mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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 LISTTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED)

NAME OF APPLICANT:	**Thunderflex 78 (Pty) Ltd**
TEL NO:	**082 517 0421**
POSTAL ADDRESS:	**PO BOX 110115** **HADISONPARK** **KIMBERLEY** **8306**
PHYSICAL ADDRESS:	**FARM OBERON** **KIMBERLEY** **8301**

FILE REFERENCE NUMBER SAMRAD: **(NC) 30/5/1/1/3/2/1/12539 PR**

1. IMPORTANT NOTICE

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

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

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

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

It is therefore 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 activity is located and document how the proposed 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 reserved;
    (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.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner: ROELIEN OOSTHUIZEN
Tel No.: 084 208 9088
Fax No.: 086 510 7120
E-mail address: roosthuizen950@gmail.com

ii) Expertise of the EAP

(1) **The qualifications of the EAP**

(with evidence)
MEM (MASTERS IN ENVIRONMENTAL MANAGEMENT (UFS))
B-Comm in Human and Industrial- Psychology (NWU)
Waiting for registration please attached resume and MEM certificate.
(with evidence attached as **Appendix 1**)

(2) **Summary of the EAP's past experience**

(In carrying out the Environmental Impact Assessment Procedure)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Scoping Reports, etc. See attached CV. (with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	REMAINING EXTENT OF PORTION 1 (ORANJE OORD) OF THE FARM BRAKKIES 384 AND PORTION 2 (A PORTION OF PORTION 1) OF THE FARM BRAKKIES 384 ADMINISTRATIVE DISTRICT OF HAY
Application area (Ha):	3016,5787 Hectares (Three thousand and sixteen comma five seven eight seven hectares.)
Administrative district:	Hay
Distance and direction from nearest town:	Approximately 50 km South West of Douglas and about 165 km South West of Kimberley in the Northern Cape province.
21 digit Surveyor General Code for each farm portion:	FARM BRAKKIES 384 C03100000000038400001 C03100000000038400002

c) Locality map

(show nearest town, scale not smaller than 1:250000)

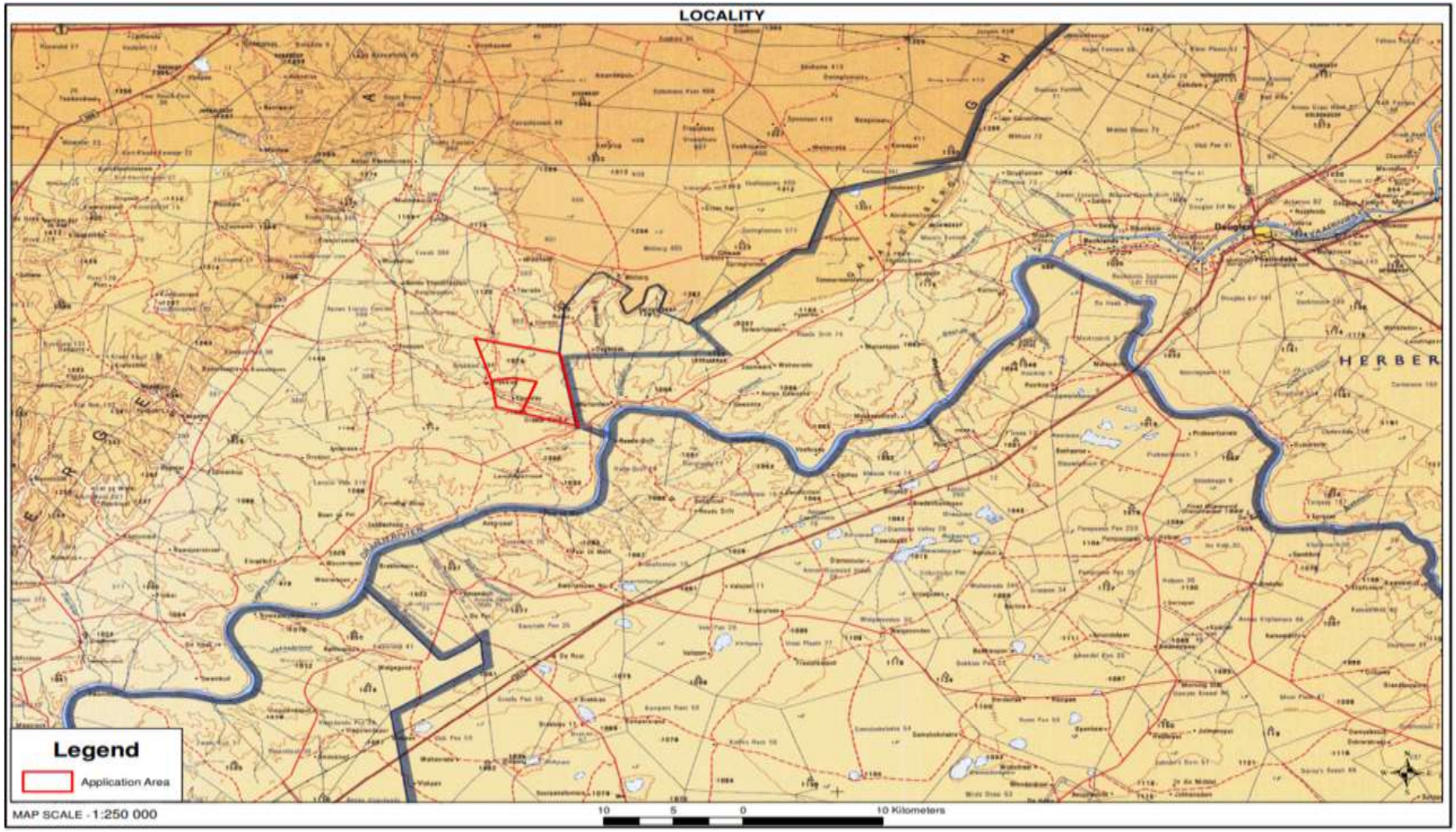


***Figure 1**. Farm Brakkies is situated in the Administrative district of Hay. Locality indicated in Red.*

d) **Description of the scope of the proposed overall activity** (provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site).

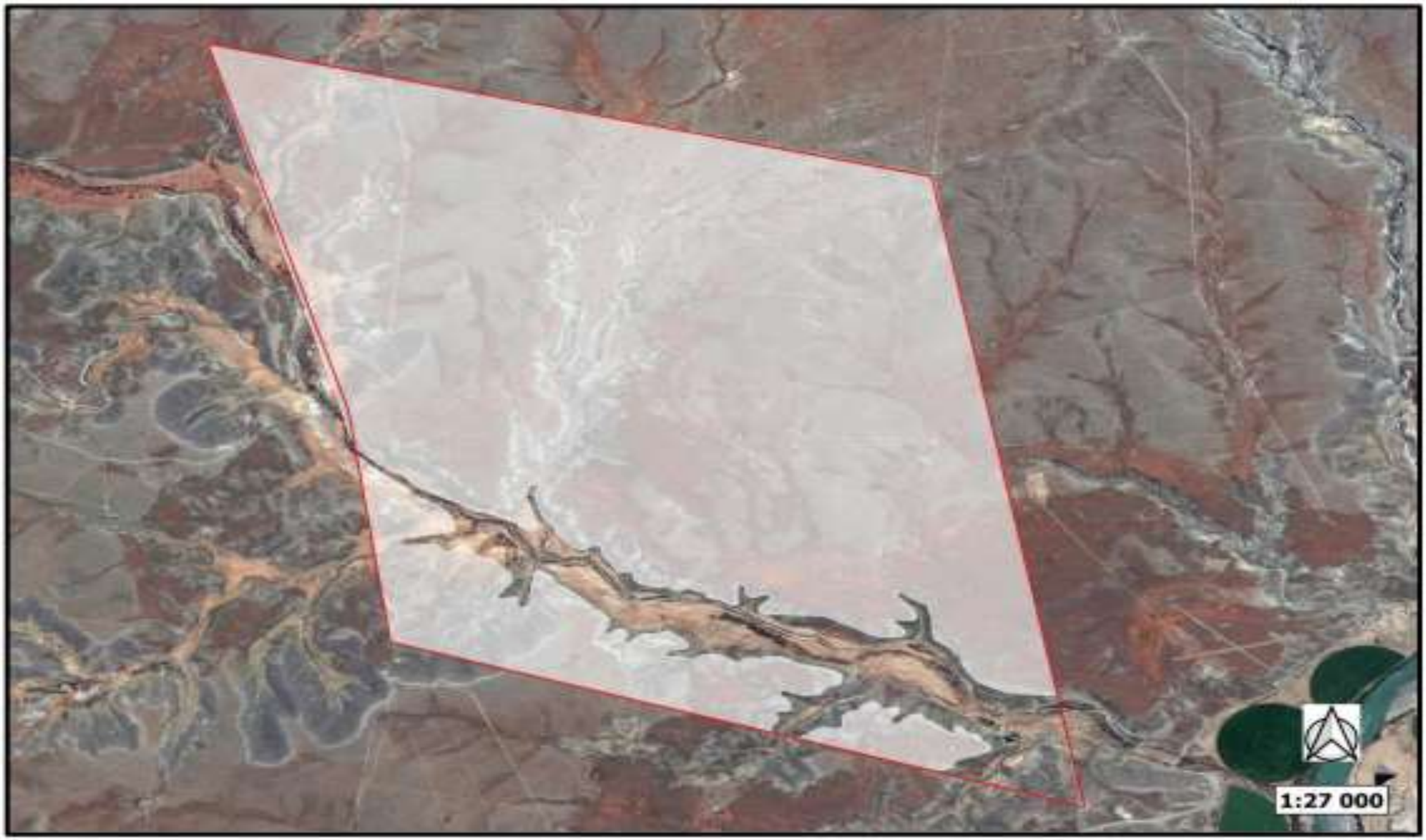


Figure 2. The Brakkies prospecting area is indicated in red, with the proposed core footprint of prospecting activities indicated in white. (Taken out of the Ecological study by Boscia Ecological Consulting by Dr. Betsie Milne).The drill grid must still be established after mapping was completed.

(i) DESCRIPTION OF PLANNED ACTIVITIES:

The entire proposed prospecting project will be conducted in three phases as described below over a period of 60 months. This prospecting will consist of non-invasive and invasive (drilling) activities. The review of available information that exists over the area of interest will be under-taken by means of conducting a literature review from satellite images and other available in-formation.

DESCRIPTION OF PLANNED NON-INVASIVE ACTIVITIES:

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

PHASE 1

Review of Past Exploration Results

In order to direct the exploration programme in an efficient manner, there will be a re-view of all information and data gathered during previous exploration. A site investiga-tion of the target areas will be undertaken to identify infrastructure and determine any potential problems that may need to be addressed.

Imagery Analysis & Geological Mapping

High-resolution satellite images will be studied and used to geologically map the applica-tion area. Contacts between various lithologies will be mapped and specific attention will be given to delineate and define areas underlain by alluvial gravels.

DESCRIPTION OF PLANNED INVASIVE ACTIVITIES:

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

PHASE 2

RC-drilling – Drilling is done in phases, over anomalous target areas, using reconnaissance lines or a grid of 200m X 200m or 100m X 50m depending on the level of confidence in the targets and the level of information required. The holes will be approximately 5 me-tres deep depending on local depth to bedrock (It is envisaged that at least 300 holes will be drilled). If initial drilling proves that only Rooikoppie gravels exist on the property and gravels only go 1m or less deep, drilling will cease and pitting will continue with a section 102 application to add pitting.

PHASE 3

Analytical Desktop Study

The project geologist monitors the programme, consolidates and processes the data and amends the programme depending on the results. This is a continuous process through-out the programme 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 programme is to proceed in terms of activity, quantity, resources, expenditure and duration.

A GIS based database will be constructed capturing all exploration data.

i) Listed and specified activities

NAME OF ACTIVITY **(E.g. for prospecting** – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route, etc. … etc. … etc. **E.g. for prospecting** – excavations, blasing, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. … etc. … etc.)	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY (Mark with an **X** where applicable or affected).	APPLICABLE LISTING NOTICE ***(GNR 544, GNR 545 or GNR 546)***	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Activity 20 of Listing Notice 1 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), 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 Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	3016.5787 ha application lodged for the surveyed portion ONLY DRILLING INVASIVE WILL BE DONE WHICH WILL BE ±7 HA IN EXTENT (300 HOLES)	X	NEMA LN 1 (GNR 327)	
Activity 24 of Listing Notice 1 The development of a road-	Tracs for the drill rig	X	NEMA LN 1 (GNR 327)	

(i) For which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 545 of 2010; or (i) With a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters				
Activity 27 of Listing Notice 1 The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	3016.5787 ha on the total hectares of the area a total of ±7 ha will be disturbed with the drill pads, drill holes.	X	NEMA LN1 (GNR 327)	
OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities) Ablution Facilities	±25m²		NOT LISTED	

ii) Description of the activities to be undertaken

(Describe methodology or technology to be employed, including the type of commodity to be prospected/mined and for a linear activity, a description of the route of the activity)

The prospecting operation is primarily based on alluvial diamond deposits that are restricted to the alluvial terraces west of the Orange River at elevations of 1 000 and 1 100 m.a.s.l. (on gravel deposits that are believed to have derived from eroded diamondiferous Finsch kimberlite material. These gravels are mainly associated with quaternary deposits confined to the Daniel Alluvial Channel (Figure 2). The presence of diamondiferous gravels on Brakkies will be evaluated by means of a standard phased approach. Initially, non-invasive desktop studies will be conducted to delineate and define areas underlain by alluvial gravels. Thereafter, a drilling programme will be performed over anomalous target areas using predefined grids. At least 300 boreholes of ± 5 m in depth are expected to be drilled over 5 years.

Prospecting activities will primarily make use of existing roads where possible, but reconnaissance tracks will be created in order to access the drilling grid. Minor bush clearing will also be done to establish the drill pads. A mobile container office with mobile toilets might be positioned in the vicinity of the drill grid, but no permanent infrastructure will be established on site.

e) Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use License has/has not been applied for).
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	- Section 5: Implementation of control measures for alien and invasive plant species; - Section 6: Control measures. - Regulation GN R1048, published on 25 May 1984, in terms of CARA	- Control measures are to be implemented upon the approval of the EMPR.
Constitution of South Africa (Act 108 of 1996)	- Section 24: Environmental right - Section 25: Rights in Property - Section 27: Water and sanitation right	- To be implemented upon the approval of the EMPR.
Environment Conservation Act (Act 73 of 1989) and Regulations (ECA)	- Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities that still relate to the existing section of ECA. - Section 28A: Exemptions.	- To be implemented upon the approval of the EMPR.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.	- Control measures are to be implemented upon the approval of the EMPR.

Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.
Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A prospecting right application was lodged under reference number NC 30/5/1/1/2/12539 PR - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal)	- The document is being compiled in order to fulfil the requirements thereof.

	- Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption) - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM:AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM:AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines)	- Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations.	- A permit application regarding protected plant species need to be lodged with DENC if necessary. - Control measures are to be implemented upon the approval of the EMPR.

	Commencement of Threatened or Protected Species Regulations 2007: 1 June 2007 GNR 150/GG 29657/23-02-2007 Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 * Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 * - Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species. - Regulation GN R151, published on 23 February 2007 (List of Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA - Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA - Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species)	
The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa's natural biodiversity and its landscapes and seascapes.	- Chapter 2 lists all protected areas.	- Not applicable. The prospecting operation does not fall within any protected area.

National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities - Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) - Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921)	- To be implemented upon the approval of the EMPR.
National Forest Act (Act 84 of 1998) and Regulations	- Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.	- A permit application regarding protected tree species need to be lodged with DAFF if any protected trees is encountered. - Control measures are to be implemented upon the approval of the EMPR.
National Heritage Resources Act (Act 25 of 1999) and Regulations	- Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources	- Control measures are to be implemented upon the approval of the EMPR.

	authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site. - Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process. - Regulation GN R548 published on 2 June 2000 in terms of NHRA	
National Water Act (Act 36 of 1998) and regulations as amended, *inter alia* Government Notice No. 704 of 1999	- Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents. - Section 21: Water uses In terms of Section 21 a licence is required for: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (f) Waste discharge related water use; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (i) altering the bed, banks, course or characteristics of a watercourse;	- A water use application will not be submitted at this stage until there is a water requirement later in the prospecting operation (DWS). - Control measures are to be implemented upon the approval of the EMPR.

	(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and; - Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j))	
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.

Northern Cape Nature Conservation Act (Act 9 of 2009)	- Addresses protected species in the Northern Cape and the permit application process related thereto.	- A permit application regarding provincially protected plant species as well as for large-scale harvesting of indigenous flora need to be lodged with DENC if applicable. - Control measures are to be implemented upon the approval of the EMPR.
Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees.	- Control measures are to be implemented upon the approval of the EMPR.
Road Traffic Act (Act 93 of 1997) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa (giving effect to section 27 of the Constitution).	- Control measures are to be implemented upon the approval of the EMPR.
National Land Transport Act, (Act 5 of 1998)		- To take note.
Northern Cape Planning and Development Act (Act 7 of 1998)	- To control planning and development	- To be implemented upon the approval of the EMPR.
Spatial Planning and Land Use Management (Act 16 of 2013 (SPLUMA) and regulations	- To provide a framework for spatial planning and land use management in the Republic; - To specify the relationship between the spatial planning and the land use management, amongst others - Regulations GN R239 published on 23 March 2015 in terms of SPLUMA	- To be implemented upon the approval of the EMPR.
Subdivision of Agricultural Land Act, 70 of 1970 and regulations	- Regulations GN R373 published on 9 March 1979 in terms of Subdivision of Agricultural Land	- To take note.

Basic Conditions of Employment Act (Act 3 of 1997)) as amended	- To regulate employment aspects	- To be implemented upon the approval of the EMPR
Community Development (Act 3 of 1966)	- To promote community development	- To be implemented upon the approval of the EMPR
Development Facilitation (Act 67 of 1995) and regulations	- To provide for planning and development	- To take note.
Development Facilitation (GN24, PG329, 24/07/1998)	- Regulations re Northern Cape LDO's	- To take note.
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59	- To take note.
Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)	- To take note.
Land Survey Act (Act 8 of 1997)) and regulations, more specifically GN R1130	- To control land surveying, beacons etc. and the like; - Agriculture, land survey S10	- To take note.
National Veld and Forest Fire Act (Act 101 of 1998)) and regulations, more specifically GN R1775	- To regulate law on veld and forest fires - (Draft regulations s21)	- To be implemented upon approval of the EMPR
Municipal Ordinance, 20/1974	- To control pollution, sewers etc.	- To be implemented upon approval of the EMPR
Municipal Ordinance, PN955, 29/08/1975	- Nature conservation Regulations	- To be implemented upon approval of the EMPR
Cape Land Use Planning Ordinance, 15/85	- To control land use planning	- To take note.
Cape Land Use Planning Ordinance, PN1050, 05/12/1988	- Land use planning Regulations	- To take note.

f) Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)

The Brakkies Project is in line with the 'Beneficiation Strategy for the Minerals Industry of South Africa' (DMR, 2011) in terms of aiming to beneficiate diamonds for sale/export. The benefits of this will fall directly to the Northern Cape Province and, specifically, the Hay District.

In addition, the South African National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. The Brakkies Exploration Project will contribute to achieving this plan in terms of direct and indirect employment of people from the local and district municipalities as well as investment in the region and on a national scale.

Need

Analysis of the Diamond Industry – ALROSA(website)

The Information on the analysis of the diamond industry was obtained from the ALROSA website which is one of the biggest diamond producers in the world.

The world diamond market is represented by diamond mining and trade in rough diamonds. The bulk of the world diamond mining is concentrated in nine countries, with their share in the global production in physical terms as high as 99%.

The world's largest producers of natural diamonds are Russia, the Democratic Republic of Congo (DRC) and Botswana, all together accounting over 60% of the global diamond production.

Top Countries in the Global Diamond Production 2016: 134.1 mln. Carats

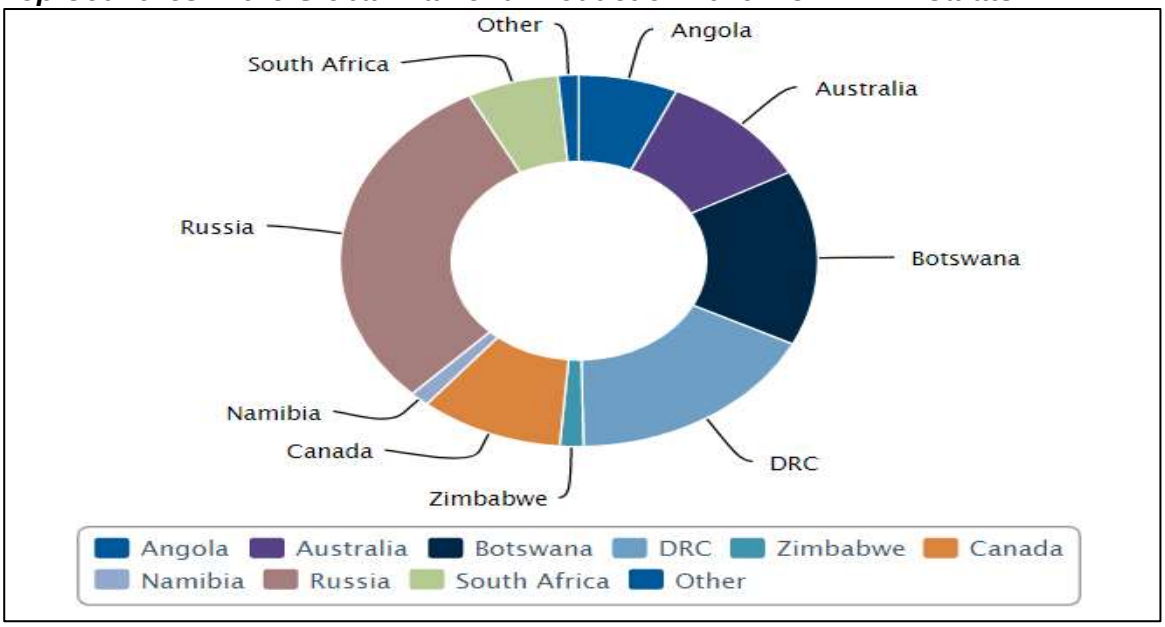


Figure 3. Kimberley Process companies' data Global Diamond Production 2011-16 (thousands carats)

World diamond production based on the costs of produced rough diamonds are dominated by Russia, Botswana and Canada with a combined production of more than 60% of the total worldwide production

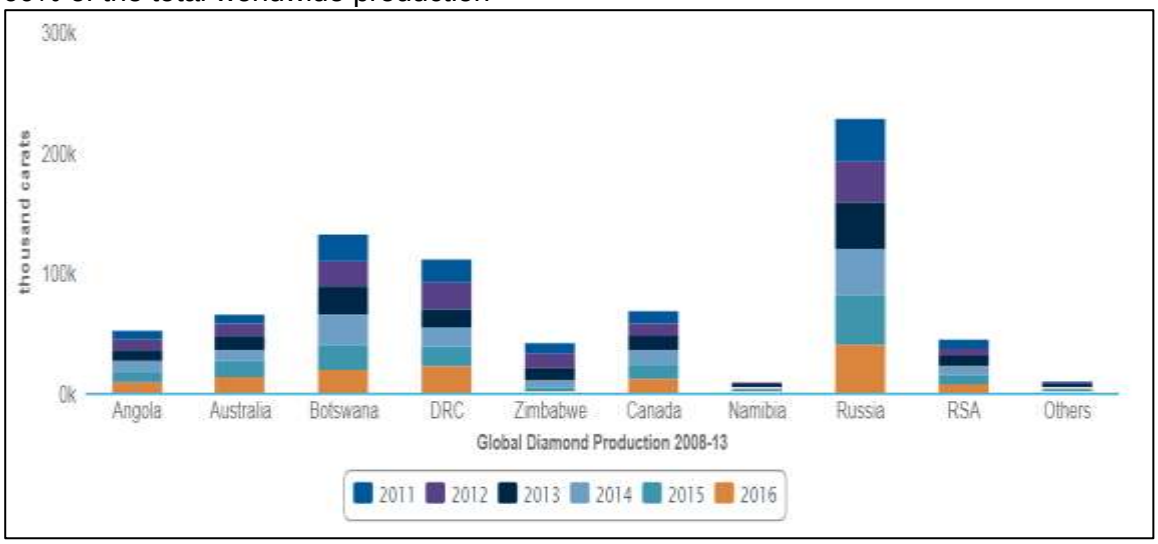


Figure 4. Global Diamond Production 2011-16 (thousands carats) Kimberley Process companies' data

Russia ranks first in the world's diamond production. ALROSA Group accounts for 93% of the total diamond production in the Russian Federation in physical terms, and it is the leader of the global diamond mining industry. Major mining companies are engaged in mining in the main diamond-producing countries, the exception being Zimbabwe and the DRC, where diamond deposits are developed by small companies and prospectors. The graph below represents the geography of the companies' activities including exploration.

Diamond Production by Leading Companies, 2016(* - *including Ekati; Companies' data)*

The world's diamond mining is concentrated in the major primary deposits accounting for about 60% of the global diamond production. The remaining production is concentrated in placer deposits, the principal of them located in the DRC (Mbiji-Mayii) and Zimbabwe (Marange).

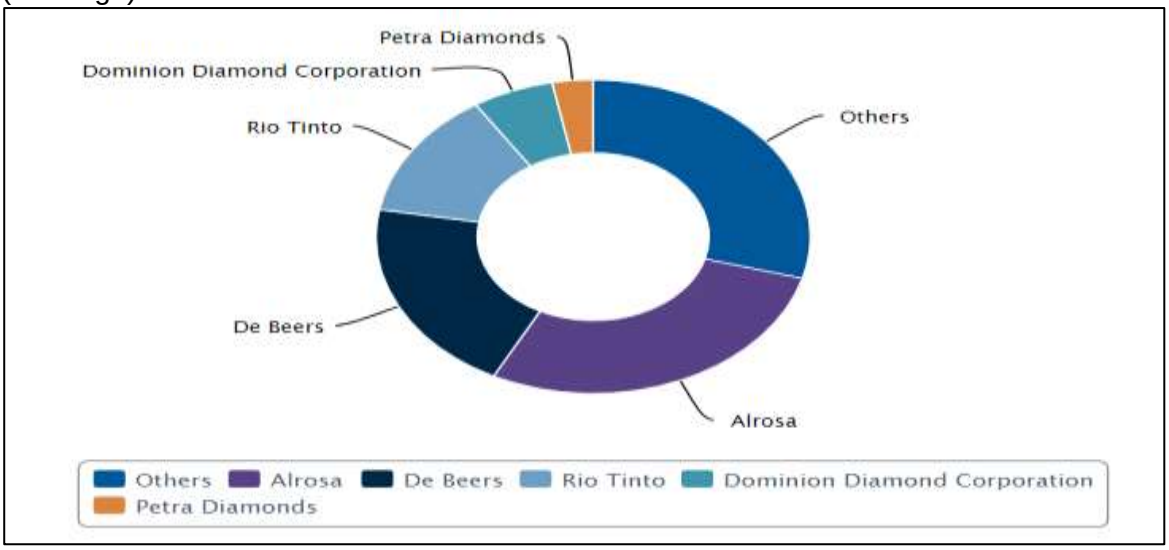


Figure 5. Diamond Production by Leading Companies, 2016(* - *including Ekati; Companies' data)*

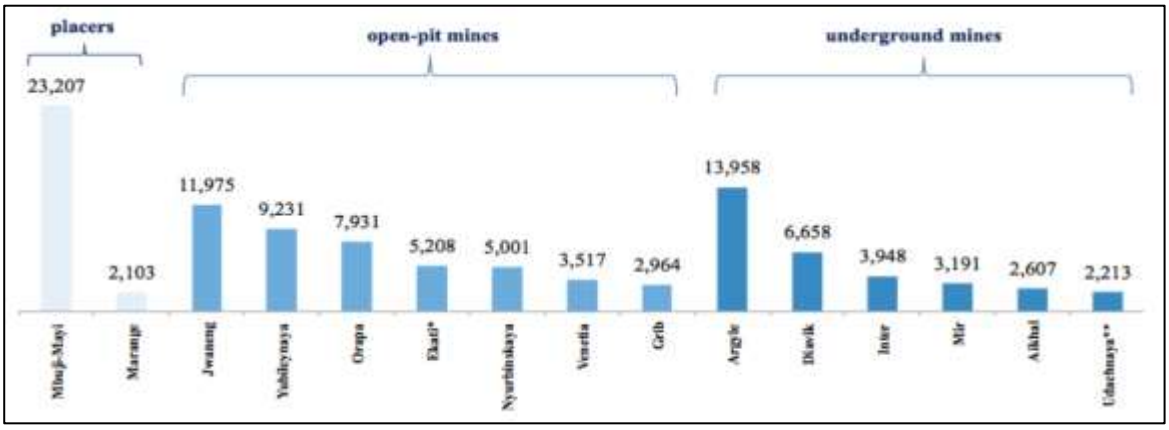


Figure 6. Production Output of the World's Major Diamond Deposits, 2016 (thousand carats) Kimberley Process and compnies' data; * - Ekati includes open-pit and undergroung mining; ** - output, including further development of the open-pit

By their attributes diamonds from deposits fall into two categories: gem quality and industrial grade diamonds. The former is used in diamond jewelry production, while the latter is used for industrial purposes (manufacture of drills, saws, and abrasive powders). Gem quality rough diamonds are sorted by size, color, quality and shape, and then are sold to buyers in conformity with the sales policy adopted in a rough diamond production company. Depending on the quality of the mined rough diamonds, the current state of the market, the adopted marketing policy, companies use different approaches to diamond sales: sights, tenders, auctions, spot transactions and long-term contracts.

The world's largest trading centers, which concentrate the bulk of trade in natural rough diamonds, are India, Belgium, the UAE, the USA, Hong Kong and Israel. Being sold from mines, natural rough diamonds arrive at cutting and polishing plants to become polished diamonds that will be used in jewellery making.

(The information above was sourced from the ALROSA website. ALROSA is a world leader in the world diamond mining industry, a Russian partially state-owned diamond mining company)

The Diamond Pipeline

The Diamond Pipeline can be defined as the route the diamond takes from mine to end consumer. The diamond pipeline, typically, comprises (**Fig. 4).**

Figure 7. The Diamond Pipeline

***Exploration/Prospecting*;** involves geologists finding diamond deposits in different areas. Prospecting is vital to the future survival of any diamond business as there is a predicted supply-demand gap.
***Mining and Recovery*;** once diamonds have been discovered and surveys shown that it is financially viable to mine them; they are now recovered from the ground. The manner in which they are mined and recovered depends on their source, thus, where they are found.

Sorting and valuing; process of sorting and valuing of diamonds, categorizing them according to size, quality, model and colour.
***Cutting and polishing*;** refers to manufacturing of diamonds; the process of turning rough diamonds into polished.
***Polished Market*;** this is referred to as the 'diamond exchange bourse', a place where diamonds are traded. These are located in some of the world's major diamond manufacturing centres, e.g. Belgium.
Retailing; polished diamonds find their way to Jewellers and Consumers through Wholesalers and Retailers.

International Diamond Market Trends

Although global financial stability has proven quite volatile over the past 4-5 years, the diamond industry appears to have stabilised somewhat, with moderate increases in diamond prices forecast for the immediate future.

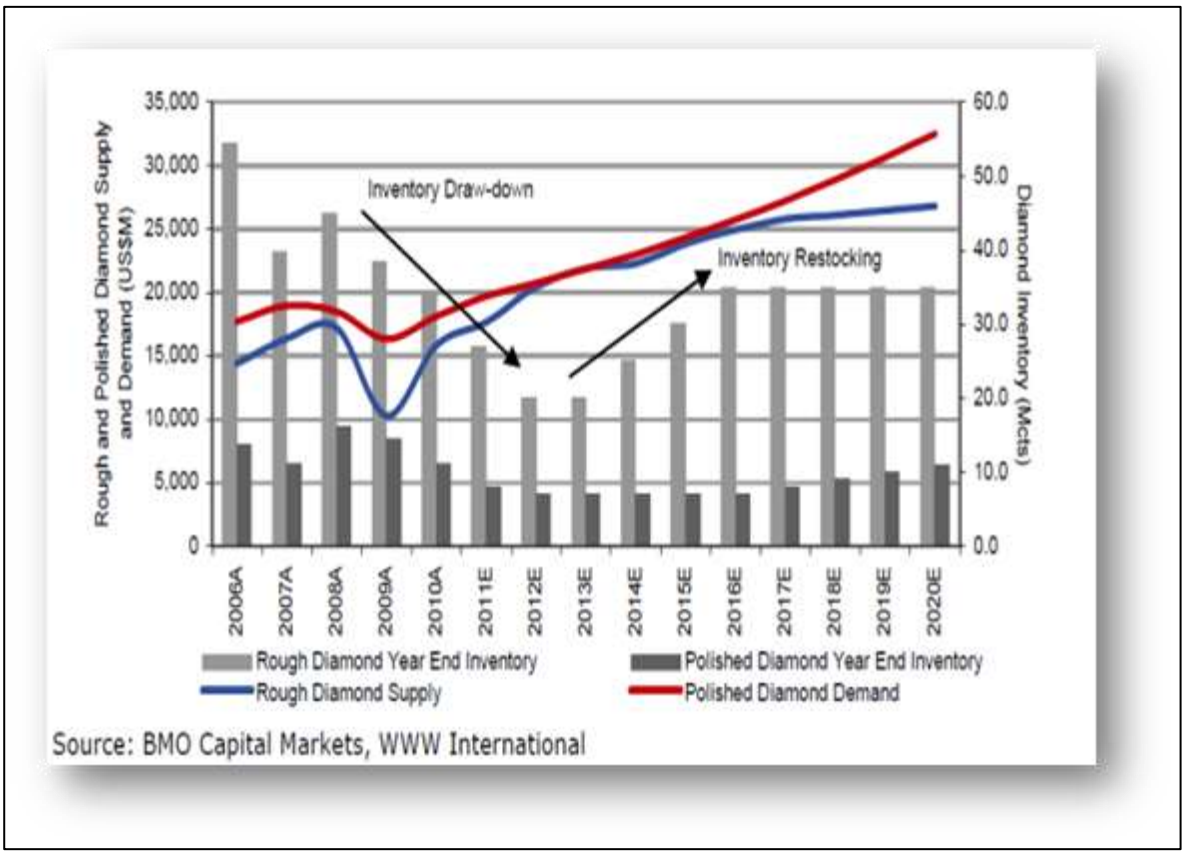


Figure 8. Inventory movements support diamond prices(USDM, Mct)

BMO Capital Markets (Sterck, 2011) estimated at the time that Chinese demand for polished diamonds accounted for 5% or USD1 billion of the market in 2010. While this represents a relatively small proportion of the market currently, growth is extremely strong.

De Beers reported that Chinese demand for polished diamonds grew at 25% in 2010, significantly ahead of GDP growth of 13%. Looking ahead, momentum into 2011 suggests that growth of 15% may be possible. From 2012 onwards, growth in household disposable income is forecast to average 11% to 12% per annum. This translates into minimum growth in diamond demand of 13% per annum.

From 2012 onwards diamond demand is likely to grow in line with economic growth at around 10% per annum. Combining steady demand growth from the established diamond consuming nations and strong growth in demand from emerging consumer's results in a forecast of polished diamond demand almost doubling by 2020, resulting in a total market value of over USD30 billion in nominal terms.

Desirability:

No	Description	Yes/No
1	Does the proposed land use / development fit the surrounding area?	Yes
2	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	Yes
3	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	Yes
4	Will the proposed land use / development impact on the sense of place?	Yes
5	Will the proposed land use / development set a precedent?	No
6	Will any person's rights be affected by the proposed land use / development?	Yes
7	Will the proposed land use / development compromise the "urban edge"?	No

Benefits:

No	Description	Yes/No
1	Will the land use / development have any benefits for society in general?	Yes
2	Will the land use / development have any benefits for the local communities where it will be located?	Yes

g) Motivation for the overall preferred site, activities and technology alternative

A Prospecting Right application was lodged to identify the preferred areas on the property. The prospecting will be done with drilling which will indicate if there are areas on the property that can be viably mined or if there is a diamond resource to prospect even further.

The Holder of the prospecting right does the necessary technical skill to execute the prospecting work set out in the Prospecting Work Programme which includes the ability to record, map and write reports. All the micro probing will be done by competent laboratories with the necessary equipment and skilled personnel. Thunderflex 78 (Pty) Ltd will conduct and manage all prospecting activities on the application area subjected to the terms and conditions of the prospecting right and all relevant legislation including but not limited to the MPRDA, the Diamonds Act, all health and Safety, Environmental and labour laws, regulations and codes.

The prospecting method of drilling is the only economic viable method currently being used by the diamond fraternity; it is also the only cost-effective method. An application for a bulk sample can also be done but it is not cost effective if drilling did not prove a reserve to bulk sample. There is no alternative prospecting method.

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

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

There are no alternatives, as the application area applied for is the area where the applicant has identified a potential for a diamond prospecting operation. The study area is found within the known cretaceous diamondiferous kimberlites and alluvial diamondiferous field

Thunderflex 78 (Pty) Ltd has applied for a Prospecting Right application at Department of Mineral Resources and Energy to do drilling whereby the presence of a resource will be determined.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Figure 1 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

(a) The property on which or location where it is proposed to undertake the activity:

The registered description of the land to which the prospecting right application relates:

Farm Name	Title Deed	In Extent
FARM BRAKKIES 384 (Remaining extent of Portion 1)	T2927/2007 CTN	2408.0605 Ha
FARM BRAKKIES 384 Portion 2 (A Portion of Portion 1)		608.5182 Ha
TOTAL		3016.5787 HA

The properties on which the Prospecting Right has been applied for is determined by the geological location of the mineral resource. Therefore, there are no alternatives for the location of the activity, except for not proceeding with the operation. This will however cause the underutilisation of a national economic resource.

The property is accessible via good roads from different directions.

Infrastructure in the area is developed with gravel roads, electricity grid and underground water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale prospecting.

The surrounding areas rely on groundwater for both domestic and livestock watering purpose. The rest of the water sources are used primarily for game and livestock watering and to a lesser extent for domestic purpose.

Alternatives considered: -

As the Prospecting Right has been accepted over the said area, it would not be viable to consider an alternative site for the prospecting.

Therefore, there are no alternatives to the area.

(b) The type of activity to be undertaken:

Scout and delineation drilling for Diamonds (Alluvial) - Code-DA - Type-D, Diamonds (General) – Code-D – Type -D and Diamonds (DIA) – Code D – Type-D

Alternatives considered: -

The only alternative land use is livestock, game farming.

Further, since a prospecting right has been accepted the option of amending the prospecting area or the type of activity is neither available nor considerable.

(c) The design or layout of the activity:

The site infrastructure will need to be strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the Environmental Impact Assessment process. Thus, the site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for prospecting as well as limited additional impact on the environmental (non-perennial drainage lines and wind direction), heritage resources.

The following infrastructure will be established and will be associated with the prospecting operation:

Scout and delineation drilling. If carried out, drilling may necessitate the establishment of access tracks and minor bush clearing for establishment of drill pads. The need for drilling can only be established once phase 1 of the Prospecting Works Program have been completed.

(d) The technology to be used in the activity:

- Technique

  The prospecting operation is primarily based on alluvial diamond deposits that are restricted to the alluvial terraces west of the Orange River at elevations of 1 000 and 1 100 m.a.s.l. (on gravel deposits that are believed to have derived from eroded diamondiferous Finsch kimberlite material. These gravels are mainly associated with quaternary deposits confined to the Daniel Alluvial Channel. The presence of diamondiferous gravels on Brakkies will be evaluated by means of a standard phased approach. Initially, non-invasive desktop studies will be conducted to delineate and define areas underlain by alluvial gravels. Thereafter, a drilling programme will be performed over anomalous target areas using predefined grids. At least 300 boreholes of ± 5 m in depth are expected to be drilled over 5 years.

  Prospecting activities will primarily make use of existing roads where possible, but reconnaissance tracks will be created in order to access the drilling grid. Minor bush clearing will also be done to establish the drill pads. A mobile container office with mobile toilets might be positioned in the vicinity of the drill grid, but no permanent infrastructure will be established on site.

  Alternatives considered: -

  The planned prospecting activities include Data Acquisition and Desktop Studies, Target Generation and Ground Truthing, Scout Drilling and Delineation drilling if possible. These are the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative prospecting method for the prospecting and drilling for diamonds.

(e) The operational aspects of the activity:

Please refer to d) for a complete description of the prospecting methods.

Prospecting activities will primarily make use of existing roads created by farming, but additional roads / tracks will most likely be created.

Alternatives considered: -

The planned prospecting activities include Data Acquisition and Desktop Studies, Target Generation and Ground Truthing, Scout Drilling and Delineation drilling if possible. The operation is also associated with processing techniques that make use of modern technologies. These are the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative prospecting method for the prospecting and drilling for diamonds.

(f) The option of not implementing the activity:

Potential land use includes grazing. Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land. The

grazing capacity is between 22 and 25 ha/AU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small stock Livelihood Zone. Even though the study area falls within a region where crop farming is abundant, the site itself is categorised to have no to very low suitability for crop production.

Brakkies is mainly used as natural pastures for livestock grazing. Existing infrastructure includes homesteads, public gravel roads, farm tracks, grazing camps and what seems to be an old landing strip. No evidence of historic mining activities on site could be traced and from the satellite images it appears as if the study area is primarily still in pristine condition, with the exception of one small old field.

The most significant impacts associated with grazing activities include the provision of water. These are not expected to have a serious/any impact on the existing groundwater features. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation. The cumulative effects of prospecting activities on the property are expected to be equal to any potential negative effects that agriculture might have.

The Thunderflex project aims to uplift the local community. If the operation does not continue it would hold back any potential employment for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a stagnant effect on the economy of South Africa and the diamond industry as a whole. Substantial tax benefits to the State and Local Government will also be inhibited.
Mining forms an integrated part of the social and economic growth of South Africa and more specifically the Northern Cape Province.

Alternative Prospecting Methods

The prospecting method of drilling is the only economic viable method currently being used by the diamond fraternity; it is also the only cost-effective method. There is no alternative prospecting method.

Consequence if not proceeding with the Operation

The operation will make provision for 5- 15 job opportunities. This will be lost if the project does not proceed. Substantial tax benefits to the State and Local Government will also be lost. The property will not be potentially prospected for diamonds that naturally occur in this area and the relevant job opportunities and positive impacts that can be made in the surrounding communities will not be happening.

Heritage:
Heritage: All information has been taken out of the Heritage impact Assessment done by Dr. Edward Matenga.

The proposed mine prospecting can go ahead as there are no heritage sites that warrant further action after the documentation. Since archaeological deposits may be buried underground, should important artefacts or skeletal material be exposed in the area during prospecting operations, such activities should be halted, and the provincial heritage resources authority or SAHRA notified in order for an investigation and evaluation of the finds undertaken

ii) Details of the Public Participation Process Followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

The consultation process with interested and affected parties is ongoing (Appendix 3).

The process as described by NEMA for Environmental Authorisation was followed. See table 1 below for the identification of Interested and Affected Parties to be consulted with.

A copy of the Background Information Document with a cover letter and comments form to invite their comments was sent by registered post to the farm owner and government departments which are: -

Siyancuma Local Municipality Douglas
Pixley ka Seme District Municipality
Northern Cape Department of Roads and Public Works
Department of Water and Sanitation
EKSOM Holdings SOC Limited and ESKOM Environmental division
Department of Agriculture, Land Reform and Rural Development
Department of Agriculture, Forestry and Fisheries
Department of Environment and Nature Conservation
Department of Rural Development and Land Reform
Department of Cooperative Governance, Human Settlements and Traditional Affairs
SANRAL
Transnet
SAHRA
National Department of Public Works

See Appendix 3 as proof, in order for other interested parties to come forward and to register as interested parties in the project.

An advert was placed in the DFA on 14 August 2020 to inform the public that a Prospecting Right was accepted for Thunderflex 78 (Pty) Ltd and that any interested or affected parties must register (copy attached).

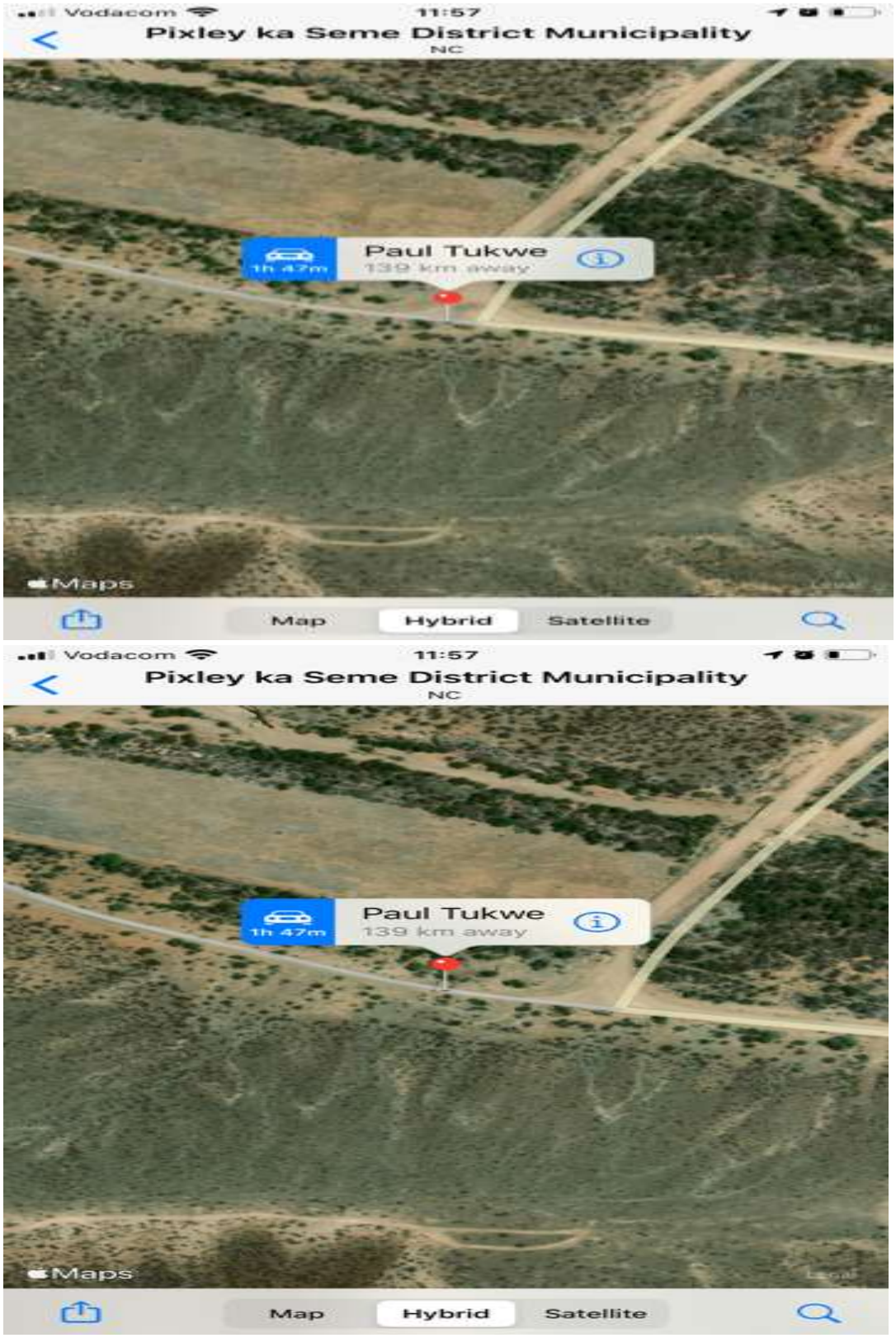
Notices were placed at the/on the fences of the farms to make all relevant parties aware of the application.

With this site notice all passers-by are requested to register and submit any written comments to be forwarded to the consultant.


NOTICE


ORANJE-OORD
(1km)
C.O. HAGER
WOUTERSPAN


KENNISGEWING
NOTICE



A notification letter on the BAR document was send to all I & APs and the BAR will be placed at the library and municipality in Douglas for easy access by all parties if they are open to the public.

iii) Summary of issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

Table 1. Summary of issues raised by I & APs

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted		Date Comments Received	Issues Raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated
AFFECTED PARTIES					
Landowner/s	**X**				
CP Scheepers P.O. Box 1995 Kimberley 8300	X				
Mr. C.O. Hager (Junior) P.O. Box 325 Douglas 8730	X				
Mr. J. Gouws P.O. Box 609 Douglas 8730	X				
Ms. Marina Nortje 15 Barkley Road Douglas 8730	X				
Lawful occupier/s of the land					

There are lawful occupiers, on the farms that are renting from Rural Development and Land Reform.					
Landowners or lawful occupiers on adjacent properties	**X**				
Municipal Councillor	**X**				
Municipality	**X**				
Siyancuma Local Municipality P.O. Box 27 Douglas; 8730	X				
Pixley ka Seme District Municipality Private Bag X1012; De Aar; 7000	X				
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA					

SANRAL P.O. Box 415; Pretoria; 0001	X				
NC Department of Roads and Public Works P.O. Box 3132; Squarehill Park; Kimberley 9301	X				
National Department of Public works Private Bag X5002 Kimberley 8300	X				
Department of Mineral Resources Private Bag X6093 Kimberley 8300	X				
Department of Agriculture, Forestry & Fisheries Attention: Jacoline Mans P.O. Box 2782 Upington 8800	X				
Dept. Rural Development & Land Reform P.O. Box 5026 Kimberley	X				

8300					
ESKOM Holdings SOC Limited Northern Cape Operating Unit: Land Development P.O. Box 606 Kimberley 8300	X				
Eskom Environmental Division PO Box 356 Bloemfontein 9300	X				
Department of Water & Sanitation Private Bag X6101; Kimberley; 8300	X				
SAHRA P.O. Box 4637 Cape Town 8000	X	3 September 2020	As the proposed development is undergoing an EA Application process in terms of the National Environmental Management Act, 107 of 1998 (NEMA), NEMA Environmental Impact Assessment (EIA) Regulations as amended, it is incumbent on the developer to ensure that a Heritage Impact Assessment (HIA) is done as per section 38(3) and 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA) as required		

			by section 24(4)b(iii) of NEMA. This must include an archaeological component, palaeontological component and any other applicable heritage components. The HIA must be conducted as part of the EA Application in terms of NEMA and the NEMA EIA Regulations. SAHRA requests that an assessment of the impacts to heritage resources that complies with section 38(3) of the NHRA as required by section 38(8) of the NHRA and section 24(4)b(iii) of NEMA be conducted as part of the EA process. The assessment must include an assessment of the impact to archaeological and palaeontological resources. The assessment of archaeological resources must be conducted by a qualified archaeologist and the report comply with the SAHRA 2007 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports (see www.asapa.co.za or www.aphp.org.za for a list of qualified archaeologists). The proposed development is located within an area of low to very high Palaeontological Sensitivity as per the SAHRIS PalaeoSensitivity		

			map. As such, a desktop Palaeontological Impact Assessment (PIA) must be undertaken by a qualified palaeontologist. (See https://www.palaeosa.org/heritage-practitioners.html for a list of qualified palaeontologists). If prospecting is to occur within the north-eastern corner of farm Orange Oord (very high sensitivity), a field-based PIA must be conducted. The report must comply with the 2012 Minimum Standards: Palaeontological Components of Heritage Impact Assessments. Any other heritage resources as defined in section 3 of the NHRA that may be impacted, such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed.		
Transnet PO Box 72501; Parkview; 2122	X				
Department of Cooperative Governance, Human	X				

Settlements and Traditional Affairs Private Bag X5005 Kimberley 8300					
Communities					
No Communities					
Dept. Land Affairs					
Department of Land Affairs and Rural Development Private Bag X5018 Kimberley 8300	X				
Traditional Leaders	X				
No Traditional leaders					
Dept. Environmental Affairs					
Dept. of Environment & Nature Conservation Private Bag X6102 Kimberley 8300	X				
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					

iv)The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) **Baseline Environment**

(a) Type of environment affected by the proposed activity (its current geographical, physical, biological, socio-economic, and cultural character)

Regional Geology

The bedrock of the Orange River valley between the confluence of the Vaal and Orange Rivers at Douglas and Prieska is dominated by flat-lying Dwyka tillite and siltstone of the Karoo Supergroup. The Dwyka, typically, comprises matrix-supported diamictite with both local and transported pebbles and boulders as dropstones in a rock-flour matrix. Underlying the Dwyka and exposed where the Orange River has incised through that sequence, are lavas of the Ventersdorp Supergroup, overlain (in places) by sediments of the Transvaal Supergroup, comprising shales, quartzites and dolomites. The bedrock is cut by faults and dolerite dykes, which are rarely exposed. The surface on which the Dwyka was deposited was irregular with several topographic highs.

The present surface of the Dwyka comprises a gently undulating terrain lying at an elevation of between 1,050m and 1,100m amsl. The river has incised into this surface to a depth of between 90m and 150m.

Owing to the irregularity of the pre-Dwyka surface, several reaches of the river are superimposed on pre- Dwyka topographic highs, which, due to their relative resistance to erosion, give rise to more rugged topography. Here the Orange River is confined to gorges with increased river gradients. In contrast, the more easily eroded Dwyka has been dissected by minor tributaries of the Orange River, giving rise to a trellis-type drainage pattern. To the north of the Orange River, the Ghaap Plateau represents an ancient surface of Transvaal Supergroup rocks.

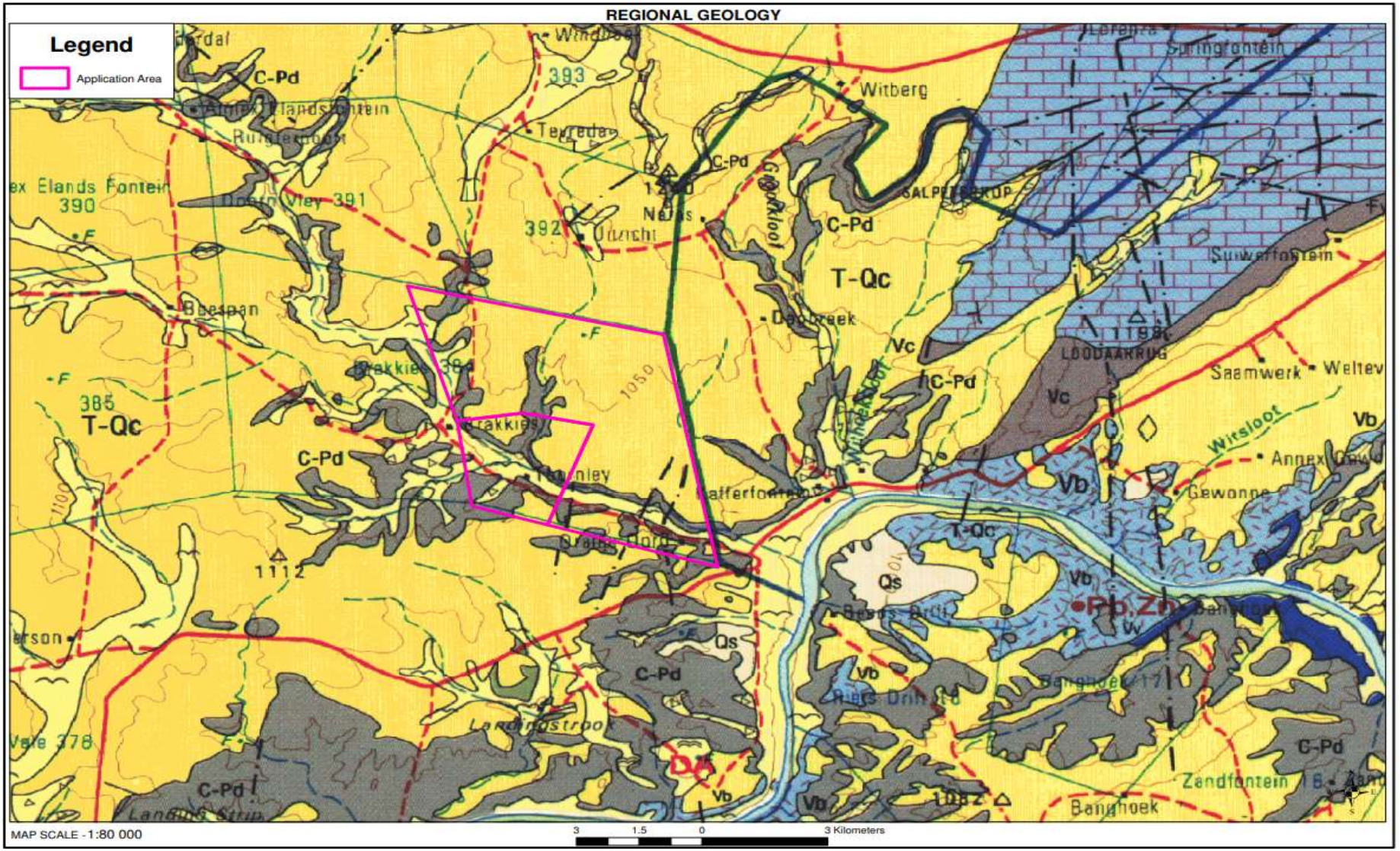


Figure 9. Geological Map of the application area.

Table 2. Lithology of the application area.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
T-Qc	Tertiary calcretes	Surface calcretes	Last 65 Ma, usually last 5 Ma
C-Pd	Dwyka Group, Karoo SG	Tillites, sandstones, mudstones and shales	Late Carboniferous to Early Permian, ca 310-290Ma
Vc	Clearwater Fm, Campbell Rand Subgroup, Ghaap Group, Transvaal SG	Khaki-coloured shale, dolomite, andesite	Ca 2630 – 2620 Ma
Vu	Ulcott Fm, Schmidtsdrift Subgroup, Ghaap Group, Transvaal SG	shale	Ca 2640 – 2630 Ma
Vb	Boomplaas Fm, Schmidtsdrift Subgroup, Ghaap Group, Transvaal SG	Oolitic, stromatolitic and algal-mat limestone	Ca 2640 – 2630 Ma

Climate:

Regional Climate: -

The Northern Cape is classified as a semi-dessert and is known to have summer rains with high temperatures in the Summer (as high as 38°C to 40°C) and cold Winters (temperatures ranging from -4°C to -6°C). The sun shines approximately 80% during Summer and approximately 70% during the Winter.

Average Annual Rainfall: -

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Ave rainfall (mm)	77	69	67	40	17	6	5	10	19	38	55	60	**463**
Ave rain days/month	6.5	5.7	6.2	4	1.6	0.9	0.8	1	1.6	3.5	5.2	5.9	**43**

Rainfall Intensity: -

Most of the rainfalls occur during thunderstorms in the Summer months as well as during cloud bursts where maximum rainfalls were measured of up to 112.5mm at a downpour of approximately 60 minutes.

Average Maximum and Minimum Temperatures:

The average maximum temperature measured during the Summer is 30.9°C and the minimum during the Winter months is 3.4°C.

Average Monthly Wind Direction and Speed: -

The prevailing wind direction in the area is mainly from the north to north-westerly with the strongest winds from the west-southwest to north-northwest that occurs between August and December. October and November month are common for high wind speeds of up to 4.85 meters per second.

Average Monthly Evaporation: -

It is estimated that the average annual evaporation rate is approximately 2365mm which indicates the dry climate conditions in this area.

Presence of Extreme Climatic Conditions: -

Hail:	October to March
Frost:	May to September
Strong Winds:	Occasional strong winds occur but not often
Droughts:	Normal for a dessert area – approximately 6 out of 10 years.

Topography:

The calcrete terraces are characterised by open plains with some relief, while the ridge slopes and intermittent river are defined as open ridges. Altitude ranges from 980 m above sea level in the channel of the intermittent river at the south-east boundary of the study area, 1 020 – 1 040 m on the ridge slopes and 1 074 m on the calcrete terraces. The terrain is indicated by a level to very gentle slope of <2% on the terraces but increases slightly from 3 to 5 % on the undulating ridge slopes where drainage lines cut through. Some areas do however have slightly steeper slopes (6-8) % and these are especially prominent where sharper ridges occur along the intermittent river.

Soil:

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Thunderflex 78 to provide an ecological and wetland study in order to highlight the ecological characteristics of the proposed prospecting area. and to determine the possible impact of prospecting on the diversity and ecological status of the

application area soils was described and included in this report as part of the ecological study.

The majority of the property is characterised by red and yellow apedal, freely drained soils, red with high base status. These soils are less than 300 mm deep, and are typically associated with the calcrete terraces, which depicts the Ag115 landtype. The soils are expected to be dominated by loamy sand. Soils associated with the Fc565 landtype are those found on the ridges slopes and include Glenrosa/Mispah forms. Lime is generally present in the entire landscape. A small section of the riverbed in the south-east are characterised by undifferentiated deep deposits (Ia124 landtype). Ag115 and Fc565 soils are not suitable for arable agriculture but are suitable for grazing if the climate permits it. Ia124 soils, however, have intermediate suitability for arable agriculture where the climate permits it. The soils associated with the study area have very low potential to regenerate, if badly eroded. The soils of the larger drainage ways and intermittent river channel are expected to be dominated by sands which are susceptible to wind erosion, while the soils of the calcrete terraces and ridge slopes are expected to comprise loamy sands that have moderate susceptibility to wind erosion. Rainfall erosivity is very low due to the arid climate, but the alluvial soils are most susceptible to water erosion during storm events.

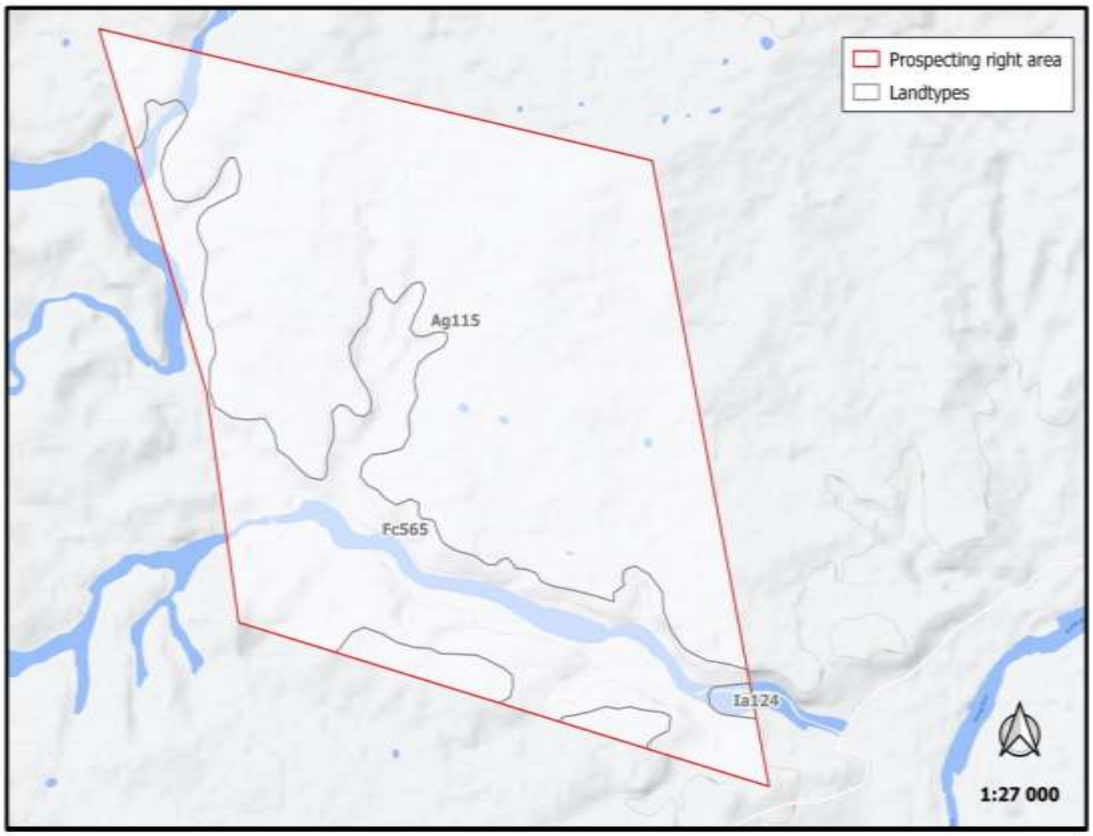


Figure 10. The distribution of land types in the study area. Map taken out of the Ecological and wetland assessment by Boscia Ecological Consultants.

Land Capability and Land Use

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Thunderflex 78 to provide an ecological and wetland study in order to highlight the ecological characteristics of the proposed prospecting area. and to determine the possible impact of prospecting on the diversity and ecological status of the application area Land capability and Land use was described and included in this report as part of the ecological study.

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land. The grazing capacity is between 22 and 25 ha/AU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small stock Livelihood Zone.

Even though the study area falls within a region where crop farming is abundant, the site itself is categorised to have no to very low suitability for crop production. Brakkies is mainly used as natural pastures for livestock grazing. Existing infrastructure includes homesteads, public gravel roads, farm tracks, grazing camps and what seems to be an old landing strip. No evidence of historic mining activities on site could be traced and from the satellite images it appears as if the study area is primarily still in pristine condition, with the exception of one small old field.

Current and historic land use

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land. The grazing capacity is between 22 and 25 ha/AU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small stock Livelihood Zone. Even though the study area falls within a region where crop farming is abundant, the site itself is categorised to have no to very low suitability for crop production. Brakkies is mainly used as natural pastures for livestock grazing. Existing infrastructure includes homesteads, public gravel roads, farm tracks, grazing camps and what seems to be an old landing strip. No evidence of historic mining activities on site could be traced and from the satellite images it appears as if the study area is primarily still in pristine condition, with the exception of one small old field.

Surface Water:

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Thunderflex 78 to provide an ecological and wetland study in order to highlight the ecological characteristics of the proposed prospecting area. and to determine the possible impact of prospecting on the diversity and ecological status of the application area Surface Water was described and included in this report as part of the ecological study.

Water resources

The National Water Act (36 of 1998) (NWA) provides a framework to protect water resources. According to this Act, a water resource includes a watercourse, surface water, estuary, or aquifer; whereas a water course includes:

a) a river or spring,
b) a natural channel in which water flows regularly or intermittently,
c) a wetland, lake or dam into which, or from which, water flows, and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.

Any reference to a watercourse includes its bed and banks and a water resource does not only include the water within the system, but also the entire water cycle; i.e. evaporation, precipitation, the habitats and processes.
The purpose of this Act (Section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors - (g) protecting aquatic and associated ecosystems and their biological diversity and (h) reducing and preventing pollution and degradation of water resources.

No activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

The Brakkies study area falls within the Boegoeberg quaternary catchments D71A and D71B of the Lower Orange Water Management Area (Figure 17). These quaternary catchments have been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) and 'Largely Natural' (B), respectively by Smook et al. (2002) and information regarding mean annual rainfall, evaporation potential and runoff for the quaternary catchments is provided in table below.

Quaternary catchment	Catchment Area (km^2)	Mean Annual Rainfall (mm)	Mean Annual Evaporation (mm)	Mean Annual Runoff (10^6 m^3)
D71A	1 210	283	2 350	5.69
D71B	2 875	315	2 350	20.01

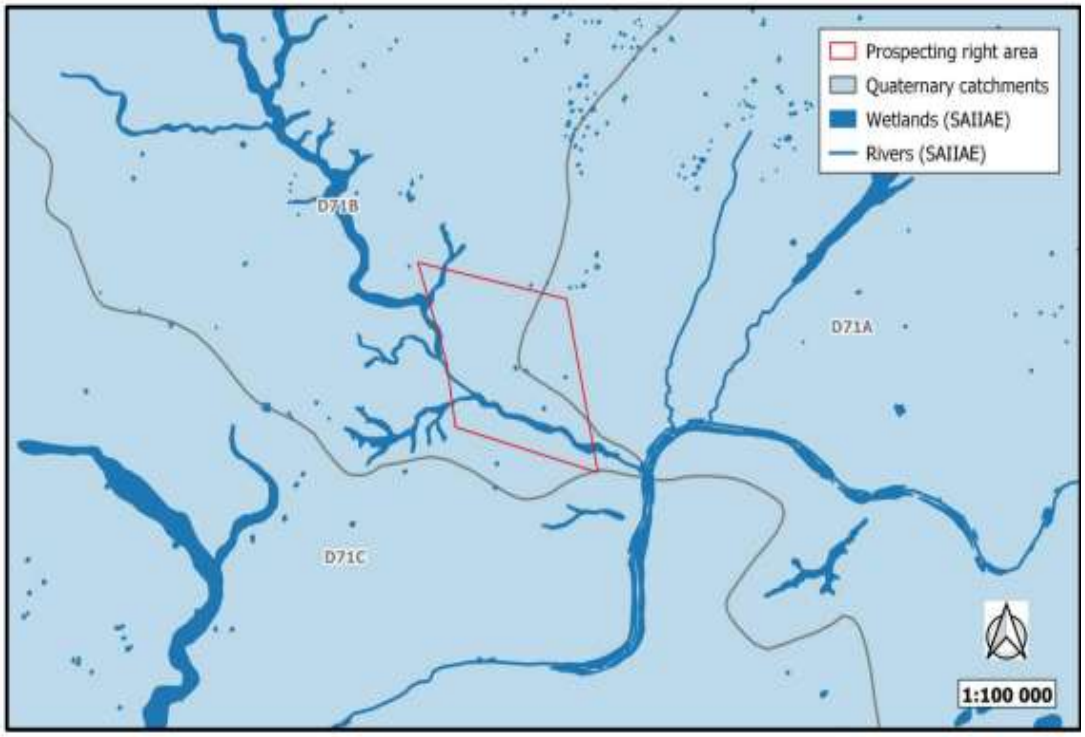


Figure 17. The locality of the proposed prospecting area in relation to the quaternary catchments of the Lower Orange Water Management Area.

The South African Inventory of Inland Aquatic Ecosystems was developed in response to a multi-stakeholder need for the planning, conservation and management of inland aquatic ecosystems, as mandated by a number of legislative Acts, including the South African National Water Act (NWA) and the National Environmental Management: Biodiversity Act (NEMBA). This inventory formed part of the National Biodiversity Assessment of 2018 and is built on previous efforts of NFEPA and the NBA of 2011. It includes a collection of data layers related to ecosystem types and pressures for rivers and inland wetlands (Van Deventer et al. 2018).

According to SAIIAE, the study area falls within the Upper Karoo Bioregion, where 1.9 % of the land area is covered by inland wetlands, including depressions, floodplains, seeps and valleybottom wetland types (Van Deventer et al. 2019). The spatial extent according to the present ecological status per wetland type is depicted in Table 3 of specialist report. Vally-bottom wetlands are most abundant in the bioregion, with the majority severely modified. A similar trend is seen with the remaining wetland types, which have also been moderately to severely modified. However, a larger proportion of depressions are still in natural or near-natural condition.

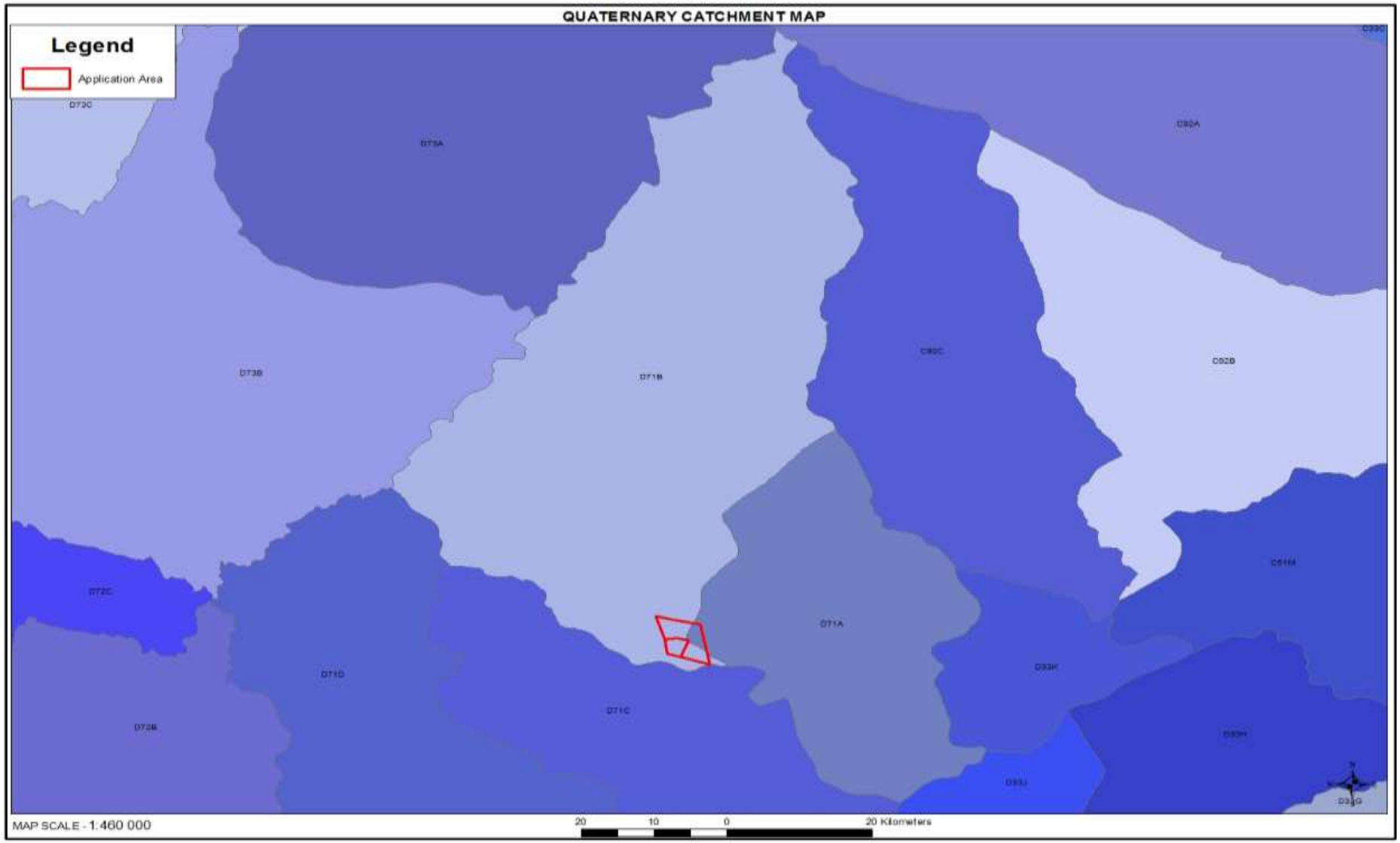


Figure 11. Catchment map of the application area.

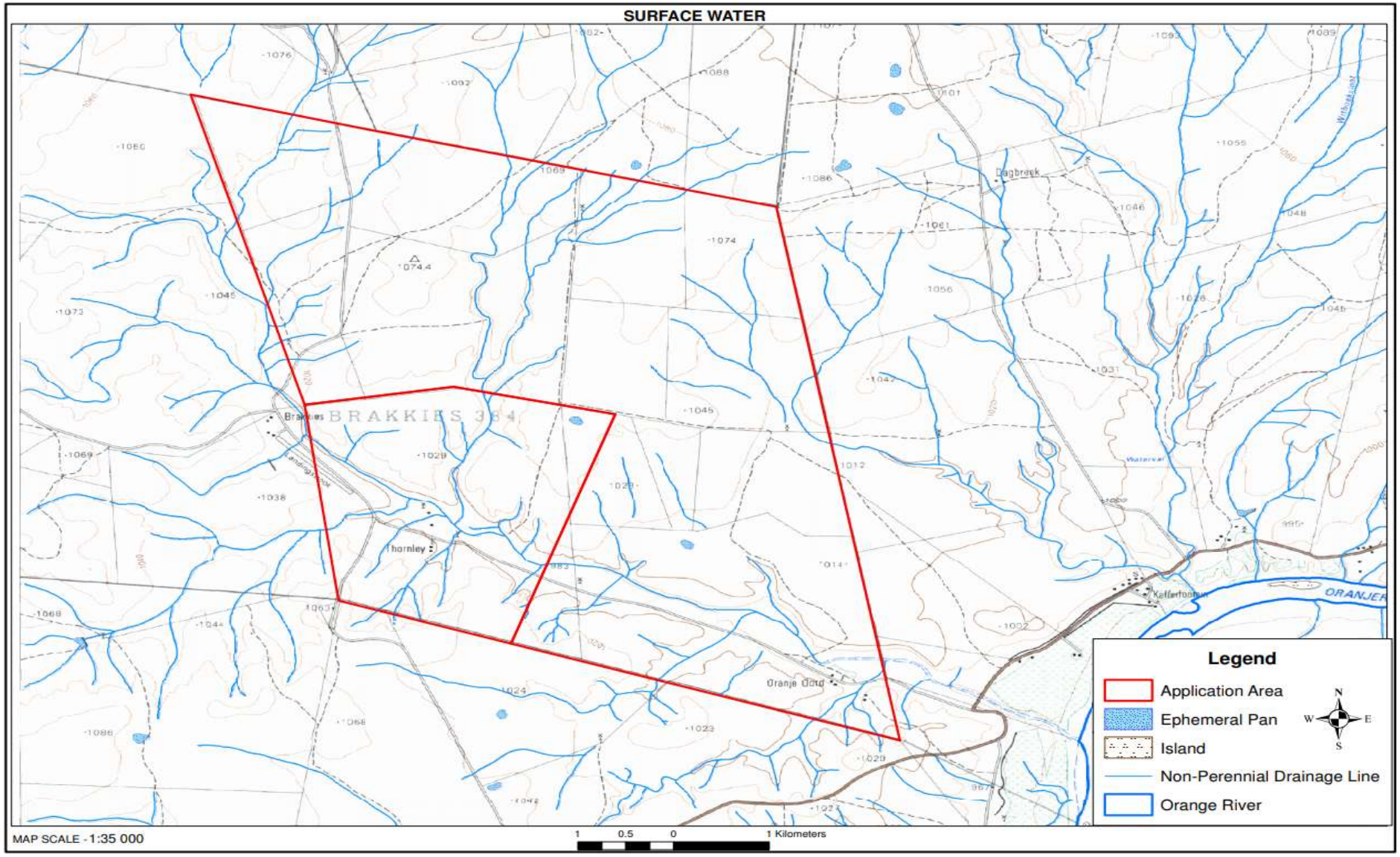


Figure 12. Surface Water map of the application area.

Ground Water:

Depth of water-table(s):

Mean depth of the water table varies with the annual rainfall. Groundwater flow would follow the topography and the surface drainage direction from the higher areas towards the lower areas in towards the Orange River.

Ground-water zone:

The diamond drilling does not affect the quality of the ground water in any manner. The drilling will never be deep enough to encounter ground water. There are no harmful or toxic properties in the gravels being prospected.

Air Quality and Noise:

With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed prospecting activity.

The current source of air pollution in the area stems from mining operations along the Orange River and from vehicles travelling on the gravel roads of the area. Farming activities, such as ploughing of irrigation fields, may generate dust during certain periods of the year.

The general air quality on the area is expected to be good.

The potential source of air pollution on the farms will be nuisance dust generated by the movement of vehicles on the site roads. Gas emissions from the vehicles will be negligible and within legal limits. Generated dust will be visible from the secondary gravel road and to local farm residents. Any potential fall-out dust will impact those who reside on the farm.

Noise on site will be generated by the drilling equipment as well as vehicles. Although these activities do generate noise, the overall impact can be described as negligible. The most susceptible receptors of noise will be the local farm residents.

Fauna:

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Thunderflex 78 to provide an ecological and wetland study in order to highlight the ecological characteristics of the proposed prospecting area and to determine the possible impact of prospecting on the diversity and ecological status of the application area fauna was described and included in this report as part of the ecological study.

For the faunal component, a lists of mammals, reptiles, amphibians, birds, fish and arthropods which are likely to occur in the study area were derived based on

distribution records from the literature, including Friedmann and Daly (2004) and Stuart and Stuart (2015) for mammals, Alexander and Marais (2007) and Bates et al. (2014) for reptiles, Du Preez and Carruthers (2009) for amphibians, Gibbon (2006) for birds, Kleynhans (2007) for fish and Thirion (2007) for arthropods. Additional information on faunal distribution was extracted from the various databases hosted by the ADU web portal, http://adu.org.za, as well as from the Baboon Spider Atlas https://www.baboonspideratlas.co.za/, the Freshwater Biodiversity Information System (FBIS) https://freshwaterbiodiversity.org/, and iNaturalist https://www.inaturalist.org/.

The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as an assessment of the availability and quality of suitable habitat at the site. The likelihood of Red Data species occurring on site has been determined using the distribution maps in the Red Data reference books (Friedmann and Daly 2004, Minter et al. 2004, Bates et al. 2014, Taylor et al. 2015, ADU 2016) and comparing their habitat preferences with the habitats identified from satellite images. The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria (IUCN 2019) and/or the various red data books for the respective taxa.

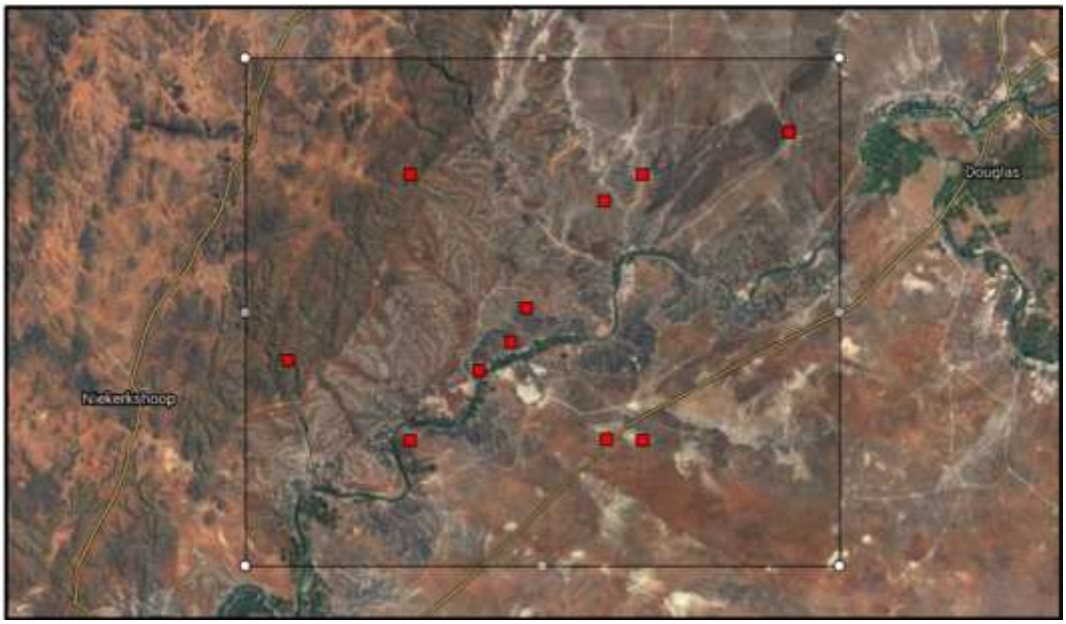


Figure 13. The extent of the map filter applied on the POSA website to extract species information is shown by the large black square. The small red squares indicate historical data points.

Additional information on faunal distribution was extracted from the various databases hosted by the ADU web portal, http://adu.org.za, as well as from the Baboon Spider Atlas https://www.baboonspideratlas.co.za/, the Freshwater Biodiversity Information System (FBIS) https://freshwaterbiodiversity.org/, and iNaturalist https://www.inaturalist.org/. The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as an assessment of the availability and quality of suitable habitat at the site. The

likelihood of Red Data species occurring on site has been determined using the distribution maps in the Red Data reference books (Friedmann and Daly 2004, Minter et al. 2004, Bates et al. 2014, Taylor et al. 2015, ADU 2016) and comparing their habitat preferences with the habitats identified from satellite images. The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria (IUCN 2019) and/or the various red data books for the respective taxa.

Mammals

As many as 54 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2). Of these, fifteen are listed either in the IUCN or South African Red Data Book. Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Those that are specially protected are also indicated in Table 3 of the study. Aardvark has a very high probability to occur on site, especially in the deep sandy areas of the alluvial floodplain. The African Straw-coloured Fruit-bat, Geoffroy's Horseshoe Bat, Honey Badger, African Striped Weasel, Aardwolf, African Wild Cat, Cape Fox, Bat-eared Fox, Striped Polecat and Ground Pangolin have a high chance of occurring across the site, given their wide habitat tolerances. Pangolins however, are seldomly encountered due to their inconspicuous nature. The Littledale's whistling rat has a high potential occurring on site based on their preferences for shrubland habitat.

The Cape Clawless Otter may potentially occur in areas where pools of water accumulate in the intermittent watercourses after good rainfall events. On the other hand, the Bushveld Gerbil and Lesser Dwarf Shrew have a low potential of occurring on site based on their preference for grassland habitat. The South African Hedgehog and Black-footed cat may potentially occur on site on account of their preferences for arid areas. They are both however rather skittish and therefore they will most likely be found very seldomly. The Brown Hyaena has a low potential to be found on site mainly based on the fact that farm fences are restricting their occurrences across their natural distribution range. The Dent's Horseshoe Bat and Darling's Horseshoe Bat also have a low chance to be found on site due to their preference for savanna habitat. Problem animals (Schedule 4) with a high likelihood to occur on site include Black-backed Jackal, Vervet Monkey and Caracal.

Table 3. Mammal species of conservation concern that are likely to occur in the region. Conservation values are indicated in terms of the international (IUCN) Red List, the South African Red Data Book (SA RDB) and Schedule 1 of the Northern Cape Nature Conservation Act (NCNCA).

Scientific name	Common name	IUCN	SA RDB	NCNCA
Eidolon helvum	African Straw-coloured Fruit-bat	NT		
Rhinolophus denti	Dent's Horseshoe Bat		NT	
Rhinolophus clivosus	Geoffroy's Horseshoe Bat		NT	
Rhinolophus darlingi	Darling's Horseshoe Bat		NT	
Orycteropus afer	Aardvark			X
Gerbilliscus leucogaster	Bushveld Gerbil		DD	
Manis temminckii	Ground Pangolin	VU	VU	X
Suncus varilla	Lesser Dwarf Shrew		DD	
Atelerix frontalis	South African Hedgehog		NT	
Proteles cristata	Aardwolf			X
Felis silvestris	African Wild Cat			X
Felis nigripes	Black-footed Cat	VU		X
Vulpes chama	Cape Fox			X
Hyaena brunnea	Brown Hyena	NT		X
Otocyon megalotis	Bat-eared Fox			X
Poecilogale albinucha	African Striped Weasel		DD	X
Ictonyx striatus	Striped Polecat			X
Mellivora capensis	Honey Badger		NT	X

Reptiles

The Brakkies prospecting area lies within the distribution range of at least 36 reptile species (see Appendix 2). No listed species are known to occur in the area, but most reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA.

Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard) and Chamaeleo dilepis dilepis (Namaqua Chamaeleon). The Karusa Lizard is a rock-dwelling species inhabiting rocky outcrops, while the Common Flap-neck Chameleon is typically found high up in bushes or trees. South African endemics include Pachydactylus mariquensis (Common Banded Gecko), Lamprophis aurora (Aurora Snake) and Homopus femoralis (Greater Dwarf Tortoise). The Common Banded Gecko prefers sandy soil and sparse vegetation in a variety of habitats such as sandy plains and dry river beds. The Aurora Snake is often found near streams and under rocks and old termitaria, while the Greater Dwarf Tortoise occurs in rocky areas with dense vegetation where they take shelter among rocks or under plants. The ephemeral pans, drainage lines and river could potentially provide a special habitat for the Marsh Terrapin. Images of these reptile species of special importance are shown in the specialist report (Appendix 4).

Amphibians

Fourteen amphibian species are known from the region (Appendix 2). No natural permanent water is expected to occur on site that would represent suitable habitats for these species, but the ephemeral river, pans and drainage lines will be very important during wet periods for breeding. For the remainder of the time, frogs are known to take refuge under rocks and logs, soil cracks, sandy substrates, leaf litter and abandoned mounds of termites.

The Giant Bull Frog (Pyxicephalus adspersus) (Figure 12 in specialist report) is listed as Near Threatened and is protected according to Schedule 1 of the NCNCA. They prefer seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna, but mainly remain buried up to 1 m underground until conditions become favourable. The site lies within the known distribution of this species and the ephemeral pans could potentially provide the ideal habitat for this species.

All other amphibians of the study area are protected according to Schedule 2 of NCNCA (see Appendix 2). The Raucous Toad and Southern Pygmy Toad are endemic to South Africa and occur in a variety of terrestrial habitats for most of the time. However, they use various temporary waterbodies containing rainwater to breed, including pans, pools, roadsides, farm dams and even quarries.

Avifauna

The study site does not fall within or near (< 100 km) any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 261 bird species have been recorded from the region. As many as 25 listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened, Endangered or Critically Endangered (Table 4 of the study). Furthermore, all birds are protected either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Those that are specially protected (Schedule 1) are also listed in Table 4. Plants in general, from grass tufts to shrubs and trees provide important micro-habitats to birds and therefore the entire study area is expected to host a diverse avifauna community. The most common bird species of conservation concern expected to occur in the terrestrial habitats on site include Kori Bustard (Near Threatened).

The ephemeral aquatic habitats could potentially attract protected water birds, such as Chestnut-banded Plover, Maccoa Duck, Marabou Stork, Lesser Flamingo, Greater Flamingo, Greater Painted-snipe and Black-winged Pratincole when wet; all of which are Near Threatened. Images of these aforementioned bird species of conservation concern are shown in Figure 13 of the specialist report (Appendix 4). Many of the remaining species of conservation concern are also expected to occur on site either by occasionally passing over, foraging or nesting.

Table 4. Bird of conservation concern that are likely to occur on site. Species are indicated in terms of the SA Bird Atlas and Schedule 1 of the Northern Cape Nature Conservation Act (NCNCA)

Scientific name	Common name	SA Bird Atlas	NCNCA
Accipiter badius	Shikra		X
Anthropoides paradisea	Blue Crane	NT	
Aquila rapax	Tawny Eagle	EN	X
Aquila verreauxii	Verreaux's Eagle	VU	X
Ardeotis kori	Kori Bustard	NT	
Bubo africanus	Spotted Eagle-Owl		X
Bubo lacteus	Verreaux's Eagle-Owl		X
Buteo rufofuscus	Jackal Buzzard		X
Buteo vulpinus	Steppe Buzzard		X
Caprimulgus europaeus	European Nightjar		X
Caprimulgus rufigena	Rufous-cheeked Nightjar		X
Caprimulgus tristigma	Freckled Nightjar		X
Charadrius pallidus	Chestnut-banded Plover	NT	X
Ciconia abdimii	Abdim's Stork	NT	
Ciconia nigra	Black Stork	VU	X
Circaetus pectoralis	Black-chested Snake-Eagle		X
Circus maurus	Black Harrier	EN	X
Circus pygargus	Montagu's Harrier		X
Circus ranivorus	African Marsh-Harrier	EN	X
Coracias garrulus	European Roller	NT	
Cursorius rufus	Burchell's Courser	VU	
Elanus caeruleus	Black-shouldered Kite		X
Falco biarmicus	Lanner Falcon	VU	X
Falco naumanni	Lesser Kestrel		X
Falco peregrinus	Peregrine Falcon		X
Falco rupicolis	Rock Kestrel		X
Falco rupicoloides	Greater Kestrel		X
Glareola nordmanni	Black-winged Pratincole	NT	X
Glaucidium perlatum	Pearl-spotted Owlet		X
Gyps africanus	White-backed Vulture	CR	X
Gyps coprotheres	Cape Vulture	EN	X
Haliaeetus vocifer	African Fish-Eagle		X
Hieraaetus pennatus	Booted Eagle		X
Leptoptilos crumeniferus	Marabou Stork	NT	X
Melierax gabar	Gabar Goshawk		X
Milvus migrans	Black Kite		X
Neotis ludwigii	Ludwig's Bustard	EN	X
Oxyura maccoa	Maccoa Duck	NT	
Phoenicopterus minor	Lesser Flamingo	NT	X
Phoenicopterus ruber	Greater Flamingo	NT	X
Polemaetus bellicosus	Martial Eagle	EN	X
Polihierax semitorquatus	Pygmy Falcon		X
Polyboroides typus	African Harrier-Hawk		X
Ptilopsus granti	Southern White-faced Scops-Owl		X
Rostratula benghalensis	Greater Painted-snipe	NT	X
Sagittarius serpentarius	Secretarybird	VU	X
Torgos tracheliotus	Lappet-faced Vulture	EN	X
Tyto alba	Barn Owl		X

NATURAL VEGETATION

Dr. Betsie Milne from Boscia Ecological Consultants has been appointed by Thunderflex 78 to provide an ecological and wetland study in order to highlight the ecological characteristics of the proposed prospecting area and to determine the possible impact of prospecting on the diversity and ecological status of the application area flora was described and included in this report as part of the ecological study.

Broad-scale vegetation patterns

The study area falls within the Nama Karoo and Azonal Vegetation Biomes (Mucina and Rutherford 2006). According to the vegetation map of Mucina and Rutherford (2012), the site is represented by two broad-scale vegetation units from the Upper Karoo and Alluvial Vegetation Bioregions, i.e. Northern Upper Karoo and Upper Gariep Alluvial Vegetation

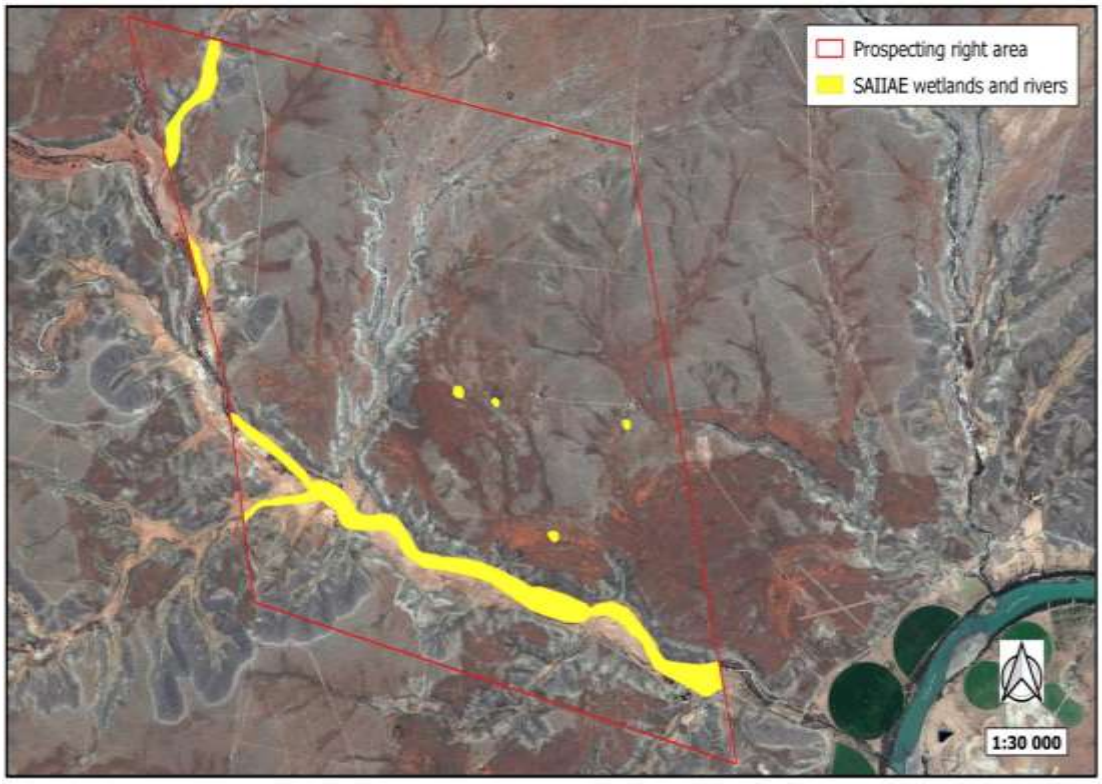


Figure 14. The location of SAIIAE wetlands on the proposed prospecting right area.

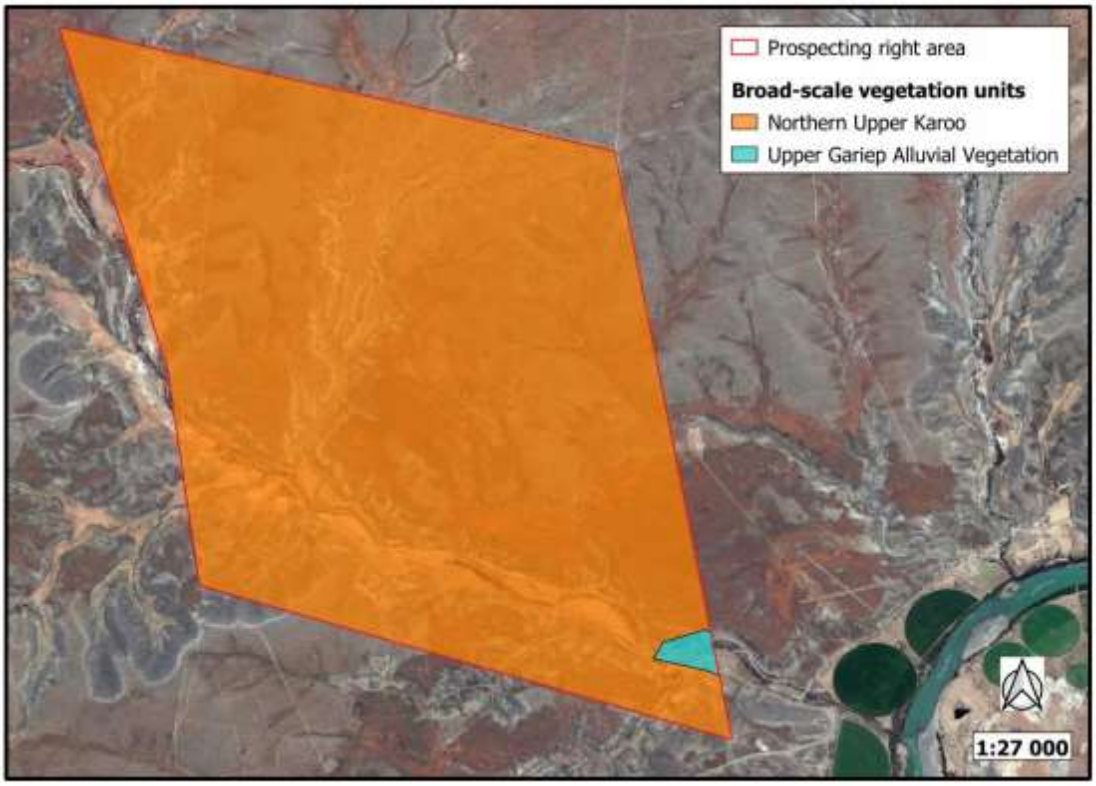


Figure 15. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area.

Upper Gariep Alluvial Vegetation is found in the Northern Cape and Free State and includes the broad alluvia of the Orange River, lower Caledon as well as the lower stretches of the Vaal, Riet and Modder Rivers as far as Groblershoop. The topography is typically flat alluvial terraces that host riparian thicket vegetation (dominated by Vachellia karroo and Diospyros lycioides), flooded grasslands, reed beds and ephemeral herblands found mainly on sand banks within the river and on the river banks. The geology of this unit is presented as recent alluvial deposits underlain by Karoo Supergroup sediments and tillites. The soils are typically of the Ia group land types. This unit is subject to flooding during summer. It is estimated that more than 20 % of the unit has been transformed for cultivation and the building of dams. Exotic woody species like Salix babylonica, Eucalyptus camaldulensis, E. Sideroxylon, Prosopis and Populus spp., dominate heavily disturbed alluvial vegetation. The unit is classified as being vulnerable and only 3 % is conserved within formal conservation areas, i.e. Tussen Die Riviere, Gariep Dam and Oviston Nature Reserves. No endemic plant species are known from this unit

Northern Upper Karoo is found in the Northern Cape and Free State at altitudes between 1 000 and 1 500 m. It is mainly restricted to the Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Phillipstown, Petrusville and Petrusburg in the east. The topography is typically flat to gently sloping, with isolated hills in the Upper Karoo Hardeveld (in the south) and Vaalbos Rocky Shrubland (in the northeast). Numerous pans are interspersed

in this unit. The vegetation occurs mainly as shrubland dominated by dwarf karoo shrubs, grasses and Senegalia mellifera. The geology and soil of this unit varies greatly. Geology include shales of the Volksrust Formation, Dwyka Group Diamictite, Jurassic Karoo Dolerite sills and sheets, and calcretes of the Kalahari Group. Soils range from shallow to deep, red-yellow, apedal, freely drained to very shallow Glenrosa and Mispah forms. The most dominant landtypes are Ae, Ag and Fc. It is estimated that about 4 % of the Northern Upper Karoo has been cleared for cultivation or transformed by building of dams; and human settlements are increasing in the northeastern parts. Erosion is moderate, very low and low, while Prosopis glandulosa, considered among the top 12 agriculturally significant invasive alien plants in South Africa, are widely distributed in this unit. The unit is classified as being least threatened and it is not currently conserved within any formal conservation areas. Endemic plant species known from this unit include Lithops hookeri, Stomatium pluridens, Atriplex spongiosa, Galenia exigua and Manulea deserticola

Fine-scale vegetation patterns

The proposed finer scale vegetation communities were delineated according to visual variabilities signified on satellite images. These can be divided into at least six units (Figure 16), which are described below. These descriptions include unique characteristics and possible species most likely associated with each unit. A list of plant species likely to occur on site is presented in Appendix 1 of the study.

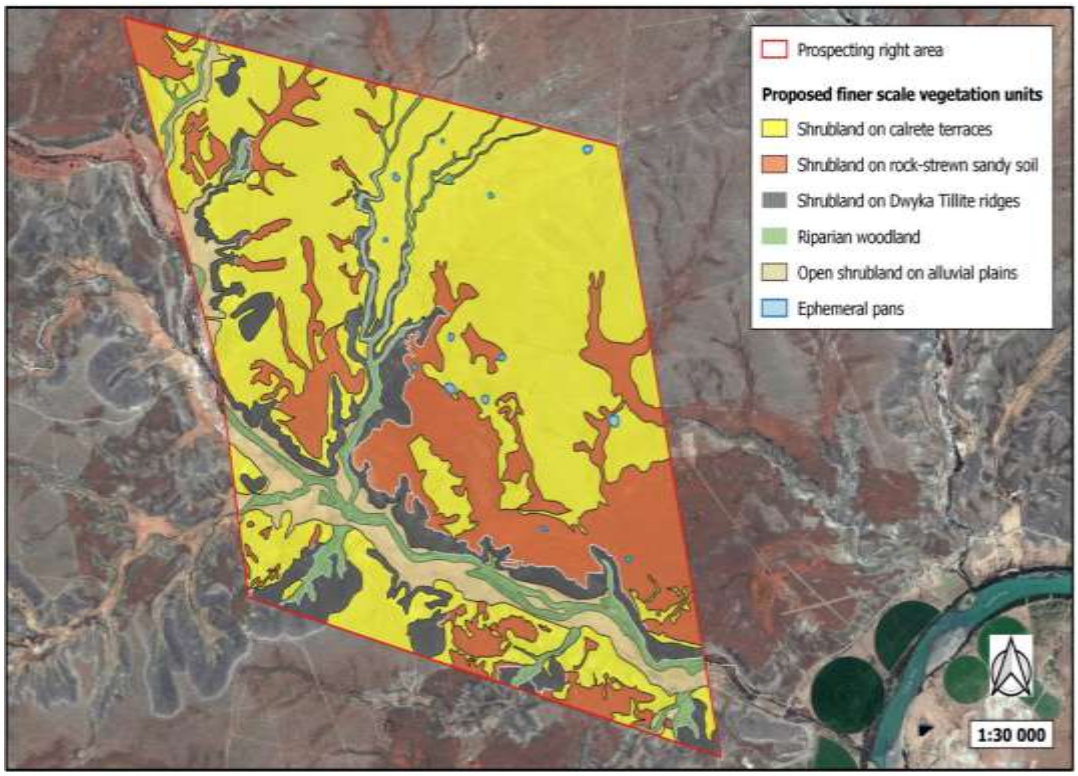


Figure 16. The distribution of proposed finer-scale plant communities in the study area.

Shrubland on calcrete terraces

This community occurs on the calcrete terraces that are found across the study area. Here, a shrub dominated vegetation community is expected to be found on stony calcareous soil. The shrub Senegalia mellifera is most likely the dominant large woody species, but other large shrubs that are expected to occur here include Rhigozum obovatum, Searsia burchellii, Ehretia rigida and Grewia flava. Pentzia incana likely dominates the lower shrub strata, while other shrubs like Rhigozum trichotomum, Pegolettia retrofracta, Rosenia humilis, Zygophyllum lichtensteinianum, Asparagus burchellii, Felicia fascicularis, Lycium cinereum, Aizoon asbestinum, Aptosimum marlothii, A. albomarginatum, A. spinescens, Barleria rigida, B. lichtensteiniana, Kleinia longiflora, Leonotis pentadentata, Eriocephalus decussatus, Lasiosiphon polycephalus, Helichrysum lucilioides, Peliostomum origanoides, Polygala asbestina, Thesium lineatum, Hermannia abrotanoides and Solanum capense are also expected to occur here. The grass layer is not expected to be well developed, with common species like Enneapogon desvauxii, Stipagrostis obtusa, Aristida adscensionis, Eragrostis echinochloidea and E. truncata most likely occurring here.

The nationally protected tree Boscia albitrunca is also expected to be common and widespread across this unit. Other species of conservation concern expected to be found on the calcrete terraces include Acanthopsis hoffmannseggiana, Aloe claviflora, Euphorbia braunsii, Hoodia gordonii and Larryleachia sp.

Shrubland on rock-strewn sandy soil

This community is found among the calcrete terraces, where pockets of deeper sand occur. Here, the substrate is expected to comprise rocks and red sandy soil with the shrub Senegalia mellifera being the most conspicuous woody species. Other tall shrubs likely include Vachellia tortilis, Phaeoptilum spinosum, Rhigozum obovatum, Searsia burchellii and Ziziphus mucronata. Common lower shrubs are expected to include Aizoon asbestinum, Eriocephalus decussatus, Pentzia incana, Barleria rigida, Rhigozum trichotomum, Aptosimum albomarginatum, A. marlothii, Chrysocoma ciliata and Felicia fascicularis. Hermannia abrotanoides, Lycium cinereum, Zygophyllum lichtensteinianum, Aizoon asbestinum, Justicia incana, J. divaricatum, Pegolettia retrofracta, Rosenia humilis, Euryops dregeanus and Asparagus sp. The grass layer is expected to include species such as Enneapogon scoparius, E. scaber, Fingerhuthia africana, Cenchrus ciliaris, Stipagrostis obtusa, S. uniplumis, Chrysopogon serrulatus, Digitaria eriantha, Eragrostis lehmanniana and Heteropogon contortus. Protected species expected to occur here include Boscia albitrunca, Nymania capensis, Hoodia gordonii, Aloe claviflora, A. hereroensis var. hereroensis, Jamesbrittenia tysonii, Acanthopsis hoffmannseggiana, Euphorbia braunsii, Trichodiadema pomeridianum, Babiana sp. and Oxalis spp.

Riparian woodland

The riparian woodland lines the immediate banks of the ephemeral river, as well as the larger drainage lines that occur in its catchment. The vegetation is expected

to be presented as a dense canopy comprising tall trees, including Ziziphus mucronata, Vachellia karroo, Searsia pendulina, S. lancea, Salix mucronata, Diospyros lycioides, Phaeoptilum spinosum, Diospyros lycioides and Lycium hirsutum. Grasses, such as Setaria verticillata is expected to be most common in the understory. Species of conservation concern expected to be found here include Olea europaea subsp. africana and Gymnosporia buxifolia.

Open shrubland on alluvial plains.

This community occurs on the sandy alluvial plains all along the ephemeral river. It is expected to be presented as an open shrubland with a grassy matrix where deep sandy soil, highly susceptible to erosion, constitute the ground cover. The shrub layer is expected to include low shrubs such as Plinthus karooicus, Pentzia incana, Lasiosiphon polycephalus, Salsola sp. and Zygophyllum lichtensteinianum. Common taller woody species most likely include Phaeoptilum spinosum, Ziziphus mucronata, Senegalia mellifera, Ehretia rigida and Lycium sp. The grass layer likely includes Enneapogon desvauxii, Stipagrostis namaquensis, S. obtusa and Aristida adscensionis are also common. The herb layer may comprise of forbs such as Helichrysum argyrosphaerum, Felicia namaquana, Stachys spathulata and Peliostomum leucorrhizum. Protected species expected to occur here include Boscia albitrunca and Psilocaulon spp.

Ephemeral pans

Numerous pans occur on Brakkies and are associated with the shrublands on calcrete terraces and rock-strewn sandy soil. All of them are ephemeral and seemingly endorheic. Due to the high variation in the characteristics of pans in the region it is not possible to describe their associated vegetation communities without a field investigation.

However, the surfaces of pans in this region are typically presented either as grassland or shrubby grassland, where low shrubs affiliated with the terrestrial matrix, e.g. Pentzia incana, Asparagus sp. and Lycium sp. migrate into the pans and occur scattered among a grass dominated substrate. Grass species such as Leptochloa fusca, Chloris virgata, Enneapogon cenchroides, E. desvauxii, Aristida congesta subsp. barbicollis, A. congesta subsp. congesta, Eragrostis bicolor, E. truncata, E. trichophora, E. echinochloidea and Tragus berteronianus are normally found here. Platycarphella parvifolia and Cullen tomentosum are common herbs on pans, while Ziziphus mucronatus, Searsia burchellii and Diospyros lycioides typically comprise the woody fringes. Species of conservation concern are expected to be found along the woody fringes and include Olea europaea subsp. africana and Boscia albitrunca.

Population of sensitive, threatened and protected plant species

The SANBI Red List provides information on the national conservation status of South Africa's indigenous plants, while the National Forests Act (No. 84 of 1998) (NFA) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) restricts activities regarding sensitive plant species. Section 15 of the

NFA prevents any person to cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. Section 49 (1) and 50 (1) of the NCNCA states that no person may, without a permit pick, transport, possess, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) plants. Furthermore, Section 51(2) states that no person may, without a permit, pick an indigenous plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

Most species previously recorded in the region are classified as least concern; a category which includes widespread and abundant taxa. However, two species, i.e. Acanthopsis hoffmannseggiana (Data Deficient - Taxonomically Problematic) and Hoodia gordonii (Vulnerable), are listed under the National Environmental: Biodiversity Act (Act No. 10 of 2004) (NEMBA) (Table 4). Both of these are expected to be found in those areas that have been earmarked for prospecting activities.

Table 5: Plant species found in the region that are of conservation concern**.**

FAMILY	Scientific name	Status	NFA	NCNCA
ACANTHACEAE	*Acanthopsis hoffmannseggiana*	DDT		
AIZOACEAE	*Mestoklema arboriforme*	LC		S2
	Tetragonia arbuscula	LC		S2
	Trichodiadema pomeridianum	LC		S2
APIACEAE	*Deverra burchellii*	LC		S2
APOCYNACEAE	*Hoodia gordonii*	VU		S1
	Larryleachia sp.	-		S2
ASPHODELACEAE	*Aloe claviflora*	LC		S2
	Aloe hereroensis var. *hereroensis*	LC		S2
BRASSICACEAE	*Boscia albitrunca*	LC	X	S2
CELASTRACEAE	*Gymnosporia buxifolia*	LC		S2
EUPHORBIACEAE	*Euphorbia braunsii*	LC		S2
IRIDACEAE	*Moraea pallida*	LC		S2
MELIACEAE	*Nymania capensis*	LC		S2
OLEACEAE	*Olea europaea* subsp. *africana*	LC		S2
OXALIDACEAE	*Oxalis* sp.	LC		S2
SCROPHULARIACEAE	*Jamesbrittenia tysonii*	LC		S2

Hoodia gordonii is particularly sensitive, because it has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. Species from the study area that are protected in terms of the National Forests (NFA) Act No 84 of 1998 (Table 5) include Boscia albitrunca. The latter species is also protected according the NCNCA. It is expected to be common and widespread across the property as well as in those areas earmarked for prospecting activities. In order to damage or remove any protected trees (seedlings to adults) an application must be submitted to the Northern Cape Department of Agriculture, Forestry and Fisheries (DAFF) and a licence obtained from DAFF at least three months prior to such activities. Specially protected species (Schedule 1) and protected species (Schedule 2) of the Northern Cape Nature Conservation

(NCNCA) Act No. 9 of 2009 with a likelihood to occur on site are also listed in Table 5. In addition to these protected species; according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for any large-scale clearance of all indigenous (Schedule 3) vegetation, before such activities commence.

Weeds and invader plant species

Weeds and invasive species are controlled in terms of the National Environmental Management: Biodiversity (NEMBA) Act 10 of 2004, the Conservation of Agricultural Resources (CARA) Act 43 of 1993, as well as the NCNCA (Schedule 6). These are species that do not naturally occur in a given area and exhibit tendencies to invade that area, and others; at the cost of locally indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds and invader species into categories (see Table 6). All declared weeds and invasive species known from the region are listed in Table 6, along with their categories according to CARA, NEMBA and NCNCA.

Table 6. The categorisation of weeds and invader plant species, according to NEMBA and CARA.

NEMBA		CARA	
1a	Listed invasive species that must be combatted or eradicated.	**1**	Plant species that must be removed and destroyed immediately. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals and the environment.
1b	Listed invasive species that must be controlled.	**2**	Plant species that may be grown under controlled conditions. These plants have certain useful qualities and are allowed in demarcated areas. In other areas they must be eradicated and controlled.
2	Listed invasive species that require a permit to carry out a restricted activity within an area.	**3**	Plant species that may no longer be planted. These are alien plants that have escaped from, or are growing in gardens and are proven to be invaders. No further planting is allowed. Existing plants may remain (except those within the flood line, 30 m from a watercourse, or in a wetland) and must be prevented from spreading.
3	Listed invasive species that are subject to exemptions and prohibitions		

Table 7: A list of declared weeds and invasive species recorded in the study area.

Scientific name	Common name	CARA	NEMBA	NCNCA
Prosopis velutina	Velvet mesquite	2	3	S6

Indicators of bush encroachment

Bush encroacher species are controlled in terms of Regulation 16 of CARA; where land users of an area in which natural vegetation occurs and that contains communities of encroacher indicator plants are required to follow sound practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs. Declared indicators of bush encroachment in the Northern Cape, which are most likely to occur on site, are listed in Table 8.

Table 8: A list of declared indicators of bush encroachment in the Northern Cape recorded in the study area.

Scientific name	Common name
Grewia flava	Wild raisin
Rhigozum obovatum	Three - thorn rhigozum
Senegalia mellifera	Black thorn
Vachellia karroo	Sweet thorn
Vachellia tortilis subsp. *heteracantha*	Umbrella thorn

Fish

In addition to those regulations in the NCNCA pertaining to wild animals, Section 32 and 33 of the NCNCA states that no person may, without a permit angle and not immediately release, catch, import, export, transport, keep, possess, breed, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) fish. Even though the river in the study area is intermittent, fish species are expected to occur here when the channels are flooded. The fact that it flows directly into the Orange River only two kilometres downstream from Brakkies, means it could serve as important migration corridors to fish when it flows. No fish are expected to occur in the ephemeral pans, even when filled, mainly due to their ephemerality and the fact that they are isolated from the fluvial systems.

Seven fish species are expected to be found in the active channel of the intermittent river during flooding events. These are listed in the specialist report in Table 10, along with their conservation status and sensitivity to physico-chemical and no-flow conditions. All of these are listed as least concern. However, they are all protected either according to Schedule 1 or 2 of the NCNCA.

Specially protected species include the Vaal-orange Smallmouth Yellowfish. Their population is highly fragmented and continuing to experience decline of mature individuals due to the continuing decline in area, extent and quality of their habitat. They typically occur in pools, riffles and rapids and fast flowing rivers, preferring sand and gravel substrates. They migrate to suitable gravel beds and breed in spring to midsummer after major summer rains.

Invertebrates

Invertebrates dominate inland habitats and play a significant role in the overall function of the ecosystem (Kremen et al. 1993, Weisser and Siemann 2004). In general, they are widely distributed and extremely diverse, which makes it almost impossible to list all species that may possibly occur on site without a dedicated study. Invertebrates have also not been surveyed as comprehensively as plants and mammals and therefore current available data on their distribution is much scarcer. Nevertheless, key morphospecies and species of conservation concern are discussed here, as well as the major habitats which delimit possible invertebrate communities on site. Eight invertebrate species of the Northern Cape appear on the IUCN Red Data list of threatened species and are listed in Table 11 (of the specialist report). However, none of these species' distribution ranges overlap with that of the study area. In addition, those species that are specially protected according to Schedule 1 of the NCNCA include all Velvet worms as well as some baboon spider species, Stag Beetles and the Flightless Dung Beetle (Table 11). None of these taxa are known to occur in the study region either. All Rock- Creeping- and Burrowing Scorpions are protected according to Schedule 2 of the NCNCA, along with a number of beetles, butterflies and moths (Table 11). Of these, Burrowing and Rock Scorpions as well as some Gossamer-winged Butterflies, Skippers, Brush-footed Butterflies and Satyrs have the highest likelihood to be found on site.

Critical biodiversity areas and broad-scale processes

The proposed prospecting site falls within critical biodiversity areas (Figure 12 of specialist report), as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. The ephemeral river of the study area is classified as Critical Biodiversity Area One, with its associated buffer- and catchment areas, along with those of the nearby Orange River, classified as Critical Biodiversity Area Two. The latter comprise the majority of the study area.

A very small section in the north is classified as Ecological Support Areas. No protected areas occur in the study area. Similarly, the Mining and Biodiversity Guidelines (DENC et al. 2013) recognises the ephemeral river to be of Highest Biodiversity Importance (Figure 19), which constitute a high risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining in order to support mainstreaming of biodiversity issues in decision making in the mining sector. Furthermore, according to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features.

This tool is a geographically based web-enabled application which allows a proponent intending to submit an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as

amended), to screen their proposed site for any environmental sensitivity. According to this the Brakkies study area is considered to be of low sensitivity based on the Plant species Theme, but is considered to be of medium sensitivity based on the Animal Species Theme. The latter is attributed to the suitable habitat the study site provides for the Near Threatened Kori bustard. The study area is however considered to be of very high sensitivity based on the Aquatic- and Terrestrial Biodiversity Themes. The aquatic sensitivity is attributed to the freshwater ecosystem priority area quinary catchment the study area falls in. The terrestrial sensitivity is a direct function of the Critical Biodiversity Areas One and Two classifications according to the Northern Cape Critical Biodiversity Areas Map.

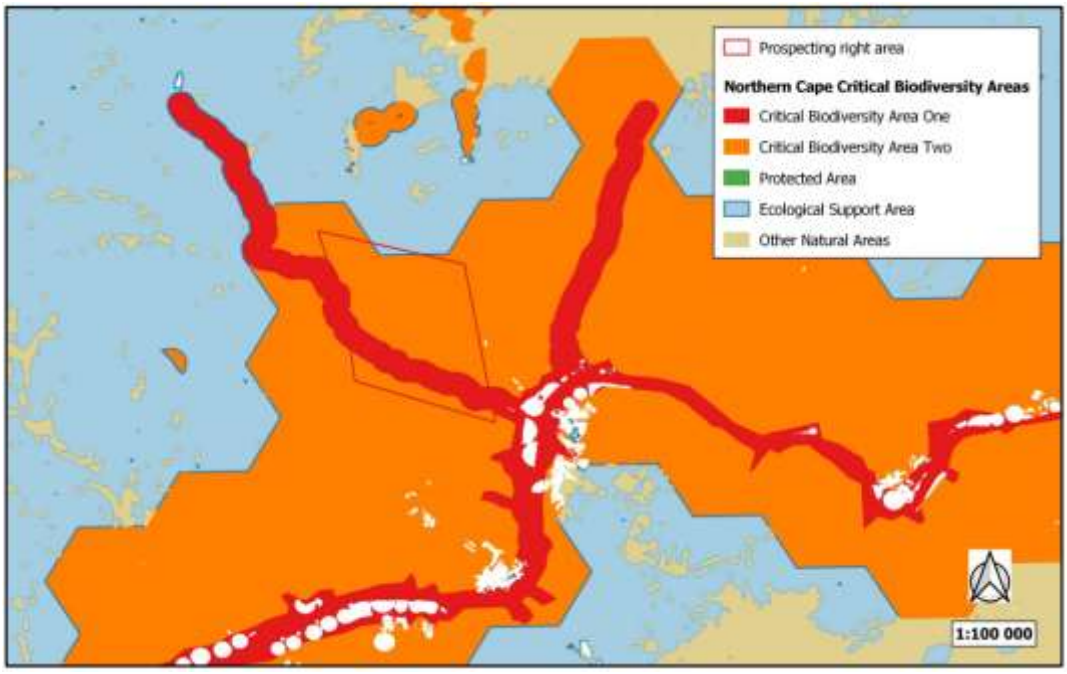


Figure 18. The study area in relation to the Northern Cape Critical Biodiversity Areas.

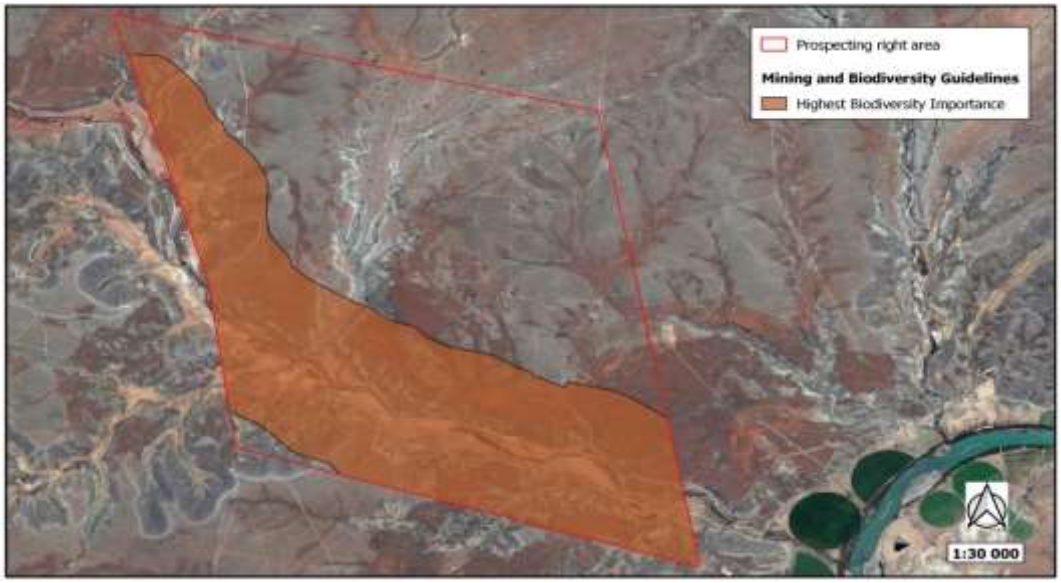


Figure 19. The study area in relation to the Prospecting and Biodiversity Guidelines.

According to the South African Inventory of Inland Aquatic Ecosystems the largest proportion of wetlands (83.3 %) which occur in the Upper Karoo Bioregion, have been classified to have a Present Ecological State (PES) of being moderately to severely modified, with only 16.7 % being in natural or good condition. None of the wetlands in this bioregion are protected. Within the direct vicinity of the proposed prospecting operation most wetlands have been rated to be in good condition, but the Orange River and wetlands further south have been moderately to severely modified (Figure 18 in specialist report). With regards to the broad-scale vegetation units of the study area, according to Mucina and Rutherford (2012) the Northern Upper Karoo is classified as least threatened, but the Upper Gariep Alluvial Vegetation is classified as being vulnerable.

Site sensitivity

The sensitivity map for the Brakkies prospecting operation is illustrated in Figure 20. The ephemeral pans, riparian woodland and all drainage lines are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. They river and pans have also been classified as very sensitive habitats and critical for biodiversity conservation, as indicated under section 3.6. Furthermore, all watercourses are unique habitats protected in terms of the National Water Act (Act No 36 of 1998).

These units are essentially no-go areas. The remaining area is all considered to be of high sensitivity, primarily due to the entire area being considered as important biodiversity areas according to the NC CBAs classification. A number of nationally protected species, such as Boscia albitrunca, Hoodia gordonii and Acanthopsis hoffmannseggiana are expected to be widespread across the site. The Dwyka ridge slopes and alluvial plains are also particularly sensitive to erosion and runoff risks during disturbances. Furthermore, the site is expected to provide important habitat to the protected Kori Bustard. These units are not regarded as no-go areas, but activities should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

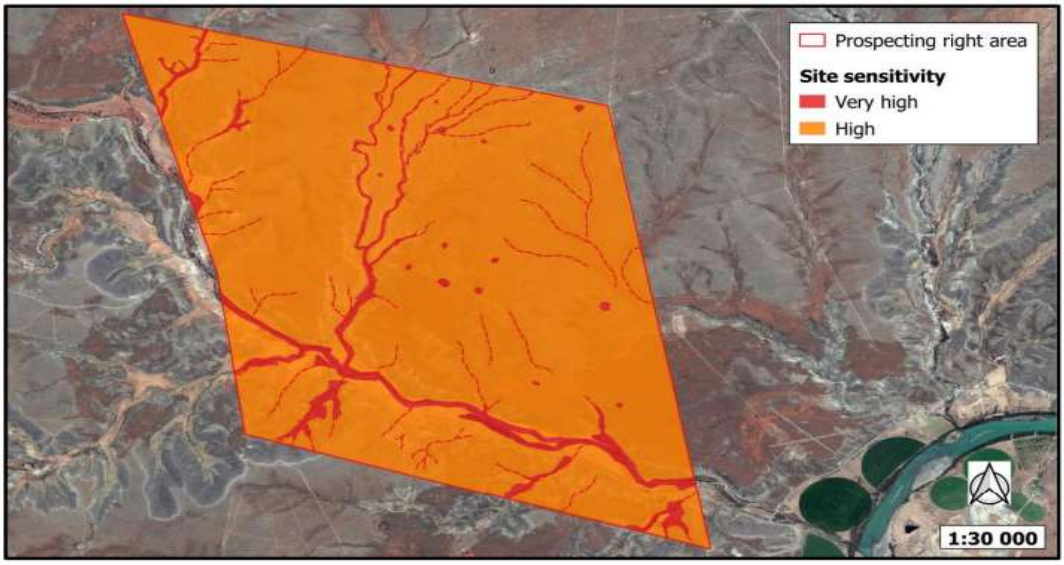


Figure 20. A sensitivity map for the Brakkies prospecting area.

Historical and Palaeontology

Dr. Edward Matenga from ASHA has been appointed by Thunderflex 78 to provide an historical impact assessment in order to highlight the historical sensitivity of the proposed prospecting area and to determine the possible impact of prospecting on the historical status of the application area (Appendix 5).

Findings of the heritage survey

The heritage sensitivity of the property is summarised as follows:

The Stone Age

Stone Age material is widely distributed on the plains, ridges and valleys on the property with 38 occurrences having been recorded. The Stone Age material comprises scrapers, blades, cores, and flakes typologically dating to the Middle Stone Age/Late Stone Age period. The occasional finding of small hand-axes and cleavers may represent a transitional period from the Early Stone Age to the Middle Stone Age. The scattered distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

Ranking of sites and Risk Assessment

	RANKING	SIGNIFICANCE	NO OF SITES
1	High	National and Provincial heritage sites (Section 7 of NHRA). All burials including those protected under Section 36 of NHRA. They must be protected.	0
2	Medium A	Substantial archaeological deposits, buildings protected under Section 34 of NHRA. Footprint of early modern mining. Cultural Landscapes. These may be protected at the recommendations of a heritage expert.	0
3	Medium B	Sites exhibiting archaeological characteristics of the area, but do not warrant further action after they have been documented.	38
4	Low	Heritage sites which have been recorded, but considered of minor importance relative to the proposed development.	3
		TOTAL	**41**

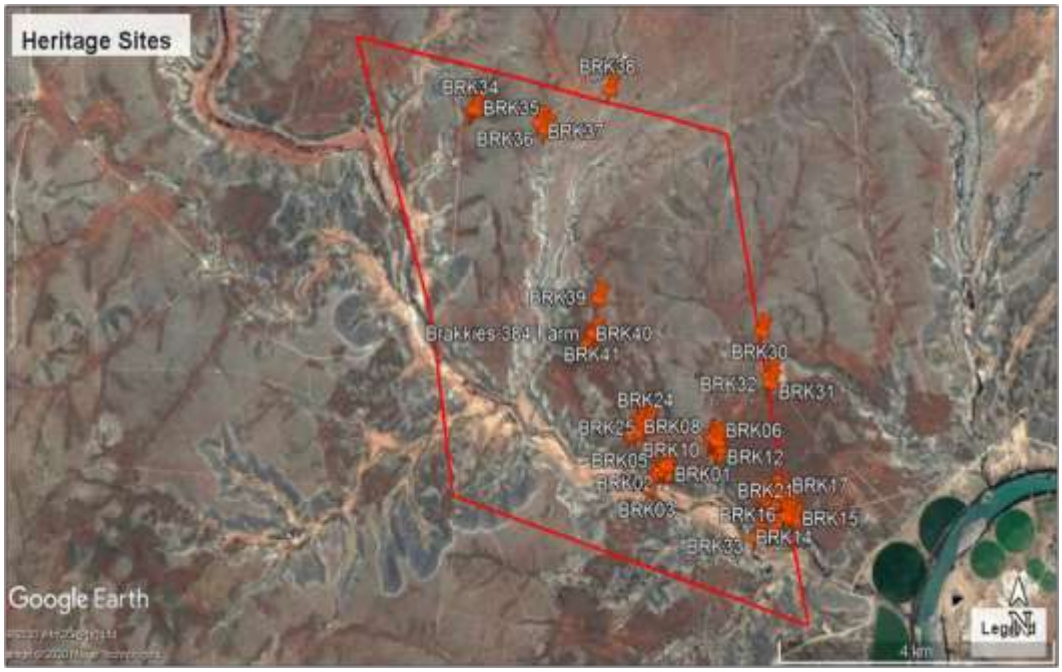


Figure 21. Brakkies 384, location of heritage sites.

Paleontological

Prof. Marion Bamford has been appointed by Thunderflex 78 to provide an palaeontological impact assessment in order to highlight the palaeontological sensitivity of the proposed prospecting area and to determine the possible impact of prospecting on the palaeontological status of the application area (Appendix 6).

A Paleontological Impact Assessment was requested for the Brakkies PR application. To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed application and is presented herein.

Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 22. The site for prospecting is in the very sensitive (orange) overlying Tertiary-Quaternary calcretes, and moderately sensitive Dwyka Group tillites and Quaternary alluvium.

Around 300-290 Ma the climate in southern Africa was still relatively cool, but there were well developed Carboniferous floras in the northern hemisphere. In South Africa, however, much of the land surface was covered by ice sheets. As they melted they dropped the moraine trapped in the ice, together with limited plant matter from the vegetation that gradually recovered and colonised the land surface. Terrestrial vertebrates had not evolved at this time. The late Carboniferous flora comprised *Glossopteris* leaves and seeds, wood, and other plants such as lycopods, sphenophytes and ferns.

The Dwyka Group is made up of seven facies that were deposited in a marine basin under differing environmental settings of glacial formation and retreat (Visser, 1986, 1989; Johnson et al., 2006). In the north these are called the Mbizane Formation, and the Elandsvlei Formation in the south. Described below are the seven facies (Johnson et al., 2006 p463-465):

The massive diamictite facies comprises highly compacted diamictite that is clast-poor in the north. It was deposited in subaqueous or subglacial positions.
The stratified diamictite comprises alternating diamictite, mudrock, sandstone and conglomerate beds. They are interpreted as being rapidly deposited, sediment gravity flows but with some possible reworking of the subglacial diamictites.
The massive carbonate-rich diamictite facies is clast-poor and was formed by the rainout of debris, with the carbonate probably originating by crystallisation from interstitial waters.
The conglomerate facies ranges from single layer boulder beds to poorly sorted pebble and granule conglomerates. The boulder beds are interpreted as lodgement deposits whereas the poorly sorted conglomerates are a product of water-reworking of diamicton by high-density sediment gravity flows.
The sandstone facies were formed as turbidite deposits.
The mudrock with stones facies represents rainout deposits in the distal iceberg zone.
The **mudrock facies** consists of dark-coloured, commonly carbonaceous mudstone, shale or silty rhythmite that was formed when the mud or silt in suspension settled. This is the only fossiliferous facies of the Dwyka Group.

The Dwyka *Glossopteris* flora outcrops are very sporadic and rare. Of the seven facies that have been recognised in the Dwyka Group fossil plant fragments have only been recognised from the mudrock facies. They have been recorded from around Douglas only (Johnson et al., 2006; Anderson and McLachlan 1976) although the Dwyka Group exposures are very extensive. Jurassic Dolerites do not contain fossils as they are igneous intrusives.

The Tertiary-Quaternary deposits potentially have a different suite of fossils.

The calcretes and underlying sands seldom preserve fossils because the sands have been transported and any fossils entrained in the sands would have been transported, fragmented and out of context so would be of minimal scientific interest. Certain features in the calcretes, such as palaeo-pans or palaeo-springs are more likely to trap any fossils if there were activities around the more permanent ancient water sources. Animals or humans drinking water, preying on animals drinking or living nearby, and then died and were buried, could be preserved. Examples of this are the fossil assemblages at Florisbad (Free State), Wonderkrater (Limpopo Province) and Kathu, Townlands and Pniel in the Northern Cape.

Palaeo-pans are often visible from the satellite imagery because the vegetation and drainage differ from the surrounding areas, even if the pan has been filled in with sand.

Figure 22. SAHRIS palaeosensitivity map for the site for the proposed PR application on portions of Farm Brakkies 384, shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

According to Goudie and Wells (1995) there are two conditions required for the formation of pans. Firstly, the fluvial processes must not be integrated, and second, there must be no accumulation of aeolian material that would fill the irregularities or depressions in the land surface. Favoured materials or substrates for the formation of pans in South Africa are Dwyka and Ecca shales and sandstones (ibid).

Examples of pans in the Northern Cape Province are Witpan, Rooipan (Telfer and Thomas, 2006), and Kathu Pan (Porat et al., 2010; Walker et al., 2014). Rooipan and Witpan (in the shape of an hourglass) and the associated lunettes range in age from 16 kyr to 2 kyr.

The Kathu Complex includes the excavated sites of Kathu Pan1, Kathu Townlands and Bestwood 1. At Kathu Pan, evidence of early hominin occupation has been observed at multiple locations within the pan, but ESA deposits have only been excavated at KP 1. Stratum 4a at KP1 was dated by a combination of OSL and ESR/U-series to ca. 500 k BP. The lithic assemblage from St. 4a is characterized by a prepared core technology that produced both blades and points and has been

attributed to the Fauresmith industry. The lithic assemblage of the underlying St. 4b at Kathu Pan 1 is characterized by well-made handaxes.

Apart from any archaeological artefacts, it is possible to find fossil bones, fossil wood, pollen and very rarely charcoal associated with pan deposits such as has been found at Florisbad (palaeo-spring, Free State) or Wonderkrater (palaeo-pan, Limpopo Province).

From the SAHRIS map above (Figure. 22) the area is indicated as highly sensitive for the Tertiary-Quaternary calcretes (orange) and moderately sensitive (green) for the Dwyka tillites and shales, so the desktop study is presented here.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age to contain fossils but of the wrong type. Only Dwyka Group mudstones would preserve fossils and the predominant rock here is tillites. Only special features on the Tertiary-Quaternary calcretes might preserve fossils but no features have been recorded, and they are not visible in the satellite imagery. Since there is a very small chance that fossils may be present or be disturbed by the drilling or test excavations, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is very low.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales, tillites calcretes and sands are typical for the country and might contain fossil plant, insect, invertebrate and vertebrate material. The loose sands of the Quaternary period would not preserve fossils.

SOCIO-ECONOMIC STRUCTURE OF THE REGION

Population Density, Growth and Location

The Northern Cape is geographically the largest province in South Africa having a land mass increased from 361,830 km² to 373,239 km² with the introduction of the new provincial boundaries and covers approximately on third of the country's surface area.

The Northern Cape is divided into five district councils, namely Namakwa, Siyanda, Pixley ka Seme, Frances Baard and Kgalagadi. These district councils are made up of 27 local Municipalities. The province only has five district management areas.

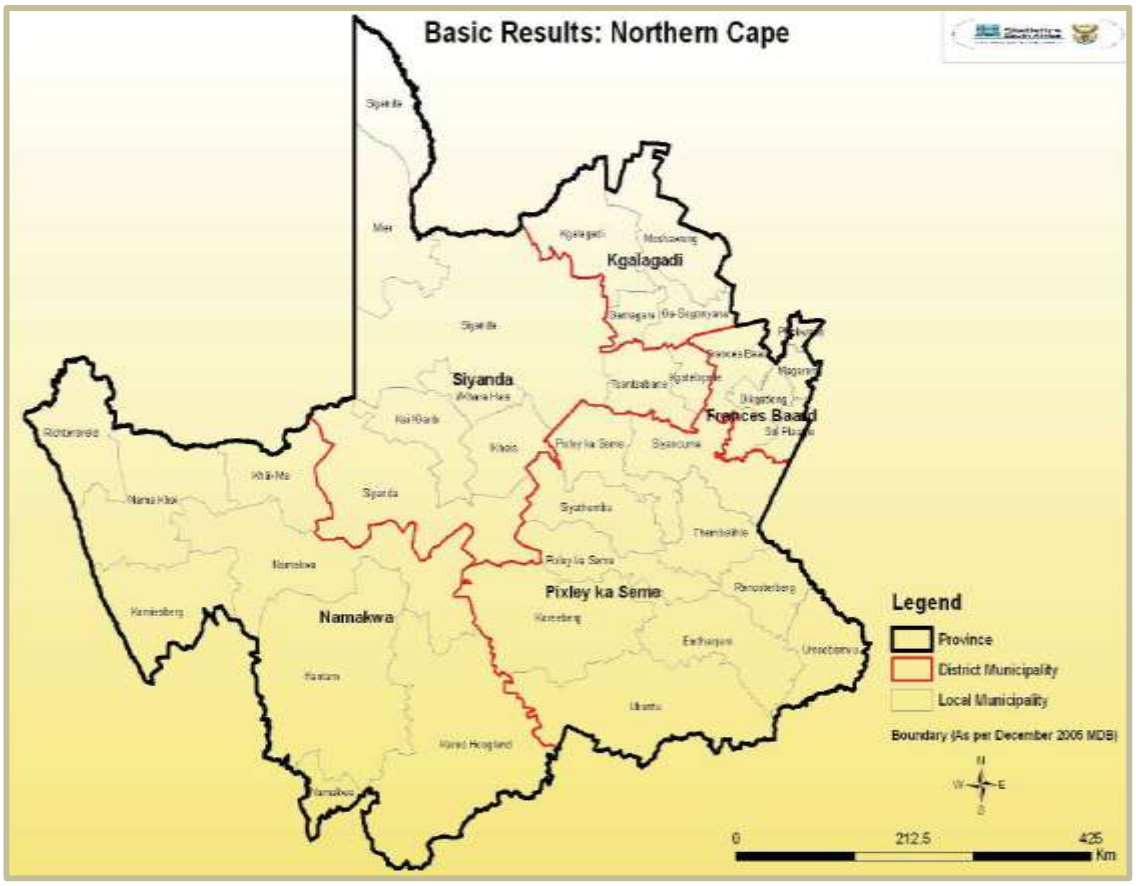


Figure 9: Local Municipal areas in the Northern Cape Province

The Siyancuma Municipality and the Siyathemba Municipality forms part of the Pixley ka Seme District Municipality which is located in the south-eastern part of the Northern Cape Province.

The Siyancuma Municipality is made up of three main entities, namely incorporating three urban settlements (Douglas, Griekwastad and Campbell), two restitution areas (Schmidtsdrift and Bucklands), rural areas (Plooysburg, Salt Lake, Witput, Belmont, Graspan, Heuningskloof, Volop), commercial farming areas, small farming areas, the Ghaap Mountain and small private game parks.

The Municipality is characterised by incorporating the confluence of South Africa's largest rivers, the Orange and Vaal Rivers, with rich mineral deposits (diamonds, tiger's eye, zinc, lead and copper).

The Municipality has relatively high levels of basic services, partially integrated society, medical facilities in Douglas and Griekwastad, one of the biggest prisons in the province and is the neighbour to Kimberley, the provincial and legal capital of the province. It still has major inequalities to overcome and in common with the rest of the country, a skew and sluggish economy to transform and speed up.

Douglas

This town is situated 100km west of Kimberley on the R375 road that connects Prieska (Siyathemba Municipality) and Kimberley.

It has three main residential areas and they are Bongani, Breipaal and the Douglas CBD.

The town is also known because of the confluence of the Vaal and Orange Rivers. It has summer rainfalls with annual rainfall average of 315mm per annum. The area's temperatures vary between 1,7°C in Winter and 34,8°C in Summer.

Douglas is the economic hub of the municipality. It is divided along racial lines by industrial areas and the Vaal River.

Since 1996 the local municipality has spent most of its budget to provide basic infrastructure in the poor areas to catch up with service backlogs, with excellent and visible results. However, the influx of unskilled people from farms has and is still continuing.

The agriculture sector, community, social and personal service sector is the strongest economic sector and biggest job provider in this town. Key service sector employers include agricultural entities, provincial and local government, education and health facilities, the local prison, services to the agricultural sector and financial services.

Griekwastad

Griekwastad is situated 150km west of Kimberley on the main route between Kimberley and Upington.

It is also ideally situated on the route to Witsand and the Siyanda District, thus making it ideal for the development of the town into a tourist stopover in future.

There are four main residential areas in the town and they are Mathlomola, Rainbow Valley, Charlesbeespark and Griekwastad CBD. Griekwastad is the most racially integrated town in the municipality with very low economic activity.

As in the case of Douglas, the local municipality, since 1996, spent most of its budget to provide basic infrastructure in the poor areas to catch up with service backlogs, with excellent and visible results. However, the influx of unskilled people from farms has and, is still continuing.

The agriculture sector, community, social and personal service sector is the strongest economic sector and biggest job provider in this town. Key service sector employers include agricultural entities, provincial and local government, education and health facilities, services to the agricultural sector.

Campbell

Campbell is situated 104km west of Kimberley between Kimberley and Griekwastad on the route to Upington. This whole area's total land is about 900 ha and the majority of the people in the area are the Griekwas.

As in the case of Douglas and Griekwastad, the local municipality, since 1996, spent most of its budget to provide basic infrastructure in the poor areas to catch up with service backlogs, with excellent and visible results. However, the influx of unskilled people from farms has and is still continuing.

The agriculture sector, community, social and personal service sector is the strongest economic sector and biggest job provider in this town. Key service sector employers include agricultural entities, provincial and local government, education facilities.

Douglas which is 30km from Campbell is the business centre for the people of Campbell. Children attend secondary school in Douglas; people have to travel to Douglas for doctors and other personal services.

According to a study done by the Pixley ka Seme District Municipality, Campbell is the poorest community in the Municipality and one of the poorest in the country. Campbell has a strong rural character and is mainly a dormitory town for workers in Douglas and elsewhere.

Smaller Settlement on Privately-Owned Land (Rural Villages)

The smaller settlements in the municipal area are: Plooysburg, Belmont, Witput, Volop and Salt Lake. The total population in these towns is estimated to be below 1,000 people. The settlements have poor linkages with the rest of the towns in the municipal area and the province. Plooysburg is situated on private land which belongs to the Dutch Reformed Church. Water services in Plooysburg have been and are still administered and provided by the church council. Witput, Belmont and Graspan are small railway towns where most of the land and water services infrastructure are owned by Spoornet, the rail parastatal. Spoornet stopped the provision of water services since alienation of the smaller railway stations some years ago. The remaining households in

Belmont, Witput, Graspan and a portion in Salt Lake presently depend on private landowners in the area to obtain water supplies.

The municipality, however as the water services authority (WSA) engaged on this matter and started negotiations with Transnet Housing on the transfer of ownership of houses and infrastructure. These negotiations are to be concluded in the year 2005. Salt Lake is a privately owned farm with a salt manufacturing plant. The community resides on two farms, Saratoga and Sunnydale. Both owners of the farms presently provide water services and housing to residents that have been living in the area for years.

Proposals were also made and negotiations started on the transfer of ownership of the houses to residents. The matter is currently taken up with the provincial Department of Housing and Local Government (DHLG).

Farm Settlements (Other Privately-Held Farmland)

Farm settlements are comprised of very small settlements scattered over the Hay and Herbert Magisterial districts and Vaal River areas.

Households are made up of mostly farmers, farm workers and their families. A few white families own the land occupied by the farm worker families.

The landowners of a particular farm provide water services to the households on the farms. It is also believed that many of the farm worker families are responsible for their own water service's needs.

Restitution Settlements (Rural Villages)

There are two restitution settlements in Siyancuma, namely, Schmidtsdrift and Bucklands. The title deeds for both Schmidtsdrift and Bucklands were recently handed over to the community by the Department of Land Affairs. Households in Schmidtsdrift occupy informal sites in the area. The Municipality presently provides water services to about 250 – 300 households (claimants) in Schmidtsdrift. Water services are of temporary nature at present.

The process of town establishment is at the final stage and was driven and funded by the Department of Land Affairs through the Land Claims Commission. Notice of the township settlement was given at the end of the year 2004 and the community participated successfully through workshops and influenced the whole process positively to their satisfaction.

The process is now for finalisation with the relevant authorities. The Bucklands restitution consists of 21 farms of which 9 belonged to the State has been finalised and successfully transferred to the claimants. The remainder is still in the hands of white commercial farmers.

The majority of claimants (farm workers and squatters) do no reside on the land, but in Douglas. Water services are currently provided by partly the municipality and landowners.

It is also believed that many of the farm worker families are responsible for their own water service's needs.

About 33% of the Northern Cape's population are African/Black, 52% are Coloured, 0,3% are Indian/Asian and 13% are White. The province's Coloured population is the largest after that of the Western Cape. Among people aged 20 years and above, almost 21% have had no schooling at all, whilst more than 20% have had some primary education. Only 5,8% of the province's people have tertiary qualifications. More than 11% have a matric, almost 31% have had some secondary education and around 9% have completed their primary education.

Of all the people in the Northern Cape, 2,2% have sight disabilities, 0,7% having hearing difficulties, 1,1% have physical disabilities, 0,5% have mental abilities and 0,3% suffer from more than one disability.

The Herbert magisterial district is one of six in the Diamantveld district council. The Herbert district have 8 communities with a total population of 21 048 of which 4 800 lives in Rietvale and 4 600 in Motswedmose ±14 kilometers south-east of the mine. The other communities are Plooysburg with 93 people, Bongani – 3 200 people, Breipaal – 4 605 people, Campbell – 2 100 people, Douglas – 1 200 people and Salt Lake – 450 people. The population growth rate for these towns is between 0 and 3.8%.

Table 6: Population distribution by municipality – Census 2001 and CS 2007

Municipality	Population			% distribution	
	Census 2001	CS 2007	% change	Census 2001	CS 2007
DC6: Namakwa	**108 111**	**126 494**	**17,0**	**10,9**	**12,0**
NC061: Richtersveld Local Municipality	10 125	14 613	44,3	1,0	1,4
NC062: Nama Khoi Local Municipality	44 750	54 644	22,1	4,5	5,2
NC064: Kamiesberg Local Municipality	10 754	12 117	12,7	1,1	1,1
NC065: Hantam Local Municipality	19 813	21 234	7,2	2,0	2,0
NC066: Karoo Hoogland Local Municipality	10 512	10 420	-0,9	1,1	1,0
NC067: Khai-Ma Local Municipality	11 344	12 571	10,8	1,1	1,2
NCDMA06: Namakwa	**813**	**897**	**10,4**	**0,1**	**0,1**
DC7: Pixley ka Seme	**164 607**	**166 849**	**1,4**	**16,6**	**15,8**
NC071: Ubuntu Local Municipality	16 375	16 153	-1,4	1,7	1,5
NC072: Umsobomvu Local Municipality	23 641	21 992	-7,0	2,4	2,1
NC073: Emthanjeni Local Municipality	35 549	38 228	7,5	3,6	3,6
NC074: Kareeberg Local Municipality	9 488	9 867	4,0	1,0	0,9
NC075: Renosterberg Local Municipality	9 070	9 185	1,3	0,9	0,9
NC076: Thembelihle Local Municipality	13 987	13 218	-5,5	1,4	1,2
NC077: Siyathemba Local Municipality	17 512	20 120	14,9	1,8	1,9
NC078: Siyancuma Local Municipality	35 810	35 970	0,4	3,6	3,4
NCDMA07: Pixley ka Seme	**3 176**	**2 116**	**-33,4**	**0,3**	**0,2**
DC8: Siyanda	**202 160**	**238 063**	**17,8**	**20,4**	**22,5**
NC081: Mier Local Municipality	6 844	7 337	7,2	0,7	0,7
NC082: Kai !Garib Local Municipality	55 702	56 501	1,4	5,6	5,3
NC083: //Khara Hais Local Municipality	75 671	100 920	33,4	7,6	9,5
NC084: !Kheis Local Municipality	16 124	18 920	17,3	1,6	1,8
NC085: Tsantsabane Local Municipality	23 987	28 005	16,7	2,4	2,6
NC086: Kgatelopele Local Municipality	14 743	21 498	45,8	1,5	2,0
NCDMA08: Siyanda	**9 090**	**4 882**	**-46,3**	**0,9**	**0,5**
DC9: Frances Baard	**325 503**	**353 200**	**8,5**	**32,8**	**33,4**
NC091: Sol Plaatje Local Municipality	201 465	243 018	20,6	20,3	23,0
NC092: Dikgatlong Local Municipality	35 765	40 752	13,9	3,6	3,9
NC093: Magareng Local Municipality	21 734	20 433	-6,0	2,2	1,9
NC094: Phokwane Local Municipality	61 321	46 409	-24,3	6,2	4,4
NCDMA09: Frances Baard	**5 218**	**2 588**	**-50,4**	**0,5**	**0,2**
DC45: Kgalagadi	**191 539**	**173 454**	**-9,4**	**19,3**	**16,4**
NC453: Gamagara Local Municipality	23 202	28 054	20,9	2,3	2,7
NC451: Moshaweng Local Municipality	91 708	70 012	-23,7	9,2	6,6
NC452: Ga-Segonyana Local Municipality	70 392	69 791	-0,9	7,1	6,6
NCDMA45: Kgalagadi	**6 237**	**5 597**	**-10,3**	**0,6**	**0,5**
Northern Cape	**991 919**	**1 058 060**	**6,7**	**100**	**100**
South Africa	**44 819 778**	**48 502 063**	**8,2**	**100**	**100**

Note: All the above figures are based on the new provincial and municipal boundaries

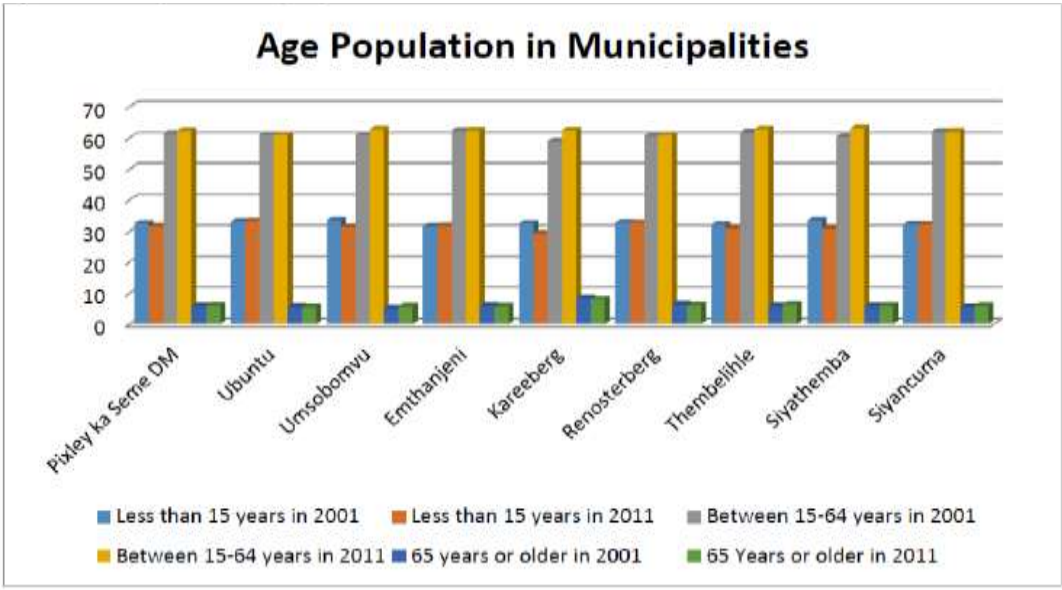


Figure 10: Population by age Statistics SA Census 2011

Major Economic Activities and Sources of Employment

The economy of this region is not well diversified. In the semi-arid areas of the region small stock and game farming predominates, with few alternative employment opportunities outside of agriculture and government. This makes the region vulnerable to the strong fluctuating conditions of the agricultural markets. The region is a long-term provider of migrant labour with young people leaving in search of work.

Most of the areas rural population is employed in the agriculture as farm workers as well as on the alluvial diamond mines along the Orange River.

Estimated Unemployment

Being a farming area, most people living in the immediate area are employed on the farms.

Housing Demand and Availability

The demand for housing in the Northern Cape Province is critical as can be seen in the number of informal settlements being built on an almost daily basis in the nearby towns and Kimberley.

Household Access to Services

There is no formal infrastructure such as schools, hospitals, sport- and recreation facilities and shops within the surrounding area. The town of Douglas is the nearest with infrastructure to the mine.

- ***Water***

  Water is available to almost 50% of the population in the Northern Cape in the form of water piped to their dwelling. The next most used source of water supply is piped on-site or in yards, which is avilable to around 33% of the population.

  Surface water from the Riet-, Vaal- and Orange Rivers is the major source of water in the region, although some smaller communities are totally dependent on ground water for supply. The source for production and domestic water for the mine will be from the Orange River.

- ***Sanitation***

  The production of households using pit latrines decreased from 18,4% in 2001 to 14,4% in 2007.

  However, seven of the municipalities recorded an increase: Karoo Hoogland, Usombomvu, Renosterberg, Thembelihle, Siyathemba, Mier and Kai !Garib. Khai-Ma local municipalities recorded the lowest proportion (0,3%), followed by Tsantsabane (2,7%).

  The proportion of households using the bucket toilet system decreased from 10,0% in 2001 to 4,4% in 2007. Only four municipalities namely, Kareeberg (32,8% to 38,1%), //Khara Hais (6,8% to 9%), !Kheis (0,5% to 6,0%) and Gamagara (0,4% to 1,4%) recorded an increase.

- ***Electricity***

  Electricity for Lighting

  The proportion of households using electricity for lighting increased from 72,4% in 2001 to 86,8% in 2007 at provincial level. All the local municipalities recorded an increase. Moshaweng and Kamiesberg municipalities recorded significant increase from 34,1% in 2001 to 85,6% in 2007 and 48,2% in 2001 to 85,2% in 2007 respectively.

  Electricity for Cooking

  The proportion of households using electricty for cooking increased fromm 54,1% in 2001 to 77,2% in 2007. This trend was recorded in all local municipalities.

  Electricity for Heating

  All the local municipaliteis, except Renosterberg and Thembelihle municipalities recorded an increase in the proportion of households using electricity for heating. Fifteen of the 27 municipalities scored

above the provincial average. However, five of the municipalities, namely, Umsobomvu (39,8%), Mier (34,0%), Moshaweng (15,8%), Renosterberg (33,1%) and Thembelihle (38,9%) were way below the provincial average.

- ***Solid Waste Management***

  Solid waste can be defined as any garbage, refuse, sludge or other discarded material resulting from industrial, commerical, institutional and residential activity.

  The proportion of households whose refuse was regularly removed by local authority/private company increased from 62,6% in 2001 to 72,2% in 2007. Only three out of 27 local municipalities recorded a decrease. The three municipalities were Emthanjeni (from 86,7% in 2001 to 83,9% in 2007), Siyathemba (from 83,1% in 2001 to 83,0% in 2007) and Tsantsabane (from 83,0% in 2001 to 77,6% in 2007).

Poverty Indicators

Table 7: Population living below the minimum living levels

Local Municipality	Population	Population below MLL	% below MML
Emthanjeni	35 438	18,418	51.97
Kareeberg	9 356	5,433	58.07
Renosterberg	9 091	5,616	61.77
Siyancuma	35 894	22,559	62.85
Siyathemba	17 497	9,374	53.58
Thembelihle	13,716	3,843	28.02
Ubuntu	16,480	10,787	65.46
Umsobomvu	23,747	20,400	85.91
Total	**164,412**	**98,064**	**59.65**

[Statistics SA Census 2011]

Poverty

The table above shows that an average of 53.58% of the population in the Siyathemba municipal area lives below the minimum living level (MLL). This is an indication of a high level of poverty in the region.

SOCIAL INFRASTRUCTURE: SCHOOLS, HOSPITAL, SPORT- AND RECREATION FACILITIES, SHOPS, POLICE AND CIVIL ADMINISTRATION:

Health Overview

The sectoral approach that was adopted to analyse the present health facilities of the Pixley ka Seme district revealed that the National

Government has adopted a primary health care strategy that includes making such services available within walking distance of communities.

The strategy also includes making such services available within walking distance. The strategy also includes improvement in sanitation and drinking water supply, etc. Thus the health care systems that presently exists in the District consist of:

- Provincial Hospital
- Provincial Clinics
- Municipal Health Centres or Clinics

Public Transport

Transport includes activities such as, providing passenger or freight transport by rail, road, water or air, auxiliary activities such as terminal parking facilities, cargo handling and activities, and postal activities and telecommunication.

The people in town use micro-buses, private cars as well as walking to go to their places of employment.

As far as public taxis are concerned they operate mostly during the morning hours when the workers are going to work and in the afternoon when they are going back from work to their respective homes.

Road transport comprises private users, business, commerce, farming, government, goods transport agencies and the few public transport operators.

Traffic Management System

The municipality does not have a traffic department. The provincial traffic department provides an ad hoc traffic service in the municipality. The police departments in the three towns support the provincial department with traffic related duties and incidents.

Traffic signs on provincial and district roads are generally adequate and in good condition. There is a lack of traffic signs in the unpaved areas in all three towns. Traffic markings (stop and lane signage) on paved streets are seldom adequate and generally unclear, especially in Douglas and Hopetown.

Rail Transport

No passenger train service is currently operating in the municipality. Transport of goods by rail between Kimberley and Douglas is irregular.

Air Transport

Light air transport facilities are available for all towns. The private sector, namely private doctors, business men use these facilities.

Public Utilities (Services)

Collective utilities (services) are those services consumed off-site, to satisfy either community of domestic service needs. Community service needs include movement, drainage, public safety, market trading and social interaction.

Collective services include water supply in the form of collective standpipes, sanitation in the form of public toilets, solid waste removal in the form of rubbish collection points, communications in the form of public telephones and post collection points, etc. Collective utility points (e.g. public standpipes, public telephones, post collection points, solid waste collection points and public toilets should be clustered around public markets and open spaces, to create favourable small scale manufacturing and trading conditions. Where these utilities perform residential functions as well, residents are enabled to satisfy several needs in a single trip.

Changes for Growth and Development

The examination and analysis of the socio-economic indicators listed above indicate without any doubt that the most critical challenge facing the district is the reduction of poverty. Other challenges that the district must confront, but which in themselves will also address poverty, includes the following:-

- Ensuring that all citizens have access to basic services such as water, sanitation, electricity and housing.
- Increasing access to services in education, health and social services.
- Stabilizing and decreasing the rate of HIVA and AIDS infection, tuberculosis, FAS, etc.
- Reduction in the rate of crime.
- Economic empowerment.
- The shortage of critical skills – development of an attraction and retention strategy; improving skills of the labour force etc.
- Targeting special groups e.g. women, disabled and youth.
- Sustainable job creation.

Opportunities for Growth and Development

An analysis of the economic indicators indicates opportunities for potential growth in the following:-

- Agriculture and agro-processing.
- Manufacturing.
- Tourism.
- Transport and infrastructure.

- Wholesale and retail.
- Mining and value adding – beneficiation.

The analysis is necessary to show what the current infrastructure is available and, where there are opportunities for development and exactly what the needs of the local community are.

When planning for future development, it is not only necessarty to know that is needed, but also what resources such as land, buildings and other faciliteis area available to address these needs.

(b) Description of the current land uses

Land Use before Prospecting:

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land. The grazing capacity is between 22 and 25 ha/AU, with the agricultural region being demarcated for sheep farming. The study area also falls within the Great Karoo Small stock Livelihood Zone. Even though the study area falls within a region where crop farming is abundant, the site itself is categorised to have no to very low suitability for crop production. Brakkies is mainly used as natural pastures for livestock grazing.

If the prospecting operation proves positive the only other use in this area will be for prospecting / mining.

Evidence of Disturbance:

On the application area there are existing gravel roads.

Existing Structures:

Existing infrastructure includes homesteads, public gravel roads, farm tracks, grazing camps and what seems to be an old landing strip. No evidence of historic mining activities on site could be traced and from the satellite images it appears as if the study area is primarily still in pristine condition, with the exception of one small old field. The prospecting will have no impact on any of the grazing lands as the diamond bearing gravels is on the highest terraces.

All 100m safety borders from infrastructure will be kept.

(c) Description of specific environmental features and infrastructure on the site

The infrastructure on site comprehensively discussed in section d(ii) as part of the Prospecting methodology discussion, as well as in Section g as part of the mine footprint description. Furthermore, a comprehensive description of the environment was presented in Section (i) as part of the Baseline report.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

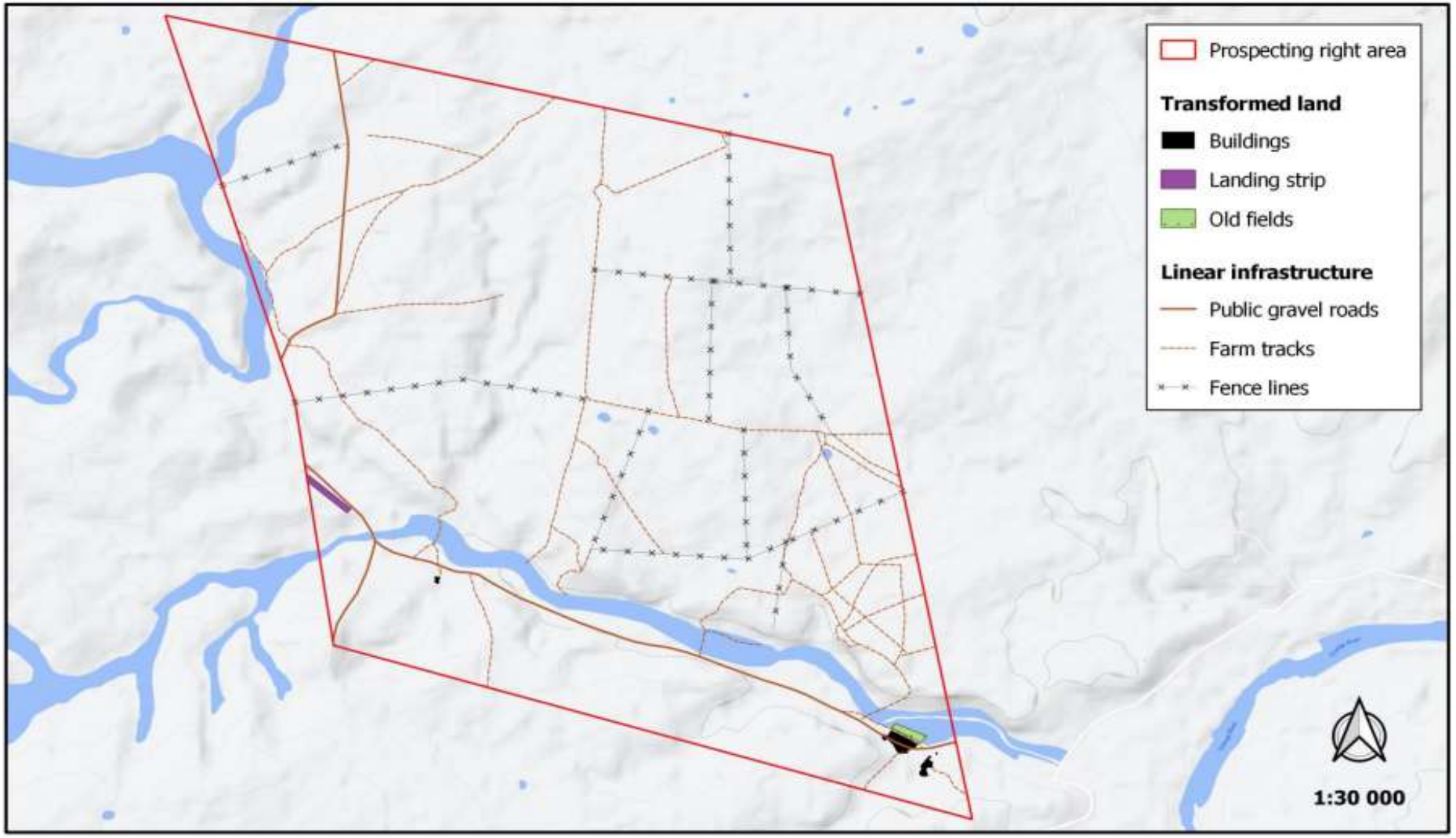


Figure 26. Environmental and current land use features

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

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

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	Sterilisation of mineral resources	Very low	Highly unlikely	Operational and Decommissioning	On-site	• Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Low-Medium	Possible for life of operation	Residual	On-site	• Topsoil needs to be removed and stored separately, if the creation of roads, drill grids or drill pads will result in the eradication of vegetation and the top soil layer. • These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.

						• Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
Soils	Soil Erosion	Low-Medium	Possible for life of operation	Residual	Low Regional	• Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration. • No new roads should be construction over watercourses for the drilling operation. All activities should use existing roads, or create roads around the watercourses. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Any potential run-off from exposed ground should be

						controlled with flow retarding barriers. Regular monitoring during the drilling operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of soil fertility During the removal of topsoil; stockpiling.	Low-Medium	Possible for life of operation	Residual	On-site	• Topsoil needs to be removed and stored separately, if the creation of roads, drill grids or drill pads will result in the eradication of vegetation and the top soil layer. • These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils.

						• The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Soil pollution Spillage of hazardous material; runoff.	Low-Medium	Medium	Construction and Operational	Low Local	• Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or chemicals should be removed from site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • Chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately; • Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance; • All construction vehicles should be inspected for oil

						and fuel leaks regularly and frequently. Vehicle maintenance will not be done on site except in emergency situations in which case mobile drip trays will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Low	Possible	Short term	Minimal Local	• Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Low	Possible	Short term	Minimal Local	• Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
	Nature of Impact	Significance	Probability	Duration	Consequence	Management / mitigation

					Extent	
Ground Water Quantity	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the groundwater resource locally	Low-Medium	Possible	Construction	Low Local	• Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. • Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation

Surface Water	• Ground works and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt.	Medium to Low	Possible	Construction	Low Local	• Sufficient care must be taken when handling hazardous materials to prevent pollution. • Under no circumstances may ablutions occur outside the provided facilities. • If servicing and washing of the vehicles occur on site, there must be specific areas constructed for these activities, which must have concrete foundations, bunding as well as oil traps to contain any spillages. • A walled concrete platform, dedicated store with adequate flooring or bermed area and ventilation must be used to accommodate chemicals such as fuels, oils, paints, herbicide and insecticides. • Oil residue shall be treated with oil absorbent and this material removed to an approved waste site. • Spill kits must be easily accessible and workers must undergo induction regarding the use thereof.

	• Spillages that may occur on access and haul roads may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.	Medium	Possible	Operational	Low to Moderate Local	• At all times care should be taken not to contaminate surface water resources. • Store all litter carefully to prevent it from washing away or blown into any of the drainage channels within the area. • Provide bins for staff at appropriate locations, particularly where food is consumed. • The prospecting site should be cleared daily, and litter removed. • Conduct ongoing staff awareness programmes in order to reinforce the need to avoid littering, which contributes to surface water pollution.
	• Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation. • Significant dust levels will emanate from the use of heavy construction vehicles.	Medium	Possible	Closure	Low Local	

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** During the construction of roads and drill pads, and through vehicular movement.	Low to medium	Certain for life of operation	Residual	On-site	• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads where possible. • Implement effective avoidance measures to limit any activities in the watercourses, by applying the no-go principles around the watercourses. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearances have taken place. Seeds and seedlings for this region can be acquired from renukaroo@gmail.com. • Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.
	Loss of Red data and/or protected floral species	Low - Medium	Possible for life of operation	Residual	On-site	• All footprint areas of the prospecting activities must be scanned for Red Listed

	Removal of listed or protected plant species during the construction of roads and drill pads. Intentional removal of listed or protected plant species for non-mine related purposes, e.g. illegal medicinal trade, cultural beliefs or firewood collection.					and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout plan and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits from DAFF and/or DENC) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals and should include a monitoring programme for at least two years after reestablishment in order to ensure successful translocation. • The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo

						Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site as well as the legislation relating to protected species. • Employ measures to ensure that no illegal harvesting takes place.
	Proliferation of alien vegetation Clearing of vegetation and disturbance during the construction of roads and drill pads.	Low	Low likelihood, temporarily	Residual	Local	• Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.
	Encouragement of bush encroachment Clearing of vegetation and disturbance during the construction of roads and drill pads.	Low	Low likelihood, temporarily	Residual	On-site	• Minimise the footprint of transformation. • Encourage proper rehabilitation of disturbed areas which encourages the growth of a diverse selection of natural plant species.

						• Mechanical methods of control to be implemented selectively where needed. • Annual follow-up monitoring to be implemented.
Fauna	**Loss, damage, and fragmentation of natural habitats** Clearing of vegetation and disturbance during the construction of roads and drill pads.	Medium-High	Possible for life of operation	Residual	Regional	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for all people and machinery. • Limit the removal of adult trees as far as possible. • No new roads should be created across a watercourse. • No drilling should take place in the river, drainage lines or

						wetlands. If unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • After such a licence has been obtained, care should still be taken to minimise the footprint within each watercourse and when handling the top few cm of the soil. Sound rehabilitation measures to restore the characteristics of any affected watercourses should also be applied.
	Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities.	Low	Certain, for life of operation	Life of operation	On-site	• Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone.

						• No new roads should be created across a watercourse. • If any of the protected species are threatened by destruction (e.g. aardvark), the relevant permits from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits. • No drilling should take place in the river, drainage lines or wetlands. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • After such a licence has been obtained, care should still be taken to minimise the footprint within each watercourse and when handling the top few cm of the soil. The crust should ideally remain intact as far as possible by carefully removing it with a spade. The affected area should be refilled, and the crust replaced back in its original

						place immediately after drilling has been performed. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit on public roads as well as driving mindfully on farm tracks to lower the risk of animals being killed while traversing the property.
Air Quality	Sources of atmospheric emission associated with the prospecting operation are likely to include fugitive dust from drilling operations and	Low	Certain	Life of operation	Low Local	• Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels. • The implementation of continuous dust fall monitoring as part of the project's air quality

	vehicle entrainment of road dust.					management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint	Low	Definite	Permanent	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels
	Construction of Roads	Low	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Noise increase at the boundary of the mine footprint.	Low	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Construction of the soil stockpile. Noise increase at the boundary of the mine footprint.	Low	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.

	Clearing of new prospecting areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Low	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Diesel emergency generators Noise increase at the boundary of the mine footprint.	Low	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Additional traffic to and from the mine	Low	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Low	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.

	Planting of grass and vegetation at the rehabilitated areas	Low	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Planting of grass and/or vegetation should be limited to daytime only.
Visual impacts	Potential visual impact	Low	Certain	Construction, Operation and Decommissioning	On-site	The design of the proposed prospecting development will determine the visual impact. As the visual impact would be low, Correct design will ensure that the development will fit into the surrounding area and will become a feature of the area.
	Potential Visual Impact on the surrounding land users/ residents	Low	Possible	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed prospecting development will determine the visual impact.
	Potential visual impact of the proposed development on the operational phase of the surrounding land users in close proximity.	Low Regional	Highly likely	Operational	Medium Local Site	• Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way; • Rehabilitation of disturbed areas and re-establishment of vegetation;
Traffic	Potential negative impacts on traffic	Very Low	Low likelihood	Operational	Low Local	Utilise existing access roads, where applicable; implement

	safety and deterioration of the existing road networks.					measures that ensure adherence to traffic rules.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	**Population Impacts** Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• Training of potential future employees, contract workers and/or community members should focus on prospecting related skills which would furthermore equip trainees/beneficiaries with the necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training courses should be accredited and certificates obtained should be acceptable by other related industries.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site.

						• Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and “danger” and “no entry” signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	On-site	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those

						in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis
Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the prospecting company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

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

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

The different environmental components on which the project can/may have an impact are: -

a) Geology
b) Topography
c) Soil
d) Land Capability
e) Land Use
f) Vegetation (Flora)
g) Wild Life (Fauna)
h) Surface Water
i) Ground Water
j) Air Quality
k) Noise
l) Archaeological and Cultural Sites
m) Sensitive Landscapes
n) Visual Aspects
o) Socio-economic Structure
p) Interested and Affected Parties

1) <u>Impact Assessment</u>

Before the impact assessment could be done the different project, activities were identified.

2) <u>Activities</u>

a) Access Roads for drilling;
b) Drilling;
c) Ablution facilities

3) <u>Environment Impact Assessment Summary</u>

Environment likely to be affected by the prospecting operation.

Please see Map Figure 1 for the location of the prospecting operation.

Environment impact assessment summary

The criteria used to assess the significance of the impacts are shown in the table 18 below/overleaf. The limits were defined in relation to prospecting characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The significance of the impacts was calculated by using the following formula:

(Severity + Extent + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts.

Table 18. Significance of impacts is defined as follows.

SIGNIFICANCE				
Colour Code	**Significance rating**	**Rating**	**Negative Impact**	**Positive Impact**
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Medium-Low	23 -33	Acceptable/Not desirable	Moderately Positive
	Medium	34 - 48	Generally undesirable	Beneficial
	Medium-High	49 - 56	Generally unacceptable	Important
	High	57 - 70	Not Acceptable	Important
	Very High	90 - 102	Totally unacceptable	Critically Important

Significance of impacts is defined as follows:

Very Low -Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low -Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Medium Low- Impact would be real but not substantial within the bounds of those which

could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium - Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible and possible.

Medium High- Impact would be real but could be substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and possible but may be difficult and or costly.

High - Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Before any assessment can made the following evaluation, criteria need to be described.

Table 19. Explanation of probability of impact occurrence

Weight	Probability of Impact Occurrence	Explanation of Probability
1	Improbable	<20% sure of particular fact or likelihood of impact occurring
2	Low Probability Possible	20 – 39% sure of particular fact or likelihood of impact occurring
3	Probable /Likely	40 – 65% sure of particular fact or likelihood of impact occurring
4	Highly Probable /Likely	66 – 85% sure of particular fact or likelihood of impact occurring
5	Definite	86% - 100% sure of particular fact or likelihood of impact occurring

Table 20. Explanation of extent of impact

Weight	Extent of Impact	Explanation of Extent
1	Footprint	Direct and Indirect impacts limited to the activity, such as footprint occurring within the total site area of impact only.
2	Surrounding Area Site	Direct and Indirect impacts affecting environmental elements within 2 km of site
3	Local Municipality Local	Direct and Indirect impacts affecting environmental elements within the Siyancuma Municipal area
4	Regional/District Regional	Direct and Indirect impacts affecting environmental elements within District (Hay District)
5	Provincial	Direct and Indirect impacts affecting environmental elements in the Northern Cape Province

Table 21. Explanation of DURATION of impact

Weight	Duration of Impact	Explanation of Duration
1	Temporary (Very Short)	Less than 1 year
2	Short term	1 to 5 years
3	Medium term	6 to 15 years
4	Long term (Life of project)	16 to 50 years
5	Very Long term	Longer than 50 years
6	Permanent	Permanent

Table 22. Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
1	No Impact	There will be no impact at all – not even a very low impact on the system or any of its parts.
2	Very Low	Impact would be negligible. In the cast of negative impacts, almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple. In the case of positive impacts alternative means would almost all likely to be better, if one or a number of ways, then this means of achieving the benefit.
3	Low	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved or little would be required or both. In the case of positive impacts alternative means for achieving this benefit would be easier, cheaper, more effective, less time-consuming, or some combination of these.
4	Moderately Severe	Impact would be real but not substantial within the bounds of those which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily possible. In the case of positive impacts other means other means of covering these benefits would be about equal in cost and effort.
5	High Severance	Impacts of substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
6	Very High Severity	Of the highest order possible within the bounds of impacts which could occur, in the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted. In the case of

		positive impacts there is no real alternative to achieving the benefit.

vii) 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

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Please see (vi).

There are no communities residing on the property under application, the registered owner of Remaining extent of Portion 1 (Orange Oord) and Portion 2 (a portion of Portion 1) of the Farm Brakkies 384 is Thunderflex 78 Pty Ltd is Mr. Hager.

viii) The possible mitigation measures that could be applied and the level of risk

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered)

- *Air Quality:*
  Level of risk: Low
  Mitigation measures
  To limit the creation of nuisance dust the following management guidelines will be followed:-
  - Avoidance of unnecessary removal of vegetation;
  - Routine spraying of unpaved site areas and roads with water;
  - Re-vegetation of rehabilitated areas to take place as soon as possible.

- *Fauna and Flora:*
  Level of risk: Medium
  Mitigation measures
  - Indigenous vegetation to be used for landscaping to minimize watering requirements.
  - If any endangered species are found on the prospecting area they will be relocated. If this is not possible potential changes in the habitat of endangered species will be monitored.
  - The above programme will also focus on species that depend on specific host plants or on specific symbiotic relationships, with specific reference to possible impacts on such related to emissions from the prospecting area.
  - If monitoring shows that endangered species are being negatively affected to the degree that they are at risk of die-off, measures will be put in place to safeguard their continued existence.

- Any area that is rehabilitated or decommissioned will be seeded with a seed mixture reflecting the natural vegetation as is currently found. If this not found to be feasible during rehabilitation a general seed mixture of the area will be used.
- Management will also take responsibility to control declared invader or exotic species on the prospecting area. The following control methods will be used: -
  - "The plants will be uprooted, felled or cut-off and can be destroyed completely."
  - "The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such a herbicide."
- The end objective of the re-vegetation program will be to achieve a stable self-sustaining habitat unit.
- Vegetation on flat surfaces will be established using the dry lands technique requiring no irrigation.
- Valid permits from Northern Cape Nature Conservation will be obtained before any protected plant species are removed.
- Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a firebreak will be cleared around the perimeter of the prospecting area.
- Any form of poaching by workers of the prospecting area will result in the maximum form of punishment as allowed for by common law. Any form of snares or traps on the site will be removed.
- If any endangered species are encountered the Department of Nature Conservation will be contacted.

❖ *Noise:*
Level of risk: Low
Mitigation measures

- As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary.
- The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The applicant will comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant and that which may migrate outside the plant area.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site

manager will take the necessary steps to reduce the noise below this level.
- Hearing protection will be available for all employees where attenuation cannot be implemented.
- If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

❖ *Mechanical Equipment:*
Level of risk:
Mitigation measures
- All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation will be equipped with a silencer on their exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.

❖ *Soil:*
Level of risk: Low to Medium
Mitigation measures
- In all places of development, the first 300mm of loose or weathered material found will be classified as a growth medium.
- The growth medium/topsoil will be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the prospecting operations, it will either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognised facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes will be implemented on disturbed areas in and around the site.
- Topsoil will be kept separate from overburden and will not be used for building or maintenance of access roads.
- The stored topsoil will be adequately protected from being blown away or being eroded.

ix) Motivation where no alternative sites were considered

The option to explore the possibility for prospecting is in itself an alternative land use. The applicant is not interested in any other alternative land use over this land aside for diamonds exploration, or any other activity, or any other method used other than prospecting for diamonds in the conventional way, which is the most cost effective.

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

Please see (ix) above.

There can be many more positive impacts if Thunderflex 78 (Pty) Ltd are granted permission to continue prospecting over this area. The option to prospect the site can have many positive impacts, in that 5 - 15 households will benefit from the income generated and thus improving their living standards. The area within which the proposed prospecting area is located is within a rural area that is known for big economic growth, because of its location. A prospecting right within this area will however further benefit the local economy because of the mines monthly expenditure that will contribute towards different service providers locally and nationally. Prospecting will also not adversely impend the landowner's use of its land since the potential area will be concurrently rehabilitated and will become available to grazing animals as it re-vegetates.

i) 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 (Including (i) a description of all environmental issues and risks that are identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

Not applicable. There is not alternative development location for the site and therefore the initial site locality is considered to be the final site locality. The impact assessment provided in section g(v) is therefore sufficient and the process undertaken to identify impacts is the same as in section g(vi).

j) Assessment of each identified potentially significant impact and risk
(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties)

In this section, the potential impacts and associated risk factors that may be generated by the proposed prospecting operation on Brakkies are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the prospecting activities are listed.

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	SIGNIFICANCE IF MITIGATED
Ablution Facilities	Soil contamination Possible. Groundwater Contamination. Odours.	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis.	Very Low
Clean & Dirty water systems:	Surface disturbance Soil contamination Surface water contamination Groundwater contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of berms and trenches. Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.	Low

Fuel Storage facility (Diesel tanks) if necessary	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of diesel tanks and bund walls. Oil traps. Groundwater quality monitoring. Drip tray at re-fuelling point. Immediately clean hydrocarbon spill.	Low
Prospecting area.	Dust Noise Removal and Disturbance of Vegetation cover and natural habitat of fauna Soil contamination	Air quality Fauna Flora Groundwater Noise Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Low- Medium	Access control Dust control and monitoring Groundwater quality monitoring Noise control and monitoring Continuous rehabilitation Stormwater run-off control Immediately clean hydrocarbon spill Drip trays Erosion control	Low

	Surface disturbance Surface water contamination					
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low - Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low
Stockpile area	Dust Noise Removal and disturbance of	Air Quality Fauna Flora Noise Soil	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills	Low

	vegetation cover and natural habitat of fauna Surface disturbance	Surface Water			Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Low-Medium	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low
Roads (both access and haulage road on the mine site):	Dust Groundwater contamination Noise Removal and disturbance of vegetation	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control	Low

	cover and natural habitat of fauna Soil contamination Surface disturbance				Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. The vegetation associated with the wetlands have a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if	

					possible, in terms of the prospecting operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface; All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.	
Temporary Workshop Facilities and Wash bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	Monitor water quality and quantity Maintain water tanks and structures	Low

k) 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 HTAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
ECOLOGICAL ASSESSMENT REPORT Thunderflex 78 (Pty) Ltd is proposing the prospecting of diamonds on the Remaining extent of Portion 1 (Orange Oord) and Portion 2 (a portion of Portion 1) of the Farm Brakkies 384 October 2020 By Dr. Betsie Milne **APPENDIX 4 to the report**	Six plant communities potentially occur on site of which the ephemeral river and pans are considered to be of very high sensitivity. The remaining areas are considered to be of high sensitivity. No profound impacts are expected to be related to the proposed prospecting operation due to the low invasive nature of drilling activities. However, the most likely impacts are expected to be related to the disruption of the hydrological regime if the river channel or any of the ephemeral pans and drainage lines are modified through road creation or drill pad establishment. Species of conservation concern that are likely to be common and widespread in the earmarked area include Acanthopsis hoffmannseggiana, Hoodia gordonii, Boscia albitrunca, Olea europaea subsp. africana, Gymnosporia buxifolia, and Aloe claviflora. Permit applications regarding protected flora need to be lodged with the Northern Cape	X	e) Policy and Legislative Context g) Motivation for the overall preferred site, activities and technology alternative h) Full description of the process followed to reach the proposed preferred alternatives within the site iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects) vii) 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 v) Impacts and risks identified including the nature, significance, consequence,

	Department of Environment and Nature Conservation three months prior to any removal of these plants. Similarly, if any of the Boscia albitrunca trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees. To conclude, disturbances to the natural habitat and associated fauna within the study area are inevitable. However, the significance of the impacts is low due to the low invasive nature of drilling activities. Nevertheless, any significance of the impacts will be affected by the success of the mitigation measures implemented during the prospecting operation. In my opinion, authorisation for the proposed operation should be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation and rehabilitation measures.		extent, duration and probability of the impacts, including the degree to which these impacts j) Assessment of each identified potentially significant impact and risk l) Environmental impact statement
PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEONTOLOGICAL DESKTOP ASSESSMENT) FOR A PROSPECTING RIGHT APPLICATION ON THE REMAINING EXTENT OF PORTION 1 (ORANJE OORD) OF THE FARM BRAKKIES 384, AND	The proposed mine prospecting can go ahead as there are no heritage sites that warrant further action after the documentation. Since archaeological deposits may be buried underground, should important artefacts or skeletal material be exposed in the area during prospecting operations, such activities should be halted, and the provincial heritage resources authority or SAHRA	X	e) Policy and Legislative Context g) Motivation for the overall preferred site, activities and technology alternative h) Full description of the process followed to reach the proposed preferred alternatives within the site iv) The Environmental attributes associated with the development footprint alternatives (The environmental

PORTION 2 (A PORTION OF PORTION 1) OF THE FARM BRAKKIES 384 NEAR DOUGLAS, NORTHERN CAPE Prepared by Edward Matenga (PhD Archaeology &Heritage, MPhil, Archaeology; Uppsala/Sweden) 3 November 2020 **Appendix 5 to the Report**	notified in order for an investigation and evaluation of the finds undertaken .		attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects) vii) 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 v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts k) Summary of specialist reports l) Environmental impact statement (i) Summary of the key findings of the environmental impact assessment; t) Specific information required by the competent Authority i) 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:- (2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act
PALAEONTOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED	Based on experience and the lack of any previously recorded fossils from the area, it is very unlikely that any fossils would be		e) Policy and Legislative Context g) Motivation for the overall preferred site, activities and technology alternative

PROSPECTING RIGHTS APPLICATION ON PORTIONS OF FARM BRAKKIES 384, SOUTHWEST OF DOUGLAS, NORTHERN CAPE PROVINCE 25 October 2020 Prof Marion Bamford Palaeobotanist P Bag 652, WITS 2050 Johannesburg, South Africa Marion.bamford@wits.ac.za **Appendix 6 to the report**	preserved in the Dwyka tillites or the calcretes of the Tertiary-Quaternary. There is only a very small chance that fossils may occur in the area so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once drilling or excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.		h) Full description of the process followed to reach the proposed preferred alternatives within the site iv)The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects) vii) 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 v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts k) Summary of specialist reports l) Environmental impact statement (i) Summary of the key findings of the environmental impact assessment; t) Specific information required by the competent Authority i) 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:-

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

Attach copies of the Specialist Reports as appendices

l) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

The prospecting operation is definitely going to have an impact on the environment. The main impacts relate to topography, geology, soil, vegetation, land use and land capability.

The application is for drilling to establish if there are potential viable resources of diamonds to mine. This will be done over a 5-year period.

Six plant communities potentially occur on site of which the ephemeral river and pans are considered to be of very high sensitivity. The remaining areas are considered to be of high sensitivity. No profound impacts are expected to be related to the proposed prospecting operation due to the low invasive nature of drilling activities. However, the most likely impacts are expected to be related to the disruption of the hydrological regime if the river channel or any of the ephemeral pans and drainage lines are modified through road creation or drill pad establishment.

Species of conservation concern that are likely to be common and widespread in the earmarked area include Acanthopsis hoffmannseggiana, Hoodia gordonii, Boscia albitrunca, Olea europaea subsp. africana, Gymnosporia buxifolia, and Aloe claviflora. Permit applications regarding protected flora need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of these plants. Similarly, if any of the Boscia albitrunca trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

To conclude, disturbances to the natural habitat and associated fauna within the study area are inevitable. However, the significance of the impacts is low due to the low invasive nature of drilling activities. Nevertheless, any significance of the impacts will be affected by the success of the mitigation measures implemented during the prospecting operation.

In my opinion, authorisation for the proposed operation should be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

Other environmental impacts relate to day to day prospecting and could easily be managed with sound housekeeping rules such as dust and noise.

The only buffers that must be implemented is the 100m away from any fixed infrastructure like the gravel road and the farm house and out buildings in terms of Mine Health and Safety Act, 1996) Regulations relating to surveying, mapping and

mine plans. These regulations states that a mine must take reasonable measures to ensure that –

- No prospecting operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the prospecting boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions in terms of the risk assessment are complied with.

- There is a 15.5m building and tree restriction on either side of the 132kV power lines which must be adhered to in all future developments and or construction. Eskom's rights are protected by Wayleave.

  Also ecological buffers must be kept from all the natural drainage lines and pans.

(ii) Final Site Map;

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicated any areas that should be avoided, including buffers. Attach as Figure 27

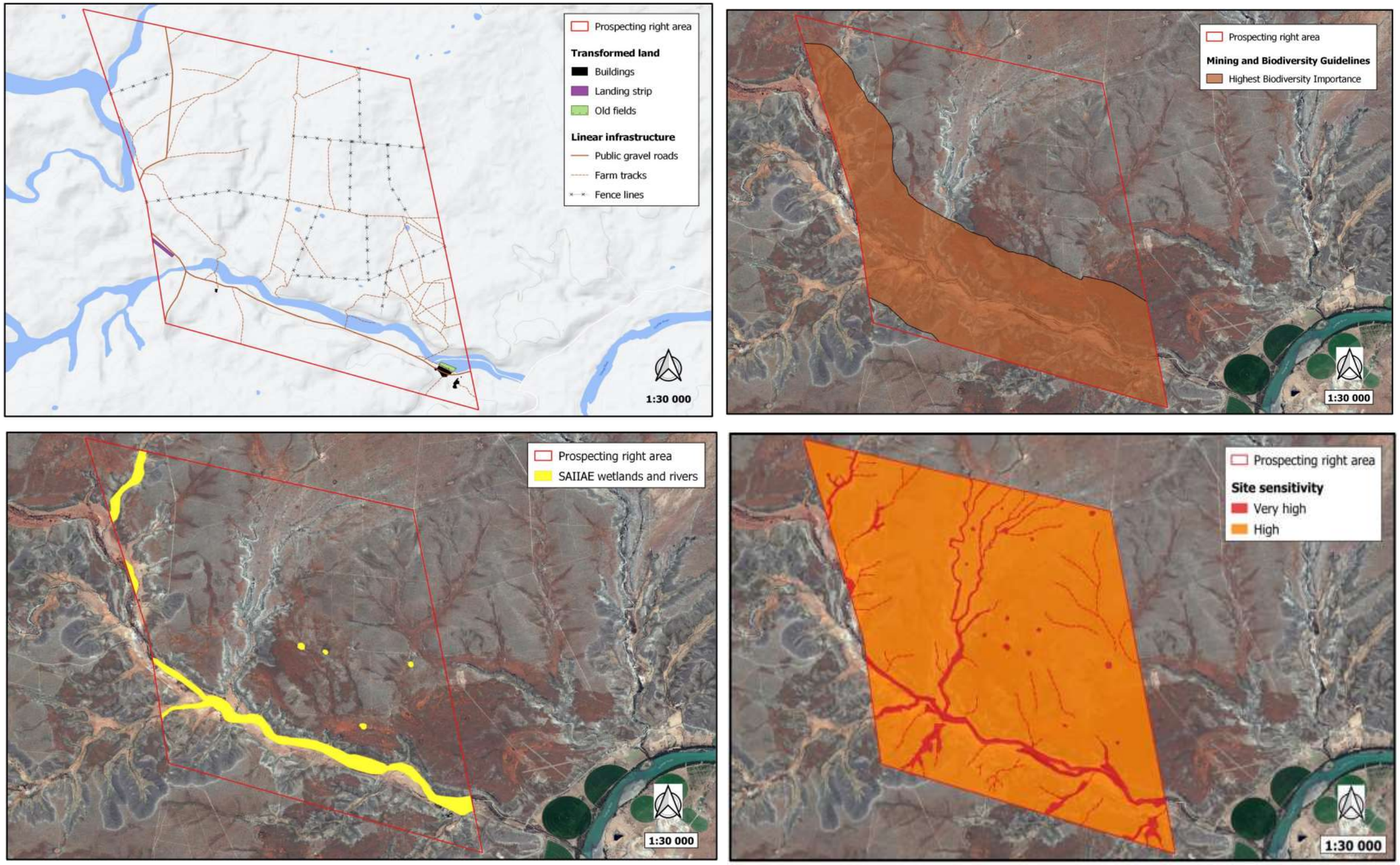


Figure 27. Final Site maps.

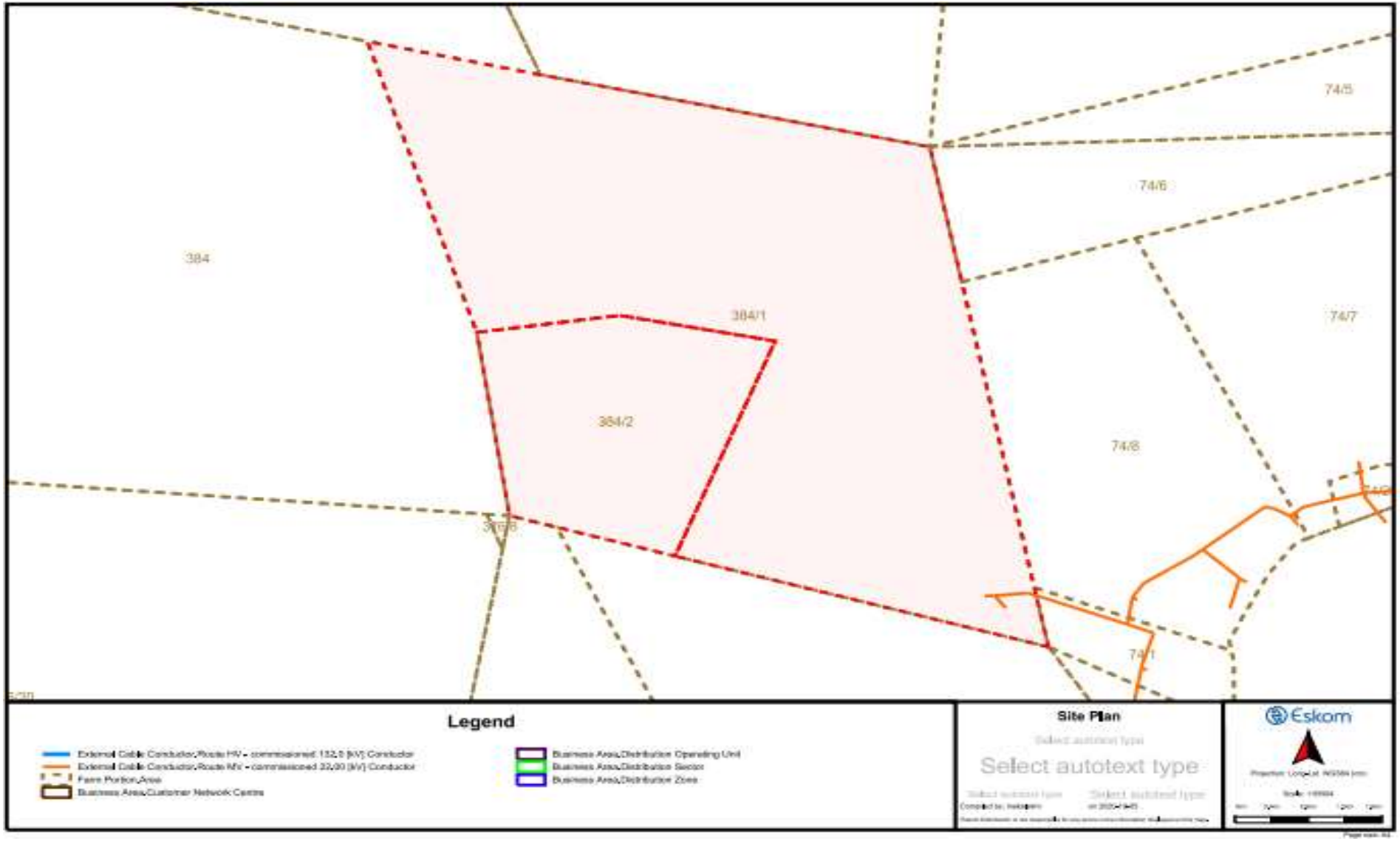


Figure 28. Layout of Powerlines on the application area (Eskom, 2020)

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

The proposed prospecting operation will be done in such a way that farming (grazing) will still be possible on the rest of the farm. If drilling is done the loss of land use will temporary as the site will be rehabilitated in such a way that it allows the establishment of a grass cover again. The rest of the farm will still be able to be used for grazing purposes.

Six plant communities potentially occur on site of which the ephemeral river and pans are considered to be of very high sensitivity. The remaining areas are considered to be of high sensitivity. No profound impacts are expected to be related to the proposed prospecting operation due to the low invasive nature of drilling activities. However, the most likely impacts are expected to be related to the disruption of the hydrological regime if the river channel or any of the ephemeral pans and drainage lines are modified through road creation or drill pad establishment.

Species of conservation concern that are likely to be common and widespread in the earmarked area include Acanthopsis hoffmannseggiana, Hoodia gordonii, Boscia albitrunca, Olea europaea subsp.africana, Gymnosporia buxifolia, and Aloe claviflora. Permit applications regarding protected flora need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any removal of these plants. Similarly, if any of the Boscia albitrunca trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

To conclude, disturbances to the natural habitat and associated fauna within the study area are inevitable. However, the significance of the impacts is low due to the low invasive nature of drilling activities. Nevertheless, any significance of the impacts will be affected by the success of the mitigation measures implemented during the prospecting operation.

In my opinion, authorisation for the proposed operation should be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

Although this is only a prospecting operation it will provide jobs when drilling is reached. This will also add to the increased economic activity and area surrounding the farm.

m) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as conditions of authorisation.

The main closure objective of Thunderflex 78 (Pty) Ltd. planned prospecting operation is to restore the site to its current land capability in a sustainable manner.

- To prevent the sterilization of any reserves.
- To prevent the establishment of any permanent structures or features except where the owners have indicated that they would prefer structures to be left.
- The prospecting operation also has the objective to establish a stable and self-sustainable vegetation cover if necessary.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability of the prospecting operation.
- To limit and manage the visual impact of the prospecting operation.
- To safeguard the safety and health of humans and animals on the prospecting operation.
- The last closure objective is that the prospecting operation is closed efficiently, cost effectively and in accordance with government policy.

Rehabilitation Plan

Infrastructure Areas:

On completion of the prospecting operation, the various surfaces, including the access road, the office area, storage areas and the ablution facilities, will finally be rehabilitated as follows:-

- All remaining material on the surface will be removed to the original topsoil level. This material will then be backfilled into the depressions. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.
- All infrastructures, equipment, ablution facilities and other items used during the operational period will be removed from the site.
- On completion of operations, all buildings, structures or objects on the office site will be dealt with in accordance with Regulation 44 of the Minerals and Petroleum Resources Development Act, 2002, which states:-

  1. *Regulation 44: When a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, the holder of such right or permit may not demolish or remove any building, structure or object –*

  (a) which may not be demolished or removed in terms of any other law;

  (b) which has been identified in writing by the Minister for purposes of this section; or

  (c) which is to be retained in terms of an agreement between the holder and the owner or occupier of the land, which agreement has been approved by the Minister in writing.

2. *The provision of subsection (1) does not apply to bona fide mining equipment, which may be removed.*

Topsoil:

- Disposal Facilities:-
  Waste material of all description inclusive of receptacles, scrap, rubble and tyres will be removed entirely from the prospecting area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.
- Ongoing Seepage, Control of Rain Water:-
  No monitoring of ground or surface water will take place, except is so requested by the DWS – Kimberley.
- Long Term Stability and Safety:-
  It will be the objective of mine management to ensure the long term stability of all rehabilitated areas including the backfilled drill holes / depressions. This will be done by the monitoring of all areas until a closure certificate has been issued.
- Final rehabilitation in respect of erosion and dust control:-
  Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is planned.

Final Rehabilitation Roads:-

- After rehabilitation has been completed, all roads will be ripped or ploughed, fertilized and seeded, providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of Information:-

- Reports on rehabilitation and monitoring will be submitted annually to the Department of Mineral Resources – Kimberley, as described in Regulation 55.

Maintenance (Aftercare):-

- Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the mine will be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments will be implemented by Mine Management.

After-effects Following Closure:-

- Acid Mine Drainage:-
  No potential for bad quality leachate or acid mine drainage development exists after mine closure.
- Long Term Impact on Ground Water:-
  No after effect on the groundwater yield or quality is expected.
- Long-term Stability of Rehabilitated Land:-

One of the main aims of any rehabilitated ground will be to obtain a self-sustaining and stable end result. Cleaning of all drill chip material concurrently and replacing of topsoil where available.

n) Aspects for inclusion as conditions of Authorisation

Any aspects which must be made conditions of the Environmental Authorisation

None other than the implementation of the EMPR.

o) Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measure proposed)

None.

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

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

In my opinion, authorisation for the proposed operation should be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

ii) Conditions that must be included in the authorisation.

None other than the implementation of the EMPR.

q) Period for which the Environmental Authorisation is required

It is required for 5 years.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basis Assessment Report and the Environmental Management Programme Report.

I hereby undertake to meet the requirements as provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

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

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Remark:							
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	15,68	1	1	-
					1	1	
2 (A)	Demolition of steel buildings and structures	m2	0	218,41	1	1	-
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	321,86	1	1	-
3	Rehabilitation of access roads	m2	1000	37,00	1	1	37 000,00
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	379,34	1	1	-
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	206,91	1	1	-
5	Demolition of housing and/or administration facilities	m2	0	436,81	1	1	-
6	Opencast rehabilitation including final voids and ramps	ha	7	222 313,32	0,04	1	62 247,73
7	Sealing of shafts adits and inclines	m3	0	117,25	1	1	-
8 (A)	Rehabilitation of overburden and spoils	ha	0	152 653,61	1	1	-
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	190 127,32	1	1	-
					1	1	
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	552 219,84	1	1	-
					1	1	
9	Rehabilitation of subsided areas	ha	0	127 824,41	1	1	-
10	General surface rehabilitation	ha	0,5	120 927,41	1	1	60 463,71
11	River diversions	ha	0	120 927,41	1	1	-
12	Fencing	m	0	137,94	1	1	-
13	Water management	ha	0	45 980,00	1	1	-
14	2 to 3 years of maintenance and aftercare	ha	0	16 093,00	1	1	-
15 (A)	Specialist study	Sum	0			1	-
15 (B)	Specialist study	Sum	0			1	-
					Sub Total 1		159 711,43
1	Preliminary and General			9 582,69	weighting factor 2		10 061,82
					1,05		
2	Contingencies				15971,14346		15 971,14
					Subtotal 2		185 744,40
					VAT (15%)		27 861,66
					Grand Total		**213 606,06**

i) Explain how the aforesaid amount was derived

The quantum of the financial provision contemplated in Regulation 54 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) will be revised and adjusted accordingly annually, based on a survey assessment of the environmental liability of Thunderflex 78 (Pty) Ltd. Logging and surveys of drill holes are conducted by a registered surveyor and results are forwarded to the Environmental Manager who calculates the outstanding rehabilitation as per the agreed rate in the DMR Guideline. A bank guarantee is prepared for the amount and submitted to the DMR.

Financial provision for the rehabilitation or management of negative environmental impacts caused by the prospecting operation [as required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] will be made in the form of a financial guarantee from a South African registered bank. This document will guarantee the financial provision relating to the Environmental Management Programme in a format as approved by the Director-General.

ii) Confirm that this amount can be provided from operating expenditure
(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining Work Programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)

Thunderflex 78 (Pty) Ltd. will fund the operation;

t) Specific information required by the competent Authority

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

(1) Impact on the socio-economic conditions of any directly affected person (Provide the results of investigation, assessment, and evaluation of the impact of the mining, or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an **Appendix**)

Socio-economic upliftment will take place due to the creation of employment opportunities as well as economic support to the surrounding business community.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act (Provide the results of investigation, assessment, evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(*i)*(vi) and (vii) of that Act, attach

the investigation report as **Appendix 5 & 6** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 herein)

A Heritage Impact Assessment was conducted by Dr. Edward Matenga in terms of Section 38 of the National Heritage Resources Act (25 of 1999) in respect of the proposed prospecting and application for Prospecting rights the remaining extent of portion 1 (Oranje oord) of the farm Brakkies 384, and Portion 2 (a portion of portion 1) of the farm Brakkies 384 near Douglas, Northern Cape

The following is a summary of the findings of the study:

Summary of Findings

The Stone Age

Stone Age material is widely distributed on the plains, ridges and valleys on the property with 38 occurrences having been recorded. The Stone Age material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. The occasional finding of small hand-axes and cleavers may represent a transitional period from the Early Stone Age to the Middle Stone Age. The scattered distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

Burial grounds

No burials were reported on the property.

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

(the EAP managing the application, must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 5 & 6**)

There are no alternatives, as the application area applied for is the area identified with potential for a diamond prospecting operation.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

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

I hereby confirm that the requirements for the provision of the details and expertise of the EAP are already included in PART A, section 1(a).

Confirmed (Mark with an X)	**X**

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

I hereby confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section 1(h).

Confirmed (Mark with an X)	**X**

c) Composite Map

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

The only buffers that must be implemented is the 100m away from any fixed infrastructure and the farm house and out buildings in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) Regulations relating to surveying, mapping and mine plans. These regulations states that a mine must take reasonable measures to ensure that –

No prospecting activities are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the prospecting boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with.

There is a 15.5m building and tree restriction on either side of the 132kV power lines which must be adhered to in all future developments and or construction. Eskom's rights are protected by Wayleave.

Also ecological buffers must be kept from all the natural drainage lines and pans.

Please see Final Site Map.

d) Description of impact management objectives including management statements

i) Determination of closure objectives (ensure that the closure objectives are informed by the type of environment described)

- The main closure objective of Thunderflex 78(Pty) Ltd planned prospecting operation is to restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any reserves.
- To prevent the establishment of any permanent structures or features except where the owners have indicated that they would prefer structures to be left.
- The prospecting operation also has the objective to establish a stable and self-sustainable vegetation cover if necessary.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability of the prospecting operation.
- To limit and manage the visual impact of the prospecting operation.
- To safeguard the safety and health of humans and animals on the prospecting operation.
- The last closure objective is that the prospecting operation is closed efficiently, cost effectively and in accordance with government policy.

ii) Volumes and rate of water use required for the operation

The operation would require about 250 litres per day for drinking water. No water for the drilling is required.

iii) Has a water use licence been applied for?

No Water will be used for the drilling operation. Only a small amount of water will be used for drinking purposes of the workers.

iv) Impact to be mitigated in their respective phases

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

ACTIVITY AND PHASE	POTENTIAL IMPACT	SIZE AND SCALE	MITIGATION OR CONTROL MEASURE RELATED TO COMPLIANCE WITH STANDARDS
Roads Construction, operational and decommissioning	Air quality Nuisance dust will be created by the drilling machine.	On-site	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.
	Fauna Clearing of vegetation and disturbance during the construction of roads and drill pads. Habitat fragmentation Prospecting activities could result in the loss of connectivity and fragmentation of natural habitat, which generally leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This impact will be most profound if characteristics of the natural	Local and regional	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so.

	watercourses are altered. However, due to the low invasive nature of drilling activities this impact is not expected to be significant. Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities. The transformation of natural habitats will result in the loss of micro habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g. birds that nest in trees or animals residing in holes in the ground. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Intentional killing of snakes, reptiles, vultures and owls will negatively affect the local populations. Broadscale ecological processes Clearing of vegetation and disturbance during the construction of roads and drill pads;		• Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no go zone. • However, if any of the protected species are threatened by destruction, the relevant permits should be obtained followed by the relevant mitigation procedures stipulated in the permits. • An Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out

	alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.
	Flora Construction of roads and drill pads; vehicular movement. Loss of indigenous vegetation The construction of roads and drill pads will damage or destroy natural vegetation. It is	Local and Regional	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.

	expected that trampled vegetation will not be significantly affected and any destruction to natural vegetation will be at a very small scale, based on the low invasive nature of drilling activities. It is likely that areas of high ecological function will rehabilitate following such disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species; however traffic volumes associated with drilling activities are very low. Loss of Red data and/or protected floral species Removal of listed or protected plant species during the construction of roads and drill pads and/or illegal harvesting It is possible that prospecting activities will destroy protected species and other species of conservation concern through construction of drill pads and roads, vehicular movement and if any illegal harvesting occurs. Introduction or spread of alien species Clearing of vegetation and disturbance during the construction of roads and drill pads The extent of alien invasive species in the study area is unknown. However, general clearing of vegetation destroy natural		• All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site.

	vegetation, wherafter invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the prospecting site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced. However, based on the low invasive nature of drilling activities, this impact is not likely to occur during the proposed operation. Encouraging bush encroachment Clearing of vegetation and disturbance during the construction of roads and drill pads The potential extent of bush encroaching species on site is unknown. While general clearing of the area and prospecting activities destroy natural vegetation, bush encroaching plants can increase due to their opportunistic nature in disturbed areas. If encroaching		• Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.

	plants establish in disturbed areas, it may the lower potential for future land use and decrease biodiversity. With proper mitigation, the impacts can be substantially reduced and if any such species are removed during prospecting activities the prospecting operation can have a positive effect by reducing bush encroachment. Based on the low invasive nature of drilling activities, this impact is expected to be insignificant. Broadscale ecological processes Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital		

	ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		
	Surface Water • Drilling and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Spillages that may occur on access and drill tracks may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces. • Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation.	On-site	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no

			personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; • Clean & dirty water plan.
	Ground water No impact to groundwater is expected from the roads that will be used by the planned prospecting operation. Hydrocarbon Spills Hydrocarbon spills from drill vehicles and fuel storage may contaminate the groundwater resource locally	On-site and Local	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.

			• All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.
	Noise Clearing of footprint areas for drilling, stripping and stockpiling of topsoil Construction of internal Roads Additional traffic to and from the mine Prospecting activities Drilling Removal of infra-structure (Temporary Ablution facility)	On-site and Local	• As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during prospecting. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the

			levels will be monitored at prescribed monitoring points. Mechanical Equipment: • All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.
	Soil Soil Erosion Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pans and drainage line characteristics. Vegetation will be stripped for construction of new roads and drill pads and these areas will be bare and susceptible to erosion. Any topsoil and overburden that is stripped and piled on surrounding areas can be eroded by wind, rain and flooding. The soil/sediments will be carried away during runoff. The affected areas should be rehabilitated, but full restoration might only occur over a number of	On-site	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.

	years, subsequent to the re-establishment of vegetation and hydrologic regime		• Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Topography Changes to surface topography Construction of roads and drill pads as well as temporary ablution facilities	Local	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration.

			• Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Visual The drill tracks will be visible to some extent from the immediate surroundings. The design of the proposed prospecting development will determine the visual impact. As the prospecting will only entail drilling the visual impact would be low.	On-site and Local	• Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure.
Drilling operational and decommissioning	Air quality Nuisance dust will be created by the drilling machine.	On-site and Local	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.
	Fauna Clearing of vegetation and disturbance during the construction of roads and drill pads.	Local and Regional	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.

	Habitat fragmentation Prospecting activities could result in the loss of connectivity and fragmentation of natural habitat, which generally leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This impact will be most profound if characteristics of the natural watercourses are altered. However, due to the low invasive nature of drilling activities this impact is not expected to be significant. Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities. The transformation of natural habitats will result in the loss of micro habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g. birds that nest in trees or animals residing in holes in the ground. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.		• No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no go zone. • However, if any of the protected species are threatened by destruction, the relevant permits should be obtained followed by the relevant mitigation procedures stipulated in the permits.

	Intentional killing of snakes, reptiles, vultures and owls will negatively affect the local populations. Broadscale ecological processes Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		• An Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.

	Flora Construction of roads and drill pads; vehicular movement. Loss of indigenous vegetation The construction of roads and drill pads will damage or destroy natural vegetation. It is expected that trampled vegetation will not be significantly affected and any destruction to natural vegetation will be at a very small scale, based on the low invasive nature of drilling activities. It is likely that areas of high ecological function will rehabilitate following such disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species; however traffic volumes associated with drilling activities are very low. Loss of Red data and/or protected floral species Removal of listed or protected plant species during the construction of roads and drill pads and/or illegal harvesting It is possible that prospecting activities will destroy protected species and other species of conservation concern through construction of drill pads and roads, vehicular movement and if any illegal harvesting occurs.	Local and Regional	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place. • All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo

	Introduction or spread of alien species Clearing of vegetation and disturbance during the construction of roads and drill pads The extent of alien invasive species in the study area is unknown. However, general clearing of vegetation destroy natural vegetation, wherafter invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the prospecting site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced. However, based on the low invasive nature of drilling activities, this impact is not likely to occur during the proposed operation. Encouraging bush encroachment Clearing of vegetation and disturbance during the construction of roads and drill pads		Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site. • Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.

	The potential extent of bush encroaching species on site is unknown. While general clearing of the area and prospecting activities destroy natural vegetation, bush encroaching plants can increase due to their opportunistic nature in disturbed areas. If encroaching plants establish in disturbed areas, it may the lower potential for future land use and decrease biodiversity. With proper mitigation, the impacts can be substantially reduced and if any such species are removed during prospecting activities the prospecting operation can have a positive effect by reducing bush encroachment. Based on the low invasive nature of drilling activities, this impact is expected to be insignificant. Broadscale ecological processes Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the		

	landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		
	Surface Water • Drilling and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Spillages that may occur on access and drill tracks may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.	On-site and Local	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors.

	• Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. Removal of vegetation could lead to erosion and sediment transportation.		• Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; Clean & dirty water plan.

	Ground water No impact to groundwater is expected from the roads that will be used by the planned prospecting operation. Hydrocarbon Spills Hydrocarbon spills from drill vehicles and fuel storage may contaminate the groundwater resource locally	On-site and Local	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.
	Noise Clearing of footprint areas for drilling, stripping and stockpiling of topsoil Construction of internal Roads Additional traffic to and from the mine Prospecting activities Drilling Removal of infra-structure (Temporary Ablution facility)	On-site and Local	• As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during prospecting. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works

			where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points. **Mechanical Equipment:** • All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.
	Soil Soil Erosion Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pans and drainage line characteristics. Vegetation will be stripped for construction of new roads and drill pads and these areas will be bare and susceptible to erosion. Any	On-site and Local	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils.

	topsoil and overburden that is stripped and piled on surrounding areas can be eroded by wind, rain and flooding. The soil/sediments will be carried away during runoff. The affected areas should be rehabilitated, but full restoration might only occur over a number of years, subsequent to the re-establishment of vegetation and hydrologic regime		• The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Topography Changes to surface topography Construction of roads and drill pads as well as temporary ablution facilities	Local	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.

			• Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

e) Impact Management Outcomes

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

ACTIVITY	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity
Roads	Air quality	Nuisance dust will be created by the drilling machine.	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.
	Fauna	Clearing of vegetation and disturbance during the construction of roads and drill pads. **Habitat fragmentation** Prospecting activities could result in the loss of connectivity and	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff,

		fragmentation of natural habitat, which generally leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This impact will be most profound if characteristics of the natural watercourses are altered. However, due to the low invasive nature of drilling activities this impact is not expected to be significant. **Disturbance, displacement and killing of fauna** Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities. The transformation of natural habitats will result in the loss of micro habitats, affecting individual species and ecological processes. This will result in the displacement of faunal		contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no go zone. • However, if any of the protected species are threatened by destruction, the relevant permits should be obtained followed by the relevant mitigation procedures stipulated in the permits. • An Environmental Control Officer must render guidance to the staff and contractors

		species that depend on such habitats, e.g. birds that nest in trees or animals residing in holes in the ground. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Intentional killing of snakes, reptiles, vultures and owls will negatively affect the local populations. **Broadscale ecological processes** Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the		with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.

		connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		
	Flora	Construction of roads and drill pads; vehicular movement. **Loss of indigenous vegetation**	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by

		The construction of roads and drill pads will damage or destroy natural vegetation. It is expected that trampled vegetation will not be significantly affected and any destruction to natural vegetation will be at a very small scale, based on the low invasive nature of drilling activities. It is likely that areas of high ecological function will rehabilitate following such disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species; however traffic volumes associated with drilling activities are very low. **Loss of Red data and/or protected floral species** Removal of listed or protected plant species during the construction of roads and drill pads and/or illegal harvesting		planting seedlings where major vegetation clearance has taken place. • All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate

		It is possible that prospecting activities will destroy protected species and other species of conservation concern through construction of drill pads and roads, vehicular movement and if any illegal harvesting occurs. **Introduction or spread of alien species** Clearing of vegetation and disturbance during the construction of roads and drill pads The extent of alien invasive species in the study area is unknown. However, general clearing of vegetation destroys natural vegetation, where after invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the prospecting site. These alien invasive species are thus a		languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site. • Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.

		threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced. However, based on the low invasive nature of drilling activities, this impact is not likely to occur during the proposed operation. **Encouraging bush encroachment** Clearing of vegetation and disturbance during the construction of roads and drill pads The potential extent of bush encroaching species on site is unknown. While general		

		clearing of the area and prospecting activities destroy natural vegetation, bush encroaching plants can increase due to their opportunistic nature in disturbed areas. If encroaching plants establish in disturbed areas, it may the lower potential for future land use and decrease biodiversity. With proper mitigation, the impacts can be substantially reduced and if any such species are removed during prospecting activities the prospecting operation can have a positive effect by reducing bush encroachment. Based on the low invasive nature of drilling activities, this impact is expected to be insignificant. **Broadscale ecological processes** Clearing of vegetation and disturbance during the construction of roads and drill		

		pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant		

		during the proposed prospecting operation.		
	Surface Water	• Drilling and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Spillages that may occur on access and drill tracks may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces. • Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation.	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site

				that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; • Clean & dirty water plan.
	Ground water	No impact to groundwater is expected from the roads that will be used by the planned prospecting operation. Hydrocarbon Spills Hydrocarbon spills from drill vehicles and fuel storage may contaminate the groundwater resource locally	Commissioning, Operational, Decommissioning, Closure	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall.

				• Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.
	Noise	Clearing of footprint areas for drilling, stripping and stockpiling of topsoil Construction of internal Roads Additional traffic to and from the mine Prospecting activities Drilling Removal of infra-structure (Temporary Ablution facility)	Construction, Commissioning, Operational, Decommissioning, Closure	• As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during prospecting. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the

				levels will be monitored at prescribed monitoring points. Mechanical Equipment: • All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.
	Soil	Soil Erosion Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pans and drainage line characteristics. Vegetation will be stripped for construction of new roads and drill pads and these areas will be bare and susceptible to erosion. Any topsoil and overburden that is stripped and piled on surrounding areas can be eroded by wind, rain and flooding. The soil/sediments will be carried	Commissioning, Operational, Decommissioning, Closure and post closure	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Any road construction over drainage lines or pan catchments should be done to allow

		away during runoff. The affected areas should be rehabilitated, but full restoration might only occur over a number of years, subsequent to the re-establishment of vegetation and hydrologic regime		continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Topography	Changes to surface topography Construction of roads and drill pads as well as temporary ablution facilities	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration.

				• Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Visual	The drill tracks will be visible to some extent from the immediate surroundings. The design of the proposed prospecting development will determine the visual impact. As the prospecting will only entail drilling the visual impact would be low.	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure.
Drilling	Air quality	Nuisance dust will be created by the drilling machine.	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.
	Fauna	Clearing of vegetation and disturbance during the	Construction, Commissioning, Operational,	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and

		construction of roads and drill pads. **Habitat fragmentation** Prospecting activities could result in the loss of connectivity and fragmentation of natural habitat, which generally leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This impact will be most profound if characteristics of the natural watercourses are altered. However, due to the low invasive nature of drilling activities this impact is not expected to be significant. **Disturbance, displacement and killing of fauna** Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities.	Decommissioning, Closure and post closure	should minimise dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no go zone. • However, if any of the protected species are threatened by destruction, the relevant

		The transformation of natural habitats will result in the loss of micro habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g. birds that nest in trees or animals residing in holes in the ground. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Intentional killing of snakes, reptiles, vultures and owls will negatively affect the local populations. **Broadscale ecological processes** Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics.		permits should be obtained followed by the relevant mitigation procedures stipulated in the permits. • An Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.

		Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		

	Flora	Construction of roads and drill pads; vehicular movement. **Loss of indigenous vegetation** The construction of roads and drill pads will damage or destroy natural vegetation. It is expected that trampled vegetation will not be significantly affected and any destruction to natural vegetation will be at a very small scale, based on the low invasive nature of drilling activities. It is likely that areas of high ecological function will rehabilitate following such disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species; however, traffic volumes associated with drilling activities are very low. **Loss of Red data and/or protected floral species**	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place. • All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and

		Removal of listed or protected plant species during the construction of roads and drill pads and/or illegal harvesting It is possible that prospecting activities will destroy protected species and other species of conservation concern through construction of drill pads and roads, vehicular movement and if any illegal harvesting occurs. **Introduction or spread of alien species** Clearing of vegetation and disturbance during the construction of roads and drill pads The extent of alien invasive species in the study area is unknown. However, general clearing of vegetation destroy natural vegetation, wherafter invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in		contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site. • Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.

		disturbed areas, it may cause an impact beyond the boundaries of the prospecting site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced. However, based on the low invasive nature of drilling activities, this impact is not likely to occur during the proposed operation. **Encouraging bush encroachment** Clearing of vegetation and disturbance during the construction of roads and drill pads		

		The potential extent of bush encroaching species on site is unknown. While general clearing of the area and prospecting activities destroy natural vegetation, bush encroaching plants can increase due to their opportunistic nature in disturbed areas. If encroaching plants establish in disturbed areas, it may the lower potential for future land use and decrease biodiversity. With proper mitigation, the impacts can be substantially reduced and if any such species are removed during prospecting activities the prospecting operation can have a positive effect by reducing bush encroachment. Based on the low invasive nature of drilling activities, this impact is expected to be insignificant. **Broadscale ecological processes**		

		Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pan- and drainage line characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The grassland habitat is the most vulnerable terrestrial habitat on site in terms of cumulative disturbances. With regards to aquatic communities, the fragmentation of ephemeral drainage ways and pans will destroy connectivity of vital ecological corridors and it will disrupt the hydrological regime on		

		a landscape level. However, due to the low invasive nature of the proposed activity the potential for cumulative impacts is not significant during the proposed prospecting operation.		
	Surface Water	• Drilling and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Spillages that may occur on access and drill tracks may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces. • Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution.	Commissioning, Operational, Decommissioning, Closure and post closure	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.

		• Removal of vegetation could lead to erosion and sediment transportation.		• The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; Clean & dirty water plan.
	Ground water	No impact to groundwater is expected from the roads that will be used by the planned prospecting operation. Hydrocarbon Spills Hydrocarbon spills from drill vehicles and fuel storage may	Commissioning, Operational, Decommissioning, Closure and post closure	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site.

		contaminate the groundwater resource locally		• Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.
	Noise	Clearing of footprint areas for drilling, stripping and stockpiling of topsoil Construction of internal Roads Additional traffic to and from the mine Prospecting activities Drilling Removal of infra-structure(Temporary Ablution facility)	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during prospecting. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.

				• Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points. **Mechanical Equipment:** • All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.
	Soil	Soil Erosion Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to pans and drainage line characteristics. Vegetation will be stripped for construction of new roads and drill pads and these areas will be bare and susceptible to erosion. Any topsoil and overburden that is stripped	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.

		and piled on surrounding areas can be eroded by wind, rain and flooding. The soil/sediments will be carried away during runoff. The affected areas should be rehabilitated, but full restoration might only occur over a number of years, subsequent to the re-establishment of vegetation and hydrologic regime		• Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Topography	Changes to surface topography Construction of roads and drill pads as well as temporary ablution facilities	Construction, Commissioning, Operational, Decommissioning, Closure and post closure	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.

				• Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraph (c) and (d) will be achieved)

ACTIVITY	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution).	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	TIME PERIOD FOR IMPLEMENTATION Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation, therefore state either:- Upon cessation of the individual activity or Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.	COMPLIANCE WITH STANDARD (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Roads	Air quality	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.	Upon the cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

				•Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	Fauna	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan.

		as a no-go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • However, if any of the protected species are threatened by destruction, the relevant permits should be obtained followed by the relevant mitigation procedures stipulated in the permits. • An Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition		•Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Biennial Annual performance Assessment Reports and annual quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.		
	Flora	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place. • All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents

		• However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the flora occurring on site. • Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species.		of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.		
	Surface Water	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; • Clean & dirty water plan.		
	Ground water	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

		• All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.		Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	Noise	• As a minimum, ambient noise levels emanating from the prospecting area will not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during construction and operation. • The management objective will be to reduce any level of noise, shock and	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

		lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points. Mechanical Equipment: • All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.		•Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

	Soil	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.		
	Topography	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.		
	Visual	• Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

Drilling	Air quality	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	Fauna	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation;

		dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • However, if any of the protected species are threatened by destruction, the relevant permits should be obtained followed by the relevant mitigation procedures stipulated in the permits.		• Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• An Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance. • Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit to lower the risk of animals being killed on the roads.		
	Flora	• Minimise the footprint of transformation, by keeping to existing roads where possible. • Ensure measures for the adherence to the speed limit to minimise dust plumes. • Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearance has taken place. • All footprint areas of the prospecting activities must be scanned for Red	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents

		Listed and protected plant species prior to any destructive activities. • It is recommended that these plants are identified and marked prior to intended activity. • These plants should, where possible, be incorporated into the activity layout and left in situ. • However, if threatened by destruction, these plants should be removed (with the relevant permits) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of an Environmental Control Officer must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.		of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• All those working on site must be educated about the conservation importance of the flora occurring on site. • Employ measures to ensure that no illegal harvesting takes place. • Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.		
	Surface Water	• No activities should take place in the ephemeral wetlands. • Any road construction over drainage lines or pan catchments should be done to allow continuance of the natural hydrological regime. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan.

		• Employ sound rehabilitation measures to restore the characteristics and habitat functionality of any affected areas. • Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control;		•Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		Clean & dirty water plan.		
	Ground water	• Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	Noise	• As a minimum, ambient noise levels emanating from the prospecting area will	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities:

		not exceed 82 dB (A) at the site boundary. • The applicant will comply with the occupational noise regulations of the Occupational Health and Safety Act, Act 85 of 1993. • The applicant will comply with the measures for good practice with regard to management of noise related impacts during construction and operation. • The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABC 083 as amended, in any place at or in any mine or works where persons may travel or work, exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level. • Hearing protection will be available for all employees where attenuation cannot be implemented. • If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points. **Mechanical Equipment:**		• Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Biennial performance Assessment Reports and Annual quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		• All mechanical equipment will be in good working order and vehicles will adhere to the relevant noise requirements of the Road Traffic Act. • All vehicles in operation will be equipped with a silencer on their exhaust system. • Safety measures, which generate noise such as reverse gear alarms on large vehicles, will be appropriately calibrated/adjusted.		
	Soil	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Any road construction over drainage lines or pan catchments should be done	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents of these documents, and to adhere thereto.

		to allow continuance of the natural hydrological regime. • Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.		Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	Topography	• If any topsoil is removed during creation of roads or drill pads then these stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.	Upon cessation of prospecting as the case may be.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. •Environmental Awareness training must be provided to employees. •The operation must have a rehabilitation and closure plan. •Management and staff must be trained to understand the contents

		• Ground exposure should be minimised in terms of the surface area and duration. • Disturbances during the rainy season (November to March) should be monitored and controlled. • Run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.		of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

i) Financial Provision

(1) Determination of the amount of Financial Provision

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

- The main closure objective of Thunderflex 78 (Pty) Ltd. planned prospecting operation is to restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any reserves.
- To prevent the establishment of any permanent structures or features except where the owners have indicated that they would prefer structures to be left.
- The re-vegetation also has the objective to establish a stable and self-sustainable vegetation cover if necessary.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability of the prospecting area.
- To limit and manage the visual impact of the prospecting activities.
- To safeguard the safety and health of humans and animals on the prospecting area.
- The last closure objective is that the prospecting area is closed efficiently, cost effectively and in accordance with government policy.

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

The process as described by NEMA for Environmental Authorisation was followed. The landowner is CO Hager.

The consultation process with interested and affected parties is ongoing.

A Notice was placed on 14 August 2020 to inform the public that a Prospecting Right was accepted for Thunderflex 78 (Pty) Ltd and that any interested or affected parties must register (copy attached).

Notices were placed on the fences of the farms to make all relevant parties aware of the application (See photo's below).

With this site notice all passers-by are requested to register and submit any written comments to be forwarded to the consultant.

A copy of the Background Information Document with a cover letter and comments form to invite their comments was sent by registered post to the farm owner and government departments.

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

The rehabilitation of land disturbed by the operation during the life of the prospecting permit will be accompanied by ongoing monitoring of the environment, until a stable state is reached. The main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the area and habitats to a condition acceptable for obtaining a closure certificate.

Final rehabilitation of the site is expected to be within 3 years after the permit has been granted. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.
Infrastructure Areas:

On completion of the prospecting operation, the various surfaces, including the access road, storage areas and the ablution facilities, will finally be rehabilitated as follows:-

- All remaining material on the surface will be removed to the original topsoil level. This material will then be backfilled into the drill holes / depressions. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.
- All infrastructures, equipment, and other items used during the operational period will be removed from the site.
- On completion of operations, all buildings, structures or objects on the office site will be dealt with in accordance with Regulation 44 of the Minerals and Petroleum Resources Development Act, 2002, which states:-
  3. *Regulation 44: When a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, the holder of such right or permit may not demolish or remove any building, structure or object –*
     (d) which may not be demolished or removed in terms of any other law;
     (e) which has been identified in writing by the Minister for purposes of this section; or

(f) which is to be retained in terms of an agreement between the holder and the owner or occupier of the land, which agreement has been approved by the Minister in writing.

4. The provision of subsection (1) does not apply to bona fide mining equipment, which may be removed.

Topsoil Deposits:

- Disposal Facilities:-
  Waste material of all description inclusive of receptacles, scrap, rubble and tyres will be removed entirely from the prospecting area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.
- On-going Seepage, Control of Rain Water:-
  No monitoring of ground or surface water will take place, except is so requested by the DWS – Kimberley.
- Long Term Stability and Safety:-
  It will be the objective of prospecting management to ensure the long term stability of all rehabilitated areas including the backfilled depressions. This will be done by the monitoring of all areas until a closure certificate has been issued.
- Final rehabilitation in respect of erosion and dust control:-
  Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is planned.

Final Rehabilitation Roads:-

- After rehabilitation has been completed, all roads will be ripped or ploughed, fertilized and seeded, providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of Information:-

- Reports on rehabilitation and monitoring will be submitted biennially to the Department of Mineral Resources – Welkom, as described in Regulation 55.

Maintenance (Aftercare):-

- Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the prospecting activities will be to create an acceptable post-prospecting environment and

land-use. Therefore, all agreed commitments will be implemented by Mine Management.

After-effects Following Closure:-

- Acid Mine Drainage:-
  No potential for bad quality leach ate or acid mine drainage development exists after mine closure.
- Long Term Impact on Ground Water:-
  No after effect on the groundwater yield or quality is expected.
- Long-term Stability of Rehabilitated Land:-

One of the main aims of any rehabilitated ground will be to obtain a self-sustaining and stable end result. Cleaning of all drill chip material concurrently and replacing of topsoil where available.

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

- The removal of waste material of any description from the prospecting area and the disposal thereof at a recognised landfill facility.
- The removal of infrastructure, equipment, plant and other items from the site.
- The ripping of compacted areas to a level of 300mm and the levelling of such areas in order to re-establish a growth medium for plants (such areas will furthermore be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the prospecting operation, if the re-establishment of vegetation is unacceptably slow.
- The backfilling of the final drill hole with drill chips and subsoil and the covering thereof with previously stored topsoil (where-after this area will also be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the proposed operation, and seedlings protected for a period of one) if the re-establishment of vegetation is unacceptably slow.

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

It is estimated at R 213 606,06 for the financial provision to manage and rehabilitate the environment.

(f) Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined.

Thunderflex 78 (Pty) Ltd will fund the operation please see the last audited financial statements to undertake prospecting operations.

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

g) Monitoring of Impact Management Actions
h) Monitoring and Reporting Frequency
i) Responsible persons
j) Time Period for Implementing Impact Management Actions
k) Mechanisms 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
Topography	To minimise the reduction of land capability.	To ensure that rehabilitation post-prospecting slopes are stable, free draining and no slopes have an angle in excess of 20º.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* to ensure that the levels and the slopes are in order.
Soil	To prevent soil pollution; To limit soil compaction; To curb soil erosion; and To reinstate a growth medium able to sustain plant life.	Soil depth and chemical composition will be tested and possible erosion damage will be assisted and rectified.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* or after a heavy rain event.
Air Quality	To control the incidence of unacceptable levels of dust pollution on site.	To ensure that the prospecting activities minimizes dust omissions, so that dust does not become a nuisance for affected parties and a health hazard.	Site Manager/Foreman appointed SHE Consultant	Visual inspections will be done and managed by dust suppression by a water tanker. Quarterly tests will also be conducted by a Safety Health and Environmental Consultant and submitted to Mine Health and Safety for monitoring purposes.

Fauna	To minimise vegetation destruction in prospecting areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an *annually basis* to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a *twice a year basis* (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.
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**
Noise and Vibration	To ensure that the legislated noise and ground vibration levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the area and that which may migrate outside the area.	The manager .	Quarterly reports on fall-out dust and noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Surface Water	To conserve water; and To eliminate the contamination of run-off.	The Orange River is in the vicinity of the prospecting operation. There is one farm between the river and the application area.	Site Manager/Water Supply	Monitoring takes place by collecting surface water samples every quarter.

l) Indicate the frequency of the submission of the performance assessment/environmental audit report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted **biennially** by an independent EAP and an Environmental Audit Report should be compiled in such a way that it meets the requirements in terms of Regulation 34 of the National Environmental Management Act 107 of 1998): Environmental Impact Assessment Regulation, 2014. The financial quantum calculation should be done annually and submitted to the competent authority.

The rehabilitation plan should also be reviewed annually in order to fulfil the requirements of Section 41(3) of the MPRDA and should be conducted by an independent EAP. Subsequently, an Annual Rehabilitation Plan should be developed to meet the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

These reports should be submitted annually to the Northern Cape DMR offices in Kimberley.

m) Environmental Awareness Plan

The objective of the environmental awareness plan is to ensure that:

- Training needs are identified and all personnel whose work may create a significant impact upon the environment have received appropriate training;
- All employees are aware of the impact of their activities
- Procedures are established and maintained to make appropriate employees aware of:
    - The significant environmental impacts (actual or potential) of their work activities and environmental benefits of improved personal performance,
    - Their roles and responsibilities in achieving conformance with environmental policies, procedures, and any implementation measures,
    - The potential consequences of departure from specified operating procedures.
- Personnel performing tasks, which can cause significant environmental impacts, are competent in terms of appropriate education, training and / or experience.

Environmental awareness will be part of the existing training and development plan. Key personnel with environmental responsibilities will be identified and the following principles will apply:

- Procedures will be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness will focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;

Top management will build awareness and motivate and reward employees for achieving environmental objectives;

- Environmental policies will be availed to mine employees and contractors;
- Environmental inductions will be conducted for employees, contractors and visitors;
- There will be an ongoing system of identifying training needs.

General environmental awareness training as part of the induction at the Thunderflex 78 Operation should focus on the following:

- General environmental awareness
- The prospecting policies and vision concerning environmental management
- Legal requirements
- Prospecting activities and their potential impacts
- Different management measures to manage identified impacts

Prospecting personnel's role in implementing environmental management objectives and targets.

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

It is the responsibility of management to ensure that all employees, contractors and visitors are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible. Environmental awareness should be part of the existing training and development plan. Key personnel with environmental responsibilities should be identified and the following principles should be applied:
Procedures should be developed to facilitate training of employees, on-site service providers and contractors;
Environmental awareness should focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;
Top management should build awareness and motivate and reward employees for achieving environmental objectives;
There should be an ongoing system of identifying training needs.
An environmental, health and safety induction programme should be provided to all employees, contractors and visitors prior to commencing work or entering the site, and they should sign acknowledgement of the induction.
An attendance register and agenda/programme should be filed for each induction.

A daily "toolbox talk" should be held prior to commencing work, which will include discussions on health, safety and environmental considerations. The toolbox talks should be led by the site manager or the appointed supervisor/s.
Refresher training should also be given to permanent employees and long-term contractors on an annual basis, to ensure that all are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

General environmental awareness training as part of the induction at Thunderflex should focus on the following:

General environmental awareness, which incorporates environmental, ecological and heritage elements;
The mine policies and vision concerning environmental management;
Legal requirements;
Mine activities and their potential impacts;
Different management measures to manage identified impacts;
Mine personnel's role in implementing environmental management objectives and targets.

Environmental awareness topics to be covered in training should include:

Natural resource management and conservation;
Biodiversity awareness and conservation principles;
Heritage resource awareness and preservation principles;
Hazardous substance use and storage;
Waste management; and Incident and emergency actions and reporting;

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

Air quality:
To control the incidence of unacceptable levels of dust pollution on site via dust dispersion control.

Surface water:
Mitigation measures (or safety precautions) that are taken in order to eliminate any risk the project area could have on the natural, cultural and social environment of the concerned area and that must be implemented during the different phases i.e. construction, operational and post closure to minimize the impacts are as follows:

- Only environmentally friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources.

- Proper clean and dirty water separation techniques must be used to ensure uncontaminated water returning to the environment.
- Non prospecting waste i.e. grease, lubricants, paints, flammable liquids, garbage, historical machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a proper designed area.
- The topography of rehabilitation disturbed areas must be rehabilitated in such a manner that the rehabilitated area blends in naturally with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation.

Ground water:
Groundwater Management Plan
The mine must develop a monitoring response protocol. This protocol will describe procedures in the event that groundwater monitoring information indicates that action is required.

Natural flora:
Loss of and disturbance to indigenous vegetation
- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads where possible.
- Implement effective avoidance measures to limit any activities in the watercourses, by applying the no-go principles around the watercourses.
- Ensure measures for the adherence to the speed limit to minimise dust plumes.
- Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings where major vegetation clearances have taken place. Seeds and seedlings for this region can be acquired from renukaroo@gmail.com.
- Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.

Loss of flora with conservation concern
- All footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to any destructive activities.
- It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout plan and left in situ.
- However, if threatened by destruction, these plants should be removed (with the relevant permits from DAFF and/or DENC) and relocated if possible.
- A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after reestablishment in order to ensure successful translocation.

- The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.
- All those working on site must be educated about the conservation importance of the flora occurring on site as well as the legislation relating to protected species.
- Employ measures to ensure that no illegal harvesting takes place.

Proliferation of alien vegetation

- Minimise the footprint of transformation.
- Encourage the growth of natural plant species.
- Mechanical methods (hand-pulling) of control to be implemented extensively.
- Annual follow-up operations to be implemented.

Encouragement of bush encroachment

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of disturbed areas which encourages the growth of a diverse selection of natural plant species.
- Mechanical methods (hand-pulling) of control to be implemented selectively.
- Annual follow-up monitoring to be implemented.

Fauna:

Loss, damage and fragmentation of natural habitats

- All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.
- The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so.
- Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for all people and machinery.
- Limit the removal of adult trees as far as possible.
- No new roads should be created across a watercourse.
- No drilling should take place in the river, drainage lines or wetlands. If unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- After such a licence has been obtained, care should still be taken to minimise the footprint within each watercourse and when handling

the top few cm of the soil. Sound rehabilitation measures to restore the characteristics of any affected watercourses should also be applied.

Disturbance, displacement and killing of fauna

- Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.
- The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no-go zone.
- No new roads should be created across a watercourse.
- If any of the protected species are threatened by destruction (e.g. aardvark), the relevant permits from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits.
- No drilling should take place in the river, drainage lines or wetlands. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- After such a licence has been obtained, care should still be taken to minimise the footprint within each watercourse and when handling the top few cm of the soil. The crust should ideally remain intact as far as possible by carefully removing it with a spade. The affected area should be refilled and the crust replaced back in its original place immediately after drilling has been performed.
- Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site.
- Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Employ measures that ensure adherence to the speed limit on public roads as well as driving
- mindfully on farm tracks to lower the risk of animals being killed while traversing the
- property.

Broad-scale ecological processes

- Minimise the footprint of transformation.
- No new roads should be created across a watercourse.
- No drilling should take place in the river, drainage lines or wetlands. If unavoidable, a water use licence to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.

- After such licence has been obtained, care should still be taken to minimise the footprint within each watercourse and to apply effective rehabilitation measures.

Noise and vibration:

- To control the incidence of unacceptable noise and vibration levels on site.
- There will be a shift in the immediate noise levels of the proposed activities on a temporary basis during the drilling phase. Regular feed-back to the community during the operational phase of the project.
- A system whereby complaints are recorded and investigated must be made available.

Visual (Aesthetics):

- Mitigation measures may be considered in two categories:
  - Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered; and
  - Secondary measures designed to specifically address the remaining negative effects of the final development proposals.

- Primary measures that will be implemented should mainly be measures that minimise the visual impact by softening the visibility of the prospecting activities, by "blending" with the surrounding areas. Such measures will include rehabilitation of the disturbed areas, by re-vegetation of the area.
- During the construction phase the following mitigation measures should be implemented to minimise the visual impact.
  - Reduce the construction period through careful planning and productive implementation of resources;
  - Ensure that rubble, litter and disused construction materials are managed and removed regularly;
  - Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way;
  - Reduce and control construction dust emitting activities through the use of approved dust suppression techniques;
- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way;
- Rehabilitation of disturbed areas and re-establishment of vegetation;

Soils:

Soil erosion

- Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.
- Ground exposure should be minimised in terms of the surface area and duration.

- No new roads should be construction over watercourses for the drilling operation. All activities should use existing roads, or create roads around the watercourses.
- Disturbances during the rainy season (November to March) should be monitored and controlled.
- Any potential run-off from exposed ground should be controlled with flow retarding barriers.
- Regular monitoring during the drilling operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

Loss of soil fertility

Topsoil needs to be removed and stored separately, if the creation of roads, drill grids or drill pads will result in the eradication of vegetation and the top soil layer.

- These topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.

Land capability:

- To minimise the reduction of land capability.

Sensitive landscapes:

- To protect sensitive landscapes from potential negative impacts.
- Maintain buffer areas.

Surface environment - waste management:

- To ensure that the discarding of any waste material produced as a result of the proposed prospecting operation, including rubble, litter, garbage, rubbish or discards of any description, whether solid of liquid, takes place only at a site or sites demarcated for such purposes.

To prevent waste material from being dumped within the borders or the vicinity of the prospecting area.

n) Specific information required by the Competent Authority

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

Section 41 of the MPRDA and regulation 53 and 54 promulgated in terms of the MPRDA deal with financial provision for mine rehabilitation and closure.

The holder of a right as described in the relevant sections of the MPRDA and its regulations must provide the Department of Mineral Resources (DMR) with sufficient financial provision. Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the mine at that time.

The holder of a prospecting right, mining right or mining permit is required to annually assess the total quantum of environmental liability for the mining operation and to ensure that financial provision are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability.

It is hereby confirmed that the financial provision will be reviewed annually.

Surface water monitoring will be undertaken monthly and annually reports will be submitted to the DWA;

The financial provision for closure (quantum and method) will be updated annually as part of the Environmental Programme Performance Assessment; and

The closure plan must be reviewed every five (5) years, and must always keep pace with the current best practices.

2) UNDERTAKING

The EAP herewith confirms

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

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

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

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

Signature of the environmental assessment practitioner:

Wadala Mining and Consulting (Pty) Ltd

Name of company:

18 November 2020

Date:

END

APPENDIX 1

CURRICULUM VITAE

Roelina Henriette Oosthuizen

Cell: 084 208 9088

E-Mail: roosthuizen950@gmail.com

1. PERSONAL INFORMATION

Name: Roelina Henriette Oosthuizen

Surname: Oosthuizen (Maiden: Alberts)

Identity number: 7004180037082

Date of birth: 18 April 1970

Gender: Female

Marital status: Married (26 years) with 3 children

Driving license: Yes, Code EB

Languages: Fluent in Afrikaans and English

Nationality: South African

Criminal offences: None

Health: Excellent, fit

2. SYNOPSIS OF PROFESSIONAL CAREER

Roelina Henriette Oosthuizen has 22 years of experience in the environmental management field. She started her career in the area of Environmental Management and Environmental Impact Assessment (EIA) evaluation in 1997 at the Department of Minerals and Energy. After moving to industry in 2005, Roelien became involved in the practical aspects of environmental management. A major project during her early years outside of government was that of the EIA for a Game Reserve and Lodge development near Barkly-Wes, she did this project together with a consultancy firm from Kimberley AWS water solutions (Mr. Adriaan du Toit). In 2007 the Company she worked for was bought by a Canadian Group of Companies and she became more involved in practical aspects of the operations and worked closely with operations personnel in dealing with ongoing management of environmental impacts at the Mine (e.g. monitoring, auditing, operating procedures). She was also centrally involved in liaison with the authorities and with stakeholders in neighbouring areas.

During her time at the Canadian Group of Companies, Roelien was the environmental manager overseeing operations in the Barkly-West, Prieska and Douglas areas. She was responsible for preparing the environmental compliance documents for each operation which included Performance Assessments (Audit reports) and Financial Quantum submissions as well as new applications for Prospecting Rights and Mining Rights with the relevant Scoping, EIA / EMP documents. Her activities included liaison with stakeholders and also with the relevant Departments. During this time, Roelien became increasingly involved in environmental policy and strategy work, as well as the environmental aspects of corporate governance.

She has assisted a range of clients with Environmental Due Diligence audits and compliance audits. Roelien has also undertaken numerous environmental audits, particularly compliance and due diligence audits for clients in the mining industry. Thus, she is familiar with best practice standards in environmental auditing.

Roelien have also represented the South African Diamond Producers Organisation (SADPO) on the Environmental Policy Committee (EPC) at the Chamber of Mines between 2005 and 2011.

In a nutshell, Roelien has wide ranging experience and is thus well-positioned to assist clients in any matter related to sustainability and environmental management. This is achieved through her own skills base and on drawing on specialists.

3. QUALIFICATIONS

MEM (Master in Environmental Management) University of the Orange Free State (2000)
B – Comm NWU (1991)

4. TRAINING COURSES

Roelien have attended various mining and environmental conferences and seminars to stay abreast with the latest changes in legislation, legal compliance and policy positions in the sector.

October 1997	Mineral Laws Administration & Environmental Management (University of Pretoria)
July 2002	Project Management for Environmental Systems (University of the Orange Free State)
August 2004	Environmental and Sustainability in Mining Minerals and Energy Education and Training Institute (MEETI)
September 2005	Converting Old Order Rights to New Order Rights in Mining International Quality & Productivity Centre Johannesburg)
November 2006	Mine waste disposal and Achievement of Mine Closure
February 2007	Introduction to ArcGis 1
April 2010	Mining Law Update Conference (IIR BV South Africa)
November 2010	Social Labour Plans for Mining Workshop (Melrose Training)
August 2011	Mineral Resources Compliance and Reporting (ITC)
May 2012	Enviro Mining Conference 2012 (Sustainability and Rehabilitation) (Spectacular Training Conferences)
August 2012	Mineral Resources Compliance and Reporting 4th Annual (ITC)
March 2013	1st EnviroMining-Ensuring Environmental Compliance and reporting
March 2014	4th Annual EnviroMining Conference
March 2015	5th Annual EnviroMining Conference
February 2018	Seminar by the Department of Environmental Affairs on knowledge sharing workshops on the Screening Tool

5. PROFESSIONAL REGISTRATION

Registered Environmental Assessment Practitioner: Number 2019/1467 at EAPASA (Environmental Assessment Practitioners Association of South Africa).
Registered as a professional at IAIAsa (International Association for Impact Assessment South Africa). IAIAsa is a voluntary organisation and is not a statutory body regulating the profession. Its members are however expected to abide by the organisations code of ethics.

6. PROFESSIONAL EXPERIENCE

Projects are listed below by area of expertise.

Environmental Management Systems (EMS) and Environmental Auditing

Development of EMS and Compilation of INCIDENT REPORT AND INVESTIGATION FORMS for the EMS of the Canadian group of Companies on various sites.

Undertaking of a range of due diligence and performance audits for operations, including those listed below:

Performance Assessment reports for a mining company with various infrastructure and mining operations near Barkly-West and Windsorton.

Performance Assessment reports for a mining company near Douglas.

Preparation of an environmental auditing checklist / protocol for a Community project with restitution ground in assisting the community to determine environmental legal compliance at their operations.

Environmental audit as part of a closure with Dr. Betsie Milne another specialist. This Annual Rehabilitation Plan has been developed to match the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).This project had the objective of ensuring that this company are accounting for environmental liabilities and risks adequately. The plan distinguishes between (a) those environmental rehabilitation liabilities pertaining to drilling, for which the Company was legally responsible and (b) those environmental rehabilitation liabilities pertaining to historic mining activities, for which the Company is not legally responsible, but consider performing as part of their best practice environmental principals. Three costing scenarios were explored in order to evaluate the most feasible rehabilitation plan, i.e. (1) Total cost (worst-case scenario) including risks, (2) legally required cost and (3) features currently available that do not involve any risks.

Sustainability projects: policies, guidelines, strategies and performance reporting

Involved in the compilation of 43-101 technical documents for listed companies which included information on sustainability and performance in rehabilitation and sustainable mining.

Alien species eradication project guideline and strategy near Barkly-Wes in terms of Regulations that have been promulgated in terms of the Conservation of Agricultural Resources Act, No. 43 of 1983 further make it unlawful to allow various species of weeds and invader plants to grow. The target species was Wild tobacco (declared weed), Pink Tamarisk (declared weed) and Mexican poppy, it also involved the community for job creation and training (2008).

Investigations for a Company near Prieska on Development of a biodiversity offsets policy for the applications for forestry tree licences for protected tree species.

Strategic Environmental Studies and Environmental Impact Assessment (EIA)

Undertaking of a Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2006 for a Private Individual which involved the proposed extension of a roof over an existing deck with two wood pillars by means of the excavating of 0.5m X 0.5m X 1m X 2 (½m²) OF SOIL WITHIN 100M OF THE HIGH WATER MARK OF THE SEA. A Positive Record of Decision (ROD) Granted (2010).

Undertaking of an ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) near Boshof for a kimberlite Diamond Mining Company (2015)

Undertaking of a strategic environmental review and amendment for a Chinese group of Companies near Postmasburg. The study provided baseline environmental information and a high-level review of the potential impacts of various components of the development (2014 – 2016). Roelien worked as a member (EAP) of a large team consisting of a project Coordinator, attorneys, water specialists, other specialist and an engineer.

Environmental Impact Assessments for various developments including the proposed mining project for the former retrenchees of De Beers in Kimberley. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialist with contributions of specialist reports to compile the EIA EMP report (2017). Roelien worked as a member (EAP) of a team consisting of De Beers (attorneys and environmentalists), the retrenchees, the appointed contractor, EKAPA, and specialist appointed for the studies.

Environmental Impact Assessments for a Salt operation near Upington. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as part of a team with the Company and another consultant that started with the Water Use Licence application. The public participation was done to include the water use activities.

Environmental Impact Assessment for a change in scope of a prospecting right application consisting of the sole and exclusive right to prospect for iron, silver, zinc, copper and sulphur ore. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as a member (EAP) of a team consisting of the directors of the company and specialists appointed for the studies

7. CAREER PATH

01 April 1997 to 28 February 2005
DEPT OF MINERALS & ENERGY
Senior Environmentalist - Assistant Director Environment

MAIN JOB FUNCTIONS

- Collect analyse and interpret information regarding the measurement of impacts of mining operations on the environment, the rehabilitation of land surfaces.
- The prevention, control and combating of pollution.
- Co-ordinate and prioritise the rehabilitation of derelict and ownerless mines.
- Co-ordinate, investigate, audit and resolve environmental problems in conjunction with the Department of Water Affairs and Forestry, Department of Agriculture and the provincial Department of Tourism, Environment and Conservation.

- Address complaints and inquiries received from the public and mining industry.
- Consult with relevant authorities and interested and affected people regarding the approval of Environmental Management Programmes.
- Ensuring that rehabilitation standards are applied.
- Ensuring that the requirements stated in Environmental Management Programme Reports are adhered to.
- Conduct inspections and recommendations on mines that apply for closure.
- Evaluate mining licences and prospecting applications and recommend site-specific conditions according to legislative requirements.
- Constant liaison with the public, the mining industry and other government authorities on environmental matters, legislation and agreements.
- Influence new development processes through participation in the EMPR and EIA processes and give guidance through education and awareness programmes.
- Calculate and verify financial provision for outstanding rehabilitation.

01 March 2005 – 30 September 2012
Appointed as professional Mineral Law Administration and Environmental Manager for HC van Wyk Diamonds which was bought over in 2007 by a **Canadian group of Companies.**

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans:
Formulation of an environmental policy and guidelines for the Group.
Participation in the development of the budget for environmental expenditure.
Co-ordination of technical studies (e.g. monitoring of groundwater quality).
Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. Forestry Licences and water sampling for Water Use Licences).
Development of environmental guidelines for contractors on sites.
Liaison with regulatory authorities on compliance with environmental legislation.
Documentation of environmental incidents.
Environmental awareness and training.
Development of a public participation strategy.
Formulation of a complaint's procedure.

01 October 2012 to 29 February 2020
Appointed as professional Mineral Law Administration and Environmental Manager for **Mentor Trade and Investments Pty Ltd**

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Formulation of an environmental policy and guidelines for the Mine.

Co-ordination of technical studies (e.g. monitoring of groundwater quality) as well as updating of the Mine's IWWMP.
Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. as water sampling and effluent).
Development of environmental guidelines for contractors.
Liaison with regulatory authorities on compliance with environmental legislation.
Documentation of environmental incidents.
Environmental awareness and training.
Development of a public participation strategy.
Formulation of a complaint's procedure.

01 March 2020 to Present full time
Appointed as EAP on projects for ***Wadala Mining and Consulting Pty Ltd***

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Liaison with regulatory authorities on compliance with environmental legislation.
Environmental awareness and training.

DIE UNIVERSITEIT VAN DIE ORANJE-VRYSTAAT

THE UNIVERSITY OF THE ORANGE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

Magister in Omgewingsbestuur

Master in Environmental Management

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

ROELINA HENRIËTTE OOSTHUIZEN

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISEKANSELIER/VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2000-09-16