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**
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FILE REFERENCE NUMBER SAMRAD: **(NC) 30/5/1/1/2/12451 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)
(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:	**THE FARM WEXFORD 246, Herbert (IN EXTENT: 1 846.4953 HA) AND REMAINING EXTENT OF THE FARM ZOETGAT 84, Hopetown (IN EXTENT: 856.1150 HA)**
Application area (Ha):	**2 702.6103 ha**
Magisterial district:	**HERBERT AND HOPETOWN**
Distance and direction from nearest town:	**The nearest towns are Douglas – 50 km northeast of the farm and Prieska 80 km southwest of the mine. The capital of the Northern Cape, Kimberley is 165 km northeast of the application area. The entrance to the farm is on the tar road (357) from Douglas to Prieska about 50 km from Douglas the turn off to the farm is on the right-hand side of the road.**
21 digit Surveyor General Code for each farm portion:	**Farm 246 – C03200000000024600000** **Farm 84 – C03300000000008400000**

c) Locality map

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

Figure 1. *Farms 246 and 84 situated in the magisterial district of Herbert and Hopetown. 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 that 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. Plan drawn to a scale ONLY DRILLING WILL TAKE PLACE

(i) DESCRIPTION OF PLANNED ACTIVITIES:

The prospecting operation is primarily based on diamondiferous gravel deposits that are associated with the alluvial terraces of the Orange River. These gravels are confined to quaternary deposits, which covers the majority of the study area (Figure 2). The presence of diamondiferous gravels on Wexford 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.

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).	**2702.6103 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- (i) For which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 545 of 2010; or (ii) With a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters	Tracs for the drill rig	X	NEMA LN 1 (GNR 327)	
Activity 27 of Listing Notice 1 The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is	2702.6103 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)	

required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.				
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)

Non-Invasive Activities

Review of Past Exploration Results

In order to direct the exploration programme in an efficient manner, there will be a review of all information and data gathered during previous exploration. A site investigation 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 application area. Contacts between various lithologies will be mapped and specific attention will be given to delineate and define areas underlain by alluvial gravels.

Ground and/or airborne magnetic survey over prospecting area. The area will be flown with an airborne gradient magnetic survey in conjunction with other adjacent prospecting rights applied for. If the survey area is too small for a cost-effective airborne survey then ground magnetics will be carried out on parallel lines spaced at 100m across the prospecting area. Minimal disturbance of vegetation and wildlife is envisaged

Target-specific ground geophysics (magnetics, electromagnetics and gravity). This will entail detailed ground geophysical surveys being carried out using hand held equipment on parallel lines spaced at an appropriate interval based on the dimensions of the target being investigated. Minimal disturbance of vegetation and wildlife is envisaged

Target specific loam sampling. Soil samples of up to 200 litres in volume will be taken in the topmost soil layer (up to 20cm deep) and sieved on site to remove very fine (<425 micron) material. Minimal disturbance of vegetation and wildlife is envisaged.

Invasive Activities

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 metres 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.

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 and 2 of the Prospecting Works Program have been completed.

Rehabilitation

Rehabilitation of drill-sites will be done concurrently as each hole is completed. Access road rehabilitation is carried out when all prospecting phases are completed at the end of the diamond drilling activity. Rehabilitated sites will be monitored after drilling has been completed to ensure vegetation growth re-occurs.
On completion of the prospecting operation, the various surfaces, including the access road, will finally be rehabilitated as follows: Any compacted area will be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.
All equipment and other items used during the operational period will be removed from the site.

Rehabilitation of the secured storage areas

On completion of the prospecting operation, the above areas will be cleared of any remaining contaminated soil which will be placed in acceptable containers and removed with the industrial waste to a recognized disposing facility or by a waste removal company.

All buildings, structures or objects in the secured storage areas shall be dealt with in accordance with regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

The surface will be ripped or ploughed to a depth of at least 300 mm, where possible, and the topsoil, previously stored adjacent the site, distributed evenly to its original depth over the whole area. The area will then be fertilized if necessary (based on a soil analysis).

The site will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora if necessary.

Any other disturbed areas will be rehabilitated as described under the relevant activities.

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	- 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) - 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)	- The document is being compiled in order to fulfil the requirements thereof.

	- 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. Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007 GNR 150/GG 29657/23-02-2007	- 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.

	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 fo 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)	- To be implemented upon the approval of the EMPR.

	- 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)	
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 authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.	- Control measures are to be implemented upon the approval of the EMPR.

	- 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; (j) removing, discharging or disposing of water found underground if it is necessary for the	- 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.

	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)

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorised to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat.

Wexford is currently used for agriculture. A large portion of Wexford West is under pivot irrigation, with associated pipeline infrastructure, reservoir, landfill site, farmstead and staff quarters. Wexford East is used for grazing pastures, but an old cultivated land and staff quarters is located in the south of the property. Existing farm tracks are also present.

Only a small portion of the grazing land will be impacted on (± 7 ha at any given time which represents the footprints of all activities on the farm combined) the rest of the areas can proceed normally. The area applied for is over the entire portions but the main prospecting focus area will be on the grazing land. After prospecting the land will be utilized for grazing again.

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 bulk sampled or if there is a diamond resource to prospect even further.

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 bulk sampling 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 an alluvial diamond prospecting operation. The farm is also situated in an area known for Alluvial Diamond deposits.
A Prospecting Right application was lodged and accepted by the Department of Mineral Resources 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 Appendix 4 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 84, Zoetgat	T50281/2014CTN	2702.6103 Ha
Farm 246, Wexford	T1179/2009	

The property on which the Prospecting Right was accepted 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 mining.

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 and Diamonds (General) – Code-D – Type -D.

Alternatives considered:-

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorised to have

suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat.

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 (drilling) as well as limited additional impact on the environmental (non-perrennial 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 the non-invasive of the Prospecting Works Program have been completed.

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

- Technology

Prospecting Work
The prospecting work programme will be designed in phases, each phase conditional on the success of the previous phase.

Phase 1: Review of Past Exploration Results

In order to direct the exploration programme in an efficient manner, there will be a review of all information and data gathered during previous exploration. A site investigation 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 application area. Contacts between various lithologies will be mapped and specific attention will be given to delineate and define areas underlain by alluvial gravels.

Phase 2:

Should the initial results of the desktop study be encouraging, further data will be generated through ground geophysics. Targets generated by geophysics and/or historical information will be investigated on the ground and subject to more detailed target-specific ground geophysics. If any of the exploration targets give a positive result, a drilling program will be undertaken in order to identify the causative body for the geophysical/geochemical targets.

Phase 3: Scout Drilling and Delineation drilling:

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 metres 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 and bulk sampling.

Alternatives considered:-

The planned prospecting activities, 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, 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:

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorised to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat.

The majority of the area is classified to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat. Therefore, prospecting activities are believed to be another economically beneficial option for the area if the drilling proves to be positive. The farming of livestock will be able to continue in areas not affected by drilling operations. 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 prospect for alluvial diamonds. There is no alternative prospecting method.

Consequence if not proceeding with the Operation

The operation will make provision for 5 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.

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 below for the identification of Interested and Affected Parties to be consulted with.

A Notice was placed on 22 January 2020 in the DFA (Diamond Fields Advertiser) 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 mine offices and on the fences of the farms to make all relevant parties aware of the application (See photo's attached in Appendix 3).

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

Notices were placed at the Hopetown Abattoir, Hopetown garage and at the turn off on the gravel road to the farms to make all relevant parties aware of the application.

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: -

Thembelihle Local Municipality Hopetown
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
SANRAL
Transnet
SAHRA
National Department of Public Works

A notification letter on the BAR document will be send to all I & APs and the BAR will be placed at the library in Hopetown for easy access by all parties.

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**				
Hannes Pretorius Trust P.O. Box 137 Hopetown 8750	X	14 February 2020	Receive registration form Marthinus Bekker Schutte thinus@schutteprok.co.za		
Granary Normandien Pty Ltd P.O. Box 781396 Sandton Gauteng 2146	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**				
Thembelihle Local Municipality MUNICIPAL MANAGER AND THE MAYOR Private Bag X5030 Hopetown 8750	X				
Pixley Ka Seme District Municipality Private Bag X1012 De Aar 7000					

Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA					
SANRAL P.O. Box 415 Pretoria 0001	X				
Department of Agriculture, Forestry & Fisheries Attention: Jacoline Mans P.O. Box 2782 Upington 8800	X				
Dept. of Agriculture, Land Reform & Rural Development Private Bag X5108 Kimberley 8300	X				
Department of Rural Development and Land Reform Private Bag X 5007 Kimberley 8300	X				
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				
National Department of Public Works Private Bag X 5002 Kimberley 8300	X				
Transnet P.O Box 72501 Park view 2122	X				

Northern Cape Department of Roads and Public works PO Box 3132 Squirehill Park Kimberley 8300	X				
South African Heritage Resources Agency PO Box 4637 Cape Town 8000	X	05 March 2020 load application on line 13 March 2020	Interim Comment In terms of Section 38(3), 38(8) of the National Heritage Resources Act (Act 25 of 1999) Attention: Willie Oosthuizen Wadala Mining and Consulting Pty Ltd Drilling Thank you for notifying SAHRA of the Environmental Authorisation (EA) application in support of a Prospecting Rights (PR) Application for proposed prospecting activities on various properties near Hopetown, Northern Cape Province (NC 30/5/1/1/2/12451 PR). 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 moderate to high Palaeontological Sensitivity as per the SAHRIS PalaeoSensitivity map. As such, a desktop Palaeontological Impact Assessment (PIA) must be undertaken by a qualified palaeontologist. 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. Further comments will be issued upon receipt of the NEMA EA documents inclusive of appendices. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.		
Communities					
No Communities					
Dept. Land Affairs					
Department of Agriculture Land Reform and Rural Development P.O. Box 28 De Aar 7000	X				

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 The Head of Department Private Bag X6102 Kimberley 8300	X				
Other Competent Authorities affected	X				
OTHER AFFECTED PARTIES					
brent@witklip.co.za		12 February 2020	Dear Brent With reference to Mr. Paul Mofokengs visit when he placed the notices on the farm. Please find attached the information regarding the prospecting right. You have been registered as an interested and affected party.		
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

Dr. Betsie Milne from Boscia Ecological Consulting has been appointed by Thunderflex to provide a desktop Ecological Study with a wetland assessment to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site and to determine the possible impact of prospecting on the application area geology was described and included in this report as part of the ecological and biodiversity Assessment (Study appended as Appendix 6).

According to Thomas (1992) the geological features on Wexford comprise Quaternary, Jurassic, Carboniferous and Randian deposits (Figure 3). The majority of Wexford East comprises calcrete, with alluvium found in the vicinity of the pans. Dwyka tillites from the Karoo Sequence and a section with Dolerite are also present. Wexford West primarily comprises wind-blown sand in the far west, with andesitic lava (Allanridge Formation) and quartzites (Bothaville) from the Ventersdorp Supergroup associated to the ridges towards the river. Diamondiferous gravels are mainly expected to be found within the quaternary deposits, which are confined to the calcrete and wind-blown sand (Figure 3).

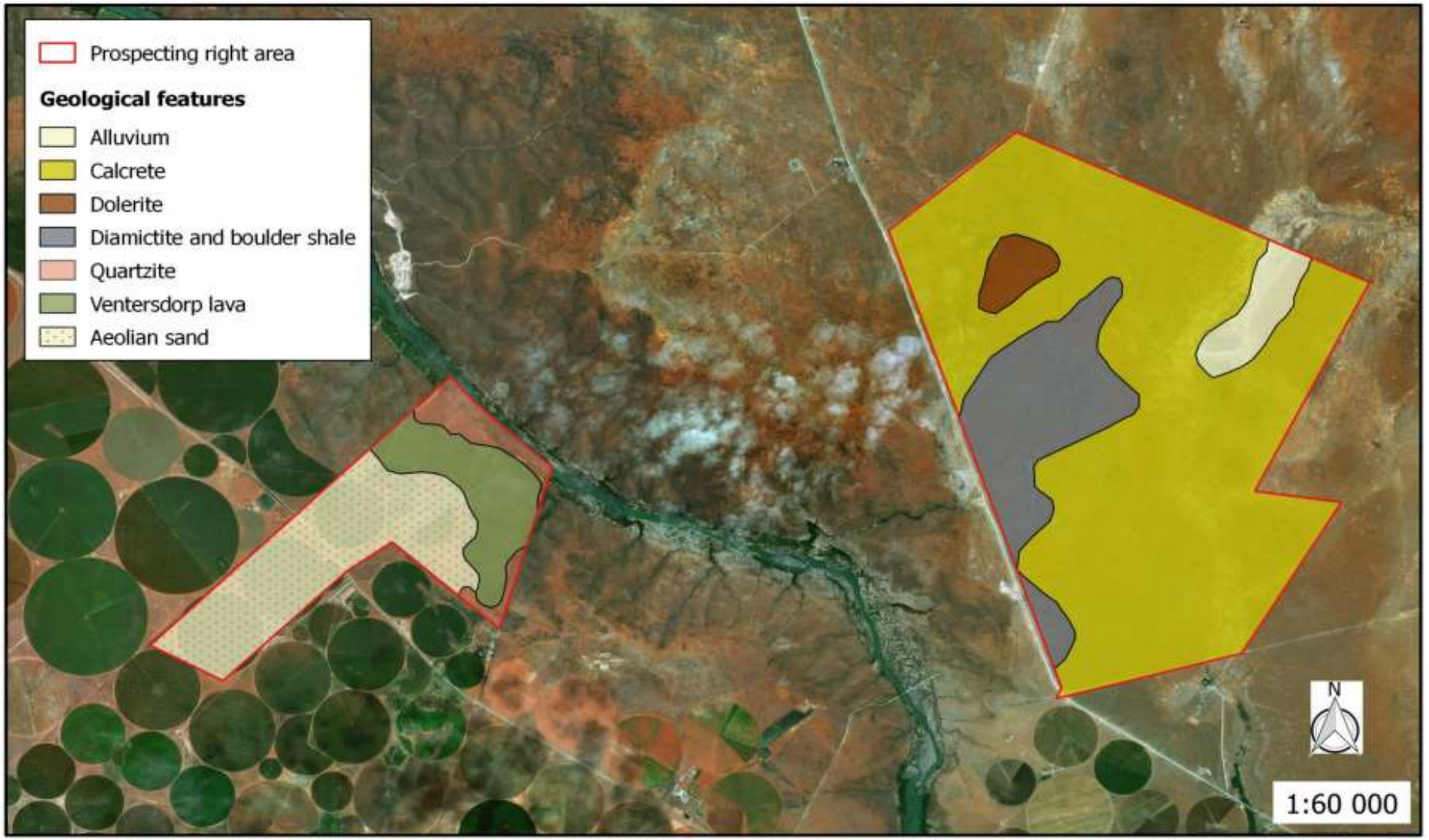

Figure 3: Geological Map of the application area.

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:

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The study area is primarily characterised by level plains with some relief, but along the river on Wexford West, the terrain transforms into open hills or ridges. Altitude ranges from 1 040 m above sea level along the river, 1 080 m on the ridges, and 1 100 m on the plains. The terrain is indicated by a very gentle slope of <2 % on the plains, but increases slightly from 3 - 12 % on the ridges towards the Orange River.

Soil:

Dr. Betsie Milne from Boscia Ecological Consulting has been appointed by Thunderflex to provide a desktop Ecological Study with a wetland assessment to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site and to determine the possible impact of prospecting on the application area soil was described and included in this report as part of the ecological and biodiversity Assessment (Study appended as Appendix 6).

Landtypes found on the property include Ae276, Ae278, Ag135 and Fb389 (Figure 4). The majority of Wexford East is characterised by red and yellow, freely drained soils, with high base status and are less than 300 mm deep. These soils are typically associated with the Ag135 landtype and have a low potential for regeneration if badly eroded. The remainder of Wexford East and the majority of Wexford West is characterised by red and yellow, freely drained soils, with high base status, and which are deeper than 300 mm. These soils are typically associated with the Ae 276 and Ae278 landtypes and have a moderate potential for regeneration if badly eroded. The ridges towards the river is characterised by soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils (Glenrosa/Mispah forms). Lime is generally present in part or most of the landscape. These soils are associated with the Fb389 landtype and have a very low potential for regeneration if badly eroded. The soils associated with the plains have low to moderate water erosion risks due to the level to gently sloping land. However, soils associated to the steep slopes of the ridges are of very high erodibility. The sandy soils of the study area are at high risk of wind erosion.

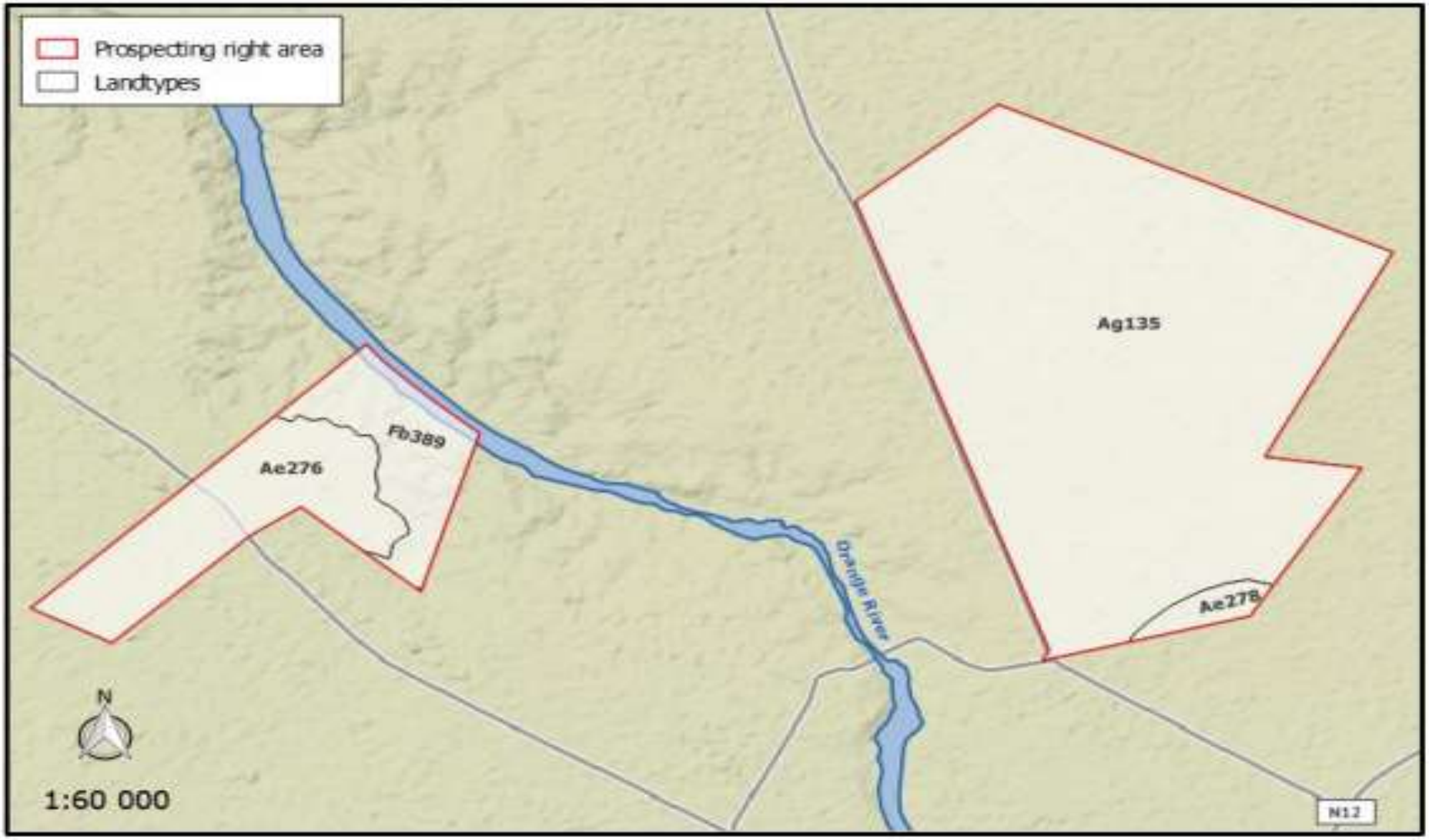

Figure 4. ***The distribution of landtypes in the study area.***

Land Capability and Land Use:

Dr. Betsie Milne from Boscia Ecological Consulting has been appointed by Thunderflex to provide a desktop Ecological Study with a wetland assessment to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site and to determine the possible impact of prospecting on the application area land capability and land use was described and included in this report as part of the ecological and biodiversity Assessment (Study appended as Appendix 6).

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorized to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat.

Wexford is currently used for agriculture. A large portion of Wexford West is under pivot irrigation, with associated pipeline infrastructure, reservoir, landfill site, farmstead, and staff quarters. Wexford East is used for grazing pastures, but an old cultivated land and staff quarters is located in the south of the property. Existing farm tracks are also present.

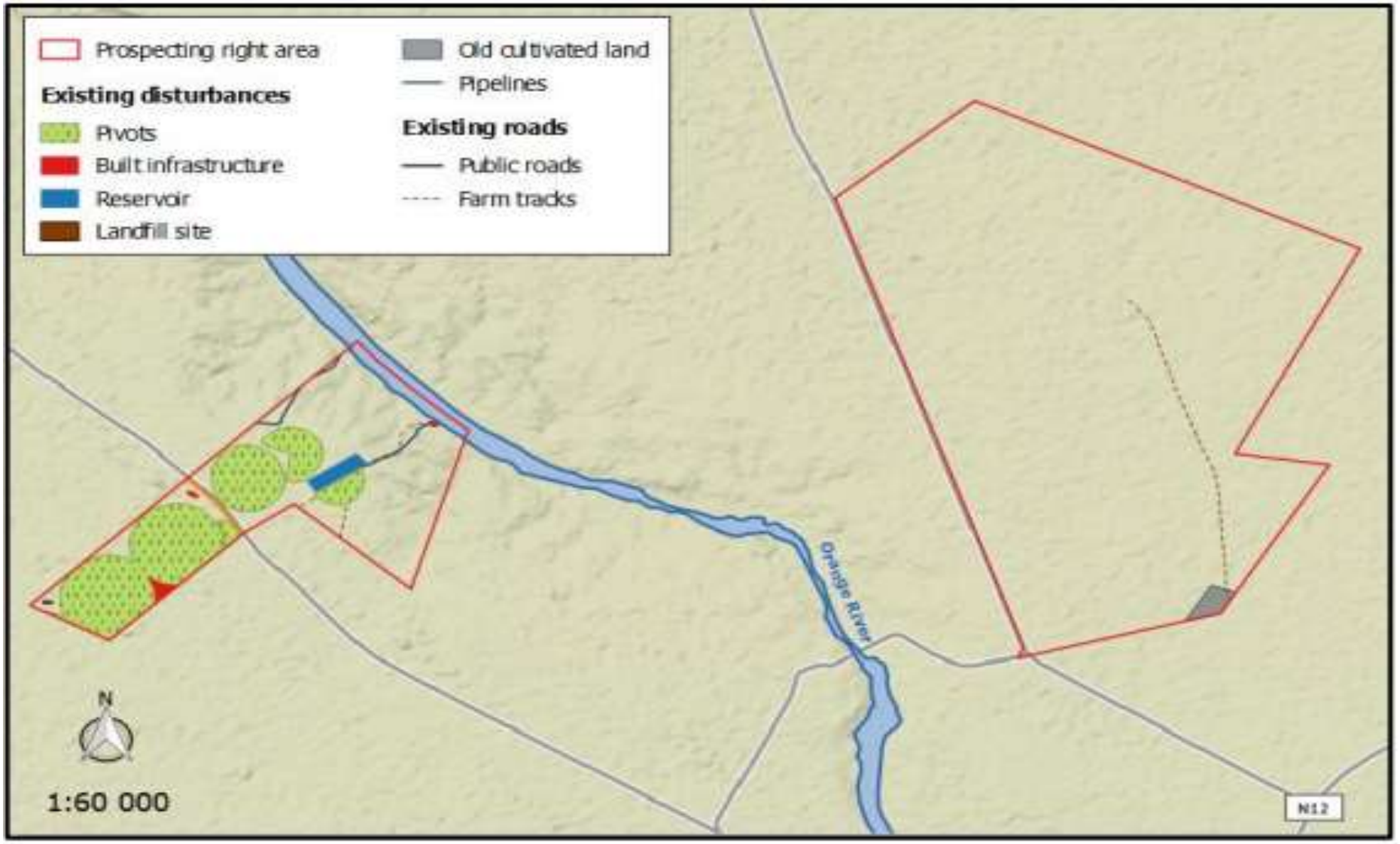

Figure 5. Evidence of existing infrastructure and land use disturbances in the study area.

Surface Water:

Dr. Betsie Milne from Boscia Ecological Consulting has been appointed by Thunderflex to provide a desktop Ecological Study with a wetland assessment to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site and to determine the possible impact of prospecting on the application area surface water was described and included in this report as part of the ecological and biodiversity Assessment (Study appended as Appendix 6).

At least two pans occur in the study area and both are situated on Wexford East (Figure 7). Although many of the pans in the Northern Cape are bare, it is expected that the pans in the study area are vegetated due the noticeable signatures evident on the satellite images.

A number of drainage lines are associated with the steep slopes of the ridges that drain towards the river (Figure 7). These drainage lines are not expected to host a unique plant community, because they are not always well defined. They usually consist of a higher cover of rocks on the surface and are often distinguishable by woody riparian canopies that form along the channels.

According to the Wetland Freshwater Priority Areas project, all of the ephemeral pans in the study area Vulnerable and not protected. They have also been classified with a Present Ecological State of A/B, which means that they are in a Natural or Good Condition. None of the wetlands have however been identified as significant wetlands in terms of Ramsar sites, IUCN Frog localities, threatened water bird localities or Crane breeding grounds.

The Orange River borders the Zoetgat application area on the North-Eastern side, but it is highly unlikely that the prospecting operation will have negative affect on any surface water. There is non-perennial natural drainage channels on Zoetgat (Farm 84) on the prospecting area. These channel's will only receive water when it rains as indicated in figure 7 below.

Mining/prospecting and agricultural activities have a significant impact on the Orange River water quality.

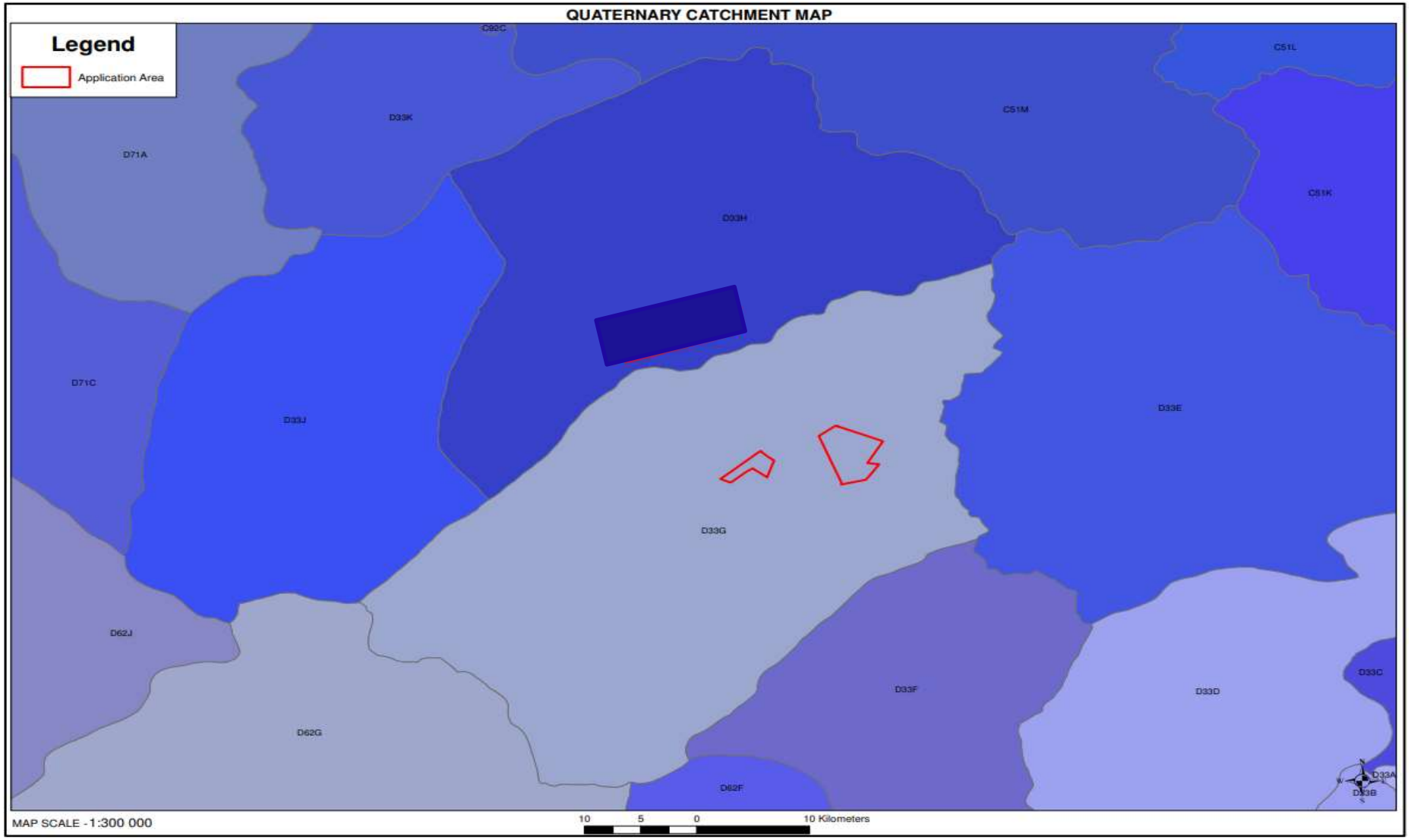

Figure 6. Catchment map of the application area.

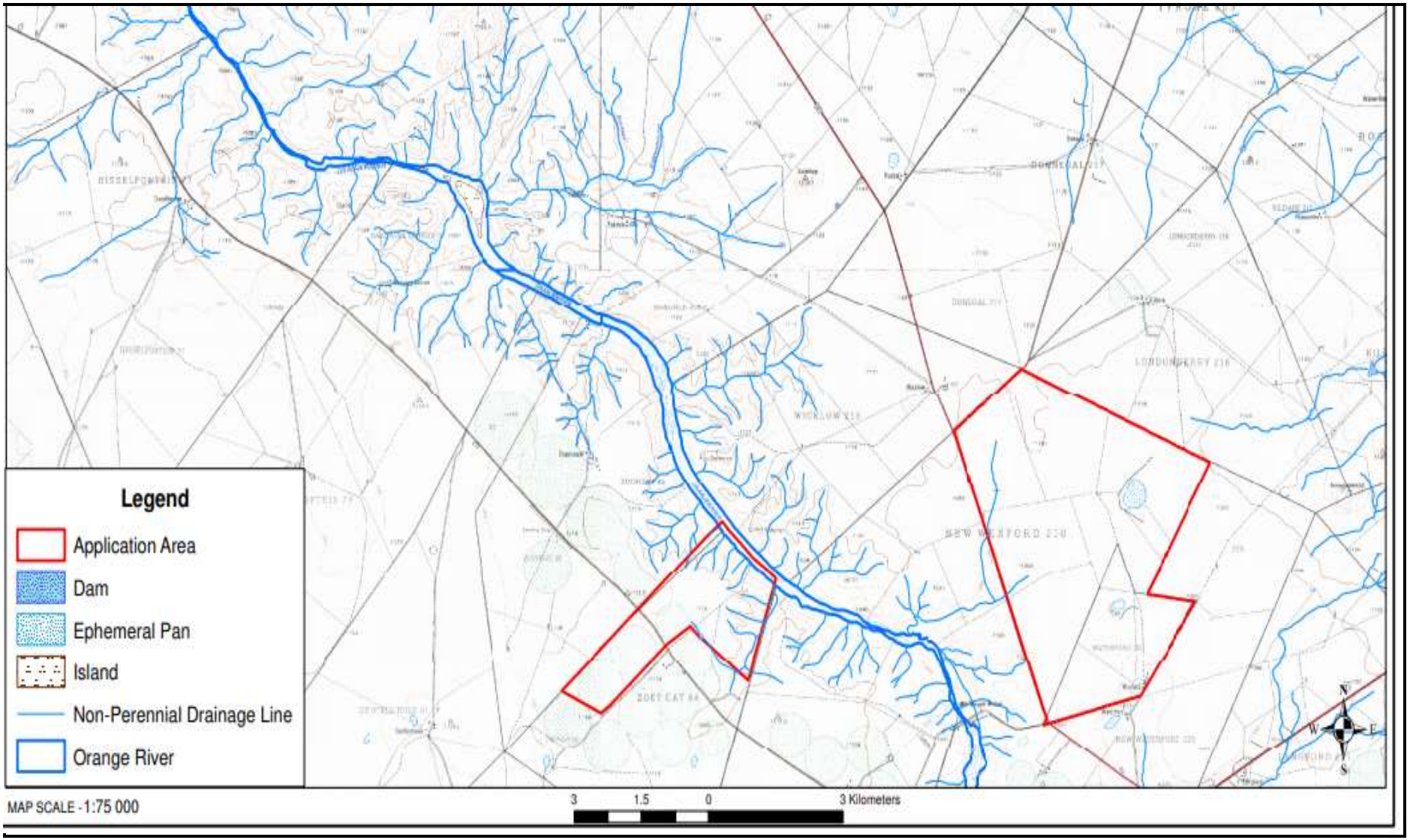

Figure 7. Surface Water map of the application area.

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.

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 Consulting has been appointed by Thunderflex to provide a desktop Ecological Study with a wetland assessment to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site and to determine the possible impact of prospecting on the application area fauna was described and included in this report as part of the ecological and biodiversity Assessment (Study appended as Appendix 6).

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. A map of important bird areas (BirdLifeSA 2015) was

also consulted. The faunal species lists provided are based on species which are known to occur in the broad geographical area.

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; 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.

Assumptions and limitations

Due to the nature of a desktop survey and the lack of ground-truth information, the species list reflected in this report cannot be regarded as entirely accurate or comprehensive. Ideally, a site should be visited at least once to compare desktop information with information on site as well as to ensure actual habitats and associated species present on site are recorded.

However, an extensive desktop review was conducted to ensure a fairly accurate representation of the study area. This is assumed to be sufficient to support this environmental authorisation application because the proposed operation is primarily non invasive with a likelihood of minor disturbances produced by the drilling operation.

Faunal communities

According to Section 3(a) and 4(a) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009, no person may, without a permit by any means hunt, kill, poison, capture, disturb, or injure any protected or specially protected animals. Furthermore, Section 12 (1) of NCNCA states that no person may, on a land of which he or she is not the owner, hunt a wild animal without the written permission from the landowner.

The many landscape features on Wexford provide diverse habitat opportunities to faunal communities. Animals likely to be found in the study area are discussed in their respective faunal groups below.

Mammals

As many as 54 terrestrial mammals and nine bat species have been recorded in the region. Eleven listed terrestrial mammal species and four listed bat species potentially occur in the area.

The African Straw-coloured Fruit-bat, Geoffroy's Horseshoe Bat, Honey Badger, African Striped Weasel 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 Dent's Horseshoe Bat and Darling's Horseshoe Bat also have a high chance to be found on site due to their preference for savanna habitat, while the Littledale's whistling rat has a high potential occurring on site based on their preferences for shrubland habitat.

The Cape Clawless Otter has a high potential to occur near the Orange River due to their preference for aquatic habitats.

On the other hand, the Bushveld Gerbil and Lesser Dwarf Shrew have a moderate potential of occurring in the grassier areas on site. 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. Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2 of study). Those that are specially protected include Aardvark, Ground Pangolin, South African Hedgehog, Aardwolf, African Wild Cat, Black-footed cat, Cape Fox, Brown hyena, Bat-eared Fox, African Striped Weasel, Striped Polecat and Honey Badger.

Of these, Aardvark has a high potential to occur on site on the sandy plains. Problem animals (Schedule 4) include Black-backed Jackal, Vervet Monkey, Chacma Baboon and Caracal. The core prospecting activities are associated with the calcrete and sandy plains. All fauna associated with these habitats will be impacted in the form of species- and/or habitat loss resulting from the prospecting activities.

Reptiles

The Wexford prospecting area lies within the distribution range of at least 36 reptiles species (see Appendix 2 of study), of which none are of international or national conservation concern. However, most are protected either according to Schedule 1, 2 or 3 of NCNCA, except for agamas, geckos and skinks (see Appendix 2 of study). Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard) and Chamaeleo dilepis dilepis (Namaqua Chamaeleon).

The habitat diversity for reptiles in the study area is high. The rocky ridge slopes are considered to be the most important habitat for reptile diversity at the site, while the ephemeral pans provide a special habitat for the marsh terrapin.

Amphibians

Eleven amphibian species are known from the region (Appendix 2 of study). Low amphibian diversity is normal for an arid area but is likely to increase within the aquatic and wetland ecosystem of the Orange River and pans (when wet). As a result, higher amphibian diversity is most likely to be found in these habitats, while only those species which are relatively independent of water are likely to be common in the terrestrial habitats.

The Giant Bull Frog (Pyxicephalus adspersus) 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 numerous ephemeral pans on site 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 of study). (Thunderflex 78 (Pty) Ltd – Wexford Ecological Assessment March 2020 by Dr. Betsie Milne p26).

Avifauna

The study site does not fall within any of the Important Bird Areas (IBA) defined by Birdlife South Africa, but it is located near (< 100 km) of one IBA, i.e. Platberg-Karoo Conservancy.

Platberg-Karoo Conservancy lies ± 50 km south-east of Wexford and contributes significantly to the conservation of large terrestrial birds and raptors. These include Blue Crane, Ludwig's Bustard, Kori Bustard, Blue Korhaan, Black Stork, Secretarybird, Martial Eagle, Verreauxs' Eagle and Tawny Eagle.

Threats in the area include overgrazing, which results in a depletion of palatable plant species, erosion, and encroachment by Karoo shrubs. The result is loss of suitable habitat and a decrease in the availability of food for large terrestrial birds. Centre-pivot irrigated croplands using underground water are increasing and agriculture is intensifying. Furthermore, strychnine poison was used extensively in the past to control damage-causing predators, such as black-backed jackal and caracal, which reduced scavenging raptor populations. Renewable energy developments are a new threat to this region.

Figure 8. A map indicating the Important Bird Area (in yellow) near the study area (in red).

A total number of 261 bird species have been recorded from the region and all of these species are protected either according to Schedule 1, 2 or 3 of NCNCA . As many as 25 listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened or Endangered. Furthermore, all birds are protected either according to Schedule 1, 2 or 3 of NCNCA.

The African Fish-Eagle (Schedule 1 of the NCNCA) is normally found in the vicinity of the Orange River. The ephemeral pans could potentially attract protected water birds, such as Chestnut-banded Plover, Maccoa Duck, Lesser Flamingo, Greater Flamingo and Greater Painted snipe when inundated, while the remaining species could occur in the core areas by occasionally passing over, foraging or nesting.

Plants in general, from grass tufts to shrubs and tall trees provide important micro-habitats to birds and therefore any form of habitat destruction in the form of vegetation clearing will inevitably impact the bird population of the study site. However, due to their high mobility birds are rather resilient to local scale changes.

Fish:

Fish species expected to occur in the active channel of the Orange River, along with their IUCN status and sensitivity to physico-chemical and no-flow conditions. The Largemouth Yellowfish is endemic to the Orange-Senqu and Vaal River systems in the Orange-Senqu River Basin. It is also listed an Near Threatened (IUCN 2019) due to the continuous decline in water quality in most rivers and streams in its geographic range, the destruction of suitable spawning beds due to erosion, as well as their slow growth rate, late maturing and low fecundity. No prospecting activities are planned near the river and therefore the Wexford operation is not expected to have any impacts on the fish communities of the region.

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). Their immense species diversity makes it almost impossible to list all species that may possibly occur on site. Nevertheless, key morphospecies as well as species of conservation concern are discussed here. Eight invertebrate species of the Northern Cape appear on the IUCN Red Data list of threatened species and are listed in Table 9, along with species that are specially protected according to Schedule 1 of the NCNCA. All other invertebrates from the class Insecta and Arachnida are protected either according to Schedule 2 or 3 of the NCNCA.

Three major habitats delimit possible invertebrate communities on site, i.e. the ephemeral pan and a variety of terrestrial habitats collectively classified as Karoo vegetation for insect preference, according to Picker et al. (2004).

i. Perennial Orange River

Invertebrates expected to be associated with the Orange River include Flatworms, earthworms, leeches, freshwater crabs, mussels and prawn, basket clams, freshwater bivalve- and pulmonate snails, bladder snails, pond snails, prong-gilled mayflies, small squaregill mayflies and numerous other species of mayflies, jewel damselflies, narrowwinged damselflies, clubtail dragonflies, emerald dragonflies, skimmers dragonflies, grass moths, giant water bugs, water boatmen, water striders, water treaders, marsh treaders, creeping water bugs, water mites, sponges, water scorpions, backswimmers, pygmy backswimmers, riffle bugs, long-horned caddisflies, microcaddisflies, net-spinning caddisflies, diving beetles, riffle beetles, whirligig beetles, water scavenger beetles, long toed water beetles, minute moss beetles, biting midges, meniscus midges, mosquitoes, house flies, black flies, horse flies, crane flies and nematoceran flies. No prospecting activities are planned near the Orange River and therefore the Wexford operation is not expected to have any direct impacts on the river invertebrate communities.

ii. Ephemeral pans

Ephemeral pans host species specifically adapted to ephemerality. Crustaceans in particular are specialist invertebrates that dominate these pans. Their eggs lie dormant in the soil until the pans are inundated. They then hatch and rapidly mature and reproduce to ensure continued persistence. Not much is known about the species distribution or conservation status of species in the Northern Cape, but typical taxa to be expected in the pans on Wexford include Notostraca, Anostraca, Spinicaudata, Cladocera, Ostracoda and Copepoda. Within a few days after the pans are inundated these species will attract a number of wetland birds. Therefore, these pans also act as important breeding and feeding links to birds in terms of connectivity, by providing stepping-stone corridors in an arid landscape. The disturbance or destruction of these pans will not only impact the specialised pan invertebrate communities locally, but will also have a regional and landscape-level effect.

iii. Karoo vegetation

Invertebrate communities associated with the karoo vegetation represent unique species assemblages, with an above-average representation of beetles, grasshoppers, flies, wasps and lacewings. Insects are widely distributed and extremely diverse. It is therefore impossible to list species occurrences without a dedicated study. However, the species of conservation concern (Table 9) are most likely to be associated with this invertebrate habitat and comprise the majority of the earmarked area for the Wexford operation.

Critical biodiversity areas and broad-scale processes

The proposed prospecting site falls within critical biodiversity areas (Figure 9), defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, i.e. 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. The Orange River is classified as Critical Biodiversity Area One, with their associated buffer- and catchment areas classified as Critical Biodiversity Area Two. The ephemeral pans are classified as Ecological Support Areas, while the remainder of the study area on Wexford East is classified as Other Natural Areas (Figure 9). No protected areas occur on site. Conversely, according to the Mining and Biodiversity Guidelines (DENC et al. 2013) no areas on the study site is recognised to have biodiversity importance.

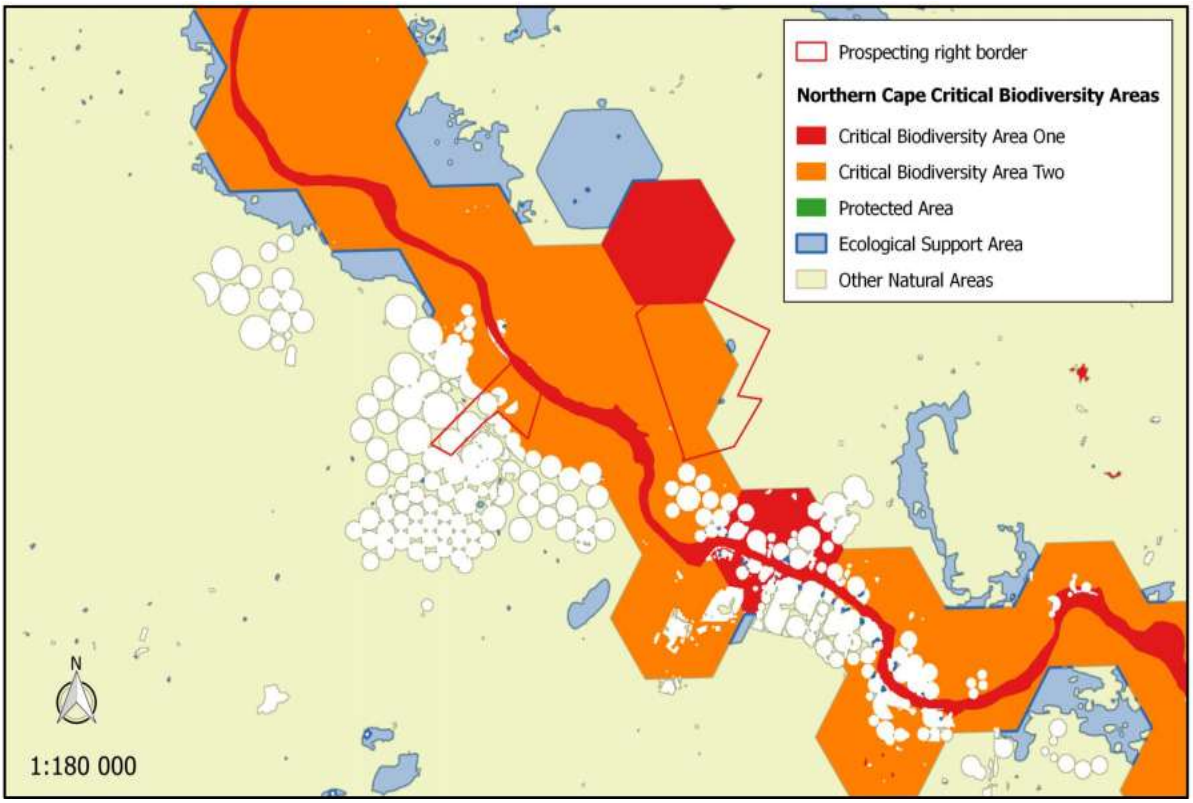

Figure 9. The study area in relation to the Northern Cape Critical Biodiversity Areas

According to the Wetland Freshwater Priority Areas project, all of the ephemeral pans in the study area Vulnerable and not protected. They have also been classified with a Present Ecological State of A/B, which means that they are in a Natural or Good Condition. None of the wetlands have however been identified as significant wetlands in terms of Ramsar sites, IUCN Frog localities, threatened water bird localities or Crane breeding grounds.
Most of the broad-scale vegetation units of the study area (Northern Upper Karoo, Highveld Salt Pans, Kimberley Thornveld and Vaalbos Rocky Shrubland) are classified as least threatened and therefore no formal fine-scale conservation planning has been conducted.

However, the Upper Gariep Alluvial Vegetation is classified as Vulnerable. Therefore, all rivers (ephemeral and perennial), their riverbeds and associated 100 m buffers have been identified as ecological corridors within the Pixley Ka Seme District Municipality (Rumboll 2014). Here, special care must be taken with mining and agricultural practises to avoid water pollution and over extraction. These should be maintained to limit the potential impact of development on the water resources. Furthermore, the Wexford operation falls within a zone where one of the most

significant crop irrigations in the Northern Cape occurs (Durand 2006). This increases the cumulative impacts in the vicinity of the study area.

Site sensitivity:

The sensitivity map for the Wexford prospecting operation is illustrated in Figure 17. The ephemeral pans, drainage lines and Upper Gariep Alluvial Vegetation (along with the banks and channels of the Orange River) are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. The Upper Gariep Alluvial Vegetation is regarded to be vulnerable and all watercourses in the study area are also unique habitats protected in terms of the National Water Act (Act No 36 of 1998).

These units are essentially no-go areas. The Vaalbos Rocky Shrubland associated with ridges are considered to be of high sensitivity, on account of the steep slopes which increases erosion and runoff risk during disturbances. Furthermore, it is expected to provide important microhabitats to reptiles and other fauna and potentially host a high density of plant species of conservation concern. This unit is not regarded as a no-go area, but activities should only proceed with caution as it may not be possible to mitigate all impacts appropriately. The Kimberley Thornveld and Northern Upper Karoo units are considered to be of medium sensitivity.

These areas have very gradual slopes and although it is expected to be affected by the prospecting operation, the nature of the impacts is likely to be largely local and the risk of secondary impact such as erosion is low. Activities within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken. The transformed areas are considered to be of low ecological sensitivity on account of the transformation of natural habitats that has already occurred here.

Flora:

For the floral component, the South African National Vegetation Map (Mucina and Rutherford 2006) was used to obtain data on broad-scale vegetation types, associated species and their conservation status. This information was then extrapolated to satellite images where homogenous vegetation units within the proposed prospecting area were identified to infer possible fine-scale communities on site. The South African National Biodiversity Institute's (SANBI) BGIS database was also consulted to obtain information on biodiversity information for the Thembelihle (NC076) Local Municipality, in which the study area falls. Further searches were undertaken specifically for Red List plant species within the current study area. Historical occurrences of Red List plant species were obtained from the SANBI: POSA database for the in the broad geographical area that includes the study site. The IUCN conservation status of plants in the species list was also extracted from the SANBI database and is based on the Threatened Species Programme (SANBI 2017) (Thunderflex 78 (Pty) Ltd – Wexford Ecological Assessment March 2020 by Dr. Betsie Milne p35).

Broad-scale vegetation patterns

According to the vegetation map of Mucina and Rutherford (2012), the site comprises three biomes with five broad-scale vegetation units; i.e. Northern Upper Karoo from the Nama Karoo

Biome, Kimberley Thornveld and Vaalbos Rocky Shrubland from the Savanna Biome as well as Highveld Salt Pans and Upper Gariep Alluvial Vegetation from the Azonal Vegetation Biome (Figure 10).

Northern Upper Karoo is found in the Northern Cape and Free State at altitudes between 1 000 and 1 500 m. It is mostly 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, but isolated hills of the Upper Karoo Hardeveld (in the south) and Vaalbos Rocky Shrubland (in the northeast) and numerous pans are interspersed in this unit. The vegetation occurs mainly as shrubland dominated by dwarf karoo shrubs, grasses and Senegalia mellifera.

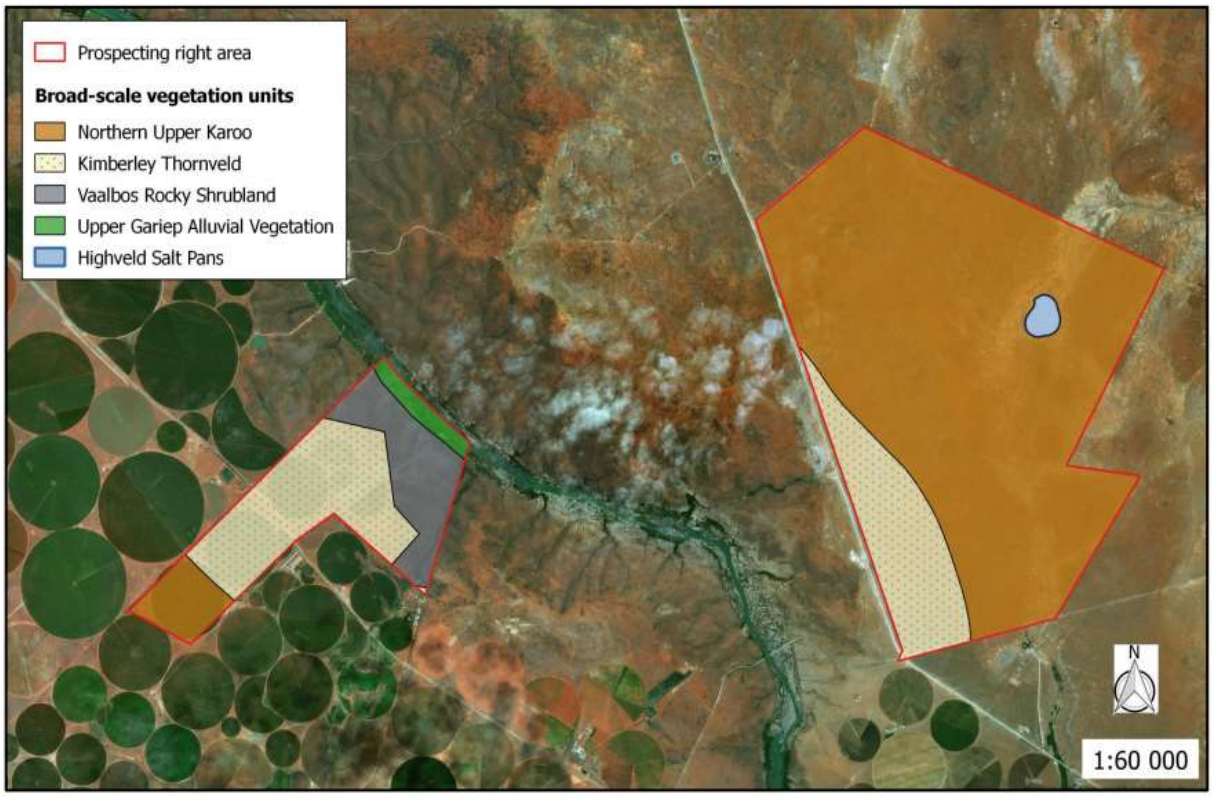

Figure 10. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area.

The geology and soil of this unit varies greatly. Geology includes 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 soils to very shallow Glenrosa and Mispah forms. The most dominant landtypes are Ae, Ag and Fc. It is estimated that about 4 % of the unit has been cleared for cultivation or transformed by building of dams; and human settlements are increasing in the north eastern 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.*

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. These include Tussen Die Riviere, Gariep Dam and Oviston Nature Reserves. No endemic plant species are known from this unit.

Highveld Salt Pans are distributed in the Northern Cape, Eastern Cape, North-West, Free State and Gauteng Provinces. They are scattered on broad Grassland/Karoo and Grassland/Savanna interfaces between Mafikeng/Koster in the north and Britstown/Middelburg in the south. The highest concentration of pans is found around Dealesville, Bultfontein, Wesselsbron, Delareyville and Petrusburg. The average size of these pans in the western Free State is 0.2 km2, with a number of the largest ones measuring several kilometres across. Altitude ranges between 1 000 and 1 600 m. The pans occur as depressions in a plateau landscape containing temporary water bodies. The central parts of the pans are often seasonally inundated and sometimes with floating macrophyte vegetation or the vegetation cover develops zonation patterns. On the pan edge open to sparse grassy dwarf shrubland may develop, especially when the pan in under heavy grazing pressure. The bottom of the pans is usually formed by shales of the Ecca Group giving rise to saline systems as the dry season progresses and evaporation intensifies. Wind erosion is of particular significance during the dry season, when the pan basin is dry and marginal vegetation is short and sparse. Dense dust can reach several thousand meters into the air under windy conditions. The unit is classified as being least threatened, with only a small portion being statutorily conserved in the Bloemhof Dam, Soetdoring, Willem Pretorius, Baberspan and S.A Lombard Nature Reserves. It is estimated that only about 4% has been transformed so far, but threats by agriculture, road building, mining and urbanization are still increasing. Alien plants such as is the only endemic species known from this unit.

Kimberley Thornveld is distributed in the North-West, Free State and Northern Cape Provinces at altitudes between 1 050 and 1 400 m. It is found in the Kimberley, Hartswater, Bloemhof and Hoopstad Districts, but is also within the Warrenton, Christiana, Taung, Boshof and Barkly West Districts. The unit is typically presented as slightly undulating sandy plains with a well-developed tree and shrub layer and an open grass layer. Andesitic lavas of the Allanridge Formation occur in the north and west, while fine-grained sediments of the Karoo Supergroup are found in the south and east. Soils are deep, sandy to loamy, and of the Hutton form. The most common land types are Ae and Ah. The unit is classified as being least threatened, but 18 % has already been transformed, predominantly by cultivation. Only 2 % is currently conserved in statutory reserves and no endemic species are known from this unit. It is specifically prone to *Senegalia mellifera* encroachment following overgrazing, but the occurrence and risk of erosion is very low.

Vaalbos Rocky Shrubland is mainly distributed in the Northern Cape and Free State, where it extends along solitary hills and scattered ridges east of the confluence of the Orange and Vaal Rivers, mainly in the Kimberley and Herbert District and west of a line bounded by the western Free State towns of Luckhoff, Petrusburg, Dealesville, Bultfontein and Hertzogville.

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, one species, i.e. *Haworthia bolusii* (Data Deficient - Taxonomically Problematic) is listed under the National Environmental: Biodiversity Act (Act No. 10 of 2004) (NEMBA) (Table 2). This species prefers shallow, rocky soils and is most likely to be associated with the Northern Upper Karoo habitat as well as the ridge slopes. (THUNDERFLEX 78 – Wexford Desktop Ecological Assessment March 2020 by Dr. Betsie Milne p20-p21).

Species likely to occur on site that are protected in terms of the National Forests (NFA) Act No 84 of 1998 include *Vachellia erioloba* and *Boscia albitrunca*. The latter species is also protected according the NCNCA. It is expected to be most abundant on the ridges and Northern Upper Karoo habitats of the site, while *V. erioloba* is expected to occur on in the Kimberley Thornveld habitat. 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. No specially protected species (Schedule 1) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009 are expected to occur on site, but those Protected according to Schedule 2 is also listed in Table 2. 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. All declared weeds and invasive species known from the region are listed in Table 4, along with their categories according to CARA, NEMBA and NCNCA. (THUNDERFLEX 78 –Wexford Desktop Ecological Assessment March 2020 by Dr. Betsie Milne p22).

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 5.

CONCLUSION, RECOMMENDATIONS AND OPINION REGARDING AUTHORISATION

Six potential plant communities were identified on site of which the Upper Gariep Alluvial Vegetation (along with the banks and channels of the Orange River), ephemeral drainage lines and ephemeral pan are considered to be of very high sensitivity. The Vaalbos Rocky Shrubland on the ridges are considered to be of high sensitivity, while the Northern Upper Karoo and Kimberley Thornveld vegetation units are considered to be of medium sensitivity. The area transformed for agriculture is considered to be of low sensitivity.

The most profound impacts are expected to be related to the loss of plant species of conservation concern as well as the disruption of ecological corridors and the hydrological regime if any of the tributaries to the Orange River are cut off, or if the ephemeral pans and ephemeral drainage lines are modified through road creation or drill pad establishment. Species of conservation concern that are likely to be found in the prospecting area include Lithops hookeri, Mestoklema arboriforme, Plinthus cryptocarpus, P. karooicus, P. sericeus, Psilocaulon coriarium, Nerine laticoma, Microloma armatum var. armatum, Orbea cooperi, Aloe claviflora, Aloe grandidentata, Haworthia bolusii, Boscia albitrunca, Gymnosporia buxifolia, Kalanchoe rotundifolia and Vachellia erioloba.

Permit applications regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation three months prior to any clearance of vegetation. Similarly, if any of the Boscia albitrunca or Vachellia erioloba 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 and the rehabilitation programme for the prospecting area. 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.

HERITAGE

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Thunderflex to provide a Heritage Impact Assessment Study to obtain heritage information for the proposed study area and identify the areas with sensitivity on the site and to determine the possible impact of prospecting on the heritage resources of the application area (Study appended as Appendix 4).

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

The Stone Age
On the farm Waterford 246 Stone Age material occurs on the shoulder of the Orange River Valley and on the plain beyond. On the farm Zoetgat 84 Stone tools were recorded in three places. On both farms the material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. Flaked cores indicate manufacturing, but no concentrations of artefacts were observed. Overall, the distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

The Iron Age
No sites dating to the Iron Age were found.

Commercial Farming
There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings.

Burial grounds
No burial grounds or graves were reported.

Conclusions and Recommendations
The mine prospecting can go ahead. As a standard precaution archaeological deposits are usually buried underground. Should archaeological 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 to take place.

Palaeontological:

All information have been taken out of the desktop Palaeontological impact Assessment done by Prof. Marion Bamford

A palaeontological impact assessment was requested for the proposed prospecting and mining rights application farm Wexford 246 and remaining extent of the farm Zoetgat 84 Gamolilo 72, North and Northwest of Hopetown, Herbert administrative district, Northern Cape Province. the applicant is Thunderflex 78 (pty) ltd and the extent of both farms is 2 702.6103ha.

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 11. Farm Wexford 246 mostly is on Kalahari calcretes, with two areas of Dwyka Group diamictes and tillites in the southwest (Figure 11). Farm Zoetgat 84 has a large outcrop of the volcanic rocks of the Allanridge Formation that are too old and of the wrong kind to preserve fossils.

Fossils of the early Dwyka Group have been recorded from sites near Douglas and Vereeniging, but considering the huge expanse of this this formation, the fossils are rare. They are confined to only one lithology.

The Dwyka Group tillites, sandstone, mudstone and shales, potentially could preserve fossils. 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 (Plumstead, 1969; Johnson et al., 2006). 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) although the Dwyka Group exposures are very extensive. Jurassic Dolerites do not contain fossils as they are igneous intrusives.

Fossils are rare in Quaternary deposits and are randomly distributed, especially in aeolian sands because such sands have been transported by winds and winds are only able to transport small particles – like sand grains. Fossils are sometimes found in pan or spring deposits but these would be visible from satellite imagery (Google Earth) as depressions or low mounds respectively. For example, the Kathu Complex comprising several deposits, Townlands, Kathu 1, 2, KP1, around the town of Kathu, near Kuruman has archaeological artefacts made from the local banded ironstone, jaspilite and quartz (Walker et al., 2014). There are also some plant (pollen) and faunal remains in the pan silcrete.

Surface limestone, such as minor ridges and deposits or well weathered former tufas such as the Taung deposits, may have fossil plants and bones entrapped in the limestone but these are large features and have been mapped and surveyed.

Tertiary cave sites such as Wonderwerk Cave in the Kuruman Hills have been occupied by humans since 2 million years ago, have also been well studied and mapped. No similar features have been recorded for the Farms Wexford and Zoetgat.

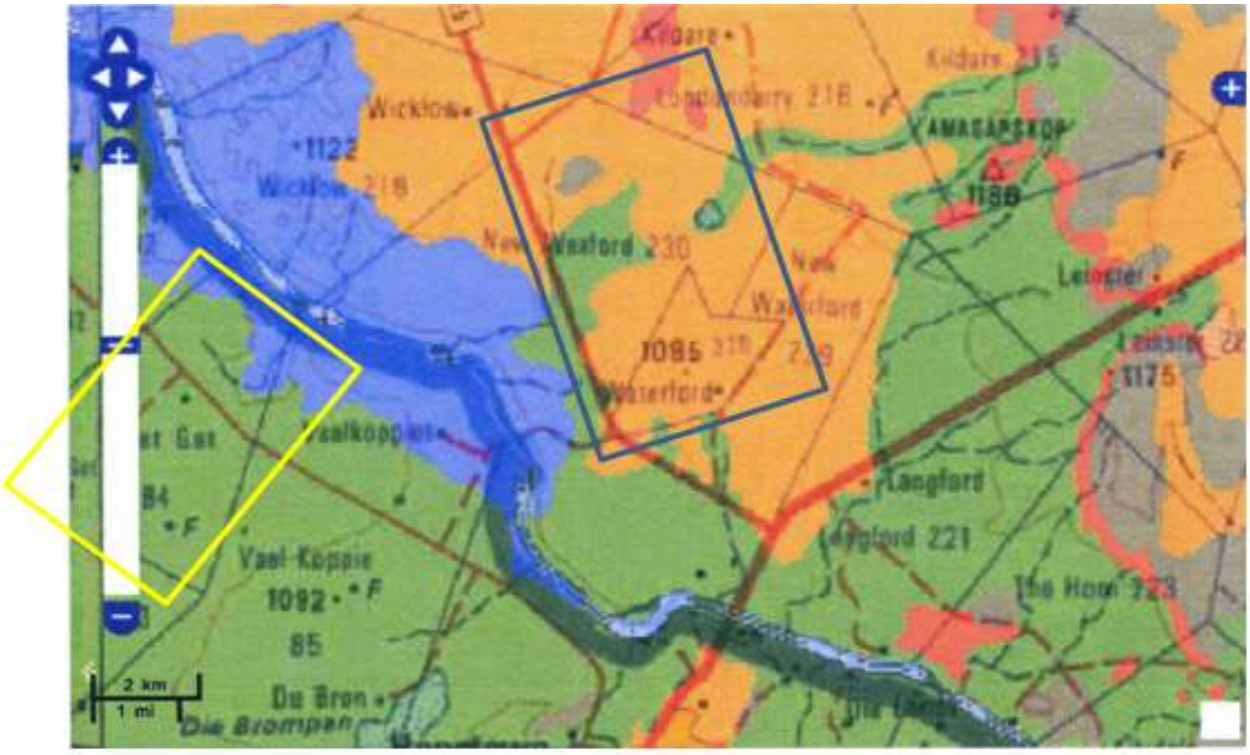

Figure 11. SAHRIS palaeosensitivity map for the farm Wexford 246 shown within the blue outline and Zoetgat 84 in the yellow outline. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

From the SAHRIS map above Farm Wexford is indicated as mostly highly sensitive (green) and this applies to the Kalahari Group sand and calcretes, with small section of moderately sensitive rocks (green) and this applies to the Dwyka Group tillites. Most of Farm Zoetgat is on Kalahari Group sands (green) that are moderately sensitive (green). The Allanridge Formation has no fossils (blue). Fossils have not been recorded from the farm, and although rare occurrences of fossils have been recorded from these younger formations in other localities, they are relatively easy to observe from satellite imagery as discrete sites.

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 much too old to contain fossils or of the wrong type, namely loose sands or surface limestone. Furthermore, the material to be mined is ancient and below the surface and does not preserve fossils. Since there is an extremely small chance that fossils from the Tertiary or Quaternary may be disturbed, 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 extremely 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, limestones and aeolian sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material, except in exceptional cases where pan silcretes or tufas occur. The Aeolian sands of the Quaternary period would not preserve fossils.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Dwyka tillites and diamictites or the calcretes or Aeolian sands of the Quaternary. There is a very small chance that fossils may occur in pans or tufas but none is evident from the satellite imagery or been recorded. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once drilling or mining have commenced then they should be rescued, and a palaeontologist called to assess and collect a representative sample.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material

(plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.

3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figures 4-5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will not be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

SOCIO-ECONOMIC STRUCTURE OF THE REGION:

Thembelihle is one of eight Local Municipalities in the Pixley Ka Seme District. The other seven Municipalities are:
1. Siyancuma Local Municipality
2. Emthanjeni Local Municipality
3. Siyathemba Local Municipality
4. Umsobomvu Local Municipality
5. Ubuntu Local Municipality
6. Kareeberg Local Municipality
7. Renosterberg Local Municipality

De Aar is the seat of the Pixley Ka Seme District Municipality (located in the Emthanjeni LM). Hopetown is located some 181 km from De Aar and 123 km from Kimberley. Spatially, Thembelihle is very distant from South Africa"s largest consumer markets. In this regard, the road transport distances illustrated by Table 2 would apply to LED initiatives.

Table 2 – Transport Distances from Thembelihle

City	Distance from Hopetown (km)
Upington	388
De Aar	181
Kimberley	123
Bloemfontein	283
Cape Town	833
Johannesburg	602
Pretoria	662
Durban	915

Description: The Pixley Ka Seme District Municipality is a Category C municipality situated in the south-east of the Northern Cape Province. It shares its borders with three other provinces, namely the Free State to the east, the Eastern Cape to the south-east, and the Western Cape to the south-west. It is the second-largest district of the five in the province, but makes up almost a third of its geographical area.

The district is comprised of eight local municipalities: Ubuntu, Umsobomvu, Emthanjeni, Kareeberg, Renosterberg, **Thembelihle**, Siyathemba and Siyancuma. Its main town is De Aar. Traffic flows through the region, linking the major industrial areas of the country.
The area has a low rainfall, while the largest river in South Africa flows through it. Two of the major dams in South Africa, the Vanderkloof and Gariep Dams, are situated on the borders of the district municipality.

Area: 103 411km²

Cities/Towns: Britstown, Campbell, Carnarvon, Colesberg, Copperton, De Aar, Douglas, Griekwastad, Hanover, Hopetown, Hutchinson, Loxton, Marydale, Niekerkshoop, Norvalspont, Noupoort,

Petrusville, Philipstown, Prieska, Richmond, Schmidtsdrif, Strydenburg, Van der Kloof, Vanwyksvlei, Victoria West, Vosburg

Main Economic Sectors: Community services (26.6%), agriculture (16.6%), transport (15.1%), trade (12.9%), finance (12.8%), electricity (7.0%), construction (3.3%), manufacturing (3.2%), mining (2.6%).

Figure 12. The Pixley Ka Seme District Municipality

Geography, History & Economy
Thembelihle Local Municipality is part of Pixley Ka Seme District Municipality.

This mostly agricultural landscape is rich in natural resources. The first diamond was discovered in Hopetown and a great part of the Anglo-Boer War was fought in these parts.
Thembelihle means 'a place of hope'. The new emblem depicts the diversity of Thembelihle inhabitants and its surroundings.

Area: 8 023km²

Cities/Towns: Hopetown, Strydenburg

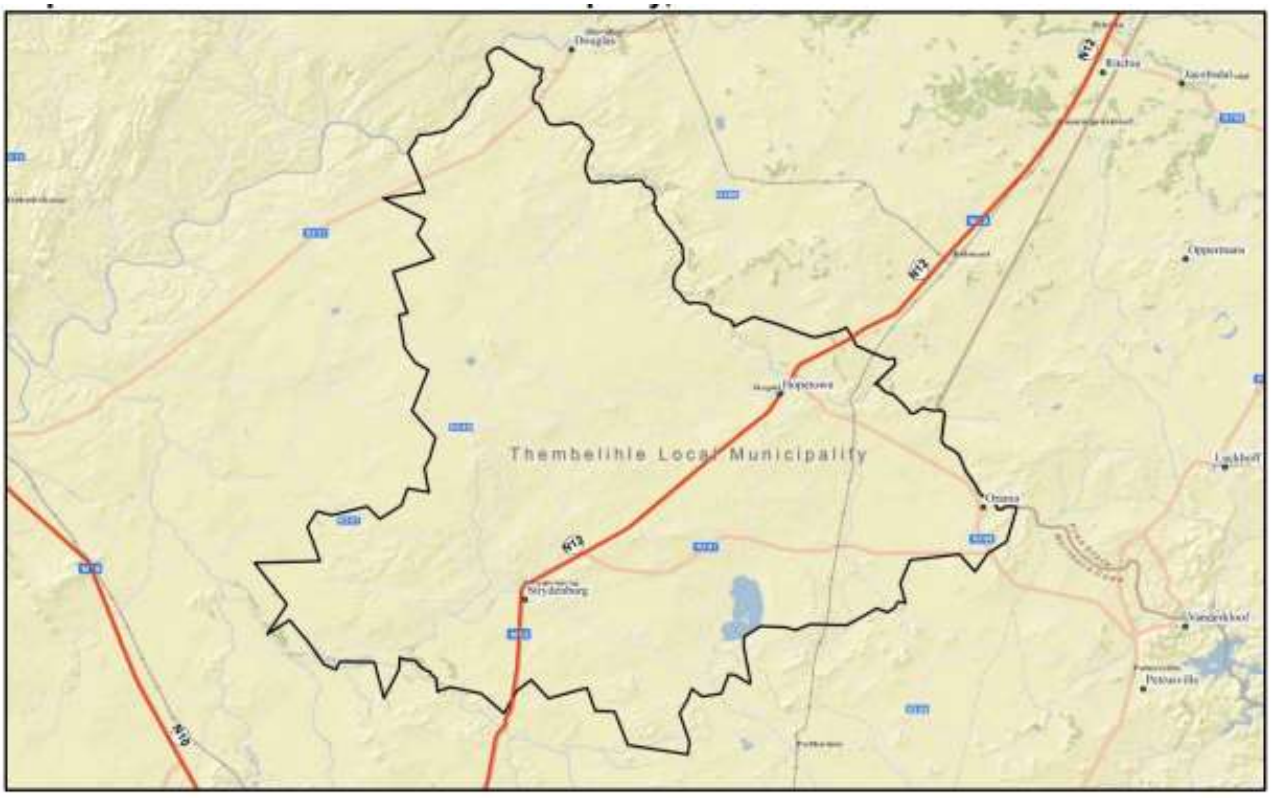

Figure 13. Thembelihle Local Municipality

The municipal area encompasses a geographic area of some 6,986 km² which implies that Thembelihle accounts for some 6.8% of the total District surface area. The local economy is mainly agriculture-based and highly dependent on the Orange River, which runs through the area. Although the area is well known for sheep farming, crops are also produced on the banks of the river. Hopetown and Strydenburg are located next to the N12 highway, which link the area to Kimberley and Cape Town (via its southbound connection to the N1).

The Thembelihle Local Municipality has a comparative disadvantage when it comes to the mining and finance sector which has a large comparative disadvantage. In general mining is a very concentrated economic sector. The Thembelihle Local Municipality area does have some mining, but this is very limited and fairly unimportant

Most of the agricultural economy consists of extensive farming (sheep and goats), as well as a growing number of game farming operations. However, there is intensive agriculture along the Orange Riet Canal System, along the upper Orange River (Colesberg-Hopetown area), and along the middle Orange River area. Hopetown is a centre of irrigation farming.

(b) *Major Economic Activities and Sources of Employment:-*
(c) *Estimated Unemployment:-*
(d) *Housing Demand and Availability:-*
(e) *Social Infrastructure:-*
(f) *Water Supply:-*

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 water on-site or in yards, which is available to around 33% of the population.

Surface water from the Orange River is the major source of water in the region, although some smaller communities are totally dependent on groundwater for supply.

Population Profile

Population figures

The total population is capture from STATS SA 2011 at the following:

Table 3. Population group by Gender for Person weighted, NC076: Thembelihle

	Male	Female	Grand Total
Black African	1245	1146	2391
Coloured	5511	5601	11112
Indian or Asian	69	12	81
White	1101	954	2055
Other	51	15	66
Grand Total	7977	7728	15705

All cells in this table have been randomly rounded to base 3

Created on 10 March 2014

Statistics South Africa: Web page: www.statssa.gov.za

Support: info@statssa.gov.za

Table 4. Population per age group

	2016	2011
Population	16 230	15 701
Age Structure		
Population under 15	25.0%	30.9%
Population 15 to 64	68.5%	62.8%
Population over 65	6.5%	6.4%

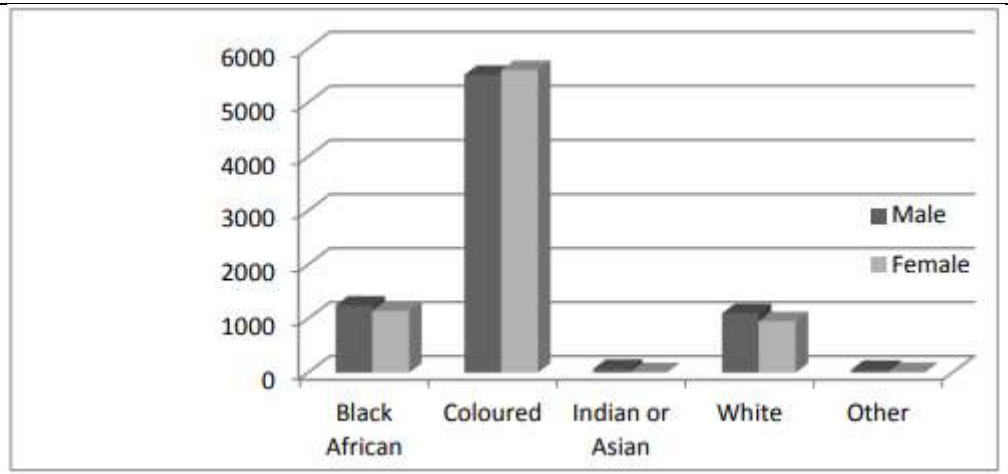

Figure 14. Population by race and gender

Economic Profile	The Thembelihle Local Municipality is a Category B municipality situated in the heart of the Karoo in the Pixley Ka Seme District of the Northern Cape Province. It is one of the smaller municipalities of the eight that make up the district, accounting for only 8% of its geographical area. This mostly agricultural landscape is rich in natural resources. The first diamond was discovered in Hopetown and a great part of the Anglo-Boer War was fought in these parts. Thembelihle means 'a place of hope'. The new emblem depicts the diversity of Thembelihle inhabitants and its surroundings. Area: 8 023km² Cities/Towns: Hopetown, Strydenburg **Social issues** The social moral standard of the wider community needs to be uplifted. Alcohol and drug abuse by the youth is on the increase while the general fight against crime is generally unsuccessful. The abuse of women, children and elderly people take place on a daily base. There is no mutual trust amongst the communities within the wider municipal area while the safety of farmers is getting worse.

Education Levels

Educational issues

- The following shortcomings activated this issue:
- lack of library facilities and the poor state thereof;
- provision of ABET education;
- poor school facilities in town and on farms;
- hostel to be provided in Hopetown; and
- a need for a day care centre;

provide bus service to farm schools.

Table 5. Geography by Present School Attendance

	None	Pre-school	School	College	Technikon	University	Adult Education Centre	Other
Hopetown	5,686	123	2,225	6	-	9	6	6
Hopetown SP	728	27	371	-	-	6	6	3
Steynville	4,966	99	1,841	6	-	6	-	-
Deetlefsville	1,207	80	648	6	3	3	9	-
Strydenburg SP	344	-	45	-	-	-	-	-
TOTAL	**12,930**	**328**	**5,129**	**18**	**3**	**24**	**21**	**9**

The survey indicated the following:

Strydenburg:

- 1 Combined School - Primary (Grade 1 – 7) and Secondary (Grade 8 – 12);
- One hostel. Hopetown:
- 3 Primary schools (Grade 1 – 7);

• 2 Secondary school (Grade 8 – 12);
• One hostel.

Once again, the education facilities in the rural areas were identified as problematic. An additional primary school was placed high of the IDP agenda. Oranje Diamant Primary is overcrowded.

	2016	2011
Education (aged 20 +)		
No schooling	10.8%	15.1%
Matric	22.2%	19.9%
Higher education	5.0%	6.6%

Employment Profile

Table 6. Official employment status by Population group and Gender for Person weighted, NC076: Thembelihle

	Black African		Coloured		Indian or Asian		White		Other		Grand Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Employed	468	243	1332	906	36	3	483	345	42	3	**3861**
Unemployed	111	126	600	672	-	-	12	6	-	-	**1527**
Discouraged work-seeker	33	57	195	381	3	-	3	12	-	-	**684**
Other not economically active	264	333	1203	1470	18	3	186	291	6	6	**3780**
Age less than 15 years	-	-	-	-	-	-	-	-	-	-	-
Not applicable	372	387	2178	2172	12	6	420	294	-	-	**5841**
Grand Total	1248	1146	5508	5601	69	12	1104	948	48	9	**15693**

All cells in this table have been randomly rounded to base 3

Summary of potential problem areas
The following main problem areas were identified:
- increased fight against crime; AIDS and unwanted pregnancies;
- upgrading and providing sufficient sport and recreational facilities is lacking;
- building of new sport and recreational facilities
- address the poor state of the health facilities.
- address the need for shelter homes for the abused

	2016	2011
Labour Market		
Unemployment rate (official)	n/a	28.4%
Youth unemployment rate (official) 15-34	n/a	35.2%

Infrastructure

A total of around 4,000 household dwellings were estimated to exist in the Thembelihle municipal area during 2010. This accounted for some 8.6% of all household dwellings in the District, which ranked Thembelihle sixth among Pixley Ka Seme"s Local Municipalities. Since 2000, the number of dwellings grew by only 0.1% on average per annum. This positive growth rate is in contrast to the negative population growth rate (i.e. 1.4% p.a.), which implies a housing shortage in Thembelihle.

Table 7. – Household Access to Services, 2000 & 2010

Household Indicator	2000	2010	Access	Growth
House or brick structure	2,896	2,377	63.3%	-2.0%
Electricity	2,739	3,362	82.8%	2.1%
Piped Water	3,872	3,904	96.6%	0.1%
Refuse removal	2,441	2,582	64.2%	0.6%
Flush or chemical toilet	2,221	2,702	66.8%	2.0%

Source: Quantec Research, 2012

Table 7. illustrates the type of dwellings found in Thembelihle and the level of household access to municipal services. In this regard, the following observations were made:

1. More than 63% of household dwellings found in Thembelihle can be classified as houses or brick structures on separate stands. This indicator is somewhat lower when compared with the average for Pixley Ka Seme (80.1%) and the Northern Cape (77.4%). Some 15.5% of local dwellings can be described as shacks.

Health infrastructure

During the workshops and land use
survey, however, the following facilities were identified:

- 1 clinic, Deetlefsville (Strydenburg);
- 1 clinic, Steynville (Hopetown); (upgraded)
- 1 hospital (Hopetown). (upgraded.)

Recreational infrastructure

The land use survey, however, indicated the following:
Strydenburg:
1 formal soccer fields (one at school);
1 sports complex (needs to be upgraded.)
2 informal soccer fields;
2 netball fields;
1 Community hall; (needs to be upgraded.)
1 Combined netball and volleyball court;
1 bowling green; and
show grounds. (not been utilize)

Hopetown:
1 sport complex
1 informal soccer field
Primary school (soccer field, cricket and netball);

<table>
<tr><td></td><td>Steynville High (cricket, volleyball, netball, 2 x tennis)
1 community hall;
1 private rugby field;
1 bowling green;
1 squash court;
golf course; (not grassed)
show ground;
2 tennis courts;
2 netball fields;
Hopetown High (2 rugby fields, 4 tennis courts; 1 swimming pool; athletics, cricket field).
The recreational facilities for farm workers, however, were identified as a shortcoming.
The need for another community hall identified and the priority of it was emphasised</td></tr>
<tr><td>Housing</td><td>Table 8.
<table>
<tr><th>Household Dynamics</th><th>2016</th><th>2011</th></tr>
<tr><td>Households</td><td>4 736</td><td>4 140</td></tr>
<tr><td>Average household size</td><td>3.4</td><td>3.7</td></tr>
<tr><td>Female headed households</td><td>32.4%</td><td>32.3%</td></tr>
<tr><td>Formal dwellings</td><td>77.4%</td><td>77.5%</td></tr>
<tr><td>Housing owned</td><td>51.0%</td><td>51.4%</td></tr>
</table></td></tr>
<tr><td>Water and Sanitation</td><td>Water and Sanitation is ranked as the major challenges of Thembelihle Municipality. This stems from the current reality that in most parts of the Thembelihle Municipality, water and sanitation services is meeting the required standards. Limited wealth of skills and experience in the water and sanitation discipline though training courses and mentoring initiatives are provided to enhance the capacity of processors to operate and man the water and sanitation infrastructure networks.</td></tr>
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Table 9. Household services

Household Services	2016	2011
Flush toilet connected to sewerage	66.4%	60.0%
Weekly refuse removal	59.4%	68.4%
Piped water inside dwelling	39.9%	33.5%
Electricity for lighting	84.2%	75.2%

</td></tr>
<tr><td>Electricity</td><td>o 310 housing units in Hopetown have been electrified by ESKOM
o 112 housing units in Strydenburg have been electrified by ESKOM</td></tr>
</table>

(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 study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorised to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat.

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

Evidence of Disturbance:

Wexford East is used for grazing pastures, but an old cultivated land and staff quarters is located in the south of the property. Existing farm tracks are also present.

Existing Structures:

Wexford is currently used for agriculture. A large portion of Wexford West is under pivot irrigation, with associated pipeline infrastructure, reservoir, landfill site, farmstead and staff quarters.

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)

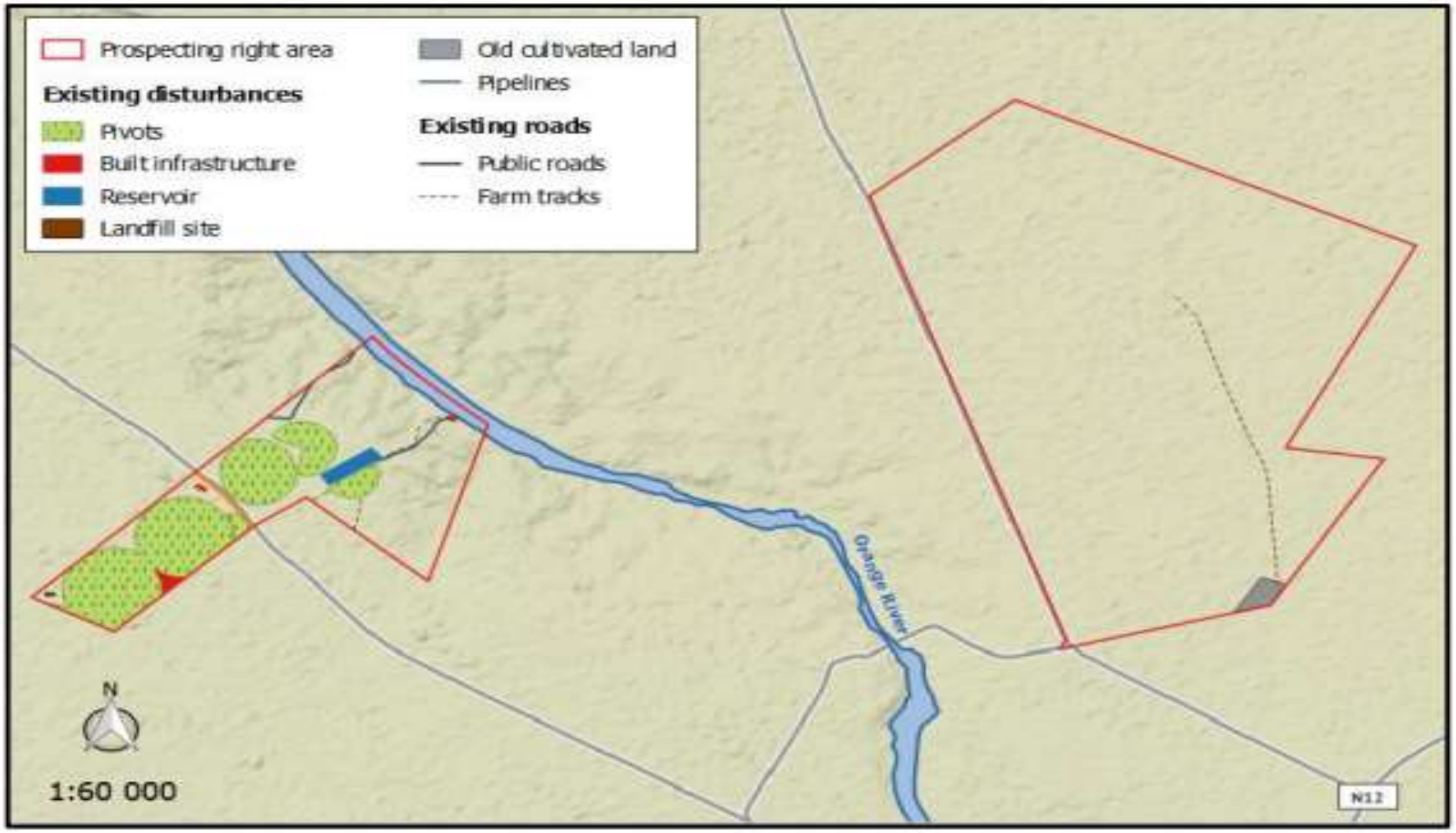

Figure 15. Environmental and current land use features

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	Life of operation	Insignificant On-Site	Ensure that prospecting and drilling is optimal of the available mineral resource.
Topography	Changes to surface topography Construction of roads and drill pads as well as temporary ablution facilities	Low	Rare and infrequent	Residual	Insignificant Local	• Prospecting of all Diamond deposits continuously, if possible and does not influence prospecting and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of the roads and drill pads. • All temporary infrastructures should be demolished during closure.
Soils	Soil Erosion Clearing of vegetation and disturbance during	Low-Medium	Possible but infrequently	Decommissioning	Minimal Local	• Re-establishment of plant cover on disturbed areas must take place as soon as possible, once

	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 years, subsequent to the re-establishment of vegetation and hydrologic regime					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.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation

	Loss of soil fertility The removal of any topsoil during the construction of roads and drill pads.	Low	Rare and infrequent	Residual	Minimal 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. • 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	Rare and infrequent	Decommissioning	Minimal 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; • 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	Rare and infrequent	Decommissioning	Minimal 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. • 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. • 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	Rare and infrequent	Decommissioning	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land use and capability.

Ground Water	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from drill vehicles and fuel storage may contaminate the groundwater resource locally	Low	Rare and infrequent	Decommissioning	Minimal Local	• Staff 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. • 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.

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
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.	Medium to Low	Possible but infrequent	Decommissioning	Minimal Local	Water Quality deterioration: change in water quality is caused by a change in natural conditions and/or an enhancement of pollution from sources. • 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. • All drilling and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.
	• 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.	Medium to Low	Possible but infrequent	Decommissioning	Minimal Local	
	• Possible leaching of polluted soil through infiltration and runoff	Medium to Low	Possible but infrequent	Decommissioning	Minimal Local	

	resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation.					
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** Construction of roads and drill pads; vehicular movement 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	Very Low	Possible but infrequent	Short term	Medium 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. • Apply for permits to authorize the large-scale clearance of indigenous vegetation from DENC.

	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	Low to medium	Possible but infrequent	Residual	Minimal Local	• 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

	of drill pads and roads, vehicular movement and if any illegal harvesting occurs.					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.
	Introduction or spread of alien species Clearing of vegetation and disturbance during	Low-Medium	Rare and infrequent	Residual	Minimal Regional	• Minimise the footprint of transformation. • Encourage the growth of natural plant species. • Mechanical methods of control to be implemented if needed.

	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, 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 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					• Annual follow-up operations to be implemented.

	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					
	Encouragement of 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	Low	Rare and infrequent	Residual	Minimal 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.

	to their opportunistic nature in disturbed areas. If encroaching plants establish in disturbed areas, it may 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.					
	Compromise of ecological processes Clearing of vegetation and disturbance during the construction of roads and drill pads; alterations to slopes, pan-, river and drainage line characteristics. Transformation of intact habitat on a	Low	Highly unlikely and infrequent	Residual	Minimal Regional	• Minimise the footprint of transformation. • Encourage proper rehabilitation of affected areas. • Encourage the growth of natural plant species. • Encourage the preservation of ecological corridors. • Employ sound rehabilitation measures to restore the characteristics of any affected watercourses.

	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.					
Fauna	**Loss, damage and fragmentation of natural habitats** Clearing of vegetation and disturbance during the construction of roads and drill pads. 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 trees are removed or characteristics of the natural watercourses are altered. However,	Low	Possible but infrequent	Decommissioning	Minimal Local	• 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. • Limit the removal of trees • 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 of any affected watercourses .

	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 reptiles residing in rock crevices. Increased noise and	Low-Medium	Possible for life of operation	Decommissioning	Minimal Regional	• 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 from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits. • A full time ECO (Environmental Control Officer) must render guidance to the staff and contractors with respect to

	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.					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.
Air Quality	Sources of atmospheric emission associated with the prospecting operation are likely to include fugitive dust from drilling, wind erosion of topsoil stockpiles, and vehicle entrainment of road dust.	Low	Possible but infrequent	Decommissioning	Minimal Local	• Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels. • Ensure measures for the adherence to the speed limit to minimise dust plumes.
SOCIAL SURROUNDINGS						

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas for drilling, stripping and stockpiling of topsoil	Low	Possible but infrequent	Decommissioning	Minimal Local	• Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. • 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.
	Additional traffic to and from the mine	Low	Possible but infrequent	Decommissioning	Minimal Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Prospecting activities Drilling	Low	Possible but infrequent	Decommissioning	Minimal Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Removal of infra-structure Temporary Ablution facility	Low	Highly unlikely and infrequent	Decommissioning	Minimal Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
Visual impacts	Potential visual impact	Low	Possible but infrequent	Decommissioning	Minimal Local	• The design of the proposed prospecting development will determine the visual impact. As the visual impact would be low • Replacing layer of topsoil over drill pad areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon closure. • The design of the proposed prospecting development will determine the visual impact. As the visual impact would be low

						• The design of the proposed prospecting development will determine the visual impact.
	Potential Visual Impact on the surrounding land users/ residents	Low	Possible but infrequent	Decommissioning	Minimal Local	The design of the proposed prospecting development will determine the visual impact.
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Possible but infrequent	Decommissioning	Minimal Low	Utilise existing access roads, where applicable; implement 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	Low Positive	Probable	Decommissioning	Minimal 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	Probable	Decommissioning	Minimal Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the prospecting phase. • Open fires for cooking and related purposes should not be allowed on site. • Speeding of prospecting vehicles must be strictly monitored
	Health Impacts	Low Negative	Probable	Decommissioning	Minimal Negative Local	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the site • The general health of prospecting 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 mining company.	Low - Medium	Probable	Decommissioning	Medium 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) Impact Assessment

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

2) Activities

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

3) Environment Impact Assessment Summary

Environment likely to be affected by the prospecting operation.

The criteria used to assess the significance of the impacts are shown in the table 10 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 10. 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 11. 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 12. 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 **Tembilihle Municipal area**
4	Regional/District **Regional**	Direct and Indirect impacts affecting environmental elements within District **(Pixley Kaseme District)**
5	**Provincial**	Direct and Indirect impacts affecting environmental elements in the **Northern Cape Province**

Table 13. 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 14. 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)

Prospecting activities (drilling) on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and prospecting activities destroy natural vegetation, 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.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary road and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be low. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the diesel cart that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

Groundwater could be affected, if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

1. This following is Heritage Impact Assessment (HIA) Report which has been prepared in support of a mine prospecting right application on the farms Waterford 246 and Remaining Extent of the Farm Zoetgat 84 located outside Hopetown in the Thembelihle Local Municipality, Northern Cape Province. A project of this scale triggers a Phase I HIA in terms of Section 38(8) of the National Heritage Resources Act (25/1999). This entailed a site visit and ground survey on 11-12 March 2020 during which the heritage sensitivity and potential adverse impacts of the proposed activities were assessed.

2. The findings of the study are summarised as follows:

3. The Stone Age
   On the farm Waterford 246 Stone Age material occurs on the shoulder of the Orange River Valley and on the plain beyond. On the farm Zoetgat 84 Stone tools were recorded in three places. On both farms the material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. Flaked cores indicate manufacturing, but no concentrations of artefacts were observed. Overall, the distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

4. The Iron Age
   No sites dating to the Iron Age were found.

5. Commercial Farming
There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings.

6. Burial grounds
No burial grounds or graves were reported.

9. Conclusions and Recommendations
The mine prospecting can go ahead. As a standard precaution archaeological deposits are usually buried underground. Should archaeological 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 to take place.

Palaeontological Impact Assessment for the proposed Waterford 246 and Zoetgat 84 Prospecting Rights Application, northeast of Hopetown, Northern Cape Province Desktop Study (Phase 1) For Archaeological and Heritage Services Africa (Pty) Ltd 30 March 2020 Prof Marion Bamford (Study appended as Appendix 5 by Prof Marion Bamford).

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.

The proposed cluster of farms for the prospecting rites application lie on potentially fossiliferous rocks of the Ecca Group (Prince Albert and Tierberg Formations) and on Quaternary Kalahari sands. No fossils have been recorded from this area but since there is a small chance that fossils could occur here a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no palaeontological site visit is required unless the geologist or responsible person finds fossils when drilling or test trenching has commenced.

Chance Find Protocol
Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants,

insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.

3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figures 4-5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will not be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

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)

Impact	Mitigation	Risk
Air quality	• Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels. 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.	Low

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. • Limit the removal of trees • 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 of any affected watercourses. • 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 from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits. • A full time ECO (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.	Low
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.	Low

	• Apply for permits to authorize the large-scale clearance of indigenous vegetation from DENC. • 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. • 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.	
Ground water	• Staff 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. • 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.	Low

	• Vehicles should be regularly serviced and maintained. • Clean & Dirty water system must be well maintained.	
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 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.	Low
Soil	• 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.	Low

	• Regular monitoring carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.	
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 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.	Low
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.	Medium

	• 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	• Replacing layer of topsoil over drill pad areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon closure. • The design of the proposed prospecting development will determine the visual impact. As the visual impact would be low • The design of the proposed prospecting development will determine the visual impact.	Low

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 are 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)

There are no alternative as the area has been selected because of the possible occurance of alluvial diamonds due to geological sequence.

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 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 Zoetgat and Wexford 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.

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE If not mitigated	MITIGATION TYPE	SIGNIFICANCE If mitigate
Roads	Air quality	Nuisance dust will be created by the drilling machine.	Prospecting	Low	• 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.	Very Low
	Fauna	Clearing of vegetation and disturbance during the construction of roads and drill pads.	Prospecting	Low	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection	Very Low

		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			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	

		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. Transformation of intact habitat on a cumulative basis would			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 and to be educated about the conservation importance of the fauna occurring on site.	

		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.			• 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.	Prospecting	Low-Medium	• Minimise the footprint of transformation, by keeping to existing roads where possible.	Low

		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			• 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	

		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 disturbed areas, it may cause an impact			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.	

		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			• 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. • Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation.	Prospecting	Low	• 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.	Low

					• 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	Prospecting	Low	• 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.	Low
	Noise	Clearing of footprint areas for drilling, stripping and stockpiling of topsoil	Prospecting	Low	• As a minimum, ambient noise levels emanating from the	Low

		Construction of internal Roads Additional traffic to and from the mine Prospecting activities Drilling Removal of infra-structure (Temporary Ablution facility)			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	Prospecting	Low	• 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.	Low

		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 years, subsequent to the re-establishment of vegetation and hydrologic regime			• 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. • 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	Prospecting	Low	• 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.	Low

					• 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.	Prospecting	Low	• Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure.	Low
Drilling	Air quality	Nuisance dust will be created by the drilling machine.	Prospecting	Low	• 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.	Very Low

					• 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 watercourses are altered. However, due to the low invasive nature of drilling activities this impact is not expected to be significant.	Prospecting	Low-Medium	• 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 as a no go zone for employees, machinery or even visitors.	Low

		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			• 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.	

		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			• 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.	

		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	Prospecting	Low-Medium	• 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	Low

		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**			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	

		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			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.	

		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	Prospecting	Low	• 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	Low

		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.			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	Prospecting	Low	• 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.	Low

		Hydrocarbon spills from drill vehicles and fuel storage may 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)	Prospecting	Low	• 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. • When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement	Low

					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 years, subsequent to the re-establishment of vegetation and hydrologic regime	Prospecting	Low	• 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.	Very Low

					• 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	Prospecting	Low	• 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	Low

					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.	

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
HERITAGE IMPACT ASSESSMENT & PALAEONTOLOGICAL DESK ASSESSMENT ON THE FARM WATERFORD 246 & REMAINING EXTENT OF THE FARM ZOETGAT 84 NEAR HOPETOWN, NORTHERN CAPE Prepared by Edward Matenga (PhD Archaeology & Heritage, MPhil, Archaeology; Uppsala/ Sweden) Monday, 30 March 2020 **Appendix 4 to the Report**	EXECUTIVE SUMMARY 1. This following is Heritage Impact Assessment (HIA) Report which has been prepared in support of a mine prospecting right application on the farms Waterford 246 and Remaining Extent of the Farm Zoetgat 84 located outside Hopetown in the Thembelihle Local Municipality, Northern Cape Province. A project of this scale triggers a Phase I HIA in terms of Section 38(8) of the National Heritage Resources Act (25/1999). This entailed a site visit and ground survey on 11-12 March 2020 during which the heritage sensitivity and potential adverse impacts of the proposed activities were assessed. 2. The findings of the study are summarised as follows: 3. The Stone Age On the farm Waterford 246 Stone Age material occurs on the shoulder of the Orange River Valley and on the plain beyond. On the farm Zoetgat 84 Stone tools were recorded in three places. On both farms the material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. Flaked cores indicate manufacturing, but no concentrations of artefacts were observed. Overall, the distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action. 4. The Iron Age No sites dating to the Iron Age were found.	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, 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)

	5. Commercial Farming There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings. 6. Burial grounds No burial grounds or graves were reported. 9. **Conclusions and Recommendations** The mine prospecting can go ahead. As a standard precaution archaeological deposits are usually buried underground. Should archaeological 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 to take place.		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 Waterford 246 and Zoetgat 84 Prospecting Rights Application, northeast of Hopetown, Northern Cape Province Desktop Study (Phase 1) For Archaeological and Heritage Services Africa (Pty) Ltd 30 March 2020 Prof Marion Bamford Palaeobotanist P Bag 652, WITS 2050 Johannesburg, South Africa	**Executive Summary** A palaeontological Impact Assessment was requested for the proposed Prospecting Rights Application on the Farm Waterford 246 and Remaining extent of the Farm Zoetgat 84, north and northwest of Hopetown, Herbert Administrative District, Northern Cape Province. In order 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 project. Farm Waterford 246 mostly lies on Quaternary Kalahari calcretes and sands that rarely preserve fossils in pans or tufas, and Dwyka tillites and diamictites that very rarely preserve glossopterids or marine fossils. Farm Zoetgat 84 is on non-fossiliferous volcanic rocks of the Allanridge Formation and moderately fossiliferous Aeolian sands of the Quaternary Kalahari Group. The two younger sediments very rarely preserve fossils and only in specific settings such as pan silcretes or limestone tufas. None has been recoded	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, extent, duration and probability of the impacts, including the degree to which these impacts

Marion.bamford@wits.ac.za **Appendix 5 to the report**	on the farms and none is evident from the satellite imagery (Google Earth), so it is highly unlikely that there are any fossils deposits present. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no palaeontological site visit is required unless fossils are found by the geologist/ responsible person once drilling or mining activities have commenced.		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
ECOLOGICAL ASSESSMENT REPORT Thunderflex 78 (Pty) Ltd Wexford Diamond Prospecting Operation March 2020 By Dr. Betsie Milne from Boscia Ecological Consultants **Appendix 6 to the report**	EXECUTIVE SUMMARY Thunderflex 78 (Pty) Ltd is proposing the prospecting of diamonds on the Farm Wexford 246 and the Remaining Extent of the Farm Zoetgat 84. The prospecting right area is located within the Herbert and Hopetown Districts of the Northern Cape Province. Thunderflex 78 has submitted a Prospecting Right application, which triggers the requirement to apply for Environmental Authorisation. An ecological assessment is required in order to consider the impacts that the proposed activities might have on the ecological integrity of the property. This terrestrial ecological assessment report describes the ecological characteristics and biodiversity of the proposed prospecting area, identifies the source of impacts from the operation, and assesses these impacts, as well as the residual impacts after closure. A desktop study was performed to obtain ecological and biodiversity information for the proposed study area and identify the ecological characteristics and sensitivity of the site. Six potential plant communities were identified on site of which the Upper Gariep Alluvial Vegetation (along with the banks and channels of the Orange River), ephemeral drainage lines and ephemeral pan are considered to be of very high sensitivity. The Vaalbos Rocky Shrubland on the ridges are considered to be of high sensitivity, while the Northern Upper Karoo and Kimberley Thornveld vegetation units are considered to be of medium sensitivity. The area transformed for agriculture is considered to be of low sensitivity. The most profound impacts are expected to be	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, 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

	related to the loss of plant species of conservation concern as well as the disruption of ecological corridors and the hydrological regime if any of the tributaries to the Orange River are cut off, or if the ephemeral pans and ephemeral drainage lines are modified through road creation or drill pad establishment. 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 and the rehabilitation programme for the prospecting area. Authorisation for the proposed operation can be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation and rehabilitation measures.		

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.

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the study site is non-arable with potential for grazing land and wildlife. The agricultural region is demarcated for sheep farming on Wexford West with a grazing capacity of 22 ha/LSU and cattle farming on Wexford East with a grazing capacity of 16 ha/LSU. The study area is categorised to have suitability for the crop production of beans, cereals, cotton, groundnut, maize, sorghum, soybean, tea and wheat. While prospecting (drilling) is on-going the farm will still be able to be used for agriculture. Only a small portion will be disturbed if the drilling phase of the Prospecting Right is to be continued.

The conservation of topsoil is of utmost importance and therefore in order ensure a sustainable land use again on the areas to be prospected the top 15 – 30cm if available need to be removed prior to any prospecting, drilling. This will be used as growth medium during the rehabilitation phase of the drill sites. Topsoil should be stored in a berm wall on the border of each drill hole in order to divert any surface runoff during a rain event.

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

(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 **Appendix**

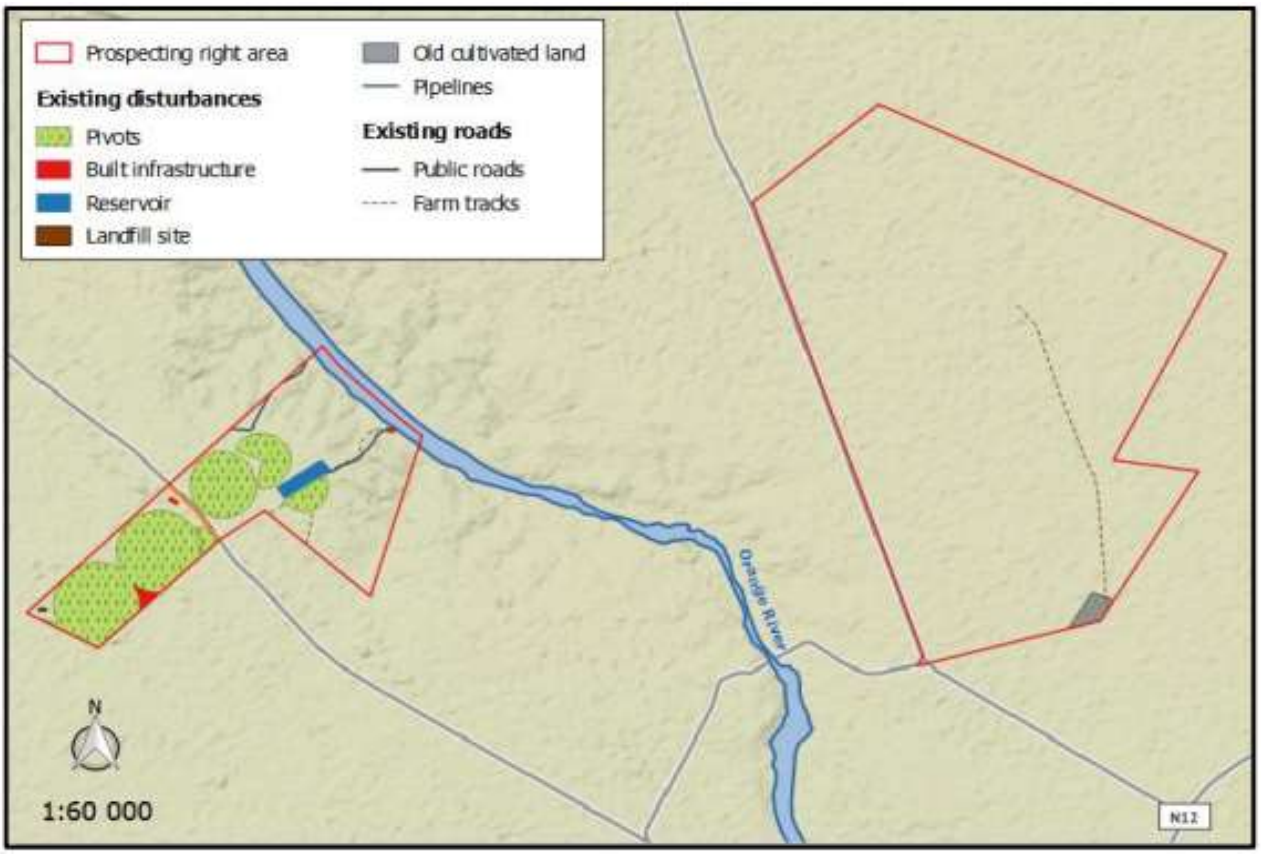

Figure 16.

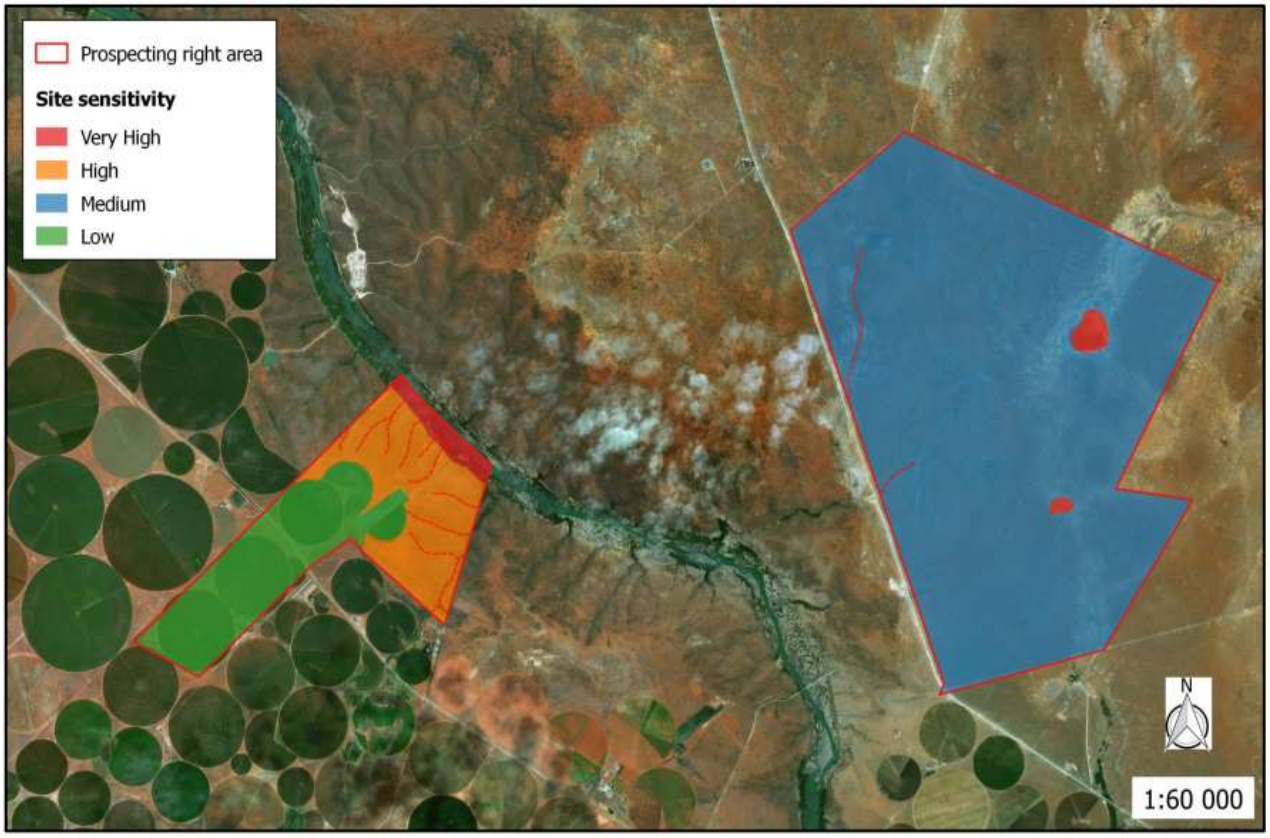

Figure 17. Sensitivity map

The only buffers that must be implemented is the 100m away from any fixed infrastructure like the roads 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.

There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings. (please refer to the HIA attached as Appendix 4).

The most profound impacts are expected to be related to the loss of plant species of conservation concern as well as the disruption of ecological corridors and the hydrological regime if the ephemeral pans and ephemeral drainage lines are modified through road creation or drill pad establishment. **Buffers must be kept from all ephemeral pans and ephemeral drainage lines.**

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

The specific possible occurrence of diamonds in the area dictates the selection of the specific prospecting site. The proposed prospecting operation will be done in such a way that farming will still be possible on the farms. If drilling is done the loss of land use will be 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 farming purposes.

Although this is only a prospecting operation it will provide 5 jobs when drilling is reached. This will also add to the increased economic activity and area surrounding the farm.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMP are adhered to e.g. rehabilitation.

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

- All activities associated with the prospecting operation must be planned.
- 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.
- 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.

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

(Which relate to the assessment and mitigation measure proposed)

Due to the nature of a desktop survey and the lack of ground-truth information, the species list reflected in this report cannot be regarded as entirely accurate or comprehensive. Ideally, a site should be visited at least once to compare desktop information with information on site as well as to ensure actual habitats and associated species present on site are recorded.

However, an extensive desktop review was conducted to ensure a fairly accurate representation of the study area. This is assumed to be sufficient to support this environmental authorisation application, because the proposed operation is primarily non-invasive with a likelihood of minor disturbances produced by the drilling operation.

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 can be granted. There are no significant reasons why the activity should not be authorised. However, if the proposed management and mitigation measures are not properly applied or if the prospecting operation intentionally disregards any of these measures, it will negatively affect the environment and have more long-term consequences. Therefore, the competent authority and the applicant should take all the

necessary steps to ensure that the prospecting operation complies with the conditions set out in the approval of the EMPR.

ii) Conditions that must be included in the authorisation.

Disturbances to the natural habitat and associated fauna within the study area are likely. 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 and the rehabilitation programme for the prospecting area. In my opinion, authorisation for the proposed operation can be granted. However, the applicant should still commit to the adherence of effective avoidance, management, mitigation, rehabilitation measures and 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	25	218,41	1	1	5 460,25
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	5	222 313,32	0,04	1	44 462,66
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	120 927,41	1	1	-
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		86 922,91
1	Preliminary and General			5 215,37	weighting factor 2 1,05		5 476,14
2	Contingencies				8692,2914		8 692,29
					Subtotal 2		101 091,35
					VAT (15%)		15 163,70
					Grand Total		**116 255,05**

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)

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

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 2.19.2** 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 application (hereinafter the properties), HERITAGE IMPACT ASSESSMENT & PALAEONTOLOGICAL DESK ASSESSMENT ON THE FARM WATERFORD 246 & REMAINING EXTENT OF THE FARM ZOETGAT 84 NEAR HOPETOWN, NORTHERN CAPE

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

EXECUTIVE SUMMARY

This following is Heritage Impact Assessment (HIA) Report which has been prepared in support of a mine prospecting right application on the farms Waterford 246 and Remaining Extent of the Farm Zoetgat 84 located outside Hopetown in the Thembelihle Local Municipality, Northern Cape Province. A project of this scale triggers a Phase I HIA in terms of Section 38(8) of the National Heritage Resources Act (25/1999). This entailed a site visit and ground survey on 11-12 March 2020 during which the heritage sensitivity and potential adverse impacts of the proposed activities were assessed.

The findings of the study are summarised as follows:

The Stone Age

On the farm Waterford 246 Stone Age material occurs on the shoulder of the Orange River Valley and on the plain beyond. On the farm Zoetgat 84 Stone tools were recorded in three places. On both farms the material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. Flaked cores indicate manufacturing, but no concentrations of artefacts were observed. Overall, the distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

The Iron Age

No sites dating to the Iron Age were found.

Commercial Farming

There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings.

Burial grounds

No burial grounds or graves were reported.

Conclusions and Recommendations

The mine prospecting can go ahead. As a standard precaution archaeological deposits are usually buried underground. Should archaeological 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 to take place.

Palaeontological Impact Assessment for the proposed Waterford 246 and Zoetgat 84 Prospecting Rights Application, northeast of Hopetown, Northern Cape Province

Executive Summary

A palaeontological Impact Assessment was requested for the proposed Prospecting Rights Application on the Farm Waterford 246 and Remaining extent of the Farm Zoetgat 84, north and northwest of Hopetown, Herbert Administrative District, Northern Cape Province. In order 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 project.

Farm Waterford 246 mostly lies on Quaternary Kalahari calcretes and sands that rarely preserve fossils in pans or tufas, and Dwyka tillites and diamictites that very rarely preserve glossopterids or marine fossils. Farm Zoetgat 84 is on non-fossiliferous volcanic rocks of the Allanridge Formation and moderately fossiliferous Aeolian sands of the Quaternary Kalahari Group. The two younger sediments very rarely preserve fossils and only in specific settings such as pan silcretes or limestone tufas. None has been recoded on the farms and none is evident from the satellite imagery (Google Earth), so it is highly unlikely that there are any fossils deposits present. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no palaeontological site visit is required unless fossils are found by the geologist/ responsible person once drilling or mining activities have commenced.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.

2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figures 4-5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will not be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

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 4**)

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 like the roads 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 mining 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.

There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect this buildings. (please refer to the HIA attached as Appendix 4).

The most profound impacts are expected to be related to the loss of plant species of conservation concern as well as the disruption of ecological corridors and the hydrological regime if the ephemeral pans and ephemeral drainage lines are modified through road creation or drill pad establishment. Buffers must be kept from all ephemeral pans and ephemeral drainage lines.

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 key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:-

Rehabilitation of Infrastructure Areas although none is anticipated except for the chemical toilet

The objectives for the removal and infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure the infrastructure identified for removal is successfully demolished and removed.
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate.

Maintenance

The necessary agreements and arrangement will be made by Thunderflex to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of the rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance Assessments

As per the MPRDA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Thunderflex will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of the EMPR;
- Conduct performance assessments of this EMPR as required by the MPRDA and associated Regulations; and
- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will occur every second year. An independent and competent person will undertake all performance assessments.

Decommissioning and Closure Objectives

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding land owners and land users. This should be done during the operational phase of the mine.
- Rehabilitate disturbed land to a state suitable for its post-closure uses.
- Rehabilitate disturbed land to a state that facilitates compliance with applicable environmental quality objectives.
- Limit the impact on staff whose positions become redundant at the tie of mine closure.
- Keep relevant authorities informed of the progress of the decommissioning phase.
- Submit monitoring data to the relevant authorities.
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative Economic Impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Thunderflex will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of planning.
- The main closure objective of Thunderflex planned prospecting operation is to restore the site to its current land capability in a sustainable manner.
- 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	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.

	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. 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 of superstition and to be educated about the

	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.		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	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

	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. Introduction or spread of alien species Clearing of vegetation and disturbance during the construction of roads and drill pads		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 languages for the workers who may require translation.

	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 The potential extent of bush encroaching species on site is unknown. While general		• 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.

	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.	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.

	• 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.	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.

	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 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.
	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. 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	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. • 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

	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. 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		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 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.

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	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.	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.

	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 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		• 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. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.

	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		

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	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 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. • 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 years, subsequent to the re-establishment of vegetation and hydrologic regime	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. • 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	STANDARD TO BE ACHIEVED (impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.
	Fauna	Clearing of vegetation and disturbance during the construction of roads and drill pads.	Construction, Commissioning, Operational, Decommissioning,	• All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater

		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	Closure and post closure	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	Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		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		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 and to be educated about the conservation importance of the fauna occurring on site.	

		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		• 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.	

		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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized

		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.		• 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-	Rehabilitation standards and closure objectives met. Erosion potential minimized.

		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		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. • Mechanical methods of control to be implemented if needed.	

		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 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		• Annual follow-up operations to be implemented.	

		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	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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		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.		• 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	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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		groundwater resource locally		• 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,	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				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	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 continuance of the natural hydrological regime.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		years, subsequent to the re-establishment of vegetation and hydrologic 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	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				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	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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized

		determine the visual impact. As the prospecting will only entail drilling the visual impact would be low.			Rehabilitation standards and closure objectives met. Erosion potential minimized.
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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.
	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	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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met.

		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 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	Erosion potential minimized.

		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.		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 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	

		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		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.	

		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	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	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		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		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	

		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		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. • Mechanical methods of control to be implemented if needed. • Annual follow-up operations to be implemented.	

		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 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.	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	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

		• 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.		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 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. • 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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				• 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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				• 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	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	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized

		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 years, subsequent to the re-establishment of vegetation and hydrologic regime		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.	Rehabilitation standards and closure objectives met. Erosion potential minimized.

				• 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.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				• 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.	

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	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.

		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		• 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.

		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 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	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.

		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		• 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.

		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.		
	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	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

		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		to the contents of the EIA and EMPr documents.

		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 Management and staff must be trained to understand the contents of these documents and to adhere thereto.

		• 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.		• 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	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.

		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		• 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.

		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	• 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.	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

		• 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.		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.	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

		• 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.		Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
	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 dissection or fragmentation of any important faunal habitat type. • No activities should take place in the ephemeral wetlands.	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.

		• 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		• 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.

		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 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	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

		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		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.

		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. • 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	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

		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		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.

		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	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

		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.		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	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

		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		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.

		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	• 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	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

		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.		• 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.

		• 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	• 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-	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.

		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.		• 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.

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.

Closure:

The main closure objective of this mine is to rehabilitate the mined areas in such a way to ensure that the rehabilitated topographical landscape would blend in with the surrounding landscape, would not pose a safety hazard for human and animal, but at the same time allow a certain alternative land use. Establish a self-sustaining and stable vegetation cover in order to mitigate the visual impact, to control erosion and to create some habitat for animals. The rehabilitated environment also needs to be aesthetically acceptable according to the principle of BPEO.

Thunderflex will ensure that the site is:

- Neither a danger to public health and safety nor to animal health and safety.
- Not a source of any pollution.
- Stable (ecological and geophysical).
- Rehabilitated to the state that is suitable for the predetermined and agreed land use.
- Compatible with the surrounding biophysical environment.
- A sustainable environment.
- Aesthetically acceptable.
- Not an economic, social or environmental liability to the local community or the state now or in the future.

Thunderflex will ensure that the physical and chemical stability of the rehabilitated prospecting site will be such that risk to the environment is not increased by naturally occurring forces to the extent that such increased risk cannot be contended with by the installed measures.

Thunderflex will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (diamonds).

Thunderflex will ensure that the prospecting site is closed efficiently and cost effectively.

Thunderflex will ensure that the operation is not abandoned but closed in accordance with the relevant requirements.

Thunderflex will ensure that the interest of all interested and affected parties will be considered.

Thunderflex will ensure that the all-relevant legislation regarding mine closure will be adhered to, and all relevant application procedures followed.

The management of environmental impacts:

With regard to the extension, the mitigation of all environmental impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing mine facilities in a well-planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To contain and prevent any pollution (physical and chemical) from the prospecting operation within structures, facilities provided therefore.
- To ensure an effective surface run-off control system in order to deal with the separation of clean and dirty water environment.
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof.
- The sustainable rehabilitation of the prospecting site (excavations, topsoil- & overburden stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

Historical and Cultural aspects:

On the farm Waterford 246 Stone Age material occurs on the shoulder of the Orange River Valley and on the plain beyond. On the farm Zoetgat 84 Stone tools were recorded in three places. On both farms the material comprises scrapers, blades, cores and flakes typologically dating to the Middle Stone Age/Late Stone Age period. Flaked cores indicate manufacturing, but no concentrations of artefacts were observed. Overall, the distribution pattern seems to indicate general hunter-gatherer activity in the area over time. None of the sites found warrant further action.

There are some building of interest at the farmstead (WFD01) which will not be affected by the proposed development. At the old farmstead

there are three ruined buildings which may be of historic significance (WFD30). There are no compelling reasons to affect these buildings.

The sites are of low to high significance.

Finally, it should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate.

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

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 below for the identification of Interested and Affected Parties to be consulted with.

A Notice was placed on 22 January 2020 in the DFA (Diamond Fields Advertiser) 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 mine offices and on the fences of the farms to make all relevant parties aware of the application (See photo's attached in Appendix 3).

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

Notices were placed at the Hopetown Abattoir, Hopetown garage and at the turn off on the gravel road to the farms to make all relevant parties aware of the application.

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: -

Thembelihle Local Municipality Hopetown
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
SANRAL
Transnet
SAHRA
National Department of Public Works

A notification letter on the BAR document will be send to all I & APs and the BAR will be placed at the library in Hopetown for easy access by all parties.

(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 mining 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 116 255,05 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.

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 20°.	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.	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	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

	To control the incidence of unacceptable noise levels on site.	and that which may migrate outside the area.		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.	There are no Rivers in the vicinity of the prospecting operation. A borehole will be used for water and will be monitored by collecting water samples quarterly.	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 bienielly 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 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

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of prospecting areas.
- Encourage the growth of natural plant species.
- Ensure measures for the adherence to the speed limit.

Loss of flora with conservation concern

- Footprint areas of the Prospecting activities must be scanned for Red Listed and protected plant species prior to prospecting.
- It is recommended that these plants are identified and marked prior to prospecting.
- These plants should, where possible, be incorporated into the design layout and left in situ.
- However, if threatened of destruction by Prospecting, these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible.
- All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.

Proliferation of alien vegetation

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of prospecting areas.

- 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 prospecting areas.
- Encourage 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

- Prospecting activities 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 prospecting area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). No construction personnel or vehicles may leave the demarcated area except those authorised to do so.

Disturbance, displacement and killing of fauna

- Careful consideration is required when planning the placement for the creation of access routes in order to avoid the destruction of habitats and minimise the overall prospecting footprint.
- The extent of the proposed prospecting should be demarcated on site layout plans, and no construction personnel or vehicles may leave the demarcated area except those authorised to do so. Those areas surrounding the prospecting area that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors.
- The appointment of a full-time ECO 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.
- All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.

- The environmental induction should occur in the appropriate languages for the workers who may require translation.
- 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.

Broad-scale ecological processes

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of prospecting areas.
- Encourage the growth of natural plant species.
- Prospecting activities 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 prospecting area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance).

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 and using an aesthetically pleasing design for the proposed development.
- 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 surrounds 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:

Topography, soil erosion and associated degradation of ecosystems

- Backfill all drill holes continuously.
- Employ effective rehabilitation strategies to restore surface topography of drilled areas.
- All temporary infrastructures should be demolished during closure.

Soil erosion

- At no point may plant cover be removed within the no-development zones.
- All attempts must be made to avoid exposure of dispersive soils.
- 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, wherever possible.
- The prospecting operation must co-ordinate different activities in order to optimise the utilisation of the alluvial diamonds and thereby prevent repeated and unnecessary dumping.
- Audits must be carried out at regular intervals to identify areas where erosion is occurring.
- Appropriate remedial action, including the rehabilitation of the eroded areas, must occur.
- Rehabilitation of the erosion channels and gullies.
- Dust suppression must take place.
- 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.

Loss of soil fertility

- The topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.

Soil pollution

- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Spill kits to clean up accidental spills from earthmoving 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.
- At no point may plant cover be removed within the no-development zones.
- All attempts must be made to avoid exposure of dispersive soils.
- 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, wherever possible.
- Audits must be carried out at regular intervals to identify areas where erosion is occurring.
- Appropriate remedial action, including the rehabilitation of the eroded areas, must occur.
- Rehabilitation of the erosion channels and gullies.
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- 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 topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Spill kits to clean up accidental spills from earthmoving 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.
  - *To prevent soil pollution;*
  - *To limit soil compaction;*
  - *To curb soil erosion; and*
  - *To reinstate a growth medium able to sustain plant life.*

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.

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:

17 July 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.

Appendix 2

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

APPENDIX 3 PUBLIC PARTICIPATION