to determine its economic viability.

4. PART B Draft Environmental Management Program Report

4.1 Details of the EAP,

This has already been covered. Refer **Section 3 paragraph (a)** of this document

4.2 Description of the Aspects of the Activity

This has already been covered. Refer **Section 3 paragraph (d)** of this document

4.3 Composite Map

This has already been covered. Refer Figure B.

4.4 Description of Impact management objectives including management statements

The main management objectives for the invasive drilling activities are:

- Avoid potential impacts by positioning the drill sites in a manner which avoids /minimise potential impacts. This can be achieved by implementing appropriate buffer zones;
- Reduce impacts through implementing realistic operational management measures such as imposing restrictions on the time of day when drilling can take place and adherence to the site EMPr; and
- Ensure that chemical and hydrocarbon spillages are avoided, where they cannot all together be avoided, minimised and mitigated.
- Establish appropriate waste management system
- Restore the physical impact of drilling through implementation of concurrent rehabilitation as and when drilling at one site is completed.

4.4.1 Determination of closure objectives.

- Objective 1 - To create a safe and healthy post-mining environment
  - Safe mining area
  - Limited residual environmental impact
- Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable land fit for grazing, as close as possible to its natural state.
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
  - Minimal negative aesthetic impact

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

The drilling activities will use between 5 000L to 10 000L per day which falls within “small industrial user” where the use is less than twenty cubic metres per day for prospecting. Therefore, the water that will be used for the prospecting activities will be sourced on agreement from an existing authorized water user which could be either the land owner or local municipality. No water will be abstracted in terms of section 21(a) of National Water Act, 1998 (Act no. 36 of 1998).

4.4.3 Has a water use license has been applied for?

No – Based on the limited water needs of the proposed prospecting activities, water from a legal source will be brought to the drill sites by mobile water tanker as and when required. The department responsible for water resources shall be consulted with regards to any water related agreement with either the land owner or local municipality prior to drilling.

4.4.4 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
Non-invasive activities	Pre-Construction	462 Ha	• All operations will be carried out under the guidance of a strong, experienced manager with proven skills in public consultation and conflict resolution, including environmental coordinator where applicable. • All prospecting personnel will be made aware of the local conditions and sensitivities in the prospecting area and the fact that some of the local residents may not welcome the prospecting activities in the area.	Environmental Awareness Plan	Before and during prospecting activities
Site Access Access Roads (temporary, jeep track roads less than 4m wide)	Construction	±2 600m^2	• Existing farm roads and tracks must be used as far as possible; • Where new access tracks are required to get the drill rig to the drilling site, such tracks must be raked / scarified during decommissioning; • Vehicles speed must take into account the possibility of collisions with fauna. • All compacted roads and drill traverses will be scarified and any topsoil stockpiled to be spread over the disturbed area.	Approved PWP Environmental Authorisation; NEMA Section 2 Principles.	Upon cessation of the individual activity

Site establishment activities: - Vegetation clearance - Topsoil stripping & stockpiling - Drill pad compaction - Placement of temporary portable toilets and resting place.	Construction	160m² per drill site Max ±3 200 m² for 20 holes	• Undertake heritage survey prior to site activities in order to identify cultural/heritage features. • Avoid cultural/heritage impacts by maintaining 50m buffer from any identified heritage feature and demarcation. • Any buried artefacts that may be uncovered during site activities will require such activities to stop to assess their significance and determine appropriate mitigation measures • The minimal area required for site establishment must be provided. • The soil disturbance and clearance of vegetation at drill pad areas will be limited to the absolute minimum required and will not be dozed or scraped with vegetation roots left intact for later re-growth. • Topsoil must be kept aside for rehabilitation; • The design of the drill fluid sump must be such that it prevents fauna from gaining access to site and becoming trapped.	Heritage Act Environmental Authorisation; NEMA Section 2 Principles	Before and during drilling activities Upon cessation of the individual activity
Exploration drilling: - Drilling - Core or chip sample collection & storage	Operational phase	Max. 20 drill holes 165mm diameter and average depth of 100m Chip samples 1.8m³ per hole Max ±36m³ for 20 holes Equipment laydown area & Sanitation requirements < 5Ha	• The drilling rig and other visually prominent items on the site will be located in consultation with the landowner; • Make use of existing vegetation as far as possible to screen the prospecting operations from view; and • If necessary, the operations can be screened from view by erecting a shade cloth barrier. • Low vehicle speeds will be enforced on unpaved surfaces. • Maintain a buffer of 500m between drill sites and dwellings.	SANS 10103 guideline GN R. 827 (NEM:AQA) GN R. 704 (NWA) NEMA	Upon cessation of the individual activity

Exploration drilling: - Drill maintenance & refuelling - Vehicle movements - Waste generation & management	Operational phase	Sludge from drilling activities <5m^3 Hydrocarbon storage <30m^3	• Oils and lubricants must be stored within sealed containment structures. • Fuel storage must be contained in mobile bowsers. • All chemicals and hydrocarbons shall be stored within 110% bund wall capacity. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevents spills/ leaks onto the soil. • Refuelling will be done with care to minimise the chance of spillages. • A spill kit will be available on each site where prospecting activities are in progress; and any spillages will be cleaned up immediately. • Underneath the drill rig or any equipment with potential oil spillages shall be lined with plastic liner to prevent soil and water contamination. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Avoid hydrocarbon spills by employing proper vehicle maintenance. • A lined sump (with sufficient capacity) will be constructed to receive drill fluids and allow for evaporation should clays be intersected in the borehole. • Storm water must be diverted around the drill site to prevent ingress of storm water. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. Waste separation must be undertaken if practical for recycling. • Drill muds to be contained in lined sump and disposed of off-site at licensed facility.	SANS 10103 guideline GN R. 827 (NEM:AQA) GN R. 704 (NWA) NEMA	Immediately in case of spills Upon cessation of the individual activity

Final Rehabilitation and removal of temporary infrastructure	Decommissioning	<5Ha	• Due to the remote location of the site, dust emissions are unlikely to be a source of nuisance; however, the site must be wetted if required. • Rehabilitation and preparation for re-vegetation must be done as soon as work is completed and before moving to the next drill site. • The disturbed site should be rehabilitated by scarifying hardened areas and filling the sludge catch pits (if any were required). • Any stored topsoil should be spread over the scarified surface to promote re-vegetation and prevent soil erosion.	Environmental Authorisation; NEMA Section 2 Principles	Ongoing during construction and operation phase.

4.5 Impact Management Outcomes

ACTIVITY (whether listed or not listed).	**POTENTIAL IMPACT**	**ASPECTS AFFECTE**	**PHASE** In which impact is anticipated	**MITIGATION TYPE**	**STANDARD TO BE ACHIEVED**
General prospecting	Conflict with other land users	Social	Life of operation	Control through monitoring & management	Impact minimised and mitigated.
Site Access	Disturbance of onsite flora and fauna	Fauna and Flora	Construction	Remedy through restriction and rehabilitation	Impact minimised and mitigated.
	Soil compaction from repeated use of access road to drill sites	Soil resources		Remedy through rehabilitation	
Site Establishment Drill pads and laydown area Vegetation clearance	Disturbance of onsite flora and fauna	Fauna and Flora	Construction	Remedy through restriction and rehabilitation	Impact mitigated end use objectives
	Noise Generation	Noise		Control through monitoring & management	Impact mitigated
	Visual intrusion	Visual			Impact mitigated

Site Establishment Drill pads and laydown area Topsoil stripping & stockpiling Compaction due to levelling and vehicle movement	Destruction or loss of Cultural and Heritage Resources	Cultural and Heritage	Construction	Avoidance by relocation of activity	Impact avoided
	Soil disturbance and compaction and topsoil stockpiling	Soil		Remedy through restriction and rehabilitation	Impact mitigated end use objectives
	Noise Generation	Noise		Control through monitoring & management	Impact mitigated
	Dust fall & nuisance from activities	Air quality			Impact mitigated
Erection of temporary structures such as drill rod racks, toilets, fuel tanker, water tanker	Visual intrusion	Visual	Construction	Remedy through restriction and rehabilitation	Impact mitigated end use objectives
Drilling Core and Chip sample collection & storage	Vehicle and drill noise disturbing on-site flora and fauna	Noise	Operational	Control through management and monitoring	Impact mitigated
	Dust emissions from drilling and general site activities (vehicle entrained dust)	Air quality		Control through management and monitoring	Impact mitigated
Drill maintenance & refuelling Waste generation & management facilities	Surface and ground water contamination From hydrocarbons	Soil and water		Avoidance through management and monitoring	Impact avoided
Removal of temporary infrastructure and drill site rehabilitation	Dust emissions (vehicle entrained dust)	Air quality	Decommissioning	Control through management and monitoring	Impact mitigated
	Erosion due to slow recovery of vegetation	Soil and vegetation		Remedy through restriction and rehabilitation	Impact mitigated

4.6 Impact Management Actions

ACTIVITY whether listed or not	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
General prospecting	• Conflict with other land users	Control through monitoring & management	Concurrently with prospecting activities	Remain within the ambits of the Prospecting Works Programme and Environmental Authorisation.
Site Access	• Disturbance of onsite flora and fauna • Soil compaction from repeated use of access road to drill sites	Remedy through restriction and rehabilitation	Immediately on cessation of drilling.	
Site Establishment Drill pads and laydown area Vegetation clearance	• Disturbance of onsite flora and fauna • Noise Generation • Visual intrusion	Remedy through restriction and rehabilitation Control through monitoring & management	Concurrently with prospecting activities as far as possible, otherwise immediately on cessation of drilling.	
Site Establishment Drill pads and laydown area Topsoil stripping & stockpiling Compaction due to levelling and vehicle movement	• Destruction or loss of Cultural and Heritage Resources • Soil disturbance and compaction and topsoil stockpiling • Noise Generation • Dust fall & nuisance from activities	Avoidance by relocation of activity Remedy through restriction and rehabilitation Control through monitoring & management		
Erection of temporary structures such as drill rod racks, toilets, fuel tanker, water tanker	• Visual intrusion	Remedy through restriction and rehabilitation	Immediately on cessation of drilling.	

Drilling Core and Chip sample collection & storage	• Vehicle and drill noise disturbing on-site flora and fauna • Dust emissions from drilling and general site activities (vehicle	Control through management and monitoring	Concurrently with prospecting activities as far as possible, otherwise immediately on cessation of drilling.	Remain within the ambits of the Prospecting Works Programme and Environmental Authorisation.
Drill maintenance & refuelling Waste generation & management facilities	• Soil, surface and ground water contamination From hydrocarbons	Avoidance through management and monitoring		
Removal of temporary infrastructure and drill site rehabilitation	• Dust emissions (vehicle entrained dust) • Erosion due to slow recovery of vegetation	Control through management and monitoring Remedy through restriction and rehabilitation		

4.7 Financial Provision

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

- Objective 1 - To create a safe and healthy post-mining environment
  - Safe mining area
    - Maintain affected environment in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof.
    - No potentially dangerous areas; secured if required
  - Limited residual environmental impact
    - No surface and/or groundwater contamination
    - Waste management practices not creating or leaving legacies
    - Develop a landscape that reduces the requirement for long term monitoring and management
- Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable land fit for grazing, as close as possible to its natural state.
    - Improve Land use with an increased production with regard to grazing.
    - Minimise disturbance of ecology due to loss of habitat and noise/visual/dust
    - Minimise risk of erosion from either increased base flow or prospecting operations:
    - Management of air emissions to minimise nuisance effects; implementation of dust suppression activities.
    - Increase of land with agricultural potential: profiling and sloping of remaining drill sumps and removal of all drill spoils and ripping of all compacted areas to facilitate recovery of natural vegetation through colonization by dispersing species (patch dynamics)
    - Prevent long term changes in land use: revert back to mainly stock farming (grazing).
    - Prepare area to promote natural re-establishment of vegetation that is self-sustaining, perpetual and provides a sustainable habitat for local fauna and successive flora species
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
    - Maintain positive and transparent relationships with stakeholders: maintaining communication channels to all stakeholders and forums.
    - Provide stakeholders with relevant information: making all information available to stakeholders and providing information to authorities as per legislative requirements.
    - Undertaking environmental management in accordance with the implementation, maintenance and auditing of an environmental management system.

- Minimal negative aesthetic impact
  - Maintain affected environment in an improved state containing no foreign debris or other materials.

The legal framework within which all the above lies entails:

- Defining and meeting closure standards.
- Complying with legislation.
- Sufficient financial provision for mine closure activities.
- Monitoring and plan for latent environmental impact.

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

The closure objectives were reported in the draft BAR as well as the Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment and was made available to all registered interested and affected parties.

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

Refer Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment appendix 2.

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

The closure objectives are to return the land disturbed by drilling activities back to its original condition. The rehabilitation plan provides the detail on how this will be achieved. Through experience, it can be confirmed that effective rehabilitation of drill sites is possible and achievable with the rehabilitation plan set out in appendix 2.

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

As per Part A, Section (s) (i) of this report

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

As per Part A, Section (s) (ii) of this report.

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

4.8.1 Monitoring of Impact Management Actions
4.8.2 Monitoring and reporting frequency
4.8.3 Responsible persons
4.8.4 Time period for implementing impact management actions
4.8.5 Mechanism for monitoring compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All Prospecting Activities	N/A	Ensure that the prospecting programme is being implemented in line with the approved prospecting works programme	Site Manager and Geologist	**Annual** Submit a prospecting progress report to DMR
	All commitments contained in the BA Report and accompanying EMPr	Ensure commitments made within the approved BAR and EMPr are being adhered to.	Site Manager and independent EAP	**Annual** Undertake and submit an environmental performance audit to DMR
Site establishment	Visual inspection of soil erosion and/or compaction	All exposed areas, access roads, the drill site and soil stockpiles must be monitored for erosion on a regular basis and specifically after rain events.	Site Manager Contractor (or sub-contractors)	**Weekly, and after rain events** Weekly monitoring reports to be signed-off by the Site Manager Corrective action to be confirmed and signed-off by the Site Manager Consolidated monthly monitoring reports (including confirmation of corrective action taken, with photographic evidence) to be submitted to the Site Manager.
Drilling Activities	Visual inspection of biodiversity impacts	Visual inspection of drill site activities and other possible secondary impacts • Ensure that the fire brake is maintained. • Rehabilitation of drill pads • Records of water intersections on borehole logs • Monitor groundwater quality and level within 500m from a drill site (If any). • Control and minimise the development of new access tracks • Appropriate storage and handling of topsoil		

Drilling Activities	Visual inspection of pollution incidents, the integrity of secondary containment structures and waste management Housekeeping & maintenance	• All secondary containment structure will be inspected on a daily basis to confirm the integrity thereof and to identify potential leaks timeously. • All spill incidents will be reported and corrective action taken in accordance with an established spill response procedure. • Standard waste management practices must be implemented to prevent contamination and littering.	Site Manager Contractor (or sub-contractors)	**Daily** Weekly monitoring reports to be signed-off by the Site Manager Corrective action to be confirmed and signed-off by the PSM Consolidated monthly monitoring reports (including confirmation of corrective action taken, with photographic evidence) to be submitted Report incidents in terms of the relevant legislation, including the MPRDA, NWA and NEMA.
Post Drilling Post Closure	Groundwater Revegetation Stability Soil erosion Alien invasive species	• Inspection of all rehabilitated areas to assess whether soil erosion is occurring and if re-establishment of vegetation is successful and to implement corrective action where required. • Identify any areas of subsidence around drill holes and under take additional backfilling if required.	Site Manager	**Bi-Annual** A final audit report for site closure must be submitted to the DMR for approval

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

An external environmental performance audit and the BA & EMPr performance assessment shall be conducted annually interchangeably by an independent environmental assessment practitioner and internal environmental assessment practitioner, respectively.

4.10 Environmental Awareness Plan

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

Training is part of its Induction process and environmental Management System (EMS). The induction includes:

- Awareness training for contractors and employees;
- Job specific training – training for personnel performing tasks which could cause
- potentially significant environmental impacts;
- EMS training;
- Comprehensive training – on emergency response, spill management, etc;
- Specialised skills; and
- Training verification and record keeping

Before commencement of the prospecting activities all employees and contractors who are involved with such activities should attend relevant induction and training. It is standard practice for employees and the employees of contractors that will be working on a new project or at a new site to attend an induction course where the nature and characteristics of the project and the site are explained.

The training course should include key information abstracted from the EMP pertaining to the potential environmental impacts, the mitigation measures that will be applied, the monitoring activities that will be undertaken and the roles and responsibilities of contractors' and personnel.

The full EMP document is also made available to attendees.

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

Environmental risks and how to manage them are dealt with in the induction course referred to in section (m) (i) above. If an incident of environmental pollution or damage does occur it is analysed and appropriate prevention and/or mitigation measures are developed. These measures are added to the EMP and conveyed to the relevant personnel.

All unplanned incidents with the potential to cause pollution or environmental degradation or conflict with local residents will be reported to the Mineral Resources Manager within 24 hours.

Hydrocarbon Spills

Hydrocarbon spills that are considered to be emergency incidents are large-scale spills (cover a surface area >1m2), resulting from situations such as; a leaking diesel bowser, an oil drum that is knocked over, large spillages from equipment, etc.

Activities that are involved in the clean-up of such instances include:

- The containment of the spill,
- The removal of all contaminated material, and
- The disposal (at a licenced hazardous disposal facility) or bioremediation (at a licenced facility) of this material.

Fire

There is the potential for fire to occur in the following locations of the drill site:

- Veld fires across vegetated areas; and
- Vehicles and equipment.

Veld fires: Any person who observes the fire must report it to the fire brigade immediately and then to their supervisor. If possible, additional personnel may be sent to contain the fire, but only if the lives of the personnel will not be endangered.

Vehicles and Equipment: Fire extinguishers will be available at the site where drilling activities will take place and in the vehicles. All staff members will be trained in the use of fire-fighting equipment.

4.11 Specific information required by the Competent Authority

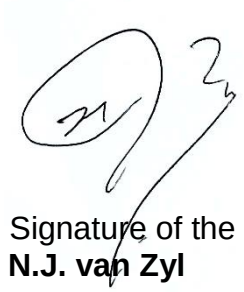
(Among others, confirm that the financial provision will be reviewed annually).

Not applicable at this stage

5. Undertaking

The EAP herewith confirms

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



Signature of the environmental assessment practitioner:
N.J. van Zyl
Name of company: **Private Enterprise**
Date: **14 January 2019**

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Appendix 1: Impact assessment
Appendix 2: Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment
Appendix 3: Public Participation Process