mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT 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:	**PAUL SEUN THUKGWI**
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FILE REFERENCE NUMBER SAMRAD: **(NC) 30/5/1/1/2/11639 PR**

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act, 2002 (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, 1998 (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 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact 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) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the—

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

  (ii) degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be avoided, managed or mitigated.

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

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

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

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	**ROELINA OOSTHUIZEN**
Tel No.:	**053 8320029**
Cell 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**

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.
Please refer to attached CV.
(with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	**Farm No. 42 Remainder of Portion 1 of the farm Annex Viegulandsput**
Application area (Ha):	**1676.89 ha**
Magisterial district:	**Prieska**
Distance and direction from nearest town:	**The farm Annex Viegulandsput is situated straight east of the small town Prieska, Northern Cape Province. The small town Prieska lies ± 45km to the west of the proposed prospecting area.**
21 digit Surveyor General Code for each farm portion:	**C06000000000004200001**

c) Locality map

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

Figure 1: The location of the Viegulands Put prospecting area is indicated in red.

d) Description of the scope of the proposed overall activity

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

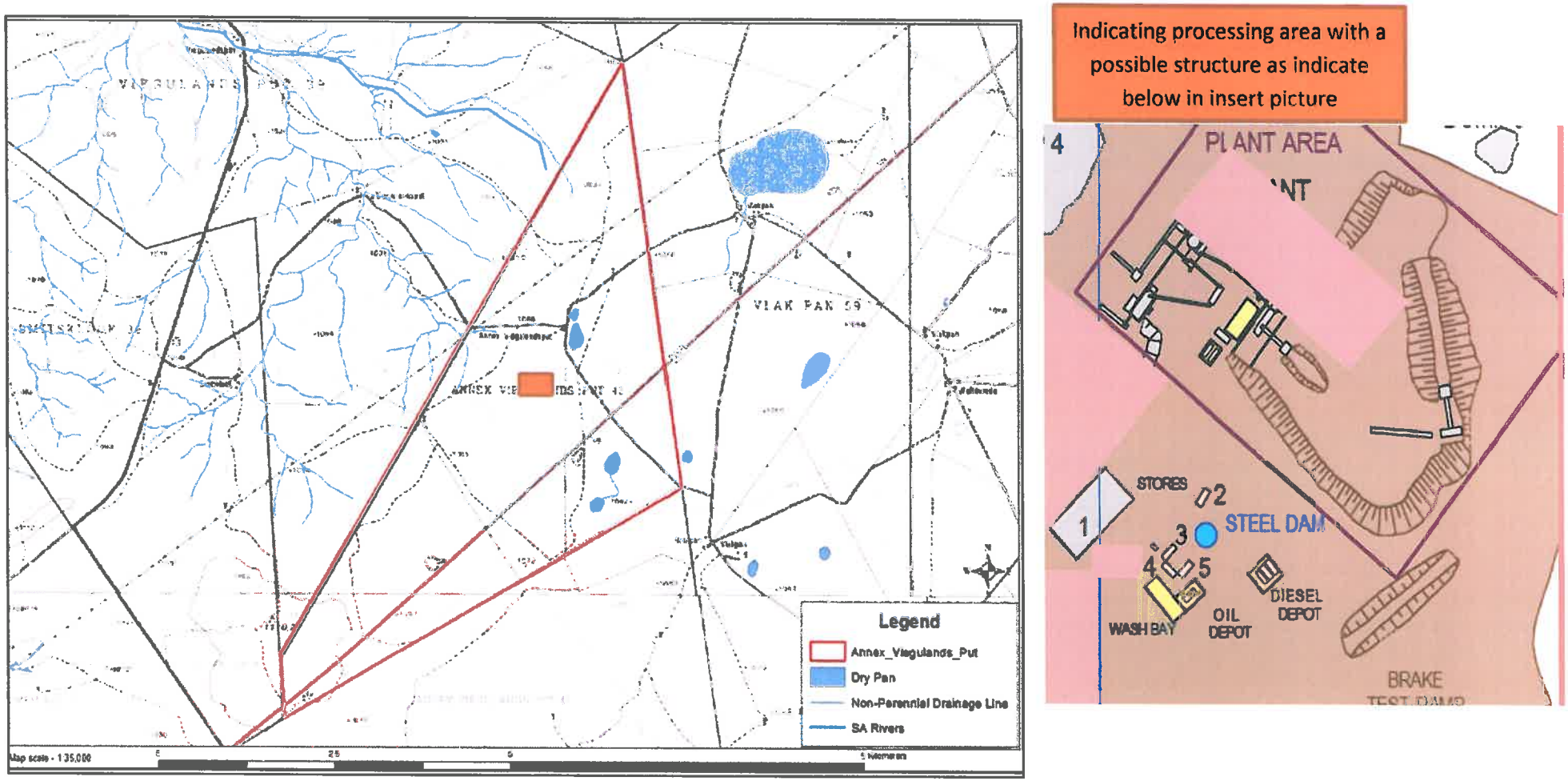


Figure 2. A map of the area indicating the overall location and extent of listed activities and main infrastructure on the prospecting site not to scale

i) Listed and specified activities

Table 1: 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 mining** – excavations, blasting, 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)/NOT LISTED***
Activity 9 of Nema Listing Notice 1 The development of infrastructure exceeding 1000metres in length for the bulk transportation of water or storm water- (vii) With an internal diameter of 0,36 meters or more; or (viii) With a peak throughput of 120 litres per second or more;	To be confirmed Water pipeline from the Orange River at least 10 kilometres.	X	GNR 983
Activity 13 of Nema Listing Notice 1 The development of facilities or infrastructure for the off stream storage of water, Including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	Zink dams with 80m³ as well as a return water dam 50 000m³	X	GNR 983
Activity 14 of Nema Listing Notice 1 The development of facilities or infrastructure, for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80cubic meters or more but not exceeding 500 cubic metres.	2 X 23 000l diesel tanks 1 X 23 000l old oil tank Storage of clean oils and grease on site	X	GNR 983
Activity 19 of NEMA Listing Notice 1 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells,	To be confirmed (no ephemeral pans will be prospected).	X	GNR 983

shell grit, pebbles or rock of more than 5 cubic metres from— (i) a watercourse; but excluding where such infilling, depositing , dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.			
Activity 20 of Listing Notice 1 Any activity including the operations 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 28 of 2002)	1676.89 ha Application lodged for the farm	X	GNR 983
Activity 24(ii) of NEMA Listing Notice 1 The development of haul roads 15m wide with no reserve	±1.5ha on the Area.	X	GNR983
Activity 30 of Listing Notice 1 Any Process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	The proposed prospecting site does not fall within any formally protected area or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation unit of the study area (Northern Upper Karoo) is classified as least threatened and therefore no formal fine-scale conservation planning has	X	GNR 983

	been conducted. **However, the site does contain a number of Critical Biodiversity Areas in relation to the Northern Cape Critical Biodiversity Areas Map (Figure 31) in the ecological study appended to the report.** Three formally mapped pans in the south-east (although one has been omitted as a pan in this assessment) are classified as Critical Biodiversity areas, along with their buffer zones. The pans in the north-east are classified as Ecological Support Areas, along with the ridge and drainage lines in the north. The Siyathemba Integrated Development Plan also promotes the conservation of ridges and wetland areas within the district. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).		
Activity 56(ii) of NEMA Listing Notice 1 The continuous lengthening (and rehabilitation) of haul roads 15m wide with no reserve	±5 000m² on the Area.	X	GNR983
Activity 15 of Listing Notice 2 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (iii) the undertaking of a linear activity; or	20 Pits will be excavated with the following dimensions: 2m long by 1m wide by varying depths (0.5 – 5m)= 0.004ha	X	GNR 984

(iv) maintenance purposes undertaken in accordance with a maintenance management plan.	20 Trenches will be 200m x 100m x 0.5 – 5m deep= 40ha		
Activity 19 of Listing Notice 2 The **removal and disposal of minerals** contemplated in terms of Section 20 of the Minerals 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)	1676.89 ha Application lodged for the farm although only the highest terrace features will be prospected.	X	GNR 984
Activity 21 of Listing Notice 2 Any activity including the operation of that activity associated with the **primary processing of a mineral resource** including winning, reduction, extraction, classifying, concentrating, crushing, **screening and washing** but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case Activity 6 of this Notice applies.	0.13 ha	X	GNR 984
Activity 9 of Category A under the National Environmental Management: Waste Act 59 of 2008 **A Mine Residue Dam and returnwater dam** The disposal of inert waste to land in excess of 25 tons but not exceeding 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation..	0.7ha The disposal of inert waste of 10 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by other legislation.	X	GNR 633
Activity 15 of Category A under the National Environmental Management: Waste Act 59 of 2008 **"Residue stockpiles or residue deposits"** The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a prospecting right or mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	0.05 ha	X	GNR 633

OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities)			
Temporary Workshop Facilities	±0.07 ha		
Storage Facilities	±3000m²		
Concrete Bund walls and diesel Depots	±250m²		
Ablution Facilities	±25m²		
Topsoil Stockpiles	±0.65 ha		NOT LISTED
Overburden Stockpiles	±1.8 ha		

ii) Description of the activities to be undertaken

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

Description of the Planned Prospecting Methods to be implemented

The entire proposed prospecting project at farm Annex Viegulandsput 42 will be conducted in four phases as described below over a period of 36 months. This prospecting will consist of non-invasive and invasive (Bulk Sampling) activities. The review of available information that exists over the area of interest will be undertaken by means of conducting a literature review from satellite images and other available information.

1) Description of Planned Non-Invasive Activities

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

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.

2) Description of Planned Invasive Activities

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

Phase 2

Invasive Prospecting Pits

20 Pits will be excavated with the following dimensions: 2m long by 1m wide by varying depths (0.5 – 5m), no material will be removed and the layers will be logged on the pit side walls. This pits will be on the same grid as the trenches. Only positive pits will be trenched.

Invasive Prospecting Pits will be positioned in the grid as indicated below on the map listed below on Fig. 3.

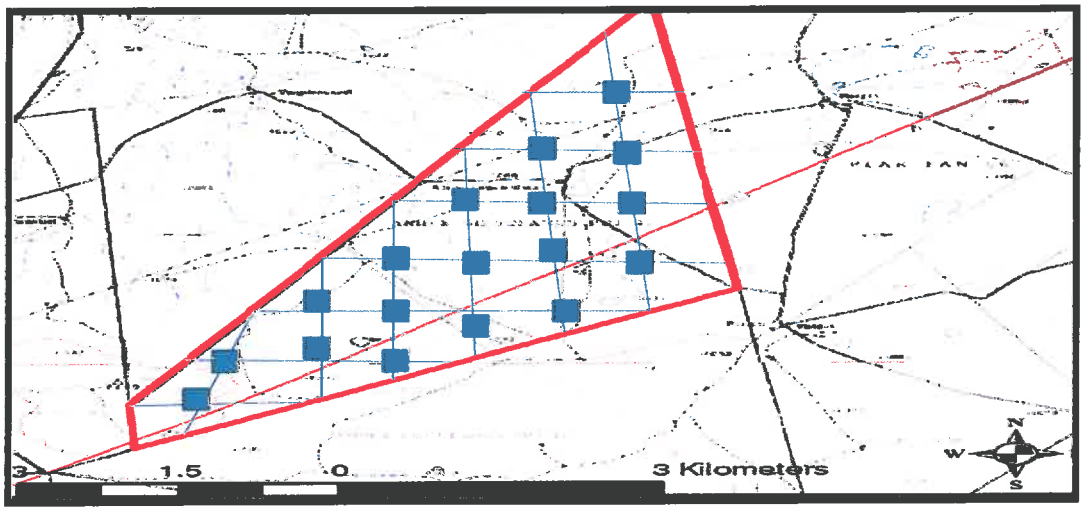


Figure 3. Locality of planned trenches for bulk sampling indicated on Annex Viegulandsput 42, the pits will be on the same grid and done with a back actor scoop but no material will be removed

Phase 3

Bulk Sampling

20 Trenches will be excavated with the following dimensions on pits that prove to contain gravels (tested positive). It is estimated that an average 3m of overburden (calcrete and soil) will be removed before accessing the gravel layer (average width 2m) which is host to the diamonds. The trenches will be 200m x 100m x 0.5 – 5m deep. We calculated the volume of gravel on 2m and if all 20 trenches are going to be excavated an average of 800 000m³ will be tested.

The South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC) Code is internationally recognised as the guideline for the classification and reporting of mineral resources. This classification is widely used to determine when enough data has been gathered during the exploration phase to classify parts of a deposit as a reserve that can be mined with a high degree of confidence. On diamonds the code states the following:-

The following characteristics of diamond deposits are different from those of typical metalliferous and coal deposits, and they emphasize the need for a Diamond specific Code.

- *The low diamond content of primary and placer diamond deposits and their variability.*
- *The particular nature of diamonds.*
- *The specialized field of diamond valuation.*
- *The relationship between average diamond value and the underlying diamond size distribution.*
- *The widely differing nature of diamondiferous deposits and their associated forms of mineralization and the estimation relevant to these.*

The Codes classifies diamond deposits as follow:

An 'Inferred Diamond Resource' is that part of a Diamond Resource for which tonnage or volume, grade and average diamond value can be estimated only with a low level of confidence. It is inferred from geological evidence and assumed geological grade continuity and when the diamond parcel is too small to be a reasonable representation of the diamond assortment. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, information that may be limited or of uncertain quality and reliability.

An 'Indicated Diamond Resource' is that part of a Diamond Resource for which tonnage and volume, densities, shape, physical characteristics, grade and average diamond value can be estimated with a reasonable level of confidence. It is based on information from exploration, sampling and testing of material gathered from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and grade continuity but are spaced closely enough for continuity to be assumed, and sufficient diamonds have been recovered to allow a reasonable estimate of average diamond value.

A 'Measured Diamond Resource' is that part of a Diamond Resource for which tonnage and volume, densities, shape, physical characteristics, grade and average diamond value can be estimated with a high level of confidence. It based on detailed and reliable information from exploration, sampling and testing of material gathered from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and grade continuity and sufficient diamonds have been recovered to allow a confident estimate of average diamond value.

Only a Measured Resource can be used for mine planning purposes.

It is normal for a deposit like Viegulandsput 42, which is situated in the Middle Orange River, to exhibit large variations in grade and diamond distribution. This has been documented by various researches. Note that this also implies significant grade variations. This emphasizes the need to Bulk Sample all sedimentologically different zones in order to obtain an accurate grade and diamond distribution curve for future financial and mine planning.

3) **Description of Pre-feasibility Studies**

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

Phase 4

Analytical Desktop Study

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

Each physical phase of prospecting is followed by desktop studies involving interpretation and modelling of all data gathered. These studies will determine the manner in which the work programme is to proceed in terms of activity, quantity, resources, expenditure and duration.

A GIS based database will be constructed to capture all exploration data.

4) **Description of Bulk Sampling Activities**

(Bulk sampling is a sampling technique only)

Table 2: Bulk Sampling Activities

ACTIVITY		DETAILS		
Number of pits/trenches planned		20 pits / 20 trenches		
	Number of pits/ trenches	**Length**	**Breadth**	**Depth**
	20	2m	1m	0.5-5m
	20	200m	100m	0.5-5m
Locality		See figure 3		
Volume Overburden (Waste)		1 200 000		
Volume Ore		800 000		
Density Overburden		1.6		
Density Ore		1.78		
Phase when bulk sampling will be required		Phase 3		
Timeframe(s)		From time-to-time during months 18 to 30		

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	- This Act establishes a framework for the National,	

13 of 2005)	Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Prospecting Right has been applied for 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) - Regulations GN R1147, published on 20 November	- Control measures are to be implemented upon the approval of the EMPR.

	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 Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered. - In terms of the specialist study five species of concern is present and the necessary permits should be applied for. Control measures are to be implemented upon the approval of the EMPR.

	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.	- The proposed prospecting site does **not fall within any formally** protected area or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation unit of the study area (Northern Upper Karoo) is classified as least threatened and therefore no formal fine-scale conservation planning has been conducted. - However, the site does contain a number of Critical Biodiversity Areas

		in relation to the Northern Cape Critical Biodiversity Areas Map (Figure 31) in the ecological study appended to the report. Three formally mapped pans in the south-east (although one has been omitted as a pan in this assessment) are classified as Critical Biodiversity areas, along with their buffer zones. The pans in the north-east are classified as Ecological Support Areas, along with the ridge and drainage lines in the north. The Siyathemba Integrated Development Plan also promotes the conservation of ridges and wetland areas within the district. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities - Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) - Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and	- To be implemented upon the approval of the EMPR.

	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 plant species need to be lodged with DENC if any protected species is encountered. - In terms of the specialist study five species of concern is present and the necessary permits should be applied for. - 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. - 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	- Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure is attached to the PIA.

	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 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)	- A water use application is in the final stages of preparation and will be lodged with Department of Water and Sanitation (DWS) when the EIA EMP has been finalized. - Control measures are to be implemented upon the approval of the EMPR.

	- 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 protected plant species need to be lodged with DENC if any protected species is encountered. - In terms of the specialist study five species of concern is present and the necessary permits should be applied for. - 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)

Need and desirability

There are two market types for diamonds namely jewellery and industrial.

A competitive market for diamonds exists internationally and locally and these reserves constitute an economically viable resource with the potential of earning foreign currency and supplying work opportunities in an area of great unemployment.

Summary of product consumers

The diamond industry is an international trade and one that involves a number of processes between the mining and extraction of the rough product through to the polished diamond jewellery of the retail sector. Commonly referred to as the pipeline put simply this consists of the mining wholesale dealing, manufacturing, polished wholesale, jewellery manufacturing and the retail sector. Increasingly such segmentation according to process for this pipeline is becoming more blurred as downstream and upstream movements take place. World rough diamond production is estimated to be some $8 billion per annum of which South Africa is the fourth biggest producing country.

Summary of customer specifications and details of any proposed beneficiation of the products

The diamond production should be ideally suited for the jewellery marked. It is hoped that at least some of the diamond production will be cut and polished locally.

Summary of infrastructure requirements such as roads, rail, electricity and water

The city of Kimberley is the capital of the Northern Cape Province, South Africa and can be reached via a tarred road. Kimberley can be described as the diamond capital of South Africa with a history of diamond mining since the discovery of diamonds in 1871 that led to the creation of the Big Hole. Today, a large number of diamond mines are operational in the area, including the Finch Diamond Mine of De Beers.

Infrastructure in the area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale diamond mining. Water for processing plant will be sourced from the nearby Orange River if the bulk sampling stage is reached.

Summary of other information applied that may influence price, e.g. exchange rate, duties, tariff barriers, etc.

a) Exchange rate – direct influence on revenue as the product price is determined in US dollars
b) Fluctuations in diamond market demand and supply may also influence prices in the market.

g) Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved 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.

Taking into consideration all the information captured in this report, the most appropriate procedure for planning and developing the proposed prospecting operation will involve the following:

(a) Prospecting Method

The location of the prospecting is determined by the geological location of the possible mineral resource. This site is located within the alluvial diamond areas. Prospecting with non-invasive and invasive methods should it prove positive with the understanding that the formulation of an effective Environmental Management Programme and the implementation thereof, as well as the obtainment of an authorisation for the abstraction of water from a resource for bulk sampling purposes from the Department of Water and Sanitation in terms of the National Water Act, 1998 (Act No. 36 of 1998, is an inseparable part of the proposed operation.

(b) Labour Force

Employing people who originate from within the boundaries of the application area's Municipality. This will guarantee benefits such as a positive contribution to the local economy; a decrease in local unemployment figures; a decrease in the social phenomena normally associated with unemployment, such as crime and alcohol abuse; and a positive contribution to cultural cohabitation.

(c) Rehabilitation

Making financial provision for the implementation of a rehabilitation strategy as is required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

(d) Environmental Monitoring

Carrying out environmental monitoring on a regular basis, as is required by Regulation 55 of the Regulations published in Government Notice No. 26275 under the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) and in the NEMA regulations published 20 November 2015, Appendix 3.

(e) General

Being open to possible comments, suggestions and complaints received from neighbouring communities or members of the general public that might result from the implementation of the proposed prospecting operation.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Figure 2 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:	**Farm No. 42 Remainder of Portion 1 of the farm Annex Viegulandsput**
Application area (Ha):	**1676.89 ha**
Magisterial district:	**Prieska**
Distance and direction from nearest town:	**The farm Annex Viegulandsput is situated straight east of the small town Prieska, Northern Cape Province. The small town Prieska lies ± 45km to the west of the proposed prospecting area.**
21 digit Surveyor General Code for each farm portion:	**C06000000000004200001**

The property on which the Prospecting Right application 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 area is accessible via gravel roads from different directions.

Infrastructure in the application area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale diamond mining. Water for Processing Plant will be a crucial element that needs to be secured towards the successful operating of the project. A water application will be submitted to the Department of Water and Sanitation.

Alternatives considered:-

As the area covered under the prospecting Right had been selected based on the assumption of alluvial gravels and indication of the presence of alluvial gravels, it will not be viable to consider an alternative site for the prospecting. Alternatives for land are thus not available, as the prospecting application cannot be considered over another area.

Therefore there are no alternatives to the area.

(b) The type of activity to be undertaken:

The entire proposed prospecting project at farm Annex Viegulandsput 42 will be conducted in four phases as described in the Prospecting Work Programme over a period of 36 months. This prospecting will consist of non-invasive and invasive (Bulk Sampling) activities. The review of available information that exists over the area of interest will be undertaken by means of conducting a literature review from satellite images and other available information.

Alternatives considered:-

The only alternative land use is grazing; however the applicant's main economic activity is prospecting and for this reason does not favour any other alternative land use.

(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 nearby access roads, proximity to the areas earmarked for prospecting as well as limited additional impact on the environmental (the river, pans, drainage channels and wind direction), heritage resources and discussions with the relevant Departments.

The following infrastructure will be established and will be associated with the prospecting operation with permission of the relevant Departments and surface owner:

- Processing Plant: 1 X 16 feet with conveyers and recovery (Only if bulk sampling continues).
- Ablution Facilities: In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.
- Clean & Dirty water system: Berms
  It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the prospecting site.
- Fuel Storage facility (Concrete Bund walls and Diesel tanks):
  It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place. (This activity will also only be established if bulk sampling is going to take place).
- Prospecting Area: prospecting for alluvial diamonds.
- Roads (both access and haulage road on the prospecting site):

Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the prospecting operation will create an additional 2 - 4 km of roads, with a width of 6 – 15 meters.

- Salvage yard (Storage and laydown area).
- Product Stockpile area.
- Waste disposal site
  The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:
  - Small amounts of low level hazardous waste in suitable receptacles;
  - Domestic waste;
  - Industrial waste.
- Temporary Workshop Facilities and Wash bay.
- Water distribution Pipeline.
- Water tank: It is anticipated that the operation will establish 1 x 10 000 litre water tank with purifiers for potable water.

Alternatives considered:-

Alternatives for fuel storage include surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential, because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage tanks. The best viable long term option is the instalment of fuel tanks within a concrete bund wall. The final location of the fuel storage tanks will be determined based on proximity to bulk sampling sites.

In terms of water use alternatives; the application area is located next to the Orange River and the River is there for seen as the best water source for the operation. Plastic pipelines are considered to be the best long term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment.

In terms of power generation the options available was for Generators or ESKOM power. All of the electricity needs for the operations will be generated by a diesel generator and there would therefore be no additional pressure on the Eskom Electricity Grid.

In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.

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

- Technique

A Prospecting Right application was lodged and accepted by the Department of Mineral Resources to be done with bulk sampling whereby the grade and quality will be determined with the bulk samples to be taken off the property.

Volumes of the mineral to be tested:

20 pits will be excavated with the following dimensions: 2 m long by 1 m wide by varying depths (0.5 – 5m) no material will be removed and the layers will be logged on the pit side walls. These pits will be on the same grid as the trenches. Only positive pits will be trenched.

20 Trenches will be excavated with the following dimensions on pits that prove to contain gravels. It is estimated that on average 3m of overburden (calcrete and soil) will be removed before accessing the gravel layer (average width 2m) which is host to the diamonds. The trenches will be 200m X 100m X 0.5 – 5m deep. We calculated the volume of gravel on 2 m and if all 20 trenches are going to be excavated an average of 800 000m^3 will be tested.

Why they will be tested:

The gravel will be tested to determine a grade (carats per hundred tonne) and value (US$ per carat). The closest alluvial operation is next to this farm on Niewejaarskraal 40 which necessitates bulk sampling for this project.

Where they will be tested:

All bulk sampling activities will take place on site. Herewith follows a description of the process:

The planned bulk sampling technique is that of a typical South African alluvial diamond operation. The planned prospecting method is a strip mining process with oversize material from the gravel scalping and the tailings from the plant, being used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the nearby treatment facility using articulated dump trucks.

The access to the various gravel trenches will be provided by a haul road to the screening and processing plants. The operation is to be conducted using conventional open pit mining equipment comprising two 40-t articulated dump trucks supported by appropriate 60-t and 40-texcavators and a front-end loader.

The vegetated soil overlying the planned bulk sampling sites and pits is stripped prior to excavation of the gravel and stockpiled on a dedicated dump to be used for rehabilitation purposes at a later stage. Where the gravels are covered by hard calcrete possible drilling and blasting will be needed. Drill patterns can be staggered or square pattern, with burden and spacing of 4m x 4m. Blast holes are charged with emulsion explosive and different down-hole charge configurations are used depending on the different rock types to be blasted. This

together with the necessary blasting accessories will achieve optimal fragmentation.

- Technology

The gravel is loaded with a 60-t excavator into ADT's. Ore is hauled to the screening plant.
As an integral part of the bulk sampling processes, backfilling will take place continuously.

Gravels are loaded onto a vibrating grizzley and the +85 mm oversize material is discarded back into the open pit (about 25% reduction). The remaining –85 mm fraction is loaded into a 16-foot rotary pan with a treatment capacity of 50 tph. A magnetic separator is used to extract some of the heavy banded iron stones. Tracer tests are done regularly to ensure that the pans are operating at the correct density. Approximately 2.5 tonne of concentrate is tapped from the pan every hour and transported in locked containers to the final recovery unit.

The final recovery unit consists of a holding bin, sizing screen, sizing bins and one state of the art Flowsort X-ray recovery unit which recover diamonds from the +2 mm to – 32 mm size fraction. Final sorting of the X-ray concentrate will be done manually.

Rehabilitation will take place continuously and at any stage only one trench will be open with previous trench being backfilled.

To whom they will be disposed of:
At an expected grade of 0.5 carats per hundred tonnes, could be recovered from the gravels. Diamonds will be sold at a reputable diamond tender house in Kimberley to determine an average US$/carat value for the diamonds.

Alternatives considered:-

The planned prospecting activities include (non-invasive and invasive prospecting (bulk sampling methods).

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 of alluvial diamonds.

(e) The operational aspects of the activity:

20 pits will be excavated with the following dimensions: 2 m long by 1 m wide by varying depths (0.5 – 5m) no material will be removed and the layers will be logged on the pit side walls. These pits will be on the same grid as the trenches. Only positive pits will be trenched.

20 Trenches will be excavated with the following dimensions on pits that prove to contain gravels. It is estimated that on average 3m of overburden (calcrete and soil) will be removed before accessing the gravel layer (average width 2m) which is host to the diamonds. The trenches will be 200m X 100m X 0.5 – 5m deep. We

calculated the volume of gravel on 2 m and if all 20 trenches are going to be excavated an average of 800 000m³ will be tested.

The gravels will be loaded with an excavator on to dump trucks for conveyance to the Processing Plant. At the Processing Plant the run of mine gravels will be fed onto a grizzly for screening out oversize material. The material will be processed through a screening section for delivery to a recovery plant. Concentrate from the recovery plant will be processed through an X-Ray/Sortex plant to extract the diamonds.

Prospecting activities will primarily make use of existing roads created by farming activities, but there is a possibility for additional roads that could be created.

Alternatives considered:-

The conventional opencast load-haul-mining method for bulk sampling has been proven to be the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative prospecting method for the prospecting and bulk sampling of alluvial diamonds.

(f) The option of not implementing the activity:

The major land uses in the region are mining and agriculture. The site is classified as non-arable with low potential for grazing land and is generally not suited for cultivation.
Apart from the current prospecting application by Paul Thukgwi for diamonds, Viegulands Put is mainly used as grazing land for goats and cattle. A farmstead, with kraals and workers quarters, is also situated on the property. Historic activities on site are signified by remnants of burrow pit excavations and old cultivation fields, which are still clearly visible today (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Mining forms an integrated part of the social and economic growth of South Africa and more specifically the Northern Cape Province.

Socio-Economy

The operation will make provision for 10 - 20 job opportunities depending on the phase of the operation. This will be lost if the project does not proceed. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

The proposed prospecting site does not fall within any formally protected area or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation unit of the study area (Northern Upper Karoo) is classified as least threatened and therefore no formal fine-scale conservation planning has been conducted.

However, the site does contain a number of Critical Biodiversity Areas in relation to the Northern Cape Critical Biodiversity Areas Map (Figure 31) in the ecological report appended as Annexure B. Three formally mapped pans in the south-east (although one has been omitted as a pan in this assessment) are classified as Critical Biodiversity areas, along with their buffer zones. The pans in the north-east are classified as Ecological Support Areas, along with the ridge and drainage lines in the north. The Siyathemba Integrated Development Plan also promotes the conservation of ridges and wetland areas within the district. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

All of the ephemeral pans of the study area have been classified by the Wetland Freshwater Priority Areas project as wetlands with a Present Ecological State (PES) of "AB", which means that the pans are in a Natural or Good condition. Furthermore, none of the pans have been identified as significant wetlands in terms of Ramsar sites, IUCN Frog localities, threatened water bird localities or Crane breeding grounds.

The mine itself is expected to cause habitat transformation through the excavation of large open pits, and will thereby contribute to cumulative habitat loss and the disruption of the broad-scale landscape connectivity in the region. The study area falls within a zone where one of South Africa's largest economically most important alluvial deposits of diamonds are found (Figure 32) in the ecological report as Annexure B. The primary secondary source of alluvial diamond deposits in the Northern Cape extends along the Orange and Vaal Rivers (Gresse 2003), while the most significant crop irrigation in the Northern Cape also stretches along these rivers (Durand 2006). According to Mucina et al. (2005), the highest proportion of any type of transformation in the Nama-Karoo Biome is the clearance of the Northern Upper Karoo for cultivation. The cumulative impacts in the vicinity of the study area are therefore considered to be very high. . (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Heritage and Cultural Resources

Eighteen (18) sites were recorded. A significance ranking system has been applied as the basis for recommending appropriate mitigation in view of the potential impact of the proposed activities. The attributes of the sites are systematically documented with photo illustrations provided in a Catalogue in Section 8 of the report from August 2017 prepared by Edward Matenga).

The Stone Age

Fourteen (14) Stone Age sites were recorded all of which have a low density of lithics. The stone tools which comprise mainly scrapers, flakes and a few blades and cores are spread throughout the property without any significant concentrations to suggest regular human activity. Thus no specific settlement locales could be defined to warrant further investigation.

The occurrence of a pear-shaped hand-axe is of particular interest as it seems to confirm the presence of Acheulean material in the area dating between 2 million to 250 000 years BP. Its occurrence together with scrapers / flakes might represent an overlap of or transition from the ESA and the Middle Stone Age. If a museum or university is interested in studying the find its GPS location was recorded with an accuracy of ±4m out of the report from August 2017 prepared by Edward Matenga.

The Iron Age

No Iron Age sites were found on the property out of report from August 2017 prepared by Edward Matenga.

Early commercial farming

Structures built of stonework at a ruined homestead include a terrace revetment wall, which appears to have been a landscaping feature. A swimming pool measuring 15m x 20m x 2.5m at the deepest end was built of stone with cement binding. The exterior has a false dry stone masonry appearance. A livestock enclosure measuring 15m x 25m x 1.2m high is also built of stones. In all instances the stonework is rough, none of the building blocks trimmed to a regular shape. There are no compelling circumstances in the development plan to get rid of these structures out of the report from August 2017 prepared by Edward Matenga.

Burial ground

There are two graves located in a fenced plot on the periphery of the farmstead. One is a double grave of a couple, Schalk and Susanna Jacobs, the previous owners of the farm born in the 1880s. The second grave is of a juvenile. Graves / burial grounds are protected in terms of Section 34 of the National Heritage Resources Act.

Palaentological

The proposed project intends to exploit the Mbizane Formation of the Dwyka Group. However, it is most unlikely the impact in palaeontological terms will be significant in view of the sparse occurrence of fossils in this unit.

The formations of the Kalahari Group present in the area include the Mokalanen Formation calcrete, the Obobogorop Formation red, colluvial "derived gravels" and the Gordonia Formation aeolian sands. The most common fossil types are trace fossils such as plant root casts and a variety insect burrows e.g. termitaria. Burrow systems made by a variety of vertebrates also occur. Land snails, tortoise carapaces and ostrich eggshell are typical. Finds of larger-mammal fossil bones are rare in the Kalahari formations and then are often in an archaeological context and associated with pans and water sources. Consequently the palaeontological sensitivity of the Kalahari Group formations is Low (Almond & Pether, 2009).

Although the overall impact of the proposed development on fossil resources is expected to be minimal, it is recommended that a standard Fossil Finds Procedure (FFP) Although the overall impact of the proposed development on fossil resources is expected to be minimal, it is recommended that a standard Fossil Finds Procedure (FFP) be incorporated into the Environmental Management Plan (EMP) for the proposed prospecting operations. A FFP has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the Environmental Control Officer (ECO). The ECO must put in place a contingency plan to rescue chance finds and where possible preserve them in situ. However, exposed fossil bones, unless already lying in the excavated spoil, must not be retrieved by a worker or ECO. All work must cease and the ECO must inform SAHRA and a professional palaeontologist, who will then decide if avoidance or mitigation are preferred. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA. be incorporated into the Environmental Management Plan (EMP) for the proposed prospecting operations. A FFP has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the Environmental Control Officer (ECO). The ECO must put in place a contingency plan to rescue chance finds and where possible preserve them in situ. However, exposed fossil bones, unless already lying in the excavated spoil, must not be retrieved by a worker or ECO. All work must cease and the ECO must inform SAHRA and a professional palaeontologist, who will then decide if avoidance or mitigation are preferred. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA. (Palaentological Assessment by Joseph Chikumbirike (PhD Palaeontology, University of the Witwatersrand September 2017).

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 (neighbouring farmers and land owners) was completed for the Basic Assessment Report that was submitted and consisted of the process below.

- The consultation process with interested and affected parties (neighbouring farmers and land owners) was completed.

- The process as described by NEMA for Environmental Authorisation was followed. See table 2 below for the identification of Interested and Affected Parties to be consulted with. The landowner, and or occupants and direct neighbours were consulted. The landowner was consulted personally with a visit to his house and a meeting in which all activities were explained and

questions answered. All neighbours were consulted through a letter registered letter that was mailed to them.

- An Advert (Notice) was placed in the DFA on 22nd May 2015 to notify all other interested and affected parties.

- The Scoping Report was put on disc and was distributed to all the registered parties per registered mail on the 28 April 2017.

- The document was also made available at the public library in Douglas on 05 May 2017 and left there for any interested and affected parties to make concerns or comments.

The draft of the Environmental Impact Assessment will be circulated to all registered interested and affected parties on 18 October 2017.

Consultation process:

Proof of consultation (attendance registers, minutes of meetings and response forms) is attached as Annexure 'A'. The consultation process is still in process

iii) Summary of issues raised by I&APs

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

Table 3: Consultation with 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**				
Mr Hendrik Jacobus Burger HJ BURGER (JNR) PO Box 518 Prieska 8940	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.	2 June 2015 May 2017 Mr Burger visits the office and follows up on the process, he confirms receipt of the Scoping Report.	The farm must not become an alluvial diamond proclaimed area with numerous operators.	EAP have explained that farms are not proclaimed as alluvial diggings anymore and that Mr. Thukgwi will be the only operator if the right is granted.	
Lawful occupier/s of the land	X				
Mr B J Burger (Jnr) P O Box 518 Prieska 8940	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.	2 June 2015	No issues raised		
Landowners or lawful occupiers on adjacent properties	**X**				
Mr DE Loots P O Box 320 Prieska 8940	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.		No comments received		
Saxendrift Mine (Pty) Ltd P O Box 251 Barkly West 8375	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.	17 June 2015	No objections to the application. Just one request that all activities to be done confirm to the Act		

Kalkkrans Trust; P O Box 148; Prieska 8940	28 April 2017 mailed registered letter with Scoping report.		Letter with disc returned as Box closed on 04 May 2017 No comments received		
Mr GF van Niekerk P O Box 11 Douglas 8730	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.		Letter with disc returned unclaimed 12 June 2017 No comments received		
Nuwejaarskraal Testamentere Trust P O Box 147 Prieska 8940	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.		Letter received from Attorney Duncan and Rothman in which they objected if the application was to be on their farm.	A reply was send to the Attorneys Duncan and Rothman in which it was confirmed that the application is not on the portion belonging to the NJK Testamentere Trust.	
Municipal Councillor	X				
Municipality	X				
Siyathemba Local Municipality P O Box 16 Prieska 8940 Mr Piet Papier	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.		No comments received		
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA	X				
ESKOM Environmental Division P O Box 356 Bloemfontein 9300 Ms A van Gensen	28 April 2017 mailed registered letter with Scoping report. e-mailed on 18 October 2017		Letter with disc returned unclaimed 07/06/2017 No comments received		
Orange Vaal River Users Association P O Box 314 Douglas 8730	28 April 2017 mailed registered letter with Scoping report. 18 October 2017 mailed registered letter with Draft EIA EMP Report.		No comments received		
SANRAL; PO Box 415; Pretoria; 0001	28 April 2017 mailed registered letter with Scoping report.	No comments received up to date			

	18 October 2017 mailed registered letter with Draft EIA EMP Report.				
Communities					
No Communities					
Dept. Land Affairs	X				
Department of Agriculture, Land Reform and Rural Development P O Box 28 De Aar 7000 Ms N Yende	28 April 2017 registered letter with Scoping report was send. 18 October 2017 mailed registered letter with Draft EIA EMP Report.	No comments received.			
Dept. of Agriculture, Forestry and Fisheries: Directorate: Forestry **Management**	28 April 2017 registered letter with **Scoping report was send.** 18 October 2017 mailed registered letter with Draft EIA EMP Report.	22 May 2017	The report refers to numerous activities that will result in clearance of vegetation. The **study site of 1676 ha is located in the** Northern Upper Karoo Vegetation type known for its protected Boscia albitrunca trees. The authorization is required for 3 year period. Bulk sampling of 20 trenches will result in clearance of vegetation of 200 X 100 X 0.5 – 5m deep and at any given time ±40 ha area will be disturbed for bulk sampling. Page 30 stated that small trees are found along drainage lines and page 42 mentions that the site is about 10km away from the Orange River. There are four 4(4) pans on site that will be protected. Page 94 mentioned that where protected trees cannot be left in situ, plants should be removed with the relevant permits from DAFF and DENC. Page 102 stated that an Archaeologist will survey the farm but other specialist reports will only be done if requested by any specific Department. The DAFF strongly recommends that a fauna and flora specialist report be conducted to assess the potential impacts on plants and animals of conservation concern. No site sensitivity map was developed; nor **was the study site overlaid on the draft** Critical Biodiversity Map (CBA) of the Northern Cape. Page 109 of the report contains a table,	Acknowledgement of letter was given.	All comments was addressed in the EIA EMP.

			showing activities, impacts and mitigation. Most of the listed activities will result in some form of vegetation clearance, yet nowhere was search and rescue of conservation-worthy plants mentioned under mitigation. Please ensure that this is included under mitigation measures and that the four (4) pans on site are clearly demarcated as "no – go"zones during prospecting.		
ESKOM Environmental Div; Holdings SOC Limited Northern Cape Operating Unit: Land Development; PO Box 356; Bloemfontein; 9300 Or PO Box 606; Kimberley; 8300 Nomzamo Mdunyelwa 0518315947	28 April 2017 registered letter with Scoping report was send. 18 October 2017 mailed registered letter with Draft EIA EMP Report.	23 May 2017	This notice affects the existing Eskom Distribution's power lines, Greefspan/Mooidraai 1 132kV Overhead Line which traverses the proposed mining area. The approximate positions of these services are indicated on the attached locality Map. Eskom Distribution will raise no objection to the proposed Mining operations on the above mentioned properties provided Eskom's rights and services are acknowledged and respected at all times. Eskom's rights are protected by Wayleave Agreements and Servitudes. The approximate positions of these services are indicated on the attached sketches. Further to the above the following conditions must be adhered to and accepted in writing before any development and or **construction:** A.1 Access and egress Eskom shall at all times retain unobstructed access to and egress from its servitudes and services. A.2 Approvals A.2.1 Eskom's consent doesn't relieve the applicant from obtaining the necessary statutory, land owner or municipal approvals. A.2.2 The applicant will adhere to all relevant environmental legislation. Any cost incurred by Eskom as a result of non-compliance will **be charged to the applicant.** A.3 Eskom Cables Eskom's underground cables affected must be placed in sleeves encased in concrete		

			across the width of the servitude, at the applicant's expense. Materials to be used and relevant dimensions shall be determined as required. A.4 Dimensions No construction or excavation work shall be executed within 11 metres from any Eskom power line structure, and/or within 11 metres from any stay wire. A.5 Earthing All work within Eskom's servitude areas shall comply with the relevant Eskom standards in force at the time. A.6 Expenditure If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the applicant's activities or because of the presence of his equipment or installation within the servitude or way leave area, the applicant shall pay such costs to Eskom on demand. A.7 Ground level variations Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's requirements. A.8 Indemnity Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the applicant, his/her agent, contractors, employees, successors in title, and assigns. The applicant indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the applicant's equipment. The applicant's		

			attention is drawn to the Electricity Act, 1987, (Act 41 of 1987, as amended in 1994), Section 27(3), which stipulates that the applicant can be fined and/or imprisoned as a result of damage to Eskom's apparatus. A.9 Machinery No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the applicant must give at least seven working days prior notice of the commencement of work The Eskom's authorised area representative for the Prieska CNC: Ertjies Taaljart Tel: 053 353 5102/083 557 0066, email address: TaljaaES@eskom.co.za. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued. A.10 Permission to do work A.10.1 No work shall commence unless Eskom has received the applicant's written acceptance of the conditions specified in the letter of consent and/or permit. A.10.2 Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with. Note: Where an electrical outage is required, a fourteen work days is required to arrange sam A.11 Remedial action Under no circumstances shall rubble, earth or other material be dumped within the servitude or Way Leave restriction area. The applicant shall maintain the area concerned to Eskom's satisfaction. The applicant shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom. **A.12 Safety** A.12.1 The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as		

			stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993). A.12.2 Equipment shall be regarded electrically live and therefore dangerous at all times. A. 12.3 In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as additional safety precaution, Eskom will not approve the erection of Houses, or structures occupied or frequented by human beings under the power lines and only after consideration of all alternatives, within the servitude area. A. 12.4 Eskom may stipulate any additional requirements to illuminate any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant. A. 12.5 It is required of the applicant to familiarize him/herself with all safety hazards related to Electrical plant. B.1 Blasting, opencast mining and undermining B.1.1 A specific document of permission in respect of the blasting or mining activity as issued by the Inspector of Mines must be submitted to Eskom before commencement of operations. [refer to the Minerals Act, 1991 (Act 50 of 1991) Regulation 9.33.5 – Permission to fire more than one shot hole at a time within 500m from surface structures] B.1.2 Blasting in close proximity to Eskom's overhead power lines or substations is prohibited unless the following precautions are met [refer to the Mine Health and Safety Act, 1996 (Act 29 of 1996) Regulation 17.6(a) - 100m and above • a blasting plan submitted with the **document of permission referred to in B.1.1** above, • a Peak Particle Velocity (PPV) to be kept below 75 mm/s, for lines and 50 mm/s for		

			buildings, • a seismic control device is set up to record the readings, ensure fly rock and air blast control by means of adequate matting, in the interest of air blast control, only single shot blasting shall be allowed. • Permission for blasting will be strictly as stipulated in the Blasting Design by the Blasting Consultants and blasting should be done away from the power lines. B.1.3 The applicant will be held liable for damage to Eskom's towers or substation equipment, as a result of blasting activities. B.1.4 Costs incurred by Eskom to comply with statutory requirements in terms of an applicant's (or his contractors) works, equipment or plant in the servitude area, shall be paid to Eskom on demand. B.1.5 Eskom may charge the applicant appropriately for time on site during blasting operations. B.1.6 Eskom reserves the right to withdraw its consent if the blasting process becomes hazardous and likely to result in power interruptions. B.1.7 If and whenever the applicant apply and if permission for the blasting process is granted the applicant must give at least fourteen work days prior notice of the commencement of blasting to The Eskom's authorised area representative for the Prieska CNC: Ertjies Taaljart Tel: 053 353 5102/083 557 0066, email address: TaljaaES@eskom.co.za . This allows time for arrangements to be made for supervision of and/or precautionary instructions to be issued in terms of the blasting operation. B.1.8 General Conditions B.1.8.1 Firing near the power lines should be along a free face, facing away from the **power lines, as the Mine has suggested.** B.1.8.2 The Mine should prepare a proper analysis of the rock structure and any geological anomalies prior to blasting.		

			B.1.8.3 The "safe distance of 25m" from Eskom pylons should be indicated on the blasting plan. Existing geological faults, decomposed zones and fractured rock structures could have destabilising effects on founding material as a result of the firing, especially when developing an open face next foundations and below founding level. These conditions should be taken into account when deciding on the method and plan of blasting near the Eskom power line pylons. B.1.8.4 Eskom retains the right to appoint any specialist at any time on behalf of the Mine, to inspect Eskom structures for deformation. B.1.8.5 The mining depth near Eskom pylons should carefully be controlled for stability and adjustments being made when so instructed by Eskom. B.1.8.6 Upon receiving the letter of consent from the inspector of the mine to blast below 100m, the applicant must present to Eskom Technical Evaluation Forum L3 the blasting philosophy for final approval. Should the applicant or his contractor damage any of Eskom services during commencement of any work whatsoever, then Eskom's 24 hour Contact Centre Tel: 08600 37566 must be dialled immediately to report the incident. Any relocation of Eskom's services, due to this undermining, will be for the account of the Applicant. The Applicant will also be responsible for granting Eskom an alternative route for the power line. The **Eskom Customer Contact Centre at 08600** 37566 must be contacted in connection with any line deviation and costs.		
Department of Water and	28 April 2017				

Sanitation; Private Bag X6101; Kimberley; 8300	registered letter with Scoping report was send. 18 October 2017 mailed registered letter with Draft EIA EMP Report.				
Dept. of Agriculture, Land Reform & Rural Development Private Bag X5108 Kimberley 8300	28 April 2017 registered letter with Scoping report was send. 18 October 2017 mailed registered letter with Draft EIA EMP Report.				
National Dept. of Public Works P.O. Box 1931 Kimberley 8300	28 April 2017 registered letter with Scoping report was send. 18 October 2017 mailed registered letter with Draft EIA EMP Report.				
SAHRA P.O. Box 4637 Cape Town 8000	Scoping Report was loaded on to site with letter dated 28 April 2017 Loaded EIA EMP + Annexures onto SAHRIS				
Traditional Leaders					
No Traditional Leaders					
Dept. Environmental Affairs					
DENC; Private Bag X6102; Kimberley;8300	28 April 2017 registered letter with Scoping report was send.				
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					
None					
INTERESTED PARTIES					
None					

* Note: The contents of this table have been recorded up to 18 October 2017 as the process of public participation is an ongoing process.

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)

(1) *GEOLOGY:*

Regional Geology

The bedrock of the Orange River valley between the confluence of the Vaal River and the Orange and Prieska, referred to as the Middle Orange, is dominated by flat-lying Dwyka tillite and siltstone of the Karoo Supergroup. These sediments were deposited by the Dwyka icesheet, with a flow direction from the north-east, in a broad valley roughly corresponding with the present Vaal-Orange system.

The Dwyka comprises matrix supported diamicite with pebbles and boulders of both local and transported lithologies, set in a rock-flour matrix, together with dropstone-bearing mudstones, shales and silts. Underlying the Dwyka, and exposed where the Orange has incised through that sequence, are lavas and pyroclastics of the Ventersdorp Supergroup, overlain in places by sediments of the Transvaal Supergroup, comprising shales, quartzites and dolomites. The bedrock is cut in places by faults and dolerite sheets, which are rarely exposed and can only, be mapped using geophysics. The surface on which the Dwyka was deposited was irregular with several topographic highs (presumed to be roches moutonnes) and glacially striated surfaces.

The present surface of the Dwyka comprises a gently undulating terrain lying at an elevation of between 1,050m and 1,100m amsl. The river has incised into this surface to a depth of between 90m and 150m. Owing to the irregularity of the pre-Dwyka surface, several reaches of the river are superimposed on pre-Dwyka topographic highs, which due to their relative resistance to erosion, give rise to more rugged topography. Here the Orange River is confined to gorges with increased river gradients. In contrast, the easily-eroded Dwyka has been dissected by minor tributaries of the Orange River, giving rise to trellis-type drainage pattern. To the north of the Orange River, the Ghaap Plateau represents an ancient surface of Transvaal Supergroup rocks.

Local Geology

The present drainage of the region consists of the Vaal-Harts River from the north-east, and the Orange River from the south-east. There is, however, strong evidence that a major drainage, flowing along the eastern face of the Ghaap Plateau, entered the system in the vicinity of Oranjeoord, approximately 20km downstream from the Vaal-Orange confluence, during the Miocene-Pliocene.

It is suggested that this substantial river may have had as much as four times the discharge of the Orange River. Given that the area was already relatively arid, the river must have had a large catchment area, McCarthy (1983) suggesting that it had the upper Zambezi, Okavango and Kwando Rivers as tributaries. The upper Limpopo may also have flowed into the system during the Miocene-Pliocene. The alluvial diamonds of the Middle Orange have several probable primary source areas:– the diamondiferous kimberlites of Lesotho, eroded by the present Orange River; diamonds from the same source as the Lichtenburg – Western Transvaal diamondfields, eroded by the Vaal-Harts system; diamonds derived from the kimberlites of the Kimberley area; and diamonds from Botswana and the Postmasburg fields, including the Finsch kimberlite, eroded by the palaeo-drainage note above.

A terrace deposit is defined as an alluvial package of sediments in a braided river environment. Subsequent incision by the river at times of less energetic flow cuts into the braided deposits, leaving them perched above current river level. If this incision takes place in the centre of the valley-fill, terraces will be developed on both banks of the river. If incision is accompanied by lateral migration, as is often the case, the terrace is restricted to one bank only. Therefore, "terrace" is a morphological term, and the terrace can display any or all of the typical braided stream features, such as splays, chute bars, point bars, channels, sand banks. The terrace initially preserves the morphology of the braided river deposits, but later erosion can dissect or totally remove the terrace. On a regional scale, the terraces tend to have an elongated sheet-like shape, with an overall gentle gradient downstream, but this gradient can be stepped at barriers across the river valley, such as lithological changes in bedrock, cross dykes, etc. Consequently, contemporaneous terraces can be deposited at differing elevations, and conversely, terraces at the same elevation were not necessarily deposited during the same cycle, at the same time.

Several attempts have been made to correlate named terraces along the Vaal and middle Orange Rivers using the base elevations, both above sea level and above the present river level, of the various

deposits. These attempts at correlation have met with limited success. In addition to the problem of stepping, no allowance can be made for post-depositional regional warping. Subsequent differential incision of the river into the terrace platform can also render the latter approach doubtful. The descriptions of the gravels given here are composite of information taken from McCarthy (1998).

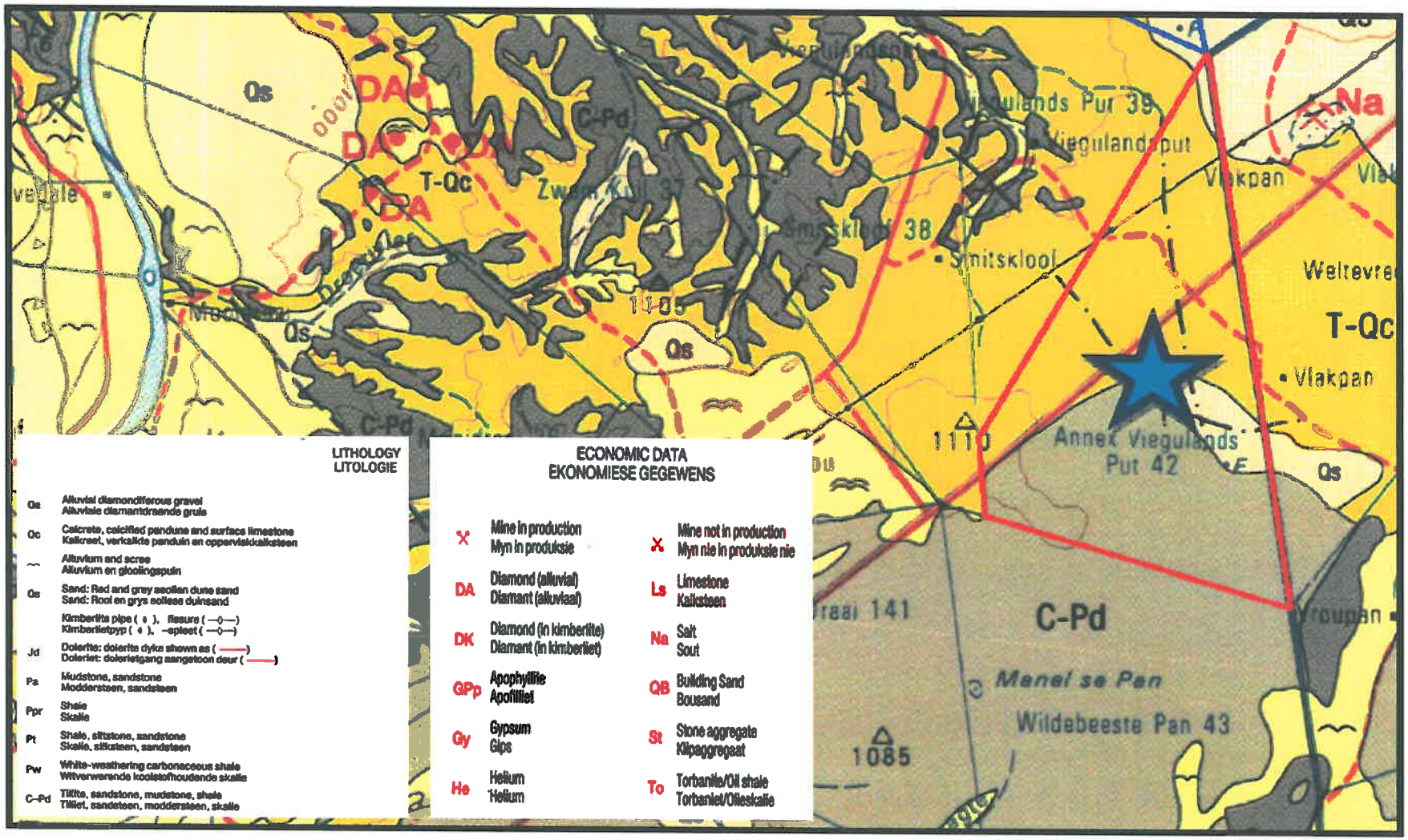


Figure 4. Extract from 1:250 000 geological map 2922 Prieska (Council for Geoscience, Pretoria) showing location of Remaining Extent of Portion 1 of the farm Annex Viegulandsput 42 South of the Orange River. Blue (Vgd)= Campbellrand Subgroup comprises of coarse to fine grained dolomite and limestone, Grey (C-Pd) = Dwyka Group, Yellow (T-Qc) = Neogene calcrete, Pale yellow (Qs) = Quaternary to Recent sands and sandy soil of the Gordonia Formation (Kalahari Group). DA marks ancient High Level Gravels associated with alluvial diamond occurrences close to the Orange.

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 imetres 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

(3) ***TOPOGRAPHY:***

The area is generally flat, characterised by level plains with some relief and altitudes around 1 060 m above sea level. Almost the entire study area occurs on a plateau, situated above a complex of ridges that drains north-westerly towards the Orange River. The terrain on site is indicated by a very gentle slope of 1 % running north-east. (Ecological Assessment Report September 2017 p20 by Boscia Ecological Consulting CC).

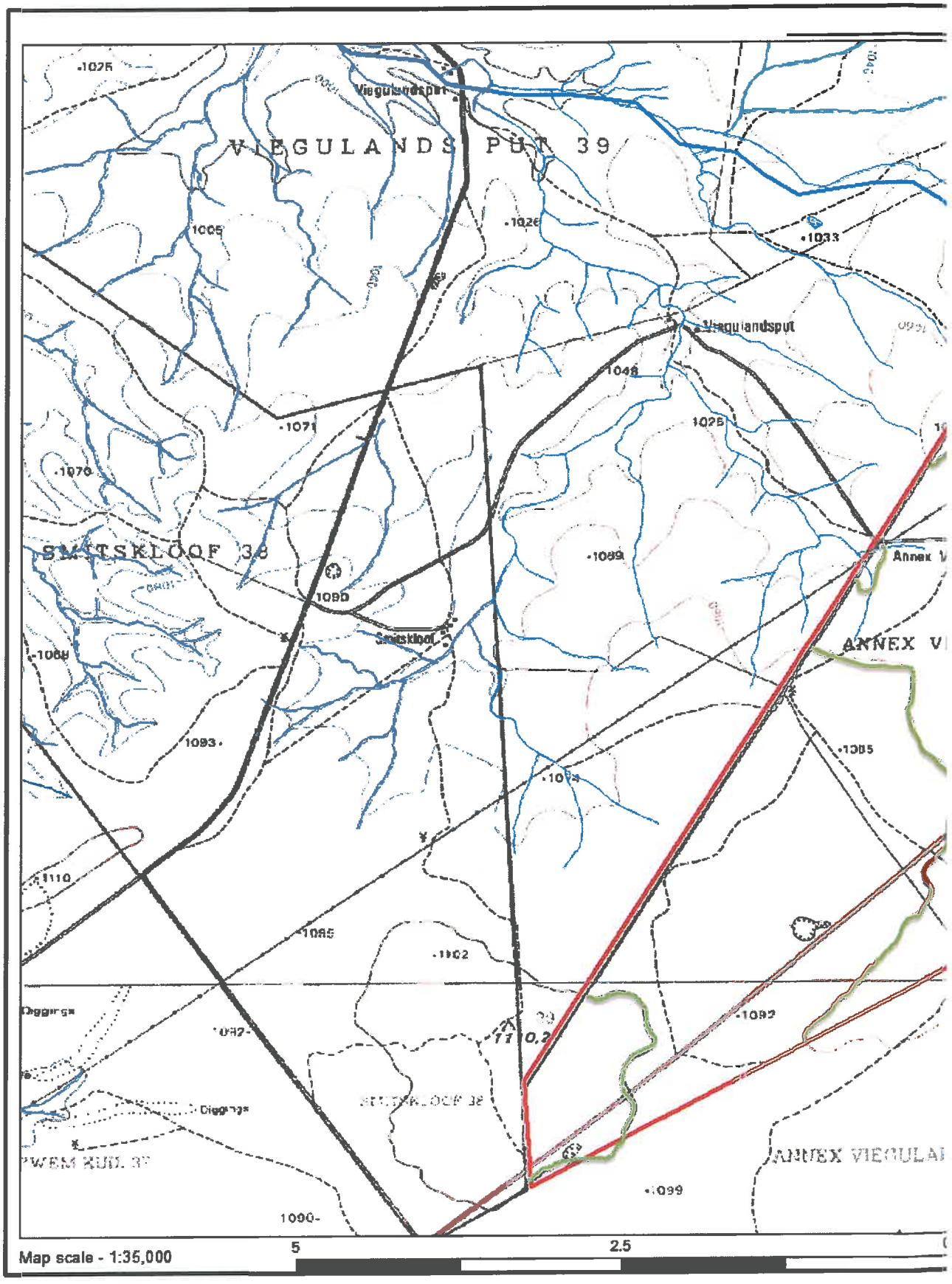


Figure 5. Topographical Map 1:50 000 application area indicated by red and topographical line in green.

(4) ***SOILS:***

Boscia Ecological Consulting CC has been appointed by Paul to provide an Ecological assessment in order to highlight the ecological characteristics of the proposed prospecting area, and to determine the possible impact of prospecting on the diversity and ecological status of the application area.

The plains are closely associated with the Ag136 landtype (Figure 6). Here, red-yellow apedal soils, which are freely drained, with a high base status and a depth of less than 300 mm are found. The ridge represents the Fc568 landtype (Figure 6), where soils with minimal development (predominantly Glenrosa or Mispah forms) and usually shallow, occur on hard or weathering rock. Lime is generally present in the landscape.. (Ecological Assessment Report September 2017 p25 by Boscia Ecological Consulting CC).

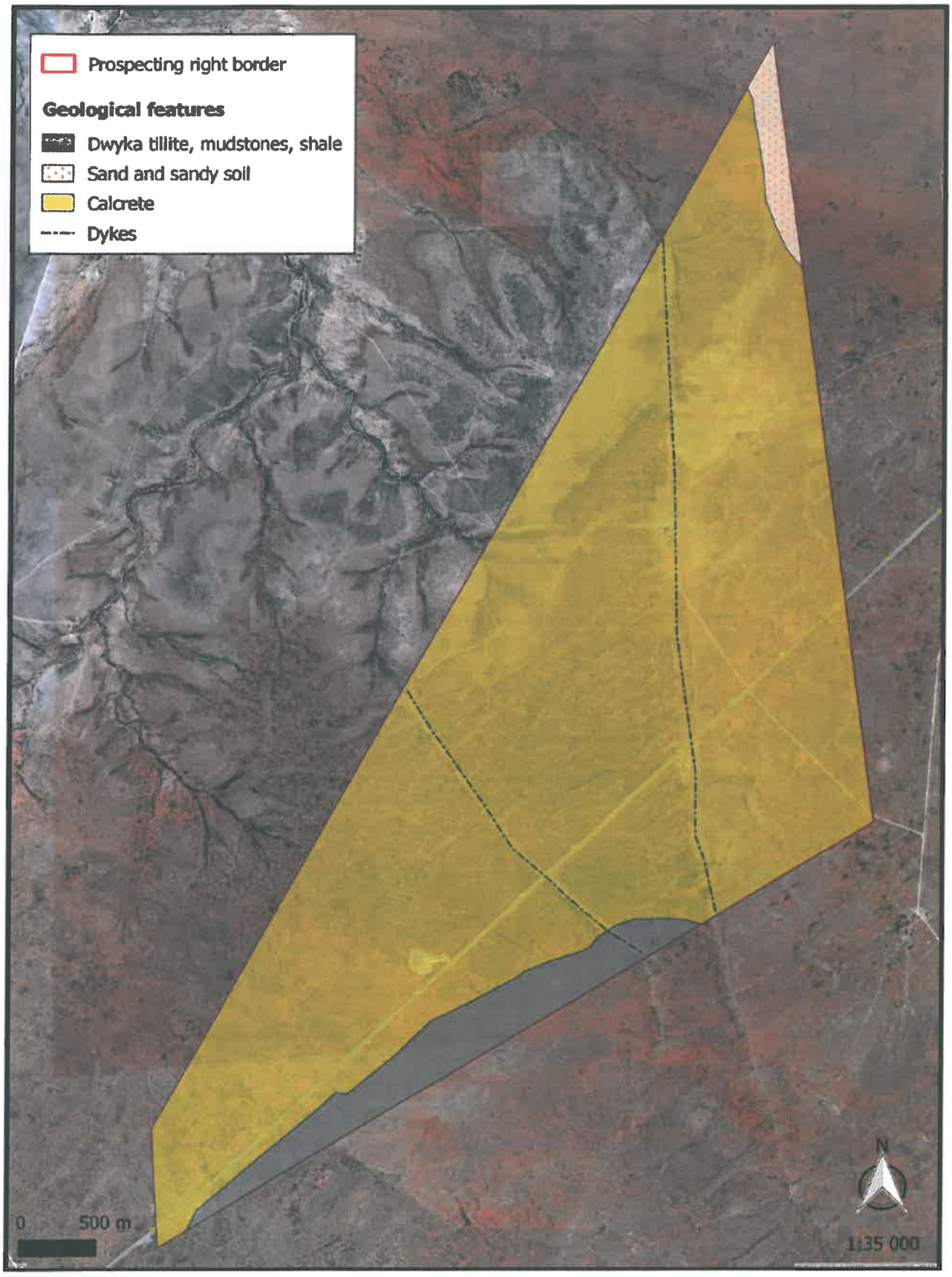


Figure 6. The Distribution of geological features in the vicinity of the study area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

(5) *LAND CAPABILITY AND LAND USE:*

Boscia Ecological Consulting CC has been appointed by Paul to provide an Ecological assessment in order to highlight the ecological characteristics of the proposed prospecting area, and to determine the possible impact of prospecting on the diversity and ecological status of the application area.

The major land uses in the region are mining and agriculture. The site is classified as non-arable with low potential for grazing land and is generally not suited for cultivation.

Apart from the current prospecting application by Paul Thukgwi for diamonds, Viegulands Put is mainly used as grazing land for goats and cattle. A farmstead, with kraals and workers quarters, is also situated on the property. Historic activities on site are signified by remnants of burrow pit excavations and old cultivation fields, which are still clearly visible today. (Ecological Assessment Report Annexure B of September 2017 p 20 by Boscia Ecological Consulting CC).

(6) *NATURAL FAUNA:*

Boscia Ecological Consulting CC has been appointed by Paul to provide an Ecological assessment in order to highlight the ecological characteristics of the proposed prospecting area, and to determine the possible impact of prospecting on the diversity and ecological status of the application area.

Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats (terrestrial and aquatic) and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
  - indicates identified habitats and fauna and flora species,
  - indicates the ecological sensitivity of habitats and conservation values of species,
  - determines the potential impacts of the project on the ecological integrity,
  - provides mitigation measures and recommendations to limit project impacts,
  - indicate ecological responsibilities pertaining to relevant conservation legislation.

This ecological assessment report attached as Annexure B describes the ecological characteristics of the proposed prospecting area, identifies the source of impacts from prospecting operation, and assesses the impacts, as well as the residual impacts after closure.

Desktop survey

A desktop survey was undertaken to obtain lists of mammals, reptiles, amphibians and birds which are likely to occur in the study area. These 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 and Gibbon (2006) for birds.

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, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.

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

Field survey

The faunal field survey was conducted concurrent with the vegetation survey. Habitats on site were assessed to compare with the habitat requirements of Red Data species. The presence of faunal species was determined using the following methods:

- Identification by visual observation,
- Identification of bird and mammal calls,
- Identification of signs (spoor, faeces, burrows and nests).

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 landscape features, i.e. plains, ridges, ephemeral pans and drainage lines provide the potential for a variety of habitats to faunal communities. The micro-habitats provided by pristine terrestrial vegetation are likely to host a variety of small mammals and reptiles, while the ephemeral pans are likely to accommodate a number of aquatic species and important bird species when inundated. The number of trees and tall shrubs across the site also provide ample breeding and nesting sites for birds.

As many as 50 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2), of which Steenbok, South African Ground Squirrel, Yellow Mongoose and signs of recent Aardvark, Cape Porcupine and African Mole Rat activity were encountered during the site visit.
Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Eighteen mammal species of conservation concern potentially occur in the area (Table 8) in the ecological report, of which 12 are listed either in the IUCN or South African Red Data Book. Those that are specially protected are also indicated in Table 8 of the ecological report.

Ground Pangolin, South African Hedgehog and Black-footed cat may potentially occur on site on account of their preferences for arid areas. They are however rather skittish and therefore they will most likely occur very seldomly. The Brown Hyaena might be present, but 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. (Ecological study by Boscia Ecological Consulting CC **S**eptember 2017, Annexure B)

Reptiles

The Viegulands Put prospecting area lies within the distribution range of at least 36 reptile species (see Appendix 2) of which the spotted sand lizard was encountered during the field survey. Reptiles expected to be associated with the ephemeral pans, include the marsh terrapin, especially during periods of inundation. No listed species are known to occur in the area, but most reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA (see Appendix 2). Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard) and Chamaeleo dilepis dilepis (Namaqua Chamaeleon). (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

Amphibians

Eleven amphibian species are known from the region (Appendix 2), indicating that the site does not potentially have a diverse frog community. This is however normal for an arid area. No natural permanent water was observed in site that would represent suitable breeding habitats for most of these species, but the ephemeral pans will be important during periods of inundation. As a result, only those species which are relatively independent of water are likely to occur regularly in the area.

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). (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

Avifauna

The study site does not fall within or near; i.e. within 100 km, of any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 261 bird species have been recorded from the region and all of these species are protected either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). This suggests that the area has been reasonably well sampled and that the species list is likely to be fairly comprehensive.

As many as 25 listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened or Endangered. Trees and shrubs, especially Senegalia mellifera was observed to be key hosts for bird nests on site.

All birds are protected either according to Schedule 1, 2 or 3 of NCNCA. Those that are specially protected (Schedule 1) are also listed in Table 9. A number of these are expected to occur on site either as residents or by occasionally passing over the area. Of these, the Kori Bustard was seen during the site visit. 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. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

(7) NATURAL VEGETATION:

Boscia Ecological Consulting CC has been appointed by Paul to provide an Ecological assessment in order to highlight the ecological characteristics of the proposed prospecting area, and to determine the possible impact of prospecting on the diversity and ecological status of the application area.

Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats (terrestrial and aquatic) and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
  - indicates identified habitats and fauna and flora species,
  - indicates the ecological sensitivity of habitats and conservation values of species,
  - determines the potential impacts of the project on the ecological integrity,
  - provides mitigation measures and recommendations to limit project impacts,
  - indicate ecological responsibilities pertaining to relevant conservation legislation.

This ecological assessment report attached as Annexure B describes the ecological characteristics of the proposed prospecting area, identifies the source of impacts from prospecting operation, and assesses the impacts, as well as the residual impacts after closure.

Data collection

The study comprised a combination of field and desktop surveys for data collection on fauna, flora and wetland habitats in order to obtain the most comprehensive data set for the assessment. The fieldwork component was conducted on 19 and 20 August 2017 and most data for the desktop component was obtained from the quarter degree squares that include the study area (2923AC and 2923 CA).

Field survey

For the field work component, satellite images were used to identify homogenous vegetation units within the proposed prospecting area. Representative sampling plots were allocated in these units and sampled with the aid of a GPS in order to characterise the species composition. The following quantitative data was collected:

- Species composition

- Species percentage cover
- Amount of bare soil and rock cover
- Presence of biotic and anthropogenic disturbances

Additional checklists of plant species were compiled during the surveys by traversing a linear route and recording species as they were encountered in each unit.

Desktop survey

For the desktop component, the South African National Vegetation Map (Mucina and Rutherford 2006) was used to obtain data on broad scale vegetation types and their conservation status.

The South African National Biodiversity Institute's (SANBI) BGIS database was also consulted to obtain information on biodiversity information for the Siyathemba Local Municipality (NC077), 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 quarter degree squares that include the study area. 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).

Broad-scale vegetation patterns

The study area falls within the Nama-Karoo Biome (Mucina and Rutherford 2006). According to the vegetation map of Mucina and Rutherford (2012), only one broad-scale vegetation units is present on site, i.e. Northern Upper Karoo. This vegetation map however does not reflect the true character of the site, because it has not been mapped at a very fine scale.

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. The geology and soil of this unit varies greatly. Geology include Shales of the Volksrust Formation, Dwyka Group Diamictite, Jurassic Karoo Dolerite sills and sheets, and calcretes of the Kalahari Group. Soils

range from shallow to deep, red-yellow, apedal, freely drained 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.

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. Prosopis glandulosa, a significant alien invader, is widely distributed in this unit. (Ecological Assessment Report September September 2017 p25- 27 by Boscia Ecological Consulting CC).

Fine-scale vegetation patterns

The plant communities within the study area are delineated according to plant species correspondences, change in soil structure, topographical changes and disturbance regimes. The vegetation on site can be divided into five distinct units and are described in the ecological report as Annexure B. These community descriptions include unique characteristics and the dominant species found in each unit. A complete plant species list, including those species likely to occur in the area is presented in Appendix 1 of the Ecological Assessment Report. (Ecological Assessment Report September 2017 p28 by Boscia Ecological Consulting CC).

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.

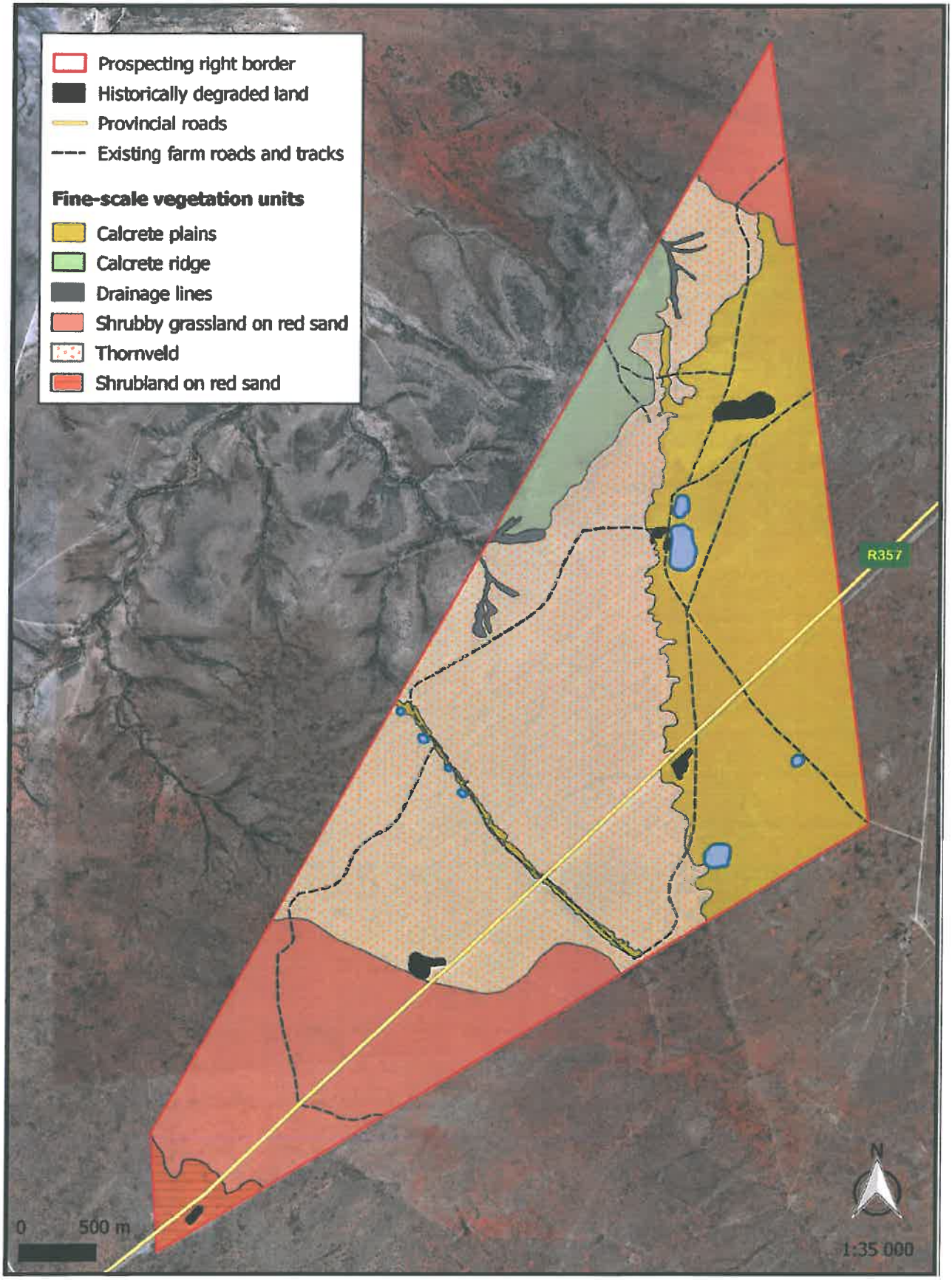


Figure 7. The distribution of fine-scale plant communities in the study area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Most species recorded in the area are classified as least concern; a category which includes widespread and abundant taxa (Table 3). One species, i.e. Hoodia gordonii is classified as Data Deficient - Insufficient Information (DDD). According to SANBI (2017), it is a widespread species that has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. Unfortunately, data do not exist to quantify the degree of decline to the population. As a result, research on population recovery post harvesting and degree of impact of the harvesting over the past 10 years is required before this species can be accurately assessed. This species was not encountered during the site visit, but the landowner confirmed that they do occur on site. They are most likely to be found on the stony habitats of the study area.

Species from the study area that are protected in terms of the National Forests (NFA) Act No 84 of 1998 (Table 3) includes Boscia albitrunca. This species is also protected according the NCNCA. It is widespread across the property, with the most pronounced occurrence in the Thornveld and drainage lines at high densities of five individuals per hectare. They are mainly found as trees of up to 3 m in height and 5 m in canopy width, but smaller individuals as small as 80 cm x 80 cm also occur. It is predicted that many of these individuals will be affected by the Viegulands Put prospecting operation. In order to damage or remove any protected trees (seedlings to adults) an application must be submitted to the Northern Cape Department of Agriculture, Forestry and Fisheries (DAFF) and a licence obtained from DAFF at least three months prior to such activities.

Specially protected species in terms of Schedule 1 of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009 (Table 3) that are known from the study area include Hoodia gordonii. Those protected in terms of Schedule 2 of the NCNCA are listed in Table 3. Apart from the already mentioned Boscia albitrunca, others that were encountered during the site visit include Aloe claviflora and Nymania capensis. Aloe claviflora is mainly found on the calcrete plains at low densities of <1 per hectare and an average size of 50 cm x 60 cm, while N. capensis is restricted to the calcrete ridge at high densities of eight individuals per hectare and an average size of 1 m in height and 50 cm in width. The remaining species (Euphorbia braunsii, Lithops sp. and Larryleachia sp.) were not encountered during the field survey, but the land owner confirmed that they also occur on the rocky habitats of the property.

A projection for species of conservation concern is presented in Table 4 and a photographic guide to those species is attached as Appendix 3.

Please note that the projections are only rough estimates to provide some form if indication as a guideline for species to be affected. It is impossible to confirm at this stage how large the final affected area will be as well as exactly where the project activities will take place. Therefore a "worst-case scenario" approach was applied on the assumption that at least half of each community will be transformed by the operation.

Table 4. Plant species found in the study region that are of conservation concern.

FAMILY	Scientific name	Status	NFA	NCNCA
APOCYNACEAE	***Hoodia gordonii***	**DDD**		**S1**
APOCYNACEAE	*Larryleachia sp.*	-		S2
ASPHODELACEAE	*Aloe claviflora*	LC		S2
CAPPARACEAE	*Boscia albitrunca*	LC	X	S2
EUPHORBIACEAE	*Euphorbia braunsii*	LC		S2
MELIACEAE	*Nymania capensis*	LC		S2
MESEMBRYANTHEMACEAE	*Lithops* sp.	-		S2

In addition to those protected species listed above; 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. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

Weeds and invader plant species

Weeds and invasive species are controlled in terms of the National Environmental Management: Biodiversity (NEMBA) Act 10 of 2004, the Conservation of Agricultural Resources (CARA) Act 43 of 1993, as well as the NCNCA (Schedule 6). These are species that do not naturally occur in a given area and exhibit tendencies to invade that area, and others; at the cost of locally indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds and invader species into categories (see Table 5). All declared weeds and invasive species recorded in and around the study area are listed in Table 6, along with their categories according to CARA, NEMBA and NCNCA. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

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 were recorded in and around the study area, are listed in Table 7. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

Table 5: The categorisation of weeds and invader plant species, according to NEMBA and CARA. . (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

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

Table 6. A list of declared weeds and invasive species recorded in the study area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Scientific name	Common name	CARA	NEMBA	NCNCA
Argemone ochroleuca	White - flowered Mexican poppy	1	1b	S6
Datura ferox	Large thorn apple	1	1b	S6
Prosopis glandulosa var. *glandulosa*	Honey mesquite	2	3	S6
Xanthium spinosum	Spiny cocklebur	1	1b	S6

Table 7. A list of declared indicators of bush encroachment in the Northern Cape recorded in the study area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Scientific name	Common name
Senegalia mellifera	Black thorn
Vachellia tortilis subsp. *heteracantha*	Umbrella thorn
Rhigozum trichotomum	Three-thorn rhigozum

CONCLUSION, RECOMMENDATIONS AND OPINION REGARDING AUTHORISATION

Five plant communities were identified on site of which all are included in the earmarked area to be affected by prospecting activities. The watercourses include several ephemeral pans and drainage lines, which are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. The calcrete ridge, calcrete plains, thornveld and grassland on sand are all considered to be of high sensitivity, on account of the high number or frequency of species of conservation concern found here and/or the important faunal habitats they provide. The most profound impacts are expected to be related to the destruction of watercourses and the alteration of aquatic habitats; which in turn will cause cumulative fragmentation of important ecological corridors in the area.

Species of conservation concern that are found in these earmarked habitats will most likely also be lost locally. These include the widespread Boscia albitrunca as well as Nymania capensis and Aloe claviflora commonly found on the calcrete plains and ridge, respectively. Similarly, the prospecting operation will result in the large-scale clearance of indigenous vegetation. Additionally, any disturbances to the Aardvark burrows will displace this protected species locally. Permit applications regarding protected fauna and flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation or destruction of Aardvark burrows.

Furthermore, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries prior to any potential disturbances to B. albitrunca.
To conclude, it is clear that the destruction of the natural habitat within the study area is inevitable. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area. The majority of the site is in a pristine condition and are expected to be adversely affected. In my opinion, authorisation should not be granted unless the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

(8) ***SURFACE WATER***

Boscia Ecological Consulting CC has been appointed by Paul to provide an Ecological assessment in order to highlight the ecological characteristics of the proposed prospecting area, and to determine the possible impact of prospecting on the diversity and ecological status of the application area.

The Orange River is about 10km away from the application area. It is unlikely that the prospecting operation will negatively affect any surface water. The pans on the area will be protected as no prospecting will be done near or in the pans with buffer zones. This drainage channels and pans will only receive water when it rains.

The study area falls within the Boegoeberg quaternary catchments D71C and D71D of the Lower Orange Water Management Area. The quaternary catchments have both been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) by Smook et al. (2002) and information regarding mean annual rainfall, evaporation potential and runoff for the quaternary catchments is provided in Table 8. Watercourses on the study site that have been formally mapped include four ephemeral pans as well as drainage lines. However, after ground-truthing the site during the field survey, more ephemeral pans were discovered and the one second from the southern border was omitted. Please refer to the wetland assessment section for a complete account. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Table 8. Catchment characteristics for the Boesak quaternary catchments, as presented by Smook et al. (2002). (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Quaternary catchment	Mean Annual Rainfall (mm)	Mean Annual Evaporation (mm)	Mean Annual Runoff (10^6 m^3)
D71C	250	2 350	4.75
D71D	248	2 350	4.96

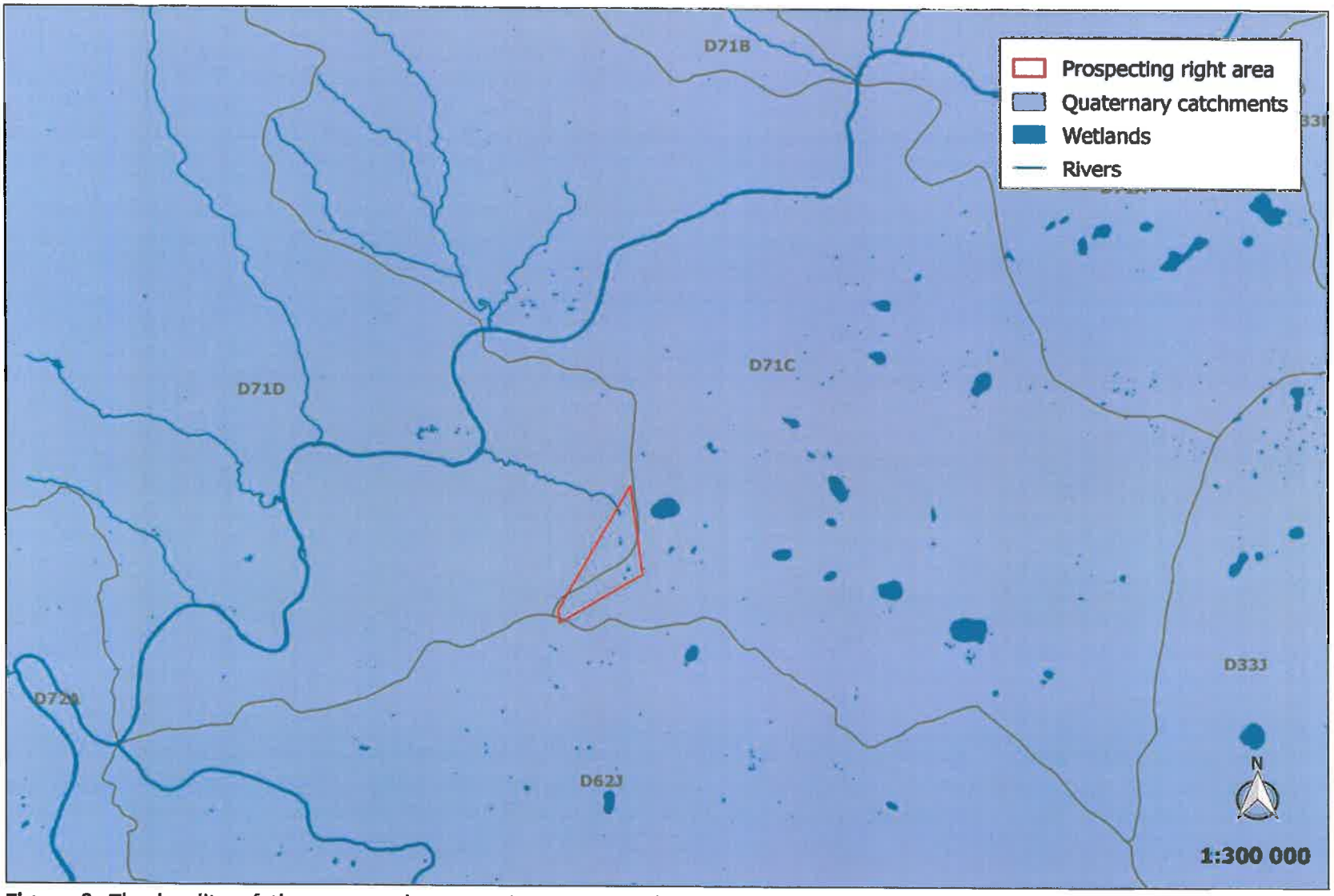


Figure 8. The locality of the proposed prospecting area in relation to the quaternary catchments of the Lower Orange Water Management Area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

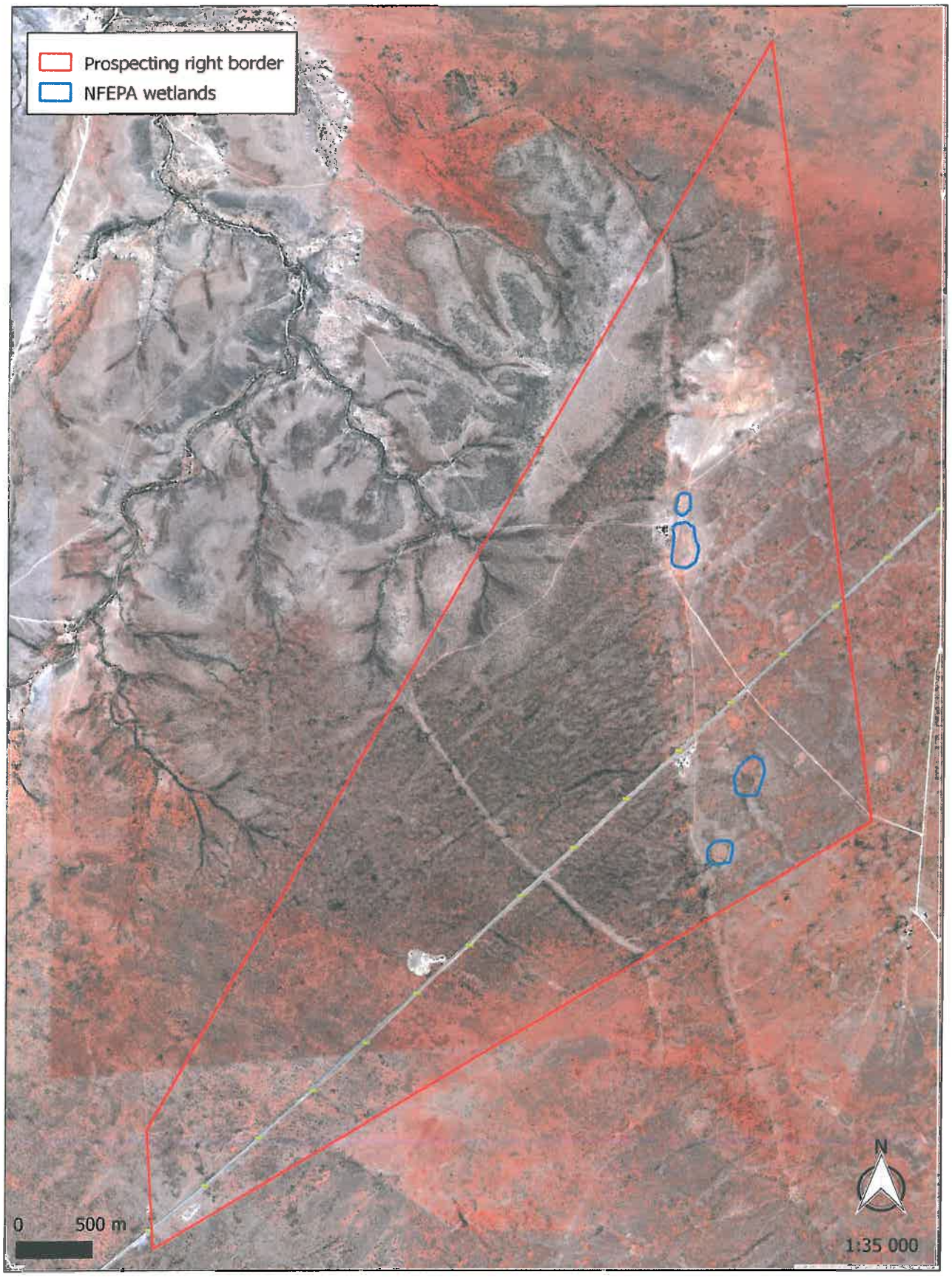


Figure 9. The location of formally mapped watercourses on the proposed prospecting right area. . (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Wetland Ecological Importance and Sensitivity

The EIS of pans on Viegulands Put were assessed as a collective, due to the fact that they are all similar in terms of ecological importance and sensitivity. The pans were rated to have a High EIS and are considered to be ecologically important and sensitive. The biodiversity of these pans may be sensitive to flow and habitat modifications.

The assessment was mainly based on a "wet scenario" and related information from similar wetlands in the region, because their ecological importance will primarily only manifest during times of inundation. A number of red listed water birds are expected to occur in the pans when they are inundated. These include the Chestnut-banded Plover, Maccoa Duck, Lesser Flamingo, Greater Flamingo and Greater Painted-snipe; which are all classified as Near-Threatened. Unfortunately, the pans of the Northern Cape have not yet been comprehensively surveyed for invertebrates and therefore it is difficult to state with confidence which species are present. However, it is known that the ephemeral pans host a number of Branchiopod species, which are unique to these wetlands. The egg-banks of these organisms are also found in the top soil layers of these pans.

The pans host fairly low species richness and habitat diversity compared to perennial wetlands, but they are considered to be moderately important breeding and feeding links in terms of connectivity, especially for the survival of wetland birds in South Africa during wet periods by providing stepping-stone corridors in an arid landscape.

The pans are considered to have a low sensitivity to changes in hydrology and water quality, because they flood infrequently (< annually). However, if these pans are inundated anthropogenically and for a prolonged period of time, they will lose their ability to sustain the unique aquatic communities, which are adapted for ephemerality, e.g. Branchiopod eggs require periods of desiccation for their life cycles to complete. The pans have moderate food storage, energy dissipation and element removal ability, mainly based on moderate roughness associated with the vegetation on these pans. The pans do not fall within any category of protected status that reflects its importance for conservation of ecological diversity at any scale, but are classified as a watercourse and therefore are protected on a National scale in terms of the National Water Act. Therefore they have been considered to have a high protected status. Furthermore, the reference flood regime and habitat have been insignificantly affected by human activity, which causes them to be rated with high ecological integrity. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

Surface water quality:

With the alluvial gravels not having any harmful or toxic substance, water emanating from the mine property will not contaminate any surface water source.

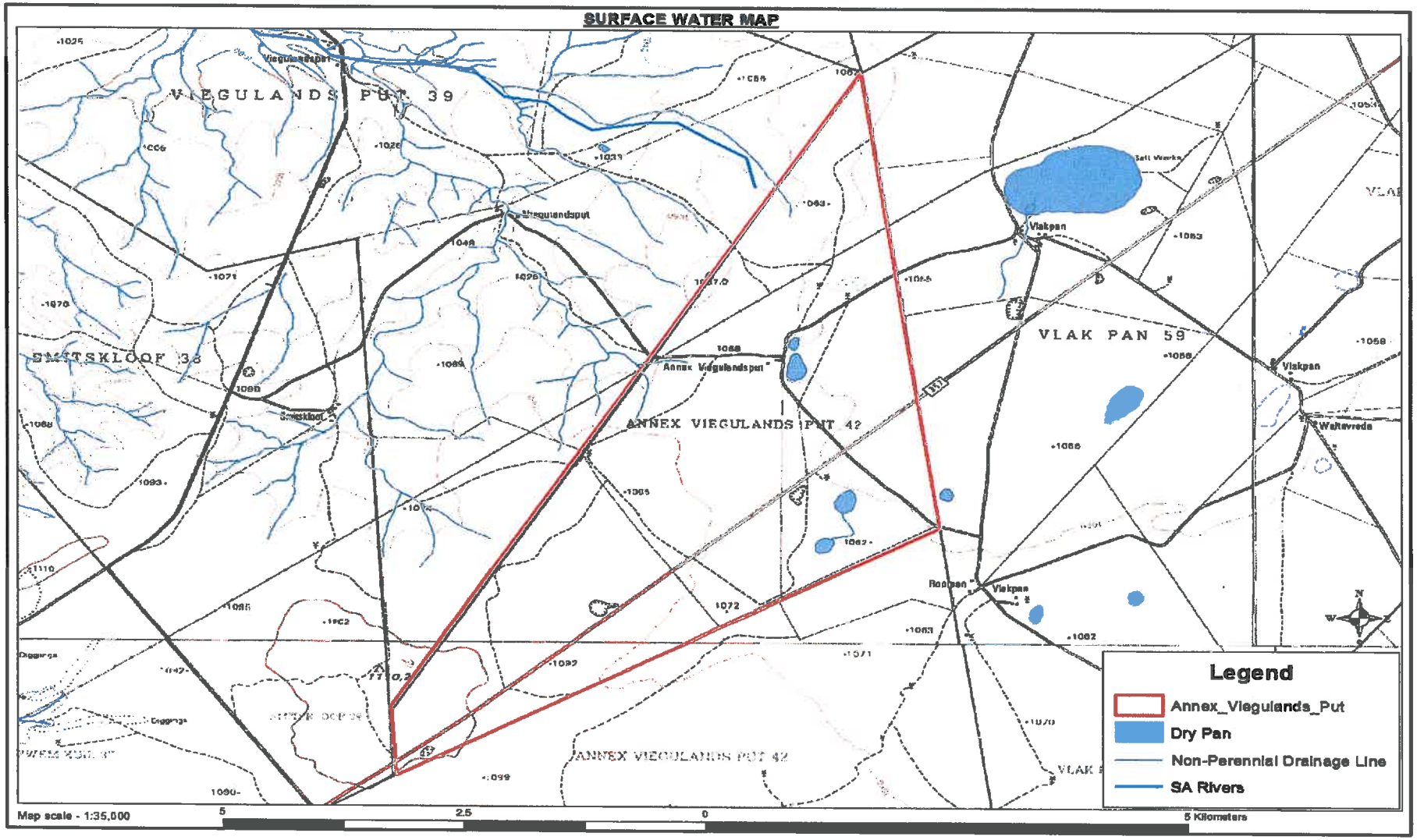


Figure 10. Surface Water Map with the Prospecting Right area indicated in red.

(9) GROUND WATER:

Depth of water-table(s):
Groundwater flow would follow the topography and the surface drainage direction from the higher area in the east towards the lower area in the west towards the Orange River.

Ground-water zone:
The diamond bulk sampling does not affect the quality of the ground water in any manner. There are no harmful or toxic properties in the gravels being mined. The recycling of the water only requires sediment settling, thus no aquifers and aquicludes are on the property.

Ground-water use:
At present ground water supplies drinking water to the animals present on the farm.

(10) 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 on the farm.

Existing sources
Current sources of impacts on air quality are the dust from unpaved gravel roads. Prospecting activities such as excavation and gravel roads from where the tar road end to the prospecting site will add impact on the environment.

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

New source
The source of air pollution on the farm will be nuisance dust generated by the opencast bulk sampling process, the loading of gravels onto the transport trucks, the dumping of gravels over each sites primary screen or feeder bins as well as from the movement of trucks and vehicles on the prospecting roads. Gas emissions from machinery will be within legal limits.

Areas of impact
As the prevailing wind direction for the area is north to North West for the months January to September and changing from north to sometimes westerly winds during October to December, there is a potential for fall-out dust to impact on the surrounding properties –

which can be described as the nearest potential area of impact. The dust management programme recommended should include daily dosing of access roads and stockpile areas if the bulk sampling stage is reached.

The dust is controlled by watering down the roadway used by these trucks while bulk sampling. The mineral processing is a wet process, thus no dust is generated.

A complain register for surrounding owners and the community will be kept on site and the management of dust would be guided by these additionally comments of public.

Noise
Existing sources:
Existing sources:
Noise on site will come from the large vehicles (tip trucks, front-end loader, back actor), from the working pan.
There are mining operations on both sides of the proposed prospecting operation. Although these operations do generate noise the overall impact can be described as negligible.

The impact would be of more importance regarding the direct worker environment that should adhere to the requirements in terms of the Mine Health and Safety Act. These noise levels will be continuous and the operators will be issued with earplugs.

Noise is normally encountered during the normal operation hours at the processing plant. Processing plant noise and mine vehicles are limited between 7am and 5pm every day during the week. Noise levels will be monitored on the Prospecting area and where necessary, protective equipment is used in certain areas where machinery is used.

(11) VISUAL ASPECTS:

The prospecting site can be visible form the R357. The negative visual impacts associated with open pits for the bulk sampling and the washing pan will however have a low negative impact since it will be visible to the landowners and can be visible from the R357. There is however no method of reducing the impact during bulk sampling operations (operational phase), it can only be mitigation by doing concurrent rehabilitation of open pits as prospecting progress.

(12) BROAD-SCALE ECOLOGICAL PROCESSES:

The proposed prospecting site does not fall within any formally protected area or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation unit of the study area (Northern Upper Karoo) is classified as least threatened and therefore no formal fine-scale conservation planning has been conducted.

However, the site does contain a number of Critical Biodiversity Areas in relation to the Northern Cape Critical Biodiversity Areas Map (Figure 11). Three formally mapped pans in the south-east (although one has been omitted as a pan in this assessment) are classified as Critical Biodiversity areas, along with their buffer zones. The pans in the north-east are classified as Ecological Support Areas, along with the ridge and drainage lines in the north. The Siyathemba Integrated Development Plan also promotes the conservation of ridges and wetland areas within the district. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

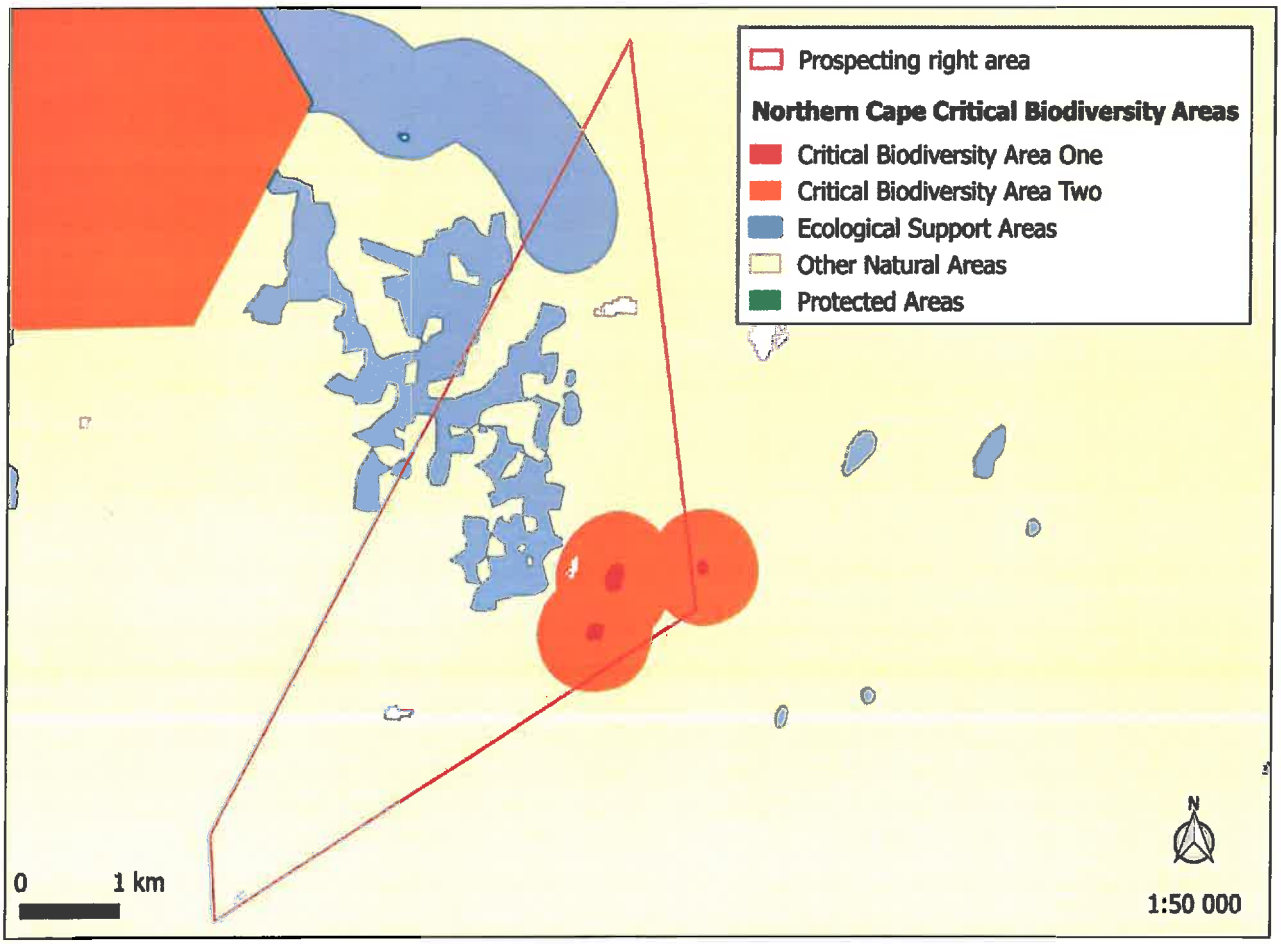


Figure 11. The study area in relation to the Northern Cape Critical Biodiversity areas. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

All of the ephemeral pans of the study area have been classified by the Wetland Freshwater Priority Areas project as wetlands with a Present Ecological State (PES) of "AB", which means that the pans are in a Natural or Good condition. Furthermore, none of the pans have been identified as significant wetlands in terms of Ramsar sites, IUCN Frog localities, threatened water bird localities or Crane breeding grounds.
The mine itself is expected to cause habitat transformation through the excavation of large open pits, and will thereby contribute to cumulative habitat loss and the disruption of the broad-scale landscape connectivity in the region. The study area falls within a zone where one of South Africa's largest economically most important alluvial deposits of diamonds are found (Figure 12). The primary secondary source of alluvial diamond deposits in the Northern Cape extends along the Orange and Vaal Rivers (Gresse 2003), while the most significant crop irrigation in the Northern Cape also stretches along these rivers (Durand 2006). According to Mucina et al. (2005), the highest proportion of any type of transformation in the Nama-Karoo Biome is the clearance of the Northern Upper Karoo for cultivation. The cumulative impacts in the vicinity of the study area are therefore considered to be very high.

Figure 12. The distribution of crop irrigation along the Orange River (bottom) north of Prieska. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

(13) SOCIO-ECONOMIC STRUCTURE OF THE REGION:

Siyathemba Municipality is a Category B Municipality (NC077), established in 2001, in accordance with the demarcation process. The Municipality is located within the central eastern parts of the Northern Cape Province on the banks of the Orange River, and falls within the boundaries of the Pixley Ka Seme District. The nearest business centre is Kimberley, which is about 220km away.

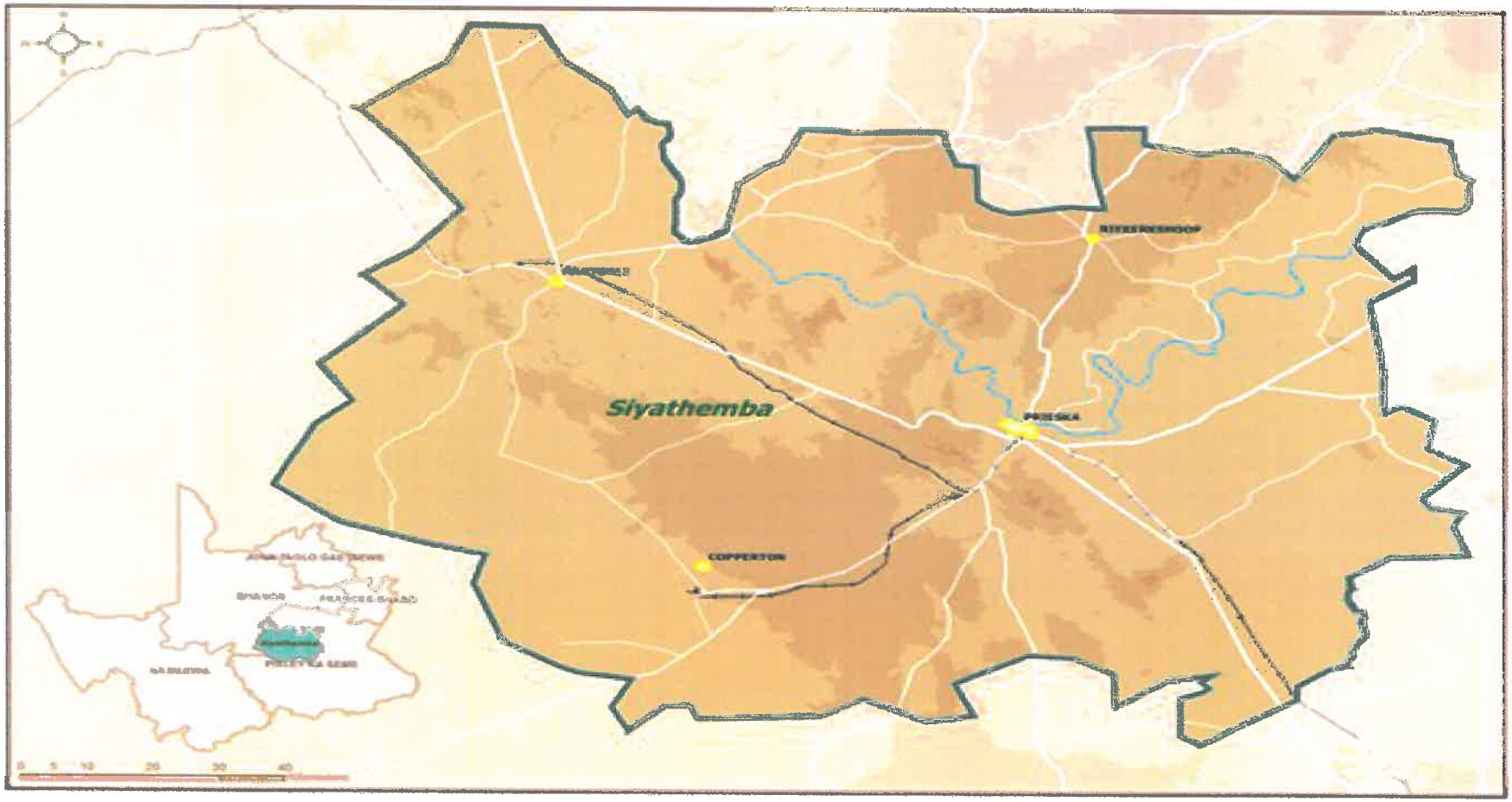


Figure 13. Locality Map

Siyathemba Municipality was initially made up of three entities, namely, Prieska, Marydale and Niekerkshoop. After demarcation the area was extended to include not only the towns and surrounding suburbs of Marydale, Niekerkshoop and Prieska but also Copperton. Copperton is an old mining town that was sold to a private owner after the closing of the Mine. The town is currently on a long terms lease by the Request Trust. Some of the houses were initially demolished and after the lease agreement was signed with the Request Trust, an agreement was reached that the rest of the houses could be retained. An agreement was reached between the Lessee and Alkantpan (Armscore) for the delivery of water, sanitation, and electricity services. Armscore also maintained one of the main roads.

The municipal area encompasses a geographic area of approximately 8,200km², which implies that Siyathemba Municipality accounts for 8% of the total district surface area and approximately 3% of the provincial area. The Municipality is divided into 4 Wards.

Table 9: Local Municipality Structure

Ward	Area
Ward 1	e'Thembenin in Prieska
Ward 2	Prieska
Ward 3	Section in Prieska including Copperton, farms and Marydale town
Ward 4	Section in Prieska, farms in Niekerkshoop

Population

The local and regional population is illustrated in the table below. From this table, it is evident that the Siyathemba Municipality had a local population of just more than 21,000 people during 2010.

Table 10: Regional Population by Age

		Population		Age Structure					
				Less than 15		15- 64		65 plus	
		2001	2011	2001	2011	2001	2011	2001	2011
DC 07	Pixley ka Seme DM	166547	186351	32.6	31.6	61.5	62.4	5.9	6.1
NC 071	Ubuntu	16375	18601	33.2	33.3	61.1	61.1	5.7	5.6
NC 072	Umsobomvu	23641	28376	33.7	31.4	61	62.8	5.3	5.8
NC 073	Emthanjeni	35785	42356	31.6	31.7	62.4	62.5	6	5.8
NC 074	Kareeberg	9488	11673	32.6	29.4	59	62.5	8.4	8.1
NC 075	Renosterberg	9070	10978	32.9	32.8	60.6	61	6.5	6.2
NC 076	Thembelihle	14467	15701	32.1	30.9	61.9	62.8	5.9	6.4
NC 077	Siyathemba	18445	21591	33.7	30.8	60.4	63.2	5.9	6
NC 078	Siyancuma	39275	37076	32.3	32.2	62.1	62.2	5.6	6

	2004	2006	2008	2010	2011
South Africa	46,745,940	47,827,370	48,911,245	49,991,472	-
Northern Cape	1,088,672	1,089,227	1,093,823	1,103,918	-
Pixley Ka Seme	190,396	185,334	180,082	179,507	186,351
Siyathemba	21,441	21,312	21,239	21,333	21,591

Source: Statistics South Africa 2011

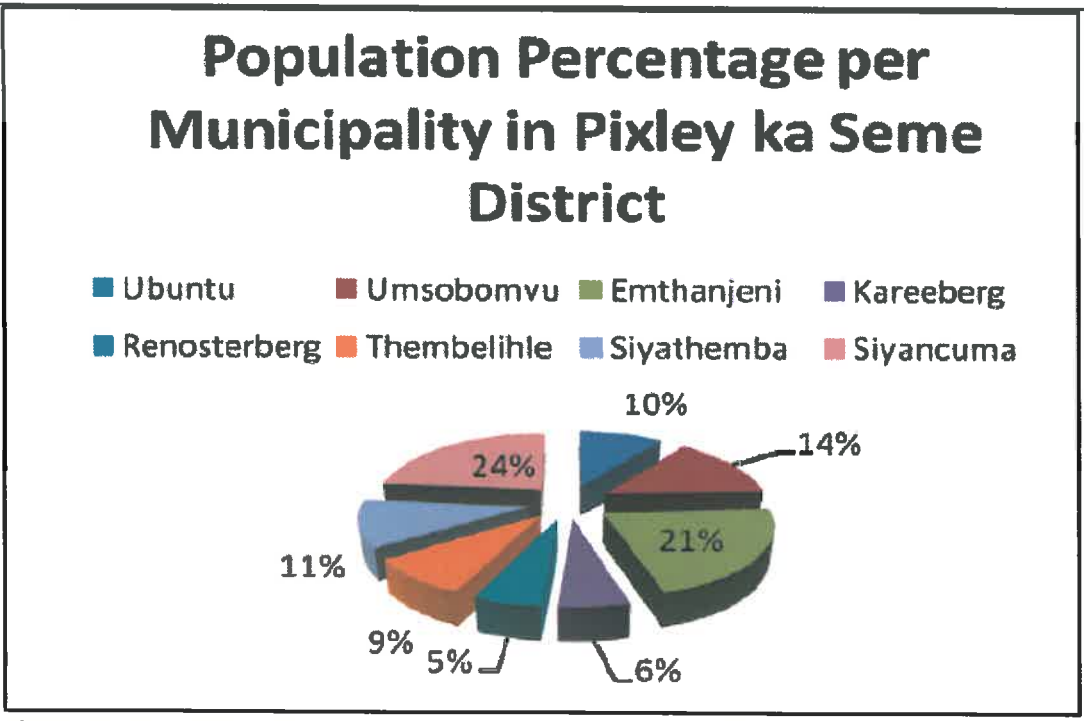


Figure 14. Population Percentage Source: Statistics South Africa 2011

In regional context, this meant that the Siyathemba Municipality contributed 11.9% to the District population (i.e. the second largest Local Municipality in the District by population) and 1.9% to the population of the Northern Cape.

The most dominant population groups is Coloured. This group represents 80% of the total population in the municipal area. The other groups are black (12%) and white (8%).

Afrikaans is the most widely spoken language (78%). There are a significant number of people which speaks other languages. A total of 824 people indicated that IsiNdebele is their first language and 91 people speak Setswana.

Age & Gender Composition	The Age & Gender Profile of the local population is illustrated by Table 11. With regards to this profile, the following observations were made:

Table 11: Age & Gender Profile

Municipality	Black African		Coloured		Indian or Asian		White		Other	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Ubuntu	2073	1890	6288	6690	51	45	702	708	114	42
Umsobomvu	8532	9222	4161	4512	96	57	780	825	120	66
Emthanjeni	6879	7179	11865	12573	153	81	1653	1734	171	66
Kareeberg	348	210	4830	5106	27	27	510	555	39	18
Renosterberg	1758	1857	3072	3225	36	21	462	480	42	21
Thembelihle	1245	1143	5508	5601	69	12	1101	954	54	15
Siyathemba	2076	1974	7659	7863	66	45	891	936	69	9
Siyancuma	6147	6075	10581	10719	144	105	1395	1383	303	222

- There were slightly more females (51.4%) than males (48.6%) among the local population during 2010. It was, however, noted that the population became slightly less female dominant since 2000, when 52.4% of the population were female.
- The working age group (15 to 64) contributed 64.4% to the local population in 2010. This age group has increased proportionately (from 58.6% to 64.4%) in relation to the other age groups. Since 2000, this group increased by approximately 1,210 people.
- The working population is slightly male dominant. Since 2000, male working age population increased by around 928 men in absolute terms whiles the number of women increased by about 282.
- The age dependency ratio declined from 0.7 in 2000to 0.6 dependants (children & the elderly) in 2010for every working age adult.
- Since 2000, the proportion of children under the age of 15 declined by 6.7%. This means that the age profile of the local population is becoming older. The number of children in the area also declined from around 14,700 during 2000 to just above 12,000 in 2010.

	The population of Siyathemba declined from just over 21,370 people in 2000 to about 21,330 in 2010. This implies that the population contracted by 0.4% on average per annum. This growth rate is slightly lower in the Pixley Ka Seme District Municipality, which contracted 0.7% p.a. The decline of the Siyathemba population was mainly driven by lower fertility rates.
HIV/AIDS Prevalence	In the Draft LED Strategy for Siyathemba Municipality, reference is made to the HIV/AIDS prevalence in the area. It is indicated that data from the Actuarial Society of South Africa was used. During 2010, the HIV/AIDS prevalence rate of the Siyathemba population was 6.0% compared to the District rate of 6.5%. These rates compared well to the Northern Cape (7.6%) and South Africa (12.6%) averages in the same year.
Water	Table 12 below gives a comparative indication of the status of water provisioning in the district as captured during the 2001 census.

Table 12: Source of water per Local Municipality

	Regional/local water scheme (operated by municipality or other water services provider)	Borehole	Spring	Rain water tank	Dam/pool /stagnant water	River/ stream	Water vendor	Water tanker	Other	Grand Total
Ubuntu	3477	1215	36	24	210	6	3	117	30	5118
Umsobomvu	6546	831	12	12	147	39	33	153	57	7830
Emthanjeni	9183	1068	15	21	33	3	33	51	36	10443
Kareeberg	2298	774	3	18	24	-	9	81	12	3219
Renosterberg	2394	450	6	3	69	48	-	15	9	2994
Thembelihle	3117	831	3	6	21	114	3	42	3	4140
Siyathemba	4539	762	-	3	66	336	6	75	30	5817
Siyancuma	6348	1677	72	18	135	780	48	408	93	9579
Grand Total	37902	7608	147	105	705	1326	135	942	270	49140

	Source: Statistics South Africa 2011 Significant progress has been made regarding the provision of water but backlogs still exist. 95% of the households in the district are provided with free basic water (FBW) which is above the provincial average of 87,7%. Only 3% of households had NO access to piped water, 46% had piped water inside dwellings by 2011. Piped water inside dwellings is about 47.00%. The table below indicates that provisioning of FBW for all municipalities in the district.

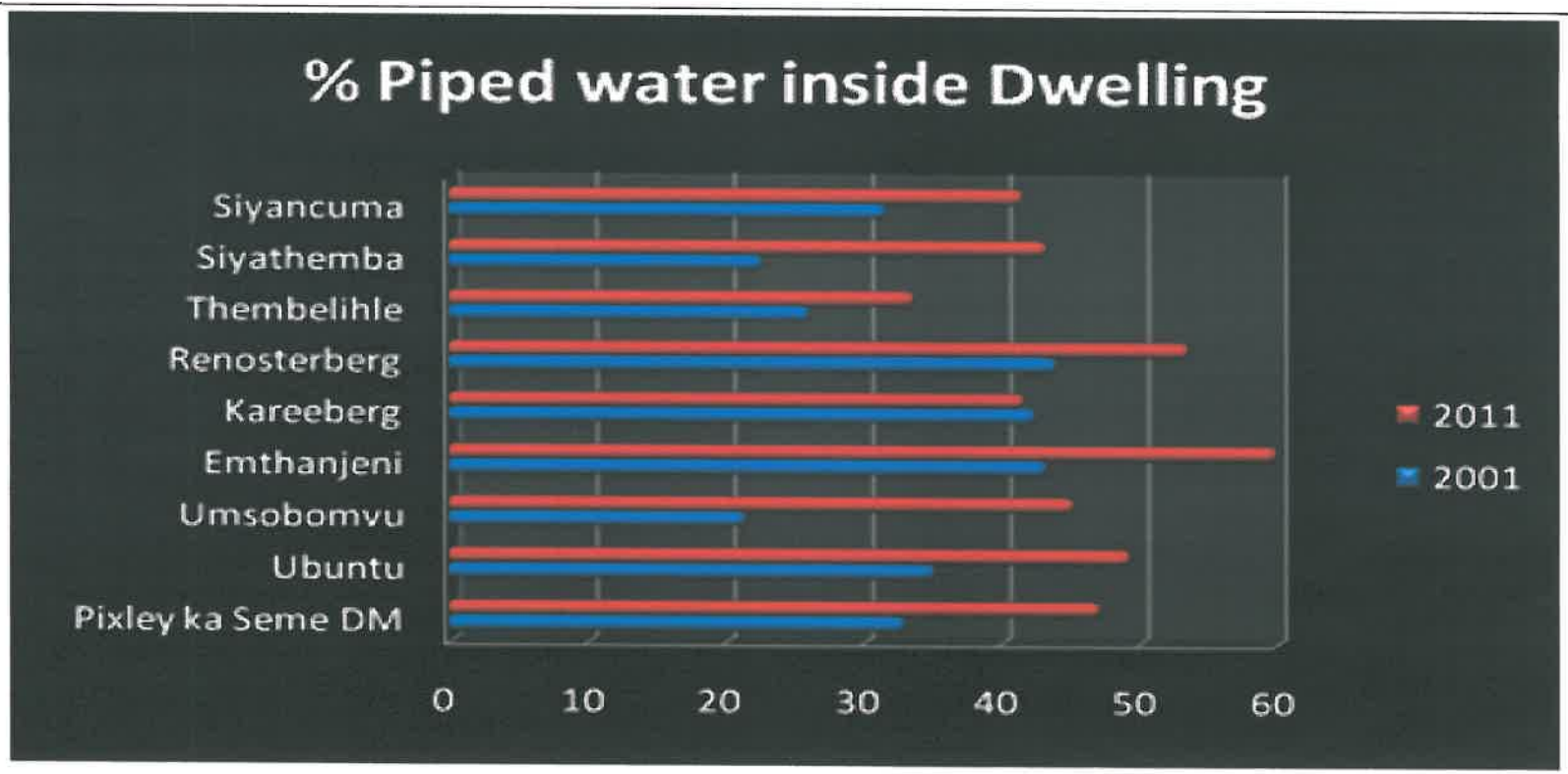


Figure 15. Piped Water inside Dwelling Source: Statistics South Africa 2011

Table 13: Access to water by households

	Piped (tap) water inside dwelling/institution	Piped (tap) water inside yard	Piped (tap) water on community stand: distance less than 200m from dwelling/institution	Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	No access to piped (tap) water	Grand Total
Ubuntu	2526	2217	282	36	9	3	48	5121
Umsobomvu	3531	3702	381	108	6	6	93	7827
Emthanjeni	6249	3741	243	108	21	6	78	10446
Kareeberg	1338	1521	225	93	9	3	33	3222
Renosterberg	1599	1233	81	51	6	6	21	2997
Thembelihle	1389	1815	471	291	63	99	15	4143
Siyathemba	2508	2958	264	21	3	3	60	5817
Siyancuma	3957	3354	1227	483	213	18	327	9579
Grand Total	23097	20541	3174	1191	330	144	675	49152

Source: Statistics South Africa 2011

Even though many urban residents in the region have access to water and improved sanitation system, some local municipalities are still have water and sanitation backlogs. Siyancuma local municipality has the highest backlog. The table below gives a reflection of the current situation in the region as at March 2011.

Table 14: Backlogs March 2011

Municipality	Water	
	Formal	Informal
Emthanjeni	2	0
Ubuntu	0	0
Umsobomvu	2	0
Renosterberg	3	0
Kareeberg	0	0
Siyathemba	31	0
Siyancuma	66	667
Thembelihle	0	0
Total	104	667

Source: Statistics South Africa 2011

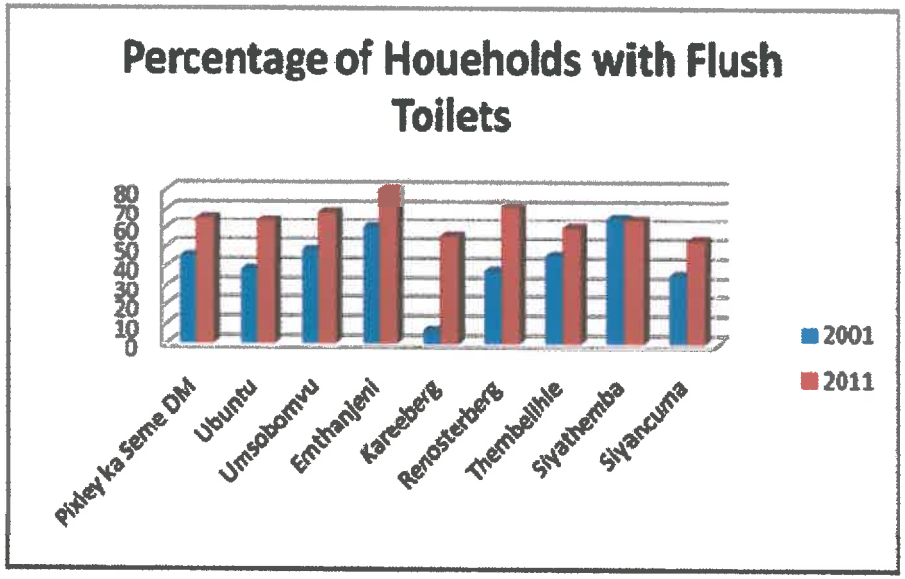


Figure 16. Households with Flush Toilets Source: Statistics South Africa 2011

Sanitation

Sewerage and sanitation are basic needs of communities which can pose serious health and hygiene risks for communities and the environment at large if not properly managed and monitored.

According to the White Paper on Basic Household Sanitation, 2001, basic sanitation is defined as:
"The minimum acceptable basic level of sanitation is:

- Appropriate health and hygiene awareness and behaviour;
- A system for disposing of human excreta, household waste water and refuse, which is acceptable and affordable to the users, safe, hygienic and easily accessible and which does not have an unacceptable impact on the environmental; and
- A toilet facility for each household."

Table 15 below provides an indication of the types as well as those without sanitation in the district:

Table 15: Sanitation per Local Municipality

	Flush toilet (connected to sewerage system)	Flush toilet (with septic tank)	Chemical toilet	Pit toilet with ventilation (VIP)	Pit toilet without ventilation	Bucket toilet
Ubuntu	3300	513	33	180	111	402
Umsobomvu	5388	414	222	852	75	117
Emthanjeni	8319	576	24	336	141	627
Kareeberg	1794	414	6	453	141	96
Renosterberg	2145	342	3	189	51	57
Thembelihle	2484	225	18	456	483	9
Siyathemba	3786	369	6	681	297	213
Siyancuma	5115	651	24	777	618	1152
Total	32331	3504	336	3924	1917	2673

The table and map above shows that, Pixley Ka Seme has Flush Toilets connected to sewerage at 65.70% households, Emthanjeni being the highest with 85.06% and Thembelihle being the east with 64.41%. However it must be mentioned that a project is currently in progress through funds from the Pixley Ka Seme District Municipality to replace buckets with the UDS system. The final 68 toilets have been finalised during this current financial year in Cambell. Full water borne sanitation is currently being constructed in Schmidtsdrift and the sanitation system will be completed with the completion of house structures.

Table 16: Sanitation backlogs 2011

Municipality	Sanitation	
	Formal	Informal
Emthanjeni	67	0
Ubuntu	1	0
Umsobomvu	2	205
Renosterberg	32	330
Kareeberg	0	126
Siyathemba	341	129
Siyancuma	2	872
Thembelihle	0	0
Total	445	1662

Refuse Removal

Weekly Refuse Removal in PKSA is about 72.60%. The number of households that are not provided with a refuse removal service in each municipality is indicated in the table below.

Table 17: Refuse Removal according to Census 2011

	Removed by local authority/private company at least once a week	Removed by local authority/private company less often	Communal refuse dump	Own refuse dump	No rubbish disposal	Other	Grand Total
Ubuntu	3417	39	108	1191	309	60	5124
Umsobomvu	5982	273	174	1245	132	24	7830
Emthanjeni	8709	216	90	1038	141	249	10443
Kareeberg	2283	15	15	762	111	33	3219
Renosterberg	2226	48	48	582	81	9	2994
Thembelihle	2832	33	189	564	483	39	4140
Siyathemba	4305	60	144	1062	234	15	5820
Siyancuma	5964	111	111	2568	741	84	9579
Grand Total	35718	795	879	9012	2232	513	49149

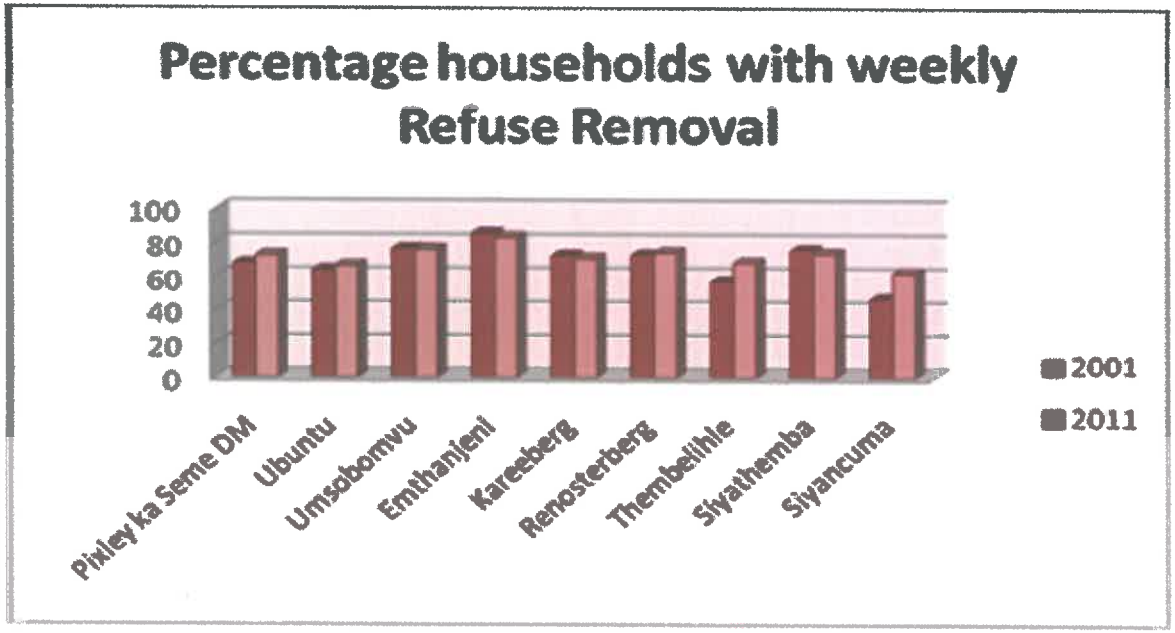


Figure 17. Households with weekly Refuse Removal Source: Statistics South Africa 2011

On refuse removal, the District has a backlog of 11 279 households. The local municipalities with the most backlogs (households that rely on their own refuse dumps or do no rubbish disposals at all) are Renosterberg, Thembelihle and Kareeberg. In Siyancuma, 3 299 out of 9 506 refuse removal backlogs (the highest backlogs in all the local municipalities). In Ubuntu, 1 416 out of 4 161 have backlogs and in Thembelihle 1 216 out of 3 592 households have refuse removal backlogs.

Electricity

The table below gives a comparative indication of the access to the source of energy in the district as captured during 2011 censuses.

The proportion of households using electricity for lighting has increased from 57% in 1996 to 84% in 2011. South Africa aims to ensure that by 2030 at least 90% of people have access to grid electricity. Increase in both demands and tariffs may slow down this last effort.

Households using electricity as a source of energy for cooking increased from 47,5% in 1993 to 73,9% in Census 2011.

Table 18: Energy for heating per Local Municipality

	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar
Ubuntu	3180	111	219	1356	81	3	18
Umsobomvu	2709	216	2721	1182	297	12	15
Emthanjeni	6921	258	1026	1131	402	36	42
Kareeberg	1617	141	63	1062	114	3	24
Renosterberg	1998	45	183	531	6	-	9
Thembelihle	1818	120	96	1362	9	-	24
Siyathemba	3057	69	51	2298	18	-	18
Siyancuma	5112	126	57	3480	93	3	21
Total	26412	1086	4416	12402	1020	57	171

Although relatively expensive, paraffin and gas are used on a limited scale for cooking and heating. Animal dung also features on a limited scale as energy/fuel source for cooking and heating in some rural areas.

Table 19: Energy for lighting per Local Municipality

	Electricity	Gas	Paraffin	Candles (not a valid option)	Solar
Ubuntu	4350	18	33	561	138
Umsobomvu	6801	15	135	855	15
Emthanjeni	9684	18	54	609	63
Kareeberg	2370	9	39	564	231
Renosterberg	2637	6	24	297	24
Thembelihle	3111	9	99	861	45
Siyathemba	5025	9	42	639	102
Siyancuma	7872	6	36	1551	75
Total	41850	90	462	5937	693

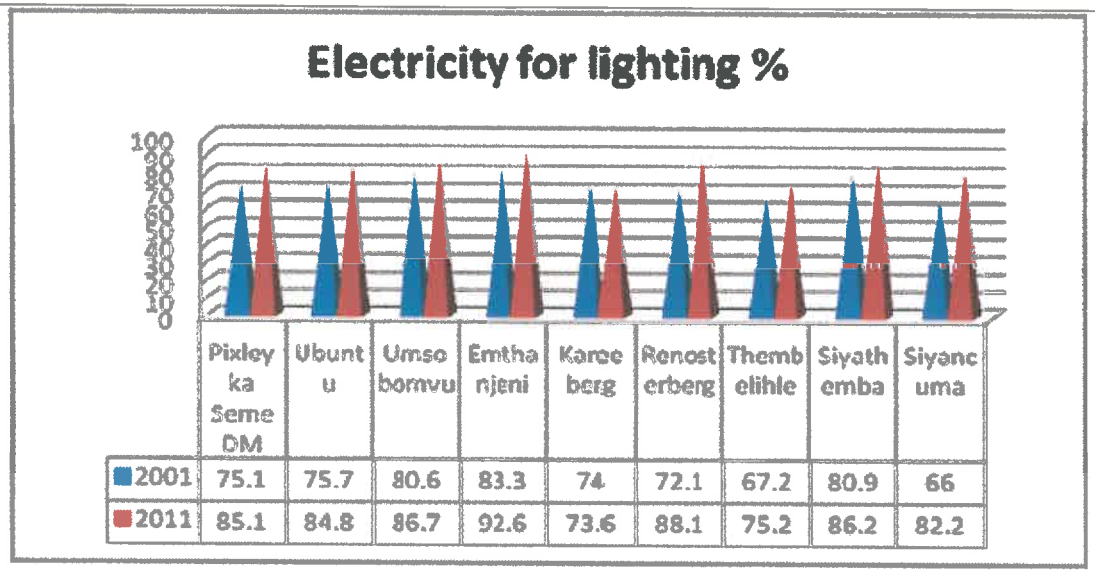


Figure 18. Electricity for lighting Source: Statistics South Africa 2011

The combination of low rainfall, relatively high population densities and the fact that most of the indigenous vegetation in the area is slow growing, have already resulted in over-utilisation of this renewable natural resource in certain places. Of major concern in this regard is wood harvesting and usage in the rural areas.

There has been an increase in the use of electricity as an energy source and a decrease in the use of paraffin, gas and candles as a source of energy/lighting. Siyancuma, Emthanjeni and Ubuntu have the highest number of backlogs, representing approximately 59,5% of the backlogs in the district.

All the Recent Information indicates that much of the district households 83% households have access to electricity for lighting and cooking purposes. As much as the existing situation is encouraging, it is however very important to note that some households (17%) are still using candles and paraffin as alternative power sources for meeting their power needs.

Housing	All local municipalities are composed of various residential components varying from formal housing units to informal dwelling units as indicated in the table below. Within the District, 82,8% of households live in formal housing, 10,8% in informal housing and only 2% in traditional houses. Household in the whole PKSD is about 49 193 in respect to the Census 2011, where the average Household Size is about 3.70% and the housing owned is at 52.00%.

Table 20: Enumeration area type by Local Municipality

	Formal residential	Informal residential	Traditional residential	Farms	Parks and recreation	Collective living quarters	Industrial	Small holdings	Vacant	Commercial
Ubuntu	13926	339	-	3729	-	-	444	-	54	105
Umsobomvu	23361	1890	-	2451	45	264	222	-	96	45
Emthanjeni	39306	-	-	2499	9	3	6	483	39	9
Kareeberg	9450	-	-	2118	-	-	102	-	3	-
Renosterberg	8934	801	-	1173	-	-	-	57	15	-
Thembelihle	13989	-	-	1626	-	12	-	-	75	-
Siyathemba	18555	-	-	2763	-	-	24	162	90	-
Siyancuma	26061	2697	-	7125	-	-	486	594	114	-

Telephones

According to the table below most households in the district, approximately 66.2% do not have telephones at their homes although many of them have expressed need for the service. The existing situation results in many households still depending on public phones and other means of telecommunication. The public telephones according to Telkom authorities are vandalised frequently. The situation calls for a need to protect these facilities as they will be of help to the residents who depend on them.

It is perhaps interesting to note, as the table indicates, that only in Emthanjeni Municipal Area that a substantial number of the households have telephones at the homes and Cell phones.

Table 21: Household access to Telephones

CELL PHONE ACCESS								
	Ubuntu	Umsobomvu	Emthanjeni	Kareeberg	Renosterberg	Thembelihle	Siyathemba	Siyancuma
Yes	3651	5775	8103	2211	2169	2991	4239	7296
No	1479	2064	2352	1011	825	1152	1593	2280
TELEPHONE ACCES								
Yes	708	849	1434	504	453	585	708	1026
No	4422	6993	9024	2718	2541	3555	5124	8550

Education

Obtaining some form of income generating employment has become increasingly difficult in recent years. This is accentuated by the lack of education with the poorly educated being the ones that experience the highest incidence of poverty.

There has been a 8,3% in the number of learners that have accessed education between 1996 and 2001. There has been a 27,1% in the number of learners that have matriculated.

Approximately 3% of persons in the Pixley ka Seme district have an educational qualification higher than a matriculation certificate. Of these, approximately one third have a tertiary qualification. The percentage of the population in the formal education system is 66,5% whilst 19,7% of the population received no formal schooling. Table 22 below is a comparison between Census 2001 and 2011 regarding the number of persons between the age of 5-24 that attend school:

Table 22: Level of Education per Local Municipality

	NC071: Ubuntu	NC072: Umsobomvu	NC073: Emthanjeni	NC074: Kareeberg	NC075: Renosterberg	NC076: Thembelihle	NC077: Siyathemba	NC078: Siyancuma	Grand Total
Grade 12 / Std 10 / Form 5	2100	4050	6396	1314	1506	1926	2433	3861	23586
NTC I / N1/ NIC/ V Level 2	6	18	42	3	6	3	9	18	105
NTC II / N2/ NIC/ V Level 3	6	15	33	6	15	9	12	12	108
NTC III /N3/ NIC/ V Level 4	9	15	54	9	12	9	9	30	147
N4 / NTC 4	6	15	39	9	12	27	18	21	147
N5 /NTC 5	12	12	36	6	6	6	9	36	123
N6 / NTC 6	12	9	51	12	9	21	18	30	162
Certificate with less than Grade 12 / Std 10	3	24	30	6	9	12	6	21	111
Diploma with less than Grade 12 / Std 10	15	24	51	18	15	15	12	24	174
Certificate with Grade 12 / Std 10	66	87	141	36	69	54	84	138	675
Diploma with Grade 12 / Std 10	138	243	381	114	102	90	135	195	1398
Higher Diploma	210	297	363	93	78	153	195	315	1704
Post Higher Diploma Masters; Doctoral Diploma	18	36	30	15	12	27	24	30	192
Bachelors Degree	75	177	261	51	63	114	90	165	996
Bachelors Degree and Post graduate Diploma	42	66	84	18	27	45	27	60	369
Honours degree	30	48	99	15	30	42	48	99	411
Higher Degree Masters / PhD	24	27	69	18	6	18	27	33	222
Grand Total	2772	5163	8160	1743	1977	2571	3156	5068	30630

Persons having no schooling did never enjoy formal education, not even some primary education. Implying illiteracy in most cases, these persons are limited to perform manual labour and cannot adequately participate in society.

Over the last 15 years the rate of no-schooling have been halved across the country. The percentage of persons 20 years and older who have no schooling decreased from 19,1% in 1996 to 8,7% in 2011. This is almost halved since 2001 when 19% aged 20+ had no schooling in the Northern Cape, went from around 22% to around 11%. Whereas in PKS Education (aged 20+) No Schooling is 14.60%, Higher Education is 6.10% and Matric 20.50%. The literacy efforts for adults and the increasing influx of 20 year olds with proper levels of education are expected to drive these proportions further down in the years to come.

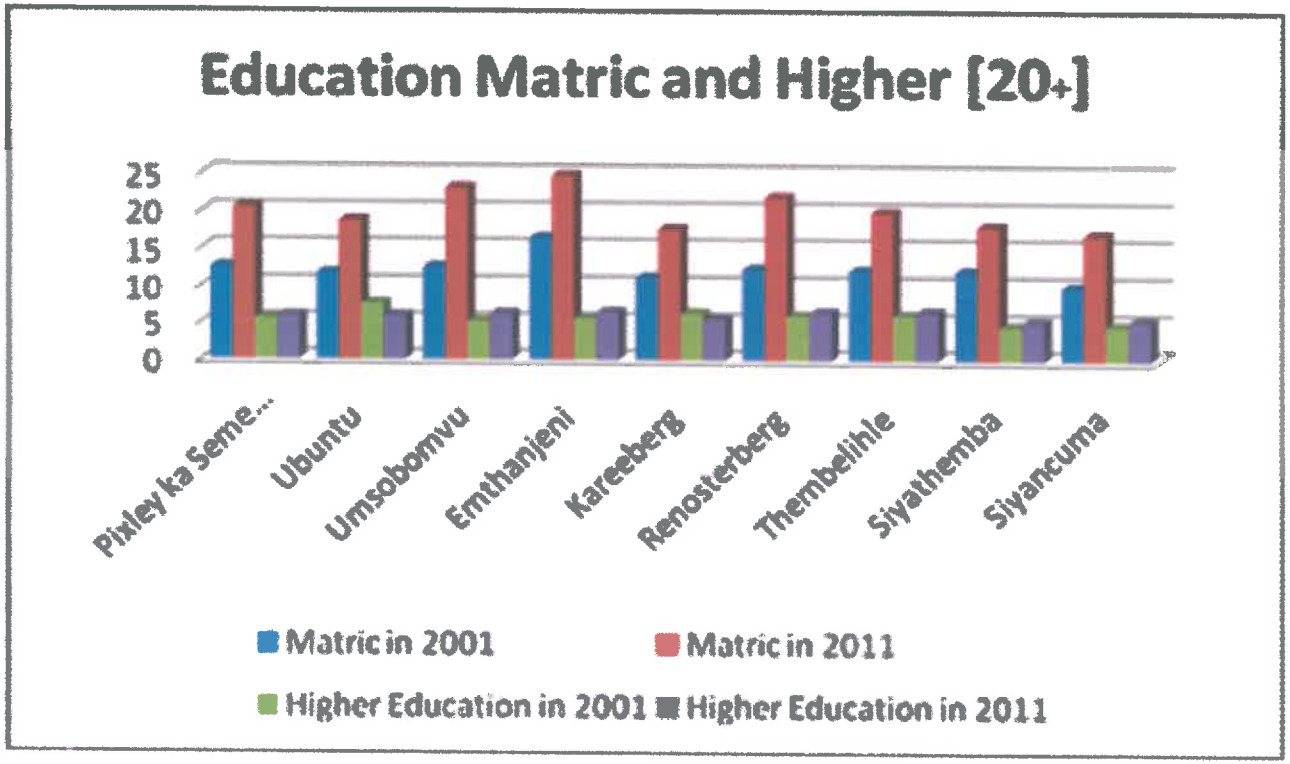


Figure 19. Education Matric and Higher Source: Statistics South Africa 2011

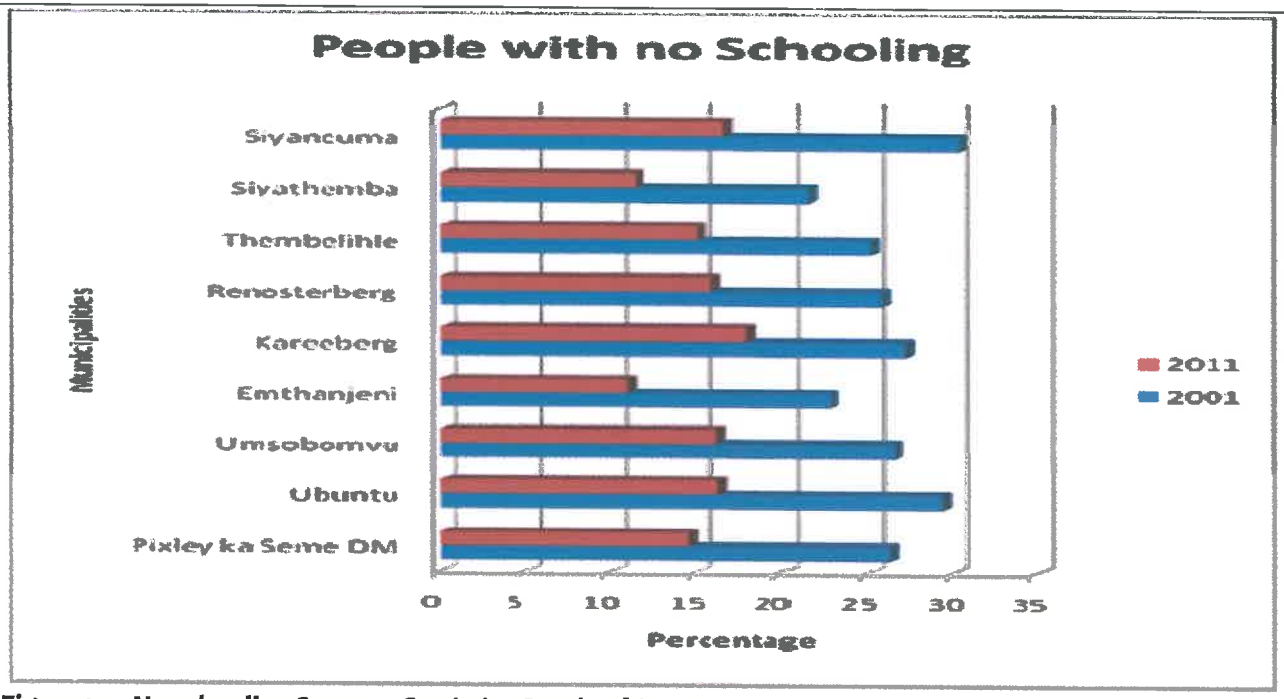


Figure 20. No schooling Source: Statistics South Africa 2011

Table 23: Schooling per Local Municipality

	% NO SCHOOLING	% HIGHER EDUCATION
Ubuntu	10.68	3.72
Umsobomvu	10.68	3.95
Emthanjeni	7.24	3.87
Kareeberg	12.49	3.57
Renosterberg	10.53	3.96
Thembelihle	10.05	3.93
Siyathemba	7.74	3.32
Siyancuma	11.00	3.21

	The above table presents the level of education of PKS Municipality's labour force; the statistics for the Northern Cape and South Africa are included for comparison. The level of primary schooling is overall higher than the primary level of schooling for South Africa. Secondary education completed is overall lower than both the province and national level of education. The tertiary levels of education are the lowest, with just above 3%.
Unemployment	There has been a decrease in the number of people employed and a concomitant increase in the number of unemployed in the district between these 2001 and 2011 censuses. This is directly related to the number of businesses that has closed in the region during the period reflected and indicates the need for a retention or wholesale and retail strategy regarding these businesses. Unemployment reaching approximately 28.3% 2011 and Youth unemployment reaching 35.4% in 2011 as per Stats SA 2011 Census. ***Table 24. Employment status per Local Municipality***

	Employed	Total%	Unemployed	Total%	Discouraged work-seeker	Total%	Other not economically active
Ubuntu	5028	27	2064	11	507	3	3774
Umsobomvu	6117	22	3018	11	1188	4	7491
Emthanjeni	9864	23	3831	9	1203	3	11559
Kareeberg	2856	24	951	8	456	4	3030
Renosterberg	2616	24	957	9	324	3	2796
Thembelihle	3861	25	1533	10	687	4	3777
Siyathemba	5370	25	1728	8	765	4	5787
Siyancuma	7947	21	3120	8	1422	4	10575
Total	43659	192	17202	75	6552	30	48789

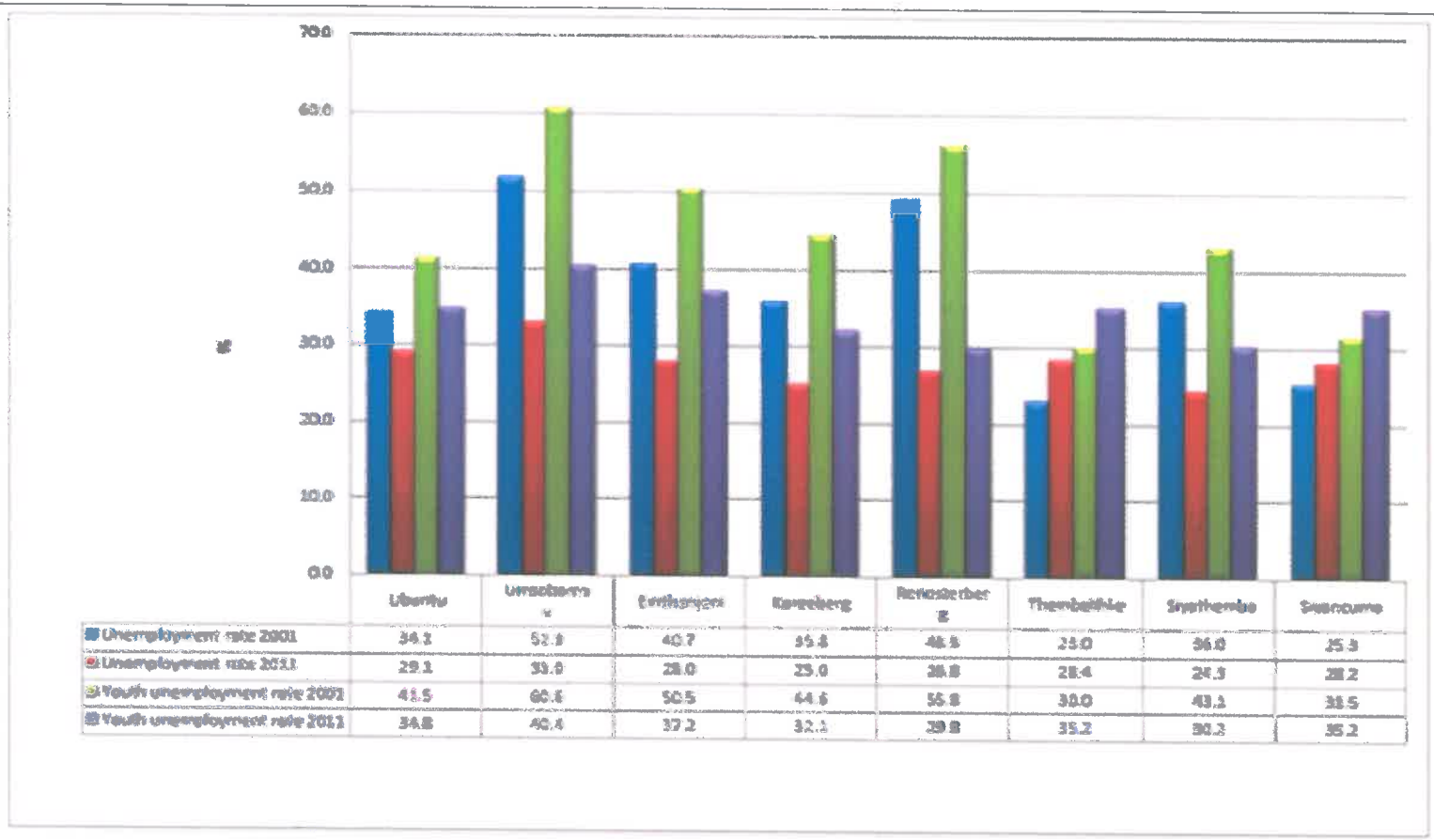


Figure 21. Unemployment & Youth Unemployment

The municipalities that have the largest percentage of unemployed are Umsobomvu and Renosterberg with unemployment rates of 30,2% and 31,5% respectively. When the actual numbers of unemployed in the districts are considered, the municipalities that have the most people in the unemployed trap are Emthanjeni, Siyancuma, Umsobomvu and Siyathemba. These account for 20 153 (70,8%) of the unemployed in the district to 7,2% provided the unemployed 20 153 are employed in these areas.

Labour

Labour Participation Rate

The labour participation rate in the district is 50,43%. This indicates the labour force as a percentage of the population in the age group

15-64 years of age.

Labour Dependency Ratio
The total number of persons supported by every person in the labour force, excluding him or herself is indicated by the labour dependency ratio. In the case of the Pixley ka Seme district this ratio is 1,81 with working individuals in the Siyathemba, Siyancuma and Thembelihle municipalities having to support approximately 2 persons. The lowest ratio in the district is to be found in the DMA area, at 0,81.

Labour Youth Dependency Ratio
Indicates the total number of youths, aged 0-14, supported by every person in the labour force, excluding him or her. The ratio in the Pixley ka Seme district is 0,09. This indicates that working individuals support approximately one youth in the age group 0-14.

Labour Aged Dependency Ratio
The labour aged dependency ratio indicates the total number of aged persons, older than 65, supported by every person in the labour force, excluding him or herself. The ratio for the district is 0,85.

Labour Absorption Capacity
The labour absorption capacity is the ability of the formal sector of the economy to absorb the supply of labour in the region. Approximately 25% of the economically active population of the district is unemployed. The municipalities that have the largest percentage of unemployed in the district is Umsobomvu and Renosterberg with unemployment rates of 30% and 31% respectively. The table 25 below indicates the above ratios in each municipality in the district:

Table 25: Labour Ratio

Local Municipality	Labour Participation Rate	Labour dependency ratio	Labour youth dependency ratio	Labour aged dependency ratio
Emthanjeni	49,70	1,81	12,05	84,53
Kareeberg	54,80	1,65	13,91	79,13
Renosterberg	56,94	1,52	18.66	84,97
Siyancuma	45,81	2,09	-1,83	83,53
Siyathemba	48,19	1,99	0,36	83,92
Thembelihle	46,93	1,95	3,10	83,68
Ubuntu	54,39	1,64	13,09	86,03
Umsobomvu	51,94	1,73	8,19	86,81
	5043	1,81	8,80	84,65

Table 26: Indicates the population by municipality living below the minimum living levels in the district

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

An average of 60% of the population in the district lives below the minimum living level (MLL). The highest percentage is found in the Umsobomvu municipal area, at 85%, and the lowest at 28% in the Thembelihle municipal area. This represents 17,3% of the provincial

	population living below the MLL. The average monthly (individual) income for the district is approximately R740 which is less than the stipend received as a grante from social services departments.
Economic Characteristics	*Regional Gross Domestic Product* The district contribution to the provincial GDPR has consistently been the lowest over recent years with its contribution declining from 10,6% to 9,6% between 2003 and 2004. The economy is predominantly primary sector focused with manufacturing and tourism also contributing to the district economy. The economic sectors that contribute the most to the GDPR of Pixley ka Seme are Agriculture, Mining, Tourism and Manufacturing. Table 27 below represents the percentage contribution per economic sector by the district to the gross domestic product of the province for 2003 and 2004. ***Table 27. % GDPR of district municipalities per economic sector for 2003 and 2004***

% OF GDPR									
	Primary		Secondary		Tertiary		Taxes - Subsidies		Total GDPR	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Namakwa	4,3	3,8	0,5	0,4	7,3	7,0	0,7	0,8	12,8	12,1
PKSDM	3,1	2,7	1,0	0,9	5,8	5,2	0,8	0,8	10,6	9,6
Siyanda	3,8	3,3	1,3	1,3	8.0	7,7	1,1	1,2	14,2	13,5
Frances Baard	6,8	6,2	3,2	3,1	26,1	28,6	2,5	2,0	38,6	40,7
Kgalagadi	16,7	16,5	1,4	1,3	4,9	5,5	0,7	0,8	23,8	24,1
NC GDPR	34,7	32,6	7,3	7,1	52,1	54,0	5,8	5,6	100,0	100,0

Pixley ka Seme's total percentage contribution in 2003 was 10,6% and declined to 9,64% in 2004. The district contribution to the GDP has consistently been the lowest over recent years with its contribution declining. It is evident that the tertiary sector contributes the greatest percentage to the GDP of the Northern Cape, followed by the primary sector and then the secondary sector.

The Pixley ka Seme district displays a similar characteristic as the province with respect to its sector contributions to GDPR; the economic sectors that contribute the most to the GDPR of Pixley ka Seme are Agriculture, Mining, Tourism and Manufacturing, with its secondary sector contribution being the least. The manufacturing sector is part of the secondary sector which indicates that is has declined over the period of 2003 (0,97%) and in 2004 (0,92%). To transform and diversify the status of the districts economy will require a concerted effort to improve and create development opportunities within this sector.

Location Quotient

A comparative advantage indicates a relatively more competitive production function for a product or service in specific economy than the aggregate economy. This economy therefore renders this service more efficiently. The location quotient is an indication of the comparative advantage of an economy in terms of its production and employment. A location quotient greater than 1 indicates a comparative advantage regarding the sector in one location with respect to another.

The analysis below indicates the location quotient of the Pixley ka Seme District with respect to the Northern Cape Province. The table and graph below indicates the location quotients of sectors in the district municipality with respect to the Northern Cape.

Sectors in the economy of Pixley ka Seme that have a location quotient larger than 1 are agriculture (2,35); community, social and personal services (1,19); transprot, storage and communication (1,16); electricity, gas and water supply (2,19). These indicate sectors that show potential for additional development in this does not imply that sectors, that do not feature here, should not be pursued since there may be latent potential in these sectors that could be exploited.

Table 28 below indicates the location quotients of the economic sectors in the municipalities.

Table 28. Indicates the location quotients of the economic sectors in the municipalities

	Kareeberg	Emthanjeni	DMA	Renosterberg	Siyancuma	Siyathemba	Thembelihle	Ubuntu	Umsobomvu
Agriculture	1,18	0,31	1,62	0,54	1,11	1,46	1,47	1,59	0,82
Mining	0,08	0,05	0,45	0,00	4,28	0,09	0,02	0,21	0,00
Manufacturing	0,41	0,71	1,28	0,13	1,92	0,76	1,99	0,91	0,18
Electricity, gas and water supply	0,17	0,60	0,36	11,42	0,08	1,14	0,28	0,00	0,97
Construction	0,52	1,25	0,85	0,58	0,99	1,69	0,48	0,55	1,00
Wholesale and retail trade	1,12	1,05	1,20	0,56	1,02	0,94	1,17	0,79	1,13
Transport, storage and communication	0,52	1,76	0,53	0,33	0,84	0,83	1,33	0,75	0,51
Finance, insurance, real estate	1,06	1,79	0,94	0,46	0,78	0,71	0,61	0,72	0,67
Community, social and personal services	1,18	1,37	0,58	0,54	0,82	0,72	0,56	0,85	1,55

Other sectors in the district that have a distinct comparative advantage with respect to the Northern Cape and South Africa are:

- Electricity, Gas and Water Supply.
- Community, social and personal services.
- Transport, storage and communication.

The municipalities in the district that have comparative advantages with respect to the sector Electricity, Gas and Water supply are Renosterberg and Siyathemba with location quotients of 11,42 and 1,14 respectively. This resounding comparative advantage in the sector for the Renosterberg municipality is due to the presence of the Van Der Kloof Dam in the municipality. It is the only sector in which Renosterberg has a comparative advantage with respect to other municipalities in the district.

Kareeberg, Emthanjeni and Umsobomvu have location quotients, with respect to other municipalities in the district, of 1, 18, 1, 37 and 1, 55 respectively in the community, social and personal services sector. In the transport, storage and communication sector, Emthanjeni and Thembelihle have location quotients of 1, 76 and 1, 33 respectively, indicating a comparative advantage in this sector with respect to other municipalities in the district. The sectors that contribute significantly to the Northern Cape GDPR is highlighted in the table above with agriculture having the highest LQ, Electricity, gas and water supply second highest LQ, etc.

	The agricultural sector has the potential for growth with a number of comparative and competitive advantages for the Northern Cape and Pixley ka Seme in particular. *Tress Indicators* The level of diversification or concentration of a region's economy is measured by a tress index. A tress index of zero represents a totally diversified economy whilst the higher the index, the more concentrated or vulnerable the region's economy is to exogenous variables e.g. adverse climatic conditions and commodity price fluctuations. The economy of the Pixley ka Seme district has a tress index of 26, 18 indicating a reliance of the Pixley ka Seme economy on the agriculture, transport and services sector. This tress index indicates that the economy is not diversified but is largely dependent on the agriculture and is vulnerable to exogenous variables such as adverse climatic conditions, commodity price fluctuations.

(14) ***SENSITIVE LANDSCAPES:***

The sensitivity map for the Viegulands Put prospecting operation is illustrated in Figure 22. The ephemeral pans and drainage lines are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. 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 calcrete ridge, calcrete plains, thornveld and grassland on sand are all considered to be of high sensitivity. These are also earmarked for prospecting activities. The high sensitivity of the calcrete ridge and calcrete plains is attributable to the high number of plant species of conservation that have been found here and that are expected to occur here, i.e. Boscia albitrunca, Aloe claviflora, Nymania capensis, Hoodia gordonii, Euphorbia braunsii, Larryleachia sp. and Lithops sp.

The thornveld is considered to be of high sensitivity on account of the high density of B. albitrunca found here and the crucial nesting habitat that the dominant S. mellifera provides to birds. The grassland on sand is considered to be highly sensitive due to the high number of Aardvark burrows encountered here.

The shrubland on sand is considered to be of medium sensitivity. This area hosts a low density of species of conservation concern and a high density of the encroaching R. trichotomum. It is expected to be affected by the prospecting operation, but impacts are likely to be largely local. Activities within this area can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

The transformed areas include the farmstead, old cultivated land and three old quarries. These areas are considered to be of low ecological sensitivity on account of the transformation of natural habitats that were caused here. Activities may proceed with little ecological impact. However, social impacts in the vicinity of the farmstead should not be ignored. **(Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)**

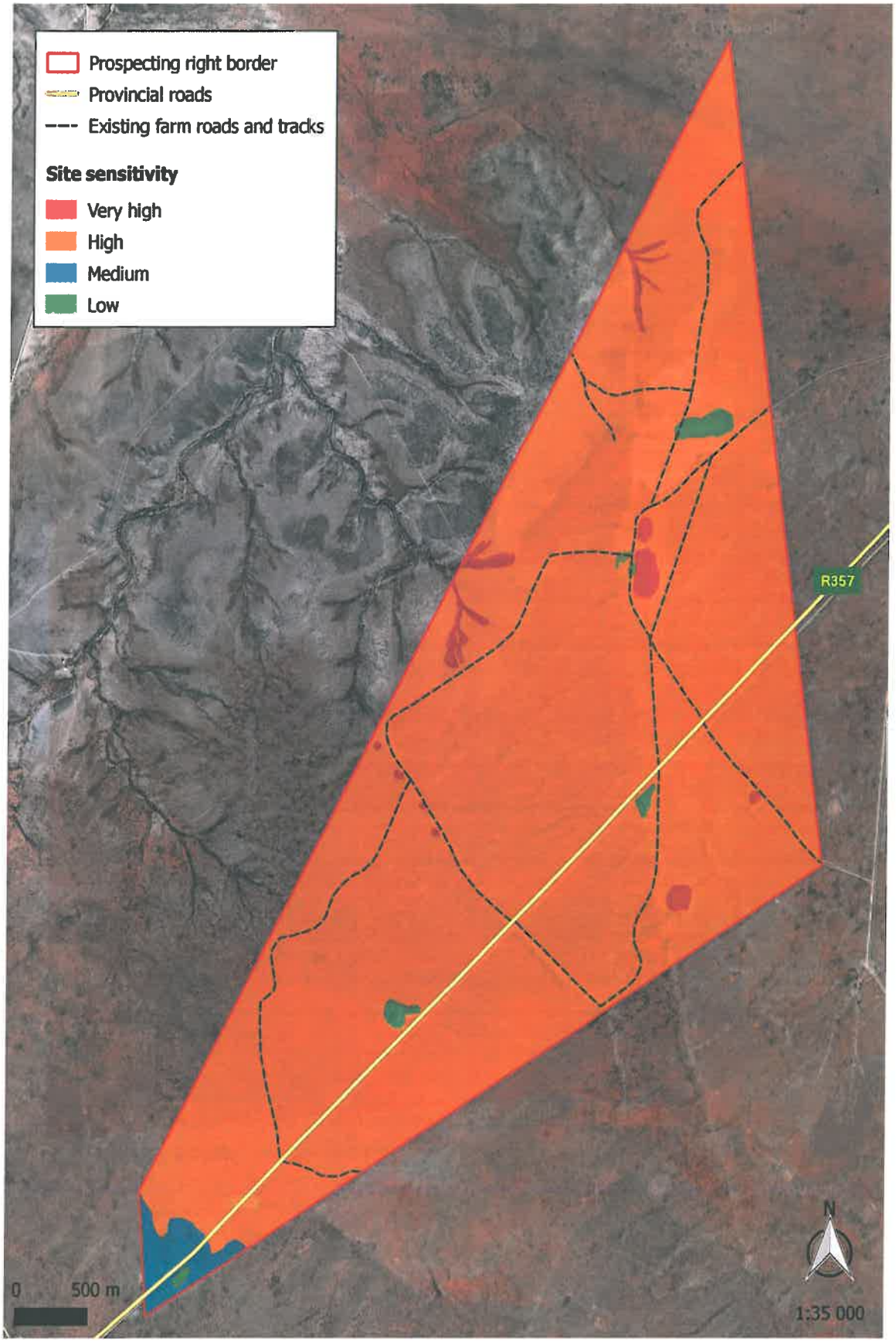


Figure 22. A sensitivity map for the Viegulands Put prospecting area. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

(15) ARCHAEOLOGICAL

Mr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Paul to provide an Heritage Impact Assessment **Annexure C** in order to highlight the Heritage of the proposed prospecting area, and to determine the possible impact of prospecting on the Heritage of the application area.

The Stone Age

Fourteen (14) Stone Age sites were recorded all of which have a low density of lithics. The stone tools, which comprise mainly scrapers, flakes and a few blades and cores, are spread throughout the property without any significant concentrations to demonstrate regular activity. Thus no specific settlement locales could be defined to warrant further investigation.

The occurrence of a pear-shaped hand-axe is of particular interest as it seems to confirm the presence of Acheulean material in the area which dates between 2 million to 250 000 years BP (VG11, Fig 7). Its occurrence among the scrapers / flakes might represent an overlap of or transition from the ESA and the Middle Stone Age. If a museum or university is interested in studying the find its GPS location was recorded with an accuracy of ±4m.

Figure 23. Acheulean handaxe (VG11).

The Iron Age
No Iron Age sites were found on the property.

Early commercial farming
Structures of stonework at a ruined homestead include a terrace revetment wall, which appears to have been a landscaping feature. A swimming pool measuring 15m x 20m x 2.5m at the deepest end was built of stone with cement binder. The exterior has a false dry stone masonry appearance. A livestock enclosure measuring 15m x 25m x 1.2m high is also built of stones. At the farmstead there is a shed with Cape Dutch style gables (VG15, VG16, Figs 8-10). In all instances the stonework is rough, none of the building blocks trimmed to a regular shape. There are no compelling circumstances in the development plan to get rid of these structures.

Burial ground
There are two graves located in a fenced plot on the periphery of the farmstead (Fig 11). One is a double grave of a couple, Schalk and Susanna Jacobs, the previous owners of the farm born in the 1880s. The second grave is of a juvenile. Graves / burial grounds are protected in terms of Section 34 of the National Heritage Resources Act.

Palaentological

Mr. Joseph Chikumbirike from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Paul to provide an Palaeontological Assessment **Annexure D** in order to highlight the Palaeontological features of the proposed prospecting area, and to determine the possible impact of prospecting on the Palaeontology of the application area.

This desktop palaeontological assessment (PIA) has been undertaken in the context of an application by Mr Paul Thukwe for a prospecting right for diamonds on the Remaining Extent of Portion 1 of the Farm Annex Viegulands Put 42 in the Pixley Ka Seme District, Northern Cape Province.

The proposed project intends to exploit the Mbizane Formation of the Dwyka Group. However, it is most unlikely the impact in palaeontological terms will be significant in view of the sparse occurrence of fossils in this unit.

The formations of the Kalahari Group present in the area include the Mokalanen Formation calcrete, the Obobogorop Formation red,

colluvial "derived gravels" and the Gordonia Formation aeolian sands. The most common fossil types are trace fossils such as plant root casts and a variety insect burrows e.g. termitaria. Burrow systems made by a variety of vertebrates also occur. Land snails, tortoise carapaces and ostrich eggshell are typical. Finds of larger-mammal fossil bones are rare in the Kalahari formations and then are often in an archaeological context and associated with pans and water sources. Consequently the palaeontological sensitivity of the Kalahari Group formations is Low (Almond & Pether, 2009).

Although the overall impact of the proposed development on fossil resources is expected to be minimal, it is recommended that a standard Fossil Finds Procedure (FFP) be incorporated into the Environmental Management Plan (EMP) for the proposed prospecting operations. A FFP has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the Environmental Control Officer (ECO). The ECO must put in place a contingency plan to rescue chance finds and where possible preserve them in situ. However, exposed fossil bones, unless already lying in the excavated spoil, must not be retrieved by a worker or ECO. All work must cease and the ECO must inform SAHRA and a professional palaeontologist, who will then decide if avoidance or mitigation are preferred. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA. (Palaentological Assessment by Joseph Chikumbirike (PhD Palaeontology, University of the Witwatersrand).

(b) Description of the current land uses

(1) ***Land Use before Prospecting :***

The major land uses in the region are mining and agriculture. The site is classified as non-arable with low potential for grazing land and is generally not suited for cultivation.

Apart from the current prospecting application by Paul Thukgwi for diamonds, Viegulands Put is mainly used as grazing land for goats and cattle. A farmstead, with kraals and workers quarters, is also situated on the property. Historic activities on site are signified by remnants of burrow pit excavations and old cultivation fields, which are still clearly visible today (Figure 24).

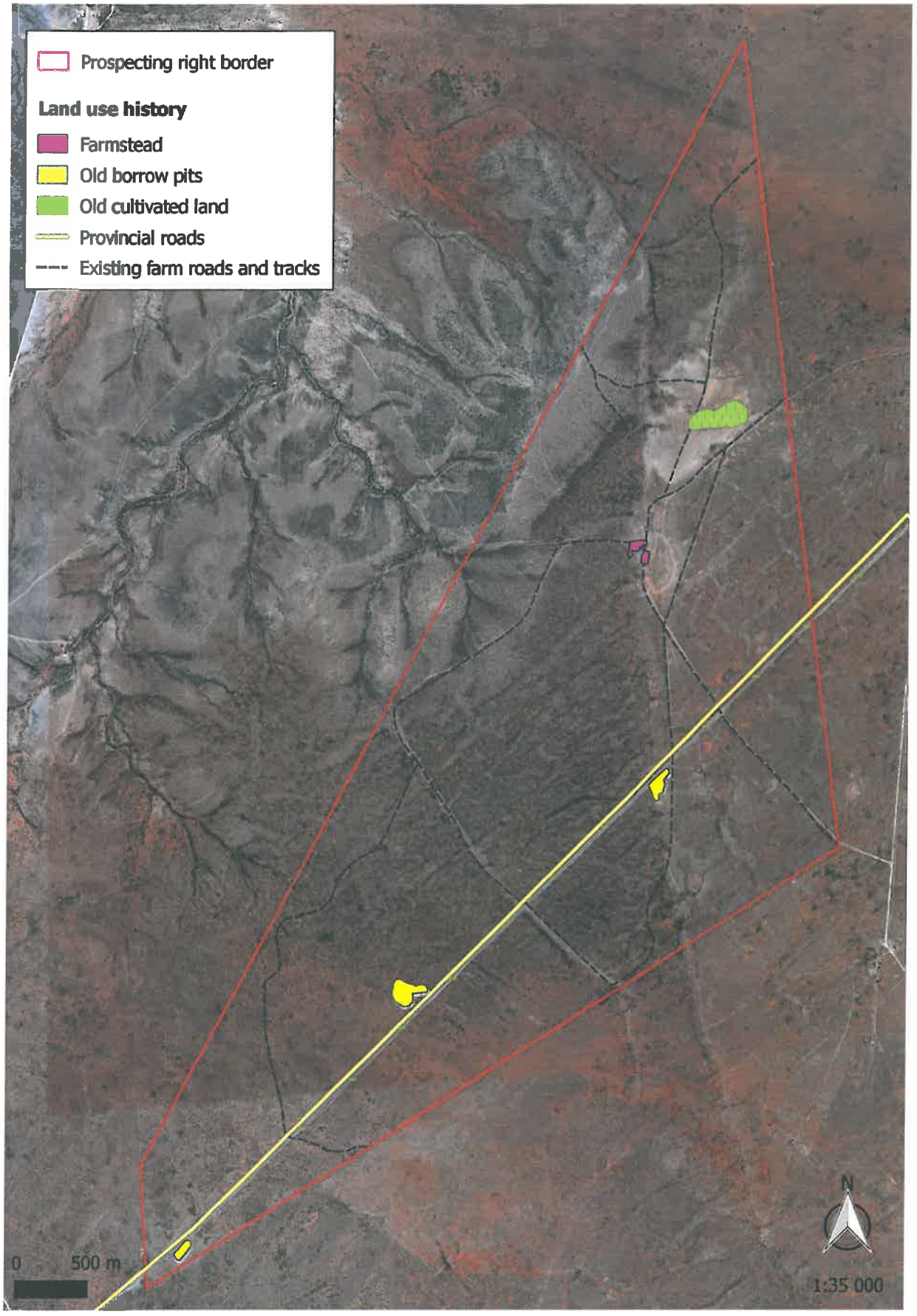


Figure 24. Evidence of the land use history on Viegulands Put.

(2) **Evidence of Disturbance:-**

Grazing pressure on some of these pans is evident and a trampling effect was observed during the site visit. Pans that have been heavily disturbed are infested by aliens such as Prosopis glandulosa, Argemone ochroleuca, Datura ferox and Xanthium spinosum. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

(3) **Existing Structures:-**

Apart from the current prospecting application by Paul Thukgwi for diamonds, Viegulands Put is mainly used as grazing land for goats and cattle. A farmstead, with kraals and workers quarters, is also situated on the property. Historic activities on site are signified by remnants of burrow pit excavations and old cultivation fields, which are still clearly visible today. (Ecological study by Boscia Ecological Consulting CC September 2017, Annexure B)

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

The infrastructure on site is comprehensively discussed in section d(ii) as part of the prospecting methodology discussion, as well as in section g as part of the prospecting footprint description. Furthermore, a comprehensive description of the environment was presented in section g (iv) (A) as part of the baseline report.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

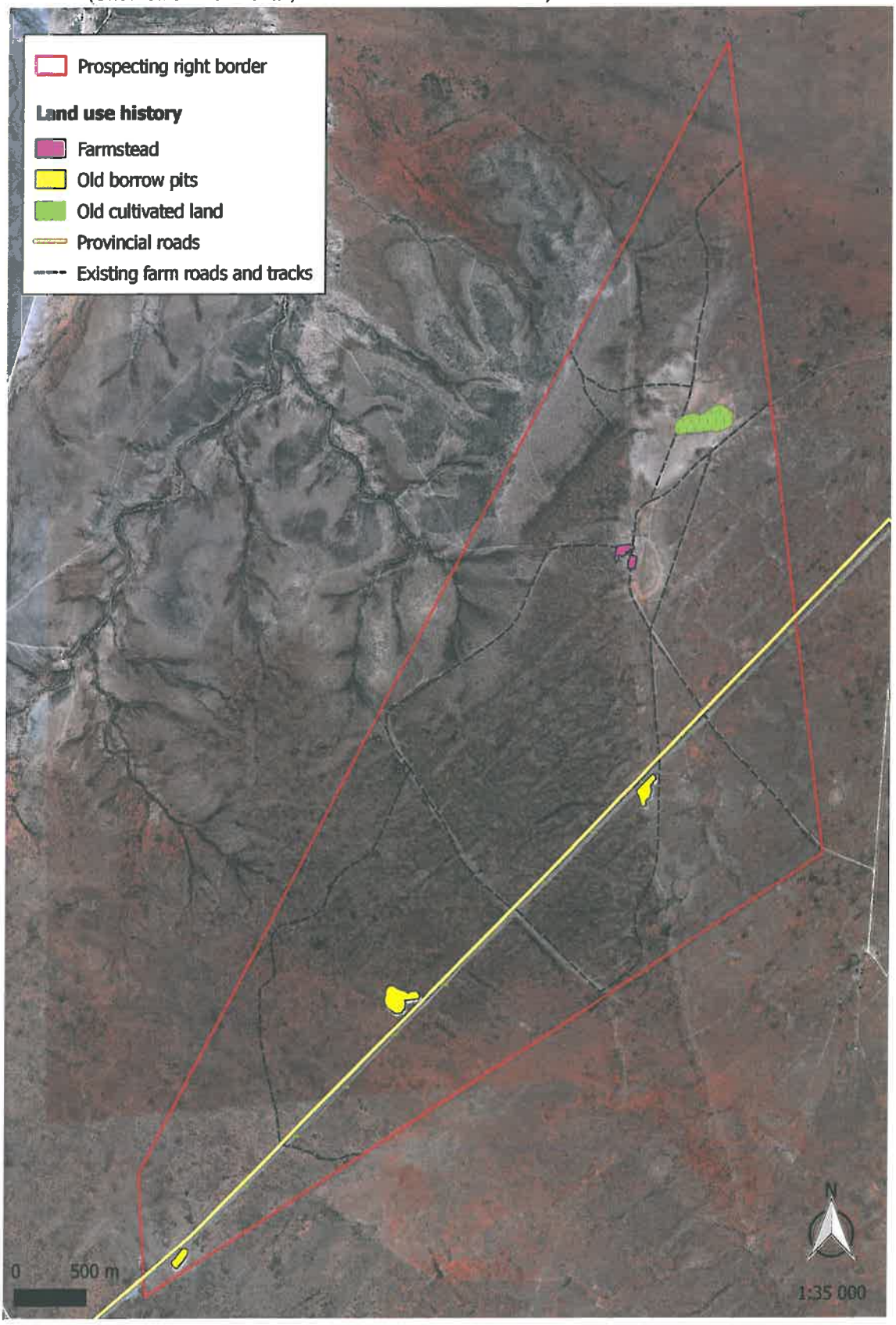


Figure 25. Environmental and current land use map. (Ecological Assessment Report September 2017 by Boscia Ecological Consulting CC).

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

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

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
			PHYSICAL			
Geology and Mineral Resource	Sterilisation of mineral resources	Very low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Medium	High	Construction and Operational	Low Local	• Prospecting of all alluvial gravels continuously, if possible and does not influence prospecting and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of bulk samples, pits, dumps and plant site. • Stabilise the mine residue deposits (Tailings dump). • All temporary infrastructures should be demolished during closure.
Soils	Soil Erosion Infrastructure; bulk samples, pits.	Medium-high	Certain	Decommissioning	Medium-high Regional	• Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.

						• Ground exposure should be minimised in terms of the surface area and duration, wherever possible. • Construction /excavation during the rainy season (November to March) should be monitored and controlled. Diversions during potential flooding should also be managed. • Run-off from exposed ground should be controlled with flow retarding barriers. • All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses. • Stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate. • Audits must be carried out at regular intervals to identify areas where erosion is occurring. • Effective rehabilitation of the

						river diversions should 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.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of soil fertility During the removal of topsoil; stockpiling.	Low-Medium	Possible	Residual	Low-medium Local	• Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible onto the cleared 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	Medium	Medium	Construction and Operational	Low Local	• Refuelling must take place in well demarcated areas and

	Spillage of hazardous material; runoff.					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.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Very Low	Possible	Short term	Minimal Local	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Very low	Possible	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel	Medium	Possible	Construction	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in

	storage areas may contaminate the groundwater resource locally					hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
Surface Water	• Ground works and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Transport of construction materials to and from site. Significant levels of dust may emanate from the use of heavy construction vehicles which in turn will impact on runoff water	Medium to Low	Possible	Construction	Low Local	Water Quality deterioration: change in water quality is caused by a change in natural conditions and/or an enhancement of pollution from sources. 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 environmental friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground

	quality. • Materials used during construction may impact negatively on the runoff water quality.					water resources. • Pipe leakages should be minimized. • Proper clean and dirty water separation techniques must be used to ensure uncontaminated water returning to the environment.
	• Spillages that may occur on access and haul roads may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.	High	Possible	Operational	Low to Moderate Local	• Non mining 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.
	• Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of	Moderate to High	Possible	Closure	Low Local	

	vegetation could lead to erosion and sediment transportation. • Significant dust levels will emanate from the use of heavy construction vehicles.					
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** Construction of roads, plant site, as well as other necessary infrastructure; placement of stockpiles; and the clearing of vegetation for prospecting, materials storage and topsoil stockpiles; vehicular movement.	Low to medium	Certain	Life of Operation	Low to Medium Local	• Minimise the footprint of transformation. • Encourage proper rehabilitation of prospected areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit.
	Loss of flora with conservation	Low to medium	Possible	Life of Operation	Low to Medium Local	• Footprint areas of the prospecting activities must be

	concern Removal of listed or protected plant species; during Construction of new roads and other necessary infrastructure, the placement of stockpiles; and clearing of vegetation for bulks samples and pits.					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. • 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 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. 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 fauna and flora occurring on site.
	Proliferation of alien vegetation Clearing of vegetation; prospecting activities	Medium-High	Possible	Residual	Medium High Regional	• Minimise the footprint of transformation. • Encourage proper rehabilitation of prospected 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 Clearing of vegetation; disturbance through prospecting activities.	Low-Medium	Possible	Residual	Low-medium Local	• Minimise the footprint of transformation. • Encourage proper rehabilitation of prospected 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.
Fauna	**Loss, damage and fragmentation of natural habitats** Clearance of vegetation; prospecting activities	Medium-High	Certain	Decommissioning	Medium-high Regional	• 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. • 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 the affected aquatic and riparian habitats.
	Disturbance,	Low-	Possible	Decommissioning	Low -Medium	• Careful consideration is

	displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities.	Medium			Regional	required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall prospecting footprint. • The extent of the proposed mine 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 mine site 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. • If any mortalities resulting from prospecting occur, it should be recorded with the date of the observation, the species affected and any other relevant information. • Employ measures that ensure adherence to the speed limit.
Air Quality	Sources of atmospheric	Low	Certain	Decommissioning	Low Local	Effective soil management; identification of the required

	emission associated with the prospecting operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and vehicle entrainment of road dust.					control efficiencies in order to maintain dust generation within acceptable levels.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Construction of Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels
	Building activities Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Building activities at the mine foot print and along the conveyer belt should be limited to daytime only.

	Hauling of building material to and from the specific areas. Noise increase at the boundary of the mine footprint	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Hauling of material should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
	Construction of the Mine Residue dump, soil stock pile and material stock pile. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Clearing of new open cast prospecting areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Diesel generators Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels

						Noise survey to be carried out to monitor the noise levels during these activities.
	Additional traffic to and from the mine	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Prospecting activities	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Back fill of mine footprint area Noise increase at the boundary of the mine footprint and	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Backfill of mine footprint area

	at the residents living close.					activities should be limited to daytime only.
	Planting of grass and vegetation at the rehabilitated areas	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Planting of grass and/or vegetation should be limited to daytime only
	Removal of infra-structure	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Removal of infrastructure should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
Visual impacts	Potential visual impact	Medium	Certain	Construction, Operation and Decommissioning	Low Local Site	The design of the proposed prospecting development will determine the visual impact. As the visual impact would be low, Correct design will ensure that the development will fit into the surrounding area and will become a feature of the area.
	Potential Visual Impact on the surrounding land users/ residents	Medium Regional	Highly Likely	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed prospecting development will determine the visual impact.
	Potential visual	Medium	Highly Likely	Construction	Low	Wetting of exposed areas should

	impact of the proposed development on the construction phase of the surrounding land users in close proximity	Regional			Local Site	be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that the design fits into the surrounding environment and it is aesthetically pleasing; • Reduce the construction period through careful planning and productive implementation of resources; • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads; • 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; and
	Potential visual impact of the proposed development on the	Medium Regional	Highly likely	Operational	Medium Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact.

	operational phase of the surrounding land users in close proximity.					• Ensure that the design fits into the surrounding environment and it is aesthetically pleasing. • Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way; • Rehabilitation of disturbed areas and re-establishment of vegetation;
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Low likelihood	Decommissioning	Low Local	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	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• A community skills audit should be undertaken by Paul. Alternatively, the existing Siyancuma/Siyathemba Labour Desk could be used to determine which skills are locally available and which employees could come into consideration for employment. • Training of potential future employees, contract workers and/or community members

						should focus on mining 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 of local construction workers during the construction phase to enable them to be employable during the operational phase would not stop the influx of outsiders, but could attempt to minimise the number of "new" outsiders coming to the area in search of employment. • Training courses should be accredited and certificates obtained should be acceptable by other related industries. • Guidance concerning legal requirements to which locals should adhere to, to make them employable, such as the standard construction industry requirements should

						also be attended to.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness

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

vi) **Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks**(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

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

The Different environmental components on which the project (can) have an impact are:

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **Surface Water**
9. **Ground Water**
10. **Air Quality**
11. **Noise and vibration**
12. **Archaeological and Cultural Sites**
13. **Sensitive Landscapes**
14. **Visual Aspects**
15. **Socio-Economic Structures**
16. **Interested and Affected Parties**

Impact Assessment

Before the impact assessment could be done the different project Activities/infrastructure components were identified.

1	**Processing Plant : 1 X 16 feet** Processing plant: 1 X 16 feet pan with conveyers and recovery
2	**Ablution Facilities:** In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.
3	**Clean & Dirty water system: Berms** It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
4	**Fuel Storage facility (Concrete Bund walls and Diesel tanks):** It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
5	**Prospecting Area :** Bulk sampling and pitting for alluvial diamonds.
6	**Salvage yard (Storage and laydown area).**
7	**Product Stockpile area.**
8	**Waste disposal site** The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: o Small amounts of low level hazardous waste in suitable receptacles; o Domestic waste; o Industrial waste.
9	**Roads (both access and haulage road on the mine site):** Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the prospecting operation will create an additional 2 - 4 km of roads, with a width of 6-15 meters.
10	**Temporary Workshop Facilities and Wash bay.**
11	**Water distribution Pipeline.**
12	**Water tank :** It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

The criteria used to assess the significance of the impacts are shown in the table 29 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 29: 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 30: 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 31: Explanation of EXTENT of impact

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

Table 32: 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 33: 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)

During the operational stages of the prospecting operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and bulk samples and pits /dumps will alter the topography by adding features to the landscape. Removal of alluvial gravels will unearth the current topography. The construction of infrastructure and various facilities in the prospecting area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and making prospecting pits or trenches, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

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 tanks 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.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper

placement of infrastructure. Most of the site has a land capability for grazing, with proper rehabilitation the land capabilities and land use potential can be restored.

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. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. 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.

Prospecting activities on the area 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.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage 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.

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)

Geology and mineral resource

Level of risk: Very low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The prospecting of alluvial gravels should be well planned and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.
- No dumping of materials prior to approval by manager.

Topography

Level of risk: Low

Mitigation measures

- Prospecting of alluvial gravels continuously if possible, otherwise when they become available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled backfilling at bulk sample sites, pits and plant site;
- Stabilise the mine residue deposit;
- All temporary infrastructures should be demolished during closure.

Soil erosion

Level of risk: Low-Medium

Mitigation measures

- 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 soil that is stockpiled during construction should be stock-piled in layers and protected by berms to prevent erosion;
- All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses;

- Stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate;
- Stockpiles susceptible to wind erosion are to be covered during windy periods;
- Audits must be carried out at regular intervals to identify areas where erosion is occurring;
- Appropriate remedial action, including the rehabilitation of eroded areas, must occur;
- Dust suppression should 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;
- Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions;
- Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired;
- Topsoil stockpiles must be kept separate from sub-soils;
- 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.

Soil pollution

Level of risk: Low

Mitigation measures

- 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.

Land capability and land use

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available land through consultation with land owner and proper planning of prospecting activities.
- Employ effective rehabilitation strategies to restore land capability and land use potential of the prospecting area.
- All activities to be restricted within the demarcated areas.

Ground water

Level of risk: Low

Mitigation measures

- Training and awareness
    - Make all employees aware of water conservation/water demand management, water pollution avoidance and minimization measures reporting procedure and registry of incidents.
    - Train all employees to reduce water consumption.
    - Make one (1) individual person at a management level responsible for the management of the overall water balance. Train employees in the managing of water balance, water pollution and water conservation within their sectors.
    - Train all employees in the implementation of standard operating procedures (SOP's) (e.g. hydrocarbon management, sewerage plant management, monitoring and record keeping).
- Minimise and manage the loss in water resource
- Allow for a safe working environment

Surface water

Level of risk: Low - Medium

Mitigation measures

- Sufficient care must be taken when handling hazardous materials to prevent pollution.
- If servicing and washing of the vehicles occur on site, there must be specific areas constructed for these activities, which must have concrete foundations, bunding as well as oil traps to contain any spillages.
- A walled concrete platform, dedicated store with adequate flooring or bermed area and ventilation must be used to accommodate chemicals such as fuels, oils, paints, herbicide and insecticides.
- Oil residue shall be treated with oil absorbent material and this material removed to an approved waste site.
- Spill kits must be easily accessible and workers must undergo induction regarding the use thereof.
- At all times care should be taken not to contaminate surface water resources.
- Provide bins for staff at appropriate locations, particularly where food is consumed.
- The prospecting site should be cleaned daily and litter removed.

- Conduct ongoing staff awareness programmes in order to reinforce the need to avoid littering, which can contribute to surface water pollution.
- Only environmental friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources.
- Pipe leakages should be minimized.
- 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.

Indigenous flora

Level of risk: Low to medium

Mitigation measures

- 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.
- Minimise the footprint of transformation
- Encourage proper rehabilitation of prospecting areas
- Encourage the growth of natural plant species (diverse selection of natural plant species).
- Mechanical methods (hand-pulling) of control to be implemented extensively.
- Annual follow-up operations to be implemented.
- Ensure measures for the adherence to speed limit.
- Maintenance of firebreaks;
- No trees felled for firewood;

Alien invasive plants

Level of risk: Low to medium

Mitigation measures

- 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.

Fauna

Level of risk: Low - Medium

Mitigation measures

- 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 authorized to do so. Those areas surrounding the prospecting site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors.
- 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.
- Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall prospecting footprint.
- The Footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to prospecting;
- Snares & traps removed and destroyed; and

Habitat

Level of risk: Medium - High

Mitigation measures

- 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.

Air quality

Level of risk: Low-Medium

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for prospecting only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.
- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.
- The length of time where open areas are exposed should be restricted. Prospecting should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all prospecting activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
    - Speed limits;
    - Spraying of surfaces with water;
    - Prospecting of alluvial gravels and rehabilitation of disturbed areas; and

Noise and vibration

Level of risk: Medium

Mitigation measures

- Machinery with low noise levels which complies with the manufacturer's specifications to be used.
- Construction activities to take place during daytime period only.
- Noise monitoring on a quarterly basis.
- Vehicles to comply with manufacturers' specifications and any activity which will exceed 90.0dBA to be done during daytime only.
- Emergency generators to be placed in such a manner that it is away from any homestead area.
- Noise monitoring to be done along the prospecting footprint and noise sources within the mine boundary on a monthly basis after which the frequency can change to a quarterly basis.

- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting or restrict lighting to certain areas.
- 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;

Traffic and road safety

Level of risk: Low

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources

Level of risk: Medium

Mitigation measures

- The heritage and cultural resources (e.g. stone age sites and farming Heritage etc.) must be protected and preserved by the delineation of a no go zone.
- Should any further heritage or cultural resources be disturbed, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist or palaeontologist and if any fossil finds is encountered an palaeontologist should be contacted to remove (refer to the fossil finds procedure attached to the palaeontologist report).

Socio-economic

Level of risk: Low-Medium

Mitigation measures

In order to ensure that negative impacts are minimised and positives are enhanced, the following is recommended:

- Implement the mitigation measures as proposed in this report.
- As job creation is one of the most pressing socio-economic needs in the local community, through the development of Paul Thukgwi Mine should focus on SMME development and related local job creation, whilst considering the limitations of the available local skills.
- Paul Thukgwi should assist their employees to find suitable housing in the towns surrounding the prospecting area to limit additional impacts on the provision of services and infrastructure by the SPM.
- Assistance in terms of skills development for those that would be employed during the start-up and construction phases of the project, as well as for permanent employees during the operational phase of the project would be necessary. Education is critical to sustain the socio-economic development of the community members living in the area. Continued support for training and capacity building thus remain important.

- Possible SMME links to the mine should be pursued to maximise local business benefits;
- The establishment of a management and monitoring committee to deal with increased social pressure on the local area, as well as increased pressure on the infrastructure and services provision is recommended. Such a committee should not only consist of representatives of Paul, but all the mining companies operating in the area together with representatives from the Siyancuma /Siyathemba Local Municipality.
- Paul Thukgwi should communicate and present their involvement in the community (goodwill, social responsibility, capacity building programmes, skills development, general development support and so forth) to obtain community support.
- Ensuring continued contact and communication between Paul, Siyancuma / Siyathemba Local Municipality, and local community leaders, as well as nearby landowners is critical, especially during the start-up and construction phase, but should also continue for the life of mine.

Interested and affected parties

Level of risk: Low

Mitigation measures

- Maintain active communication with IAPs.
- Ensure transparent communication with IAPs at all times.
- IAPs must be kept up to date on any changes in the prospecting operation.
- A complaints management system should be maintained by the mine to ensure that all issues raised by community members are followed up and addressed appropriately.

ix) Motivation where no alternative sites were considered

No alternative location for the proposed prospecting operation was considered, as the alluvial gravels have been deposited in this area. There is therefore no other alternative with regard to the overall operation footprint.

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

Not applicable. There is no alternative development location for the site as this is the area with the possible mineable resource.

h) 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 no 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).

i) 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)

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	SIGNIFICANCE IF MITIGATION
Processing Plant: 1 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	Medium

Ablution Facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Very Low
Clean & Dirty water systems:	Surface disturbance Soil contamination Surface water contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	It will be necessary to divert storm water around bulk sampling sites and pits and dumps areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage areas. Bulk sample sites and pits for Alluvial gravel, where and when applicable, should be rehabilitated concurrently as prospecting progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipes will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Maintain a buffer zone around the non-perennial streams and pans. Note that	Low

					these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. 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.	Low
Prospecting Area.	Dust Noise Removal and disturbance of	Air quality Fauna Flora Groundwater Noise and vibration	Commissioning Operational Decommissioning Closure	Medium	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control	Low

	vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Soil Surface Water Topography Safety			Immediately clean hydrocarbon spill Drip trays MRD stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. 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 authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. 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. Careful consideration is required when	

					planning the placement for stockpiling topsoil and the creation of access routes in order to minimise the overall prospecting footprint. The Footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to prospecting; Snares & traps removed and destroyed; and	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor	Low

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

					pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Temporary Workshop Facilities and Wash bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Monitor pipeline for water leaks Maintenance of pipeline 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.	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

j) 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
Annexure B ECOLOGICAL ASSESSMENT REPORT Paul Seun Thukgwi Viegulands Put Diamond Prospecting Site September 2017	Five plant communities were identified on site of which all are included in the earmarked area to be affected by prospecting activities. The watercourses include several ephemeral pans and drainage lines, which are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. The calcrete ridge, calcrete plains, thornveld and grassland on sand are all considered to be of high sensitivity, on account of the high number or frequency of species of conservation concern found here and/or the important faunal habitats they provide. The most profound impacts are expected to be related to the destruction of watercourses and the alteration of aquatic habitats; which in turn will cause cumulative fragmentation of important ecological corridors in the area. Species of conservation concern that are found in these earmarked habitats will most likely also be lost locally. These include the widespread Boscia albitrunca as well as Nymania capensis and Aloe claviflora commonly found on the calcrete plains and ridge, respectively. Similarly, the prospecting operation will result in the large-scale clearance of indigenous vegetation. Additionally, any disturbances to the Aardvark burrows will displace this protected species locally. Permit applications regarding protected fauna and flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation or destruction of Aardvark burrows. Furthermore, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries prior to any potential disturbances to B. albitrunca. To conclude, it is clear that the destruction of the natural habitat within the study area is inevitable. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area. The majority of the site is in a pristine condition and are expected to be adversely affected. In my opinion, authorisation should not be granted unless the applicant commits	X	i) Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()

	to the adherence of effective avoidance, management, mitigation and rehabilitation measures.		
Annexure C PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEONTOLOGICAL ASSESSMEMT) REQUESTED IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT (NO 25/1999) FOR THE PROPOSED MINE PROSPECTING ON THE REMAINING EXTENT OF PORTION 1 OF THE FARM VIEGULANDS PUT 42, PRIESKA DISTRICT, NORTHERN CAPE PROVINCE Prepared by Edward Matenga (MPhil, Archaeology; PhD Archaeology &Heritage, Uppsala/Sweden) **August 2017**	The mine prospecting can go ahead subject to the precautions stated above taken. The study is mindful that archaeological deposits are usually buried underground. Should archaeological artefacts or skeletal material be exposed in the area during development activities, 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.	X	i) Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()
Annexure D PALAEONTOLOGICAL ASSESSMENT (DESKTOP) REQUESTED IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR PROPOSED PROSPECTING ON THE REMAINING EXTENT OF PORTION 1 OF THE FARM ANNEX VIEGULANDS PUT 42, NEAR PRIESKA, SIYATHEMBA LOCAL MUNICIPALITY, PIXLEY KA	The proposed project intends to exploit the Mbizane Formation of the Dwyka Group. However, it is most unlikely the impact in palaeontological terms will be significant in view of the sparse occurrence of fossils in this unit. The formations of the Kalahari Group present in the area include the Mokalanen Formation calcrete, the Obobogorop Formation red, colluvial "derived gravels" and the Gordonia Formation aeolian sands. The most common fossil types are trace fossils such as plant root casts and a variety insect burrows e.g. termitaria. Burrow systems made by a variety of vertebrates also occur. Land snails, tortoise carapaces and ostrich eggshell are typical. Finds of larger-mammal fossil bones are rare in the Kalahari formations and then are often in an archaeological context and associated with pans and water sources. Consequently the	X	i) Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()

SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE Prepared by Joseph Chikumbirike (PhD Palaeontology, University of the Witwatersrand) August 2017	palaeontological sensitivity of the Kalahari Group formations is Low (Almond & Pether, 2009). Although the overall impact of the proposed development on fossil resources is expected to be minimal, it is recommended that a standard Fossil Finds Procedure (FFP) be incorporated into the Environmental Management Plan (EMP) for the proposed prospecting operations. A FFP has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the Environmental Control Officer (ECO). The ECO must put in place a contingency plan to rescue chance finds and where possible preserve them in situ. However, exposed fossil bones, unless already lying in the excavated spoil, must not be retrieved by a worker or ECO. All work must cease and the ECO must inform SAHRA and a professional palaeontologist, who will then decide if avoidance or mitigation are preferred. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA.		

Attach copies of the Specialist Reports as appendices (All studies attached as Annexures from A – D)

k) Environmental impact statement

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

- The Processing plant may have a medium impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Ablution facilities will have a very low impact on groundwater and soil in case of an emergency spill after mitigation.
- The Clean & Dirty water systems may have a low impact on groundwater, soil and surface water after mitigation.
- The Fuel Storage facility (Diesel tanks) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Prospecting Area may have a medium impact on air quality fauna, flora, noise, soil, surface water and topography after mitigation.
- The Salvage yard (Storage and laydown area) may have a low impact on fauna, flora, groundwater, soil and surface water after mitigation.
- The Security Gate and guard house at access control point may have a low impact on air quality, fauna, flora and soil after mitigation.
- The waste disposal site (domestic and industrial waste) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Roads (both access and haulage road on the mine site) may have a low impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Workshop and Wash bay may have a low impact on groundwater, soil and surface water after mitigation.
- The Water distribution Pipeline may have a low impact on fauna, flora, and surface water after mitigation.
- The Water tanks may have a low impact on fauna, flora, and surface water after mitigation.

From the assessment of impacts throughout all the phases it is clear that though the impacts may occur directly as a result of the proposed start in prospecting operations, the impacts are mostly of medium significance before mitigation. According to the assessment carried out by the EAP the majority of the impacts can be reduced to a low significance with the appropriate mitigation measures in place.

The EAPs and environmental consultants responsible for the compilation of this document, and the associated PPP are of the opinion based on the presented specialist assessments and impact assessment that the Environmental Authorization application should be authorised.

The following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- Adhere to the approved Environmental Management Programme

- Adhere to the Emergency procedures Report and implement spill clean-up procedures
- Apply for relevant permits with authorities for the removal of indigenous tree species and indigenous vegetation if applicable.
- Major spills should be reported within 24hr to the Department of Water and Sanitation and the NCDENC.

The nature of impacts can vary widely depending on the type of physical environment, the size of the activity and the perceptions and values of each of the affected parties. It was the objective of the assessment to identify both positive and negative impacts. The existing information was reviewed to assess the present status of the environment and the extent to which they have already been modified. The planned activities and associated infrastructure was used as reference to assess potential impacts.

In general, the environmental impacts associated to the prospecting operation are rather negative, while the social impacts are more beneficial. Impacts on vegetation are likely to be most profound, because the prospecting operation will constitute large-scale clearance of indigenous vegetation and most likely also the removal of protected species if any are encountered. Soil erosion and surface water deterioration are likely to be possible important impacts if appropriate management strategies are not practised.

Positive impacts include the demarcation and subsequent protection of heritage resources and the eradication of alien invasive species. Positive social impacts include the creation of jobs, social upliftment, training opportunities, community development and numerous economic benefits.

To conclude, it must be accepted that any activities will have both physical and social impacts. Therefore the destruction of the natural environmental features within the prospecting area is inevitable. The significance of the impacts will however be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area.

(ii) Final Site Map;

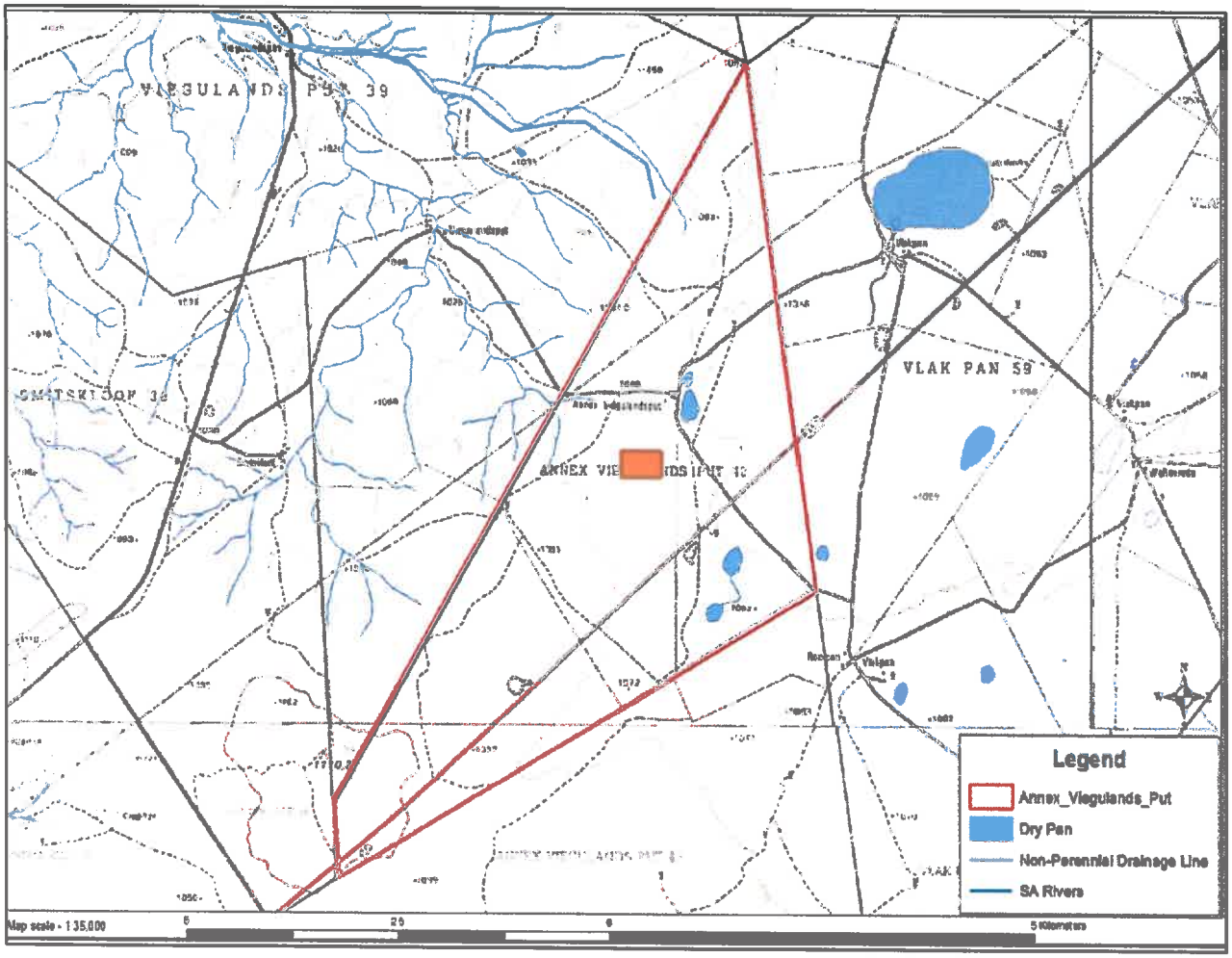
Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicated any areas that should be avoided, including buffers. Attach as **Appendix (Figure 26)**

The final site map below indicates the prospecting right application area in which all prospecting will take place. Existing roads are also depicted. The associated infrastructure relating to the prospecting site is also indicated.

No prospecting operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, pans, or any other structure whatsoever including such structures beyond the prospecting boundaries, or any

surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with;

Please see Final Site Map below.



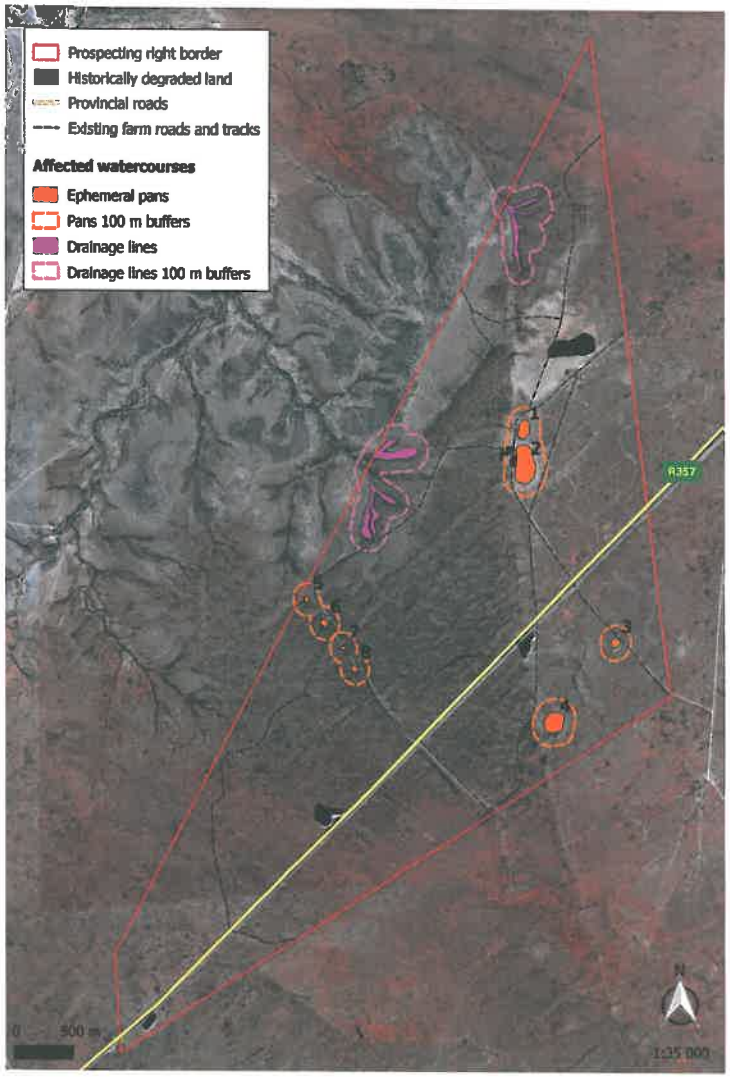


Figure 26: Final Site Surface layout map with sensitivity map on the right side (Dr. B Milne, Ecological report).

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

As mentioned before, the specific occurrence of diamonds in the area dictates the selection of the specific prospecting site and there are no alternatives in terms of project location.

In terms of alternative land use, the proposed Prospecting operation will be done in such a way that grazing will still be possible as the site will be rehabilitated in such a way that it allows the establishment of grass cover again.

The prospecting operation will provide 10 – 20 jobs depending on the phase of prospecting and will also add to the increased economic activity and the area surrounding the prospecting site.

Bulk sample trenches and pits, where and when applicable, should be rehabilitated concurrently as prospecting progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration.

During the operational stages of the prospecting operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. However the site layout plan has been developed not to place any infrastructure where resource materials could be located. The infrastructure and bulk sample sites and pits /dumps will alter the topography by adding features to the landscape. Topsoil removal and Mine Residue Dumps will change the natural topography. The construction of infrastructure and various facilities in the prospecting area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and prospecting of alluvial gravels, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

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 tanks 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.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly 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. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. 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.

Any dumping within the drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation.

Prospecting activities 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.

The transformation of natural habitats to prospecting and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.

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, activities on the farming areas 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.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage 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.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

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.

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project outweigh the potential social risks and/or threats to the local communities. However, as indicated earlier in the report, the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality, but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the prospecting activities on the residents should be limited.

The prospecting activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing prospecting activities

On a more detailed level, the following **positive** impacts are anticipated:

- The creation of job opportunities in the area, and associated local economic development;
- Economic and revenue contribution to the local municipal area, as well as the Siyancuma / Siyathemba District and adjacent municipalities;
- The involvement of Paul Thukgwi with regards to training and capacity building of his employees and subsequent improvement of the livelihoods of the employees' families, as well as its efforts in sustaining the socio-economic development of the communities in close proximity to the operation;
- The involvement of Paul Thukgwi with regards to social development projects and support through the Integrated Development Plans (IDPs);
- The positive impact of prospecting activity on the regional and local economy; and
- Positive impact of extensive local procurement focus.

Negative impacts as a result of the prospecting activity refer to:

- Inconvenience and intrusion impacts during the start-up and construction phases of the project such as the inflow of an additional workforce to the area, the possible influx of jobseekers, possible increase in the criminal activities (safety and security issues), disruption of social networks, as well as possible health risks;
- Disruptions in the daily living and movement patterns (increased traffic and possible dust pollution);
- Additional pressure on infrastructure development and maintenance;
- General intrusion impacts such as visual and noise pollution

From a social perspective it can be concluded that the proposed Paul Thukgwi Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered to e.g. ongoing environmental management and rehabilitation once the mine reaches its end of life.

I) 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.

Air Quality

- To limit the creation of nuisance dust the following management guidelines must be followed:
- Avoidance of unnecessary removal of vegetation.
- Routine spraying of unpaved site areas and roads utilized by the prospecting operation with water.
- Speed limits of vehicles inside the prospecting area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
- Continuous dumping and rehabilitation of disturbed areas.
- All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.

Archaeology:

- All operators of equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
    - All construction in the immediate vicinity (50m radius of the site) should cease.
    - The heritage practitioner should be informed as soon as possible.
    - In the event of obvious human remains the SAPS should be notified.
    - Mitigation measures (such as refilling) should not be attempted.
    - The area in a 50m radius of the find should be cordoned off with hazard tape.
    - Public access should be limited.
    - No media statement should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.
    - Paleontological finds should be handled as per the fossil finds procedure.

Fauna

- To ensure a minimum of impact to animals the following management guidelines will be followed:
    - Speed limits of vehicles inside the application area must be strictly controlled to avoid road kills.
    - Continuous controlled dumping and backfilling.
    - Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
    - No hunting (snares) must be allowed at the application area or in the surrounding area.
    - All prospecting and access roads must be fenced where possible.

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.
- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - 'The plants will be uprooted, felled or cut off and can be destroyed completely.'
    - The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.
- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to prospecting activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

- Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
- The following procedure must be followed if a vehicle or piece of equipment would break down inside a bulk sample excavation and outside of the maintenance area.
    - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
    - All efforts must be made to move the broken down vehicle or piece of equipment to the maintenance area.
    - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
- No repairs may be allowed outside the maintenance area except for emergencies.
- Equipment used as part of the proposed operation must be adequately maintained so as to ensure that the oil, diesel, grease or hydraulic fluid does not leak during the operation.
- Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).
- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine.

- Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.
- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

- Working hours must be kept between sunrise and sunset as far as possible.
- As a minimum, ambient noise levels emanating from the prospecting activities may not exceed 82dBA at the site boundary.
- The Applicant must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The Applicant must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
- 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, SABS 083 as amended, in any place at or in any mine or works where persons may travel or worke exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
- Hearing protection must be provided to 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 must be in good working order and vehicles must adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation must be equipped with a silencer on its exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, must be appropriately calibrated / adjusted.

Screening / Migration Control:

- Appropriate measures must be specifically being installed and / or employed at the plant to act as screen and to reflect/reduce the noise.
- Appropriate non-metallic washers/insulation must be used with any joining of apparatus made from materials such as corrugated iron. Such apparatus must be maintained in a fixed position.

Safety

- No employees may reside on the prospecting site.
- Access and haul roads must be maintained.
- Security access point to ensure monitoring of access to the site.

Soil

- In all places of development the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed where possible, from all areas where physical disturbance of the surface will occur.
- In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
- The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the life of the prospecting area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
- Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
- The stored topsoil must be adequately protected from being blown away or being eroded.
- Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
- Vehicle movement must be confined to establish roads for as far as practical in order to prevent the compaction of soils.

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.
- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.

- An application for an integrated Water Use Licence must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open bulk sample sites must be limited to emergency break downs with drip trays.
- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.
- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.

Topography

- All alluvial gravel bulk sampling sites and pits must be rehabilitated if and when possible and made safe so as to reflect as far as possible the pre-prospecting topography of the area.
- All temporary features e.g. plant, containers and stockpiling must be removed and handled in the prescribed manner during rehabilitation.

Visual

- Security Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night
- Alluvial bulk sampling sites and pits must be subject to progressive backfilling and made safe (including the re-establishment of vegetation).
- Permanent structures or features that are part of the proposed prospecting operation must be kept neat and well presented.
- Waste material of any description must be removed from the prospecting area on a regular basis and be disposed of at a recognized landfill facility.

The impact management objectives for the Paul Thukgwi planned prospecting operation should include:

- To ensure efficient extraction of the diamonds and to prevent the sterilization of any diamond reserves.
- To limit the alteration of the surrounding topography
- To manage and preserve soil types
- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.
- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of wetlands.

- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.
- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
  - To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
  - To minimise noise and vibration to a level that disturbances felt by the communities are limited.
  - To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
  - To ensure that all traffic generated by the proposed prospecting development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.
  - To preserve the historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
  - To ensure that the current socio-economic status quo is improved.
  - To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

The location of the central prospecting site and associated infrastructure is primarily based on proximity to the access roads, proximity to the areas earmarked for prospecting and limited additional impact on the environment and heritage resource.

It will therefore cause additional impacts if this infrastructure is moved and render the consideration of alternative prospecting sites useless.
The prospecting activities and methodologies associated with prospecting of alluvial diamonds is the only economic viable method currently being used by the diamonds fraternity. There is no alternative prospecting method for the prospecting of alluvial diamonds.

n) Aspects for inclusion as conditions of Authorisation

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

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

(Which relate to the assessment and mitigation measure proposed)

The above mitigation measures are tried and tested over many years in the diamond mining/prospecting industry. The Applicant must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is therefore assumed that the above assumptions are adequate and that the information provided is correct.

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.

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 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.

(1) Specific conditions to be included into the compilation and approval of EMPr

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

(2) Rehabilitation requirements

A Detailed rehabilitation plan will be appended to the EMPR. The Mine had to provide to the DMR, a financial rehabilitation guarantee to the amount as

calculated in terms of the financial quantum Guideline and approved by the DMR.

Infrastructure areas

On completion of the prospecting operation, the various surfaces, including the access road, the office area, storage areas and the plant site, will finally be rehabilitated as follows: All other material on the surface will be removed to the original topsoil level where possible. This material will then be backfilled into any open pits or bulk sampling sites. 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, plant, 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.

Topsoil and Stockpile Deposits:

Disposal Facilities: Waste material of all description inclusive of receptacles, scrap, rubble and tyres should be removed entirely from the prospecting area and disposed of at a recognized landfill facility. It should not be permitted to be buried or burned on the site.

Ongoing Seepage, Control of Rain Water:

Water Quality Management in accordance with the South African Water Quality Guidelines must be adhered to in order to provide timely and accurate water data to the Department of Water and Sanitation (DWS) as well as to manage impacts caused by the activity. Specific objectives of such a program are to:

- Determine whether water quality comply with water quality standards.
- Provide timely data for intervention as and when required.
- Assess the status of water quality in the surrounding areas.
- Provide analytical water quality information describing trends (present conditions and changes).

The objectives are to limit the adverse effect of pollutants in the water resource. The setting of in-stream Resource Water Quality Objectives (RWQO) is based on the South African Water Quality Guidelines.

Water Monitoring Points

Surface water: The Orange River which are about 10 km away from the farm on which the prospecting right application is made. Monitoring takes place by collecting surface water samples every quarter.

Long Term Stability and Safety: It should be the objective of mine management to ensure the long term stability of all rehabilitated areas including the backfilled bulk sampling sites and pits. This should 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 deemed necessary, unless vegetation growth is not returned to a desirable state by the time of mine closure.

Final Rehabilitation Roads:

- After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and 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 should be submitted annually to the Department of Mineral Resources – Kimberley, as described in Regulation 55.

Maintenance (Aftercare):

- Maintenance after closure should include 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 should be to create an acceptable post-mine environment and land-use. Therefore all agreed commitments should be implemented by Mine Management.

After-effects Following Closure:

Acid Mine Drainage: No potential for bad quality leachate or acid mine drainage development is associated with diamond 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 should be to obtain a self-sustaining and stable end result. The concurrent monitoring of all material and replacement of topsoil where available should be ensured.

q) Period for which the Environmental Authorisation is required

5 years. Thus the period required is for the Life of Mine of the Prospecting Right. **Prospecting Right application for 3 years but can be renewed.**

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 Basic Assessment Report and the Environmental Management Programme Report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Environmental Impact 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

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Paul Thukgwi site as it stands currently (risking premature rehabilitation) is estimated to be R1 916 473 according to the DMR calculations.

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0.13	13.72	1	1.1	1.96196
					1	1.1	
2 (A)	Demolition of steel buildings and structures	m2	700	191.16	1	1.1	147193.2
2(B)	Demolition of reinforced concrete buildings and structures	m2	250	281.71	1	1.1	77470.25
3	Rehabilitation of access roads	m2	9000	2	1	1.1	19800
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	332.01	1	1.1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	181.1	1	1.1	0
5	Demolition of housing and/or administration facilities	m2	0	382.32	1	1.1	0
6	Opencast rehabilitation including final voids and ramps	ha	4	194579.4	0.52	1.1	445197.6672
7	Sealing of shafts adits and inclines	m3	0	102.62	1	1.1	0
8 (A)	Rehabilitation of overburden and spoils	ha	2.45	133609.85	1	1.1	360078.5458
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha		166408.65	1	1.1	0
					1		
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	483329.59	1	1.1	0
					1	1.1	
9	Rehabilitation of subsided areas	ha	0	111878.12	1	1.1	0
10	General surface rehabilitation	ha	3	105841.53	1	1.1	349277.049
11	River diversions	ha	0	105841.53	1	1.1	0
12	Fencing	m	0	120.73	1	1.1	0
13	Water management	ha	0	40243.93	1	1.1	0
14	2 to 3 years of maintenance and aftercare	ha	3	14085.38	1	1.1	46481.754
15 (A)	Specialist study	Sum	0			1.1	0
15 (B)	Specialist study	Sum	0			1.1	0

1	Preliminary and General	86730.02567	weighting factor 2 1.05	91066.52696
2	Contingencies	144550.0428		144550.0428

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) Deviations from the approved scoping report and plan of study

i) Deviations from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)

Not applicable – No deviations from the methodology proposed in the Scoping Report.

ii) Motivation for the deviation

Not applicable – No deviations from the methodology proposed in the Scoping Report.

u) Other 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, bulk sampling 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 **Appendix 2.19.1** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 therein)

From a social perspective the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMP).
It should be noted that the responsibility of the mitigation lies with the owner, operator, and/or with the local municipality. The mitigation measures would have to form part of the respective stakeholder's expenditure predictions or operations and management within the area, therefore the monitoring activities cannot be expressed in financial terms.
From a social perspective it can be concluded that the proposed Paul Thukgwi Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

(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)

Mr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Paul Thukgwi to provide an Heritage Impact Assessment **Annexure C** in order to highlight the Heritage of the proposed prospecting area, and to determine the possible impact of prospecting on the Heritage of the application area.

The Stone Age

Fourteen (14) Stone Age sites were recorded all of which have a low density of lithics. The stone tools, which comprise mainly scrapers, flakes and a few blades and cores, are spread throughout the property without any significant concentrations to demonstrate regular activity. Thus no specific settlement locales could be defined to warrant further investigation.

The occurrence of a pear-shaped hand-axe is of particular interest as it seems to confirm the presence of Acheulean material in the area which dates between 2 million to 250 000 years BP. Its occurrence among the scrapers / flakes might represent an overlap of or transition from the ESA and the Middle Stone Age. If a museum or university is interested in studying the find its GPS location was recorded with an accuracy of ±4m. (HIA report by Dr. Edward Matenga August 2017).

The Iron Age

No Iron Age sites were found on the property.

Early commercial farming

Structures of stonework at a ruined homestead include a terrace revetment wall, which appears to have been a landscaping feature. A swimming pool measuring 15m x 20m x 2.5m at the deepest end was built of stone with cement binder. The exterior has a false dry stone masonry appearance. A livestock enclosure measuring 15m x 25m x 1.2m high is also built of stones. At the farmstead there is a shed with Cape Dutch style gables (VG15, VG16, Figs 8-10). In all instances the stonework is rough, none of the building blocks trimmed to a regular shape. There are no compelling circumstances in the development plan to get rid of these structures. (HIA report by Dr. Edward Matenga August 2017).

Burial ground

There are two graves located in a fenced plot on the periphery of the farmstead. One is a double grave of a couple, Schalk and Susanna Jacobs, the previous owners of the farm born in the 1880s. The second grave is of a juvenile. Graves / burial grounds are protected in terms of Section 34 of the National Heritage Resources Act. (HIA report by Dr. Edward Matenga August 2017).

Palaentological

Mr. Joseph Chikumbirike from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Paul Thukgwito provide an Palaeontological Assessment **Annexure D** in order to highlight the Palaeontological features of the proposed prospecting area, and to determine

the possible impact of prospecting on the Palaeontology of the application area.

The proposed project intends to exploit the Mbizane Formation of the Dwyka Group. However, it is most unlikely the impact in palaeontological terms will be significant in view of the sparse occurrence of fossils in this unit.

The formations of the Kalahari Group present in the area include the Mokalanen Formation calcrete, the Obobogorop Formation red, colluvial "derived gravels" and the Gordonia Formation aeolian sands. The most common fossil types are trace fossils such as plant root casts and a variety insect burrows e.g. termitaria. Burrow systems made by a variety of vertebrates also occur. Land snails, tortoise carapaces and ostrich eggshell are typical. Finds of larger-mammal fossil bones are rare in the Kalahari formations and then are often in an archaeological context and associated with pans and water sources. Consequently the palaeontological sensitivity of the Kalahari Group formations is Low (Almond & Pether, 2009).

Although the overall impact of the proposed development on fossil resources is expected to be minimal, it is recommended that a standard Fossil Finds Procedure (FFP) be incorporated into the Environmental Management Plan (EMP) for the proposed prospecting operations. A FFP has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the Environmental Control Officer (ECO). The ECO must put in place a contingency plan to rescue chance finds and where possible preserve them in situ. However, exposed fossil bones, unless already lying in the excavated spoil, must not be retrieved by a worker or ECO. All work must cease and the ECO must inform SAHRA and a professional palaeontologist, who will then decide if avoidance or mitigation are preferred. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA. (Palaentological Assessment by Joseph Chikumbirike (PhD Palaeontology, University of the Witwatersrand).

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 where the applicant has proven diamonds and has found 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)

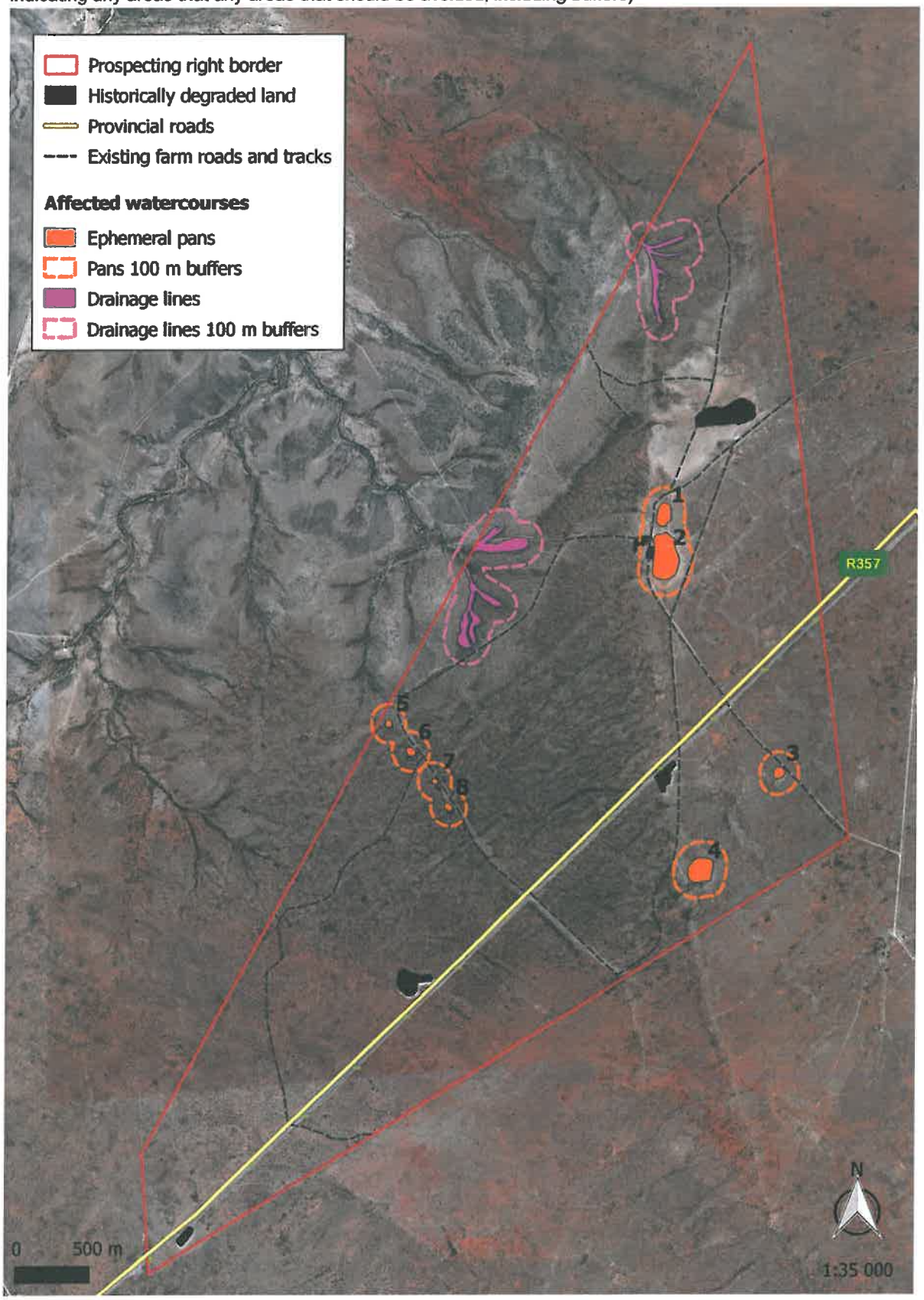
I hereby confirm that the requirement for the provision of the details and expertise of the EAP is already included in Part A as required.

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 requirement for the aspects of the activity is already included in Part A as required.

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)



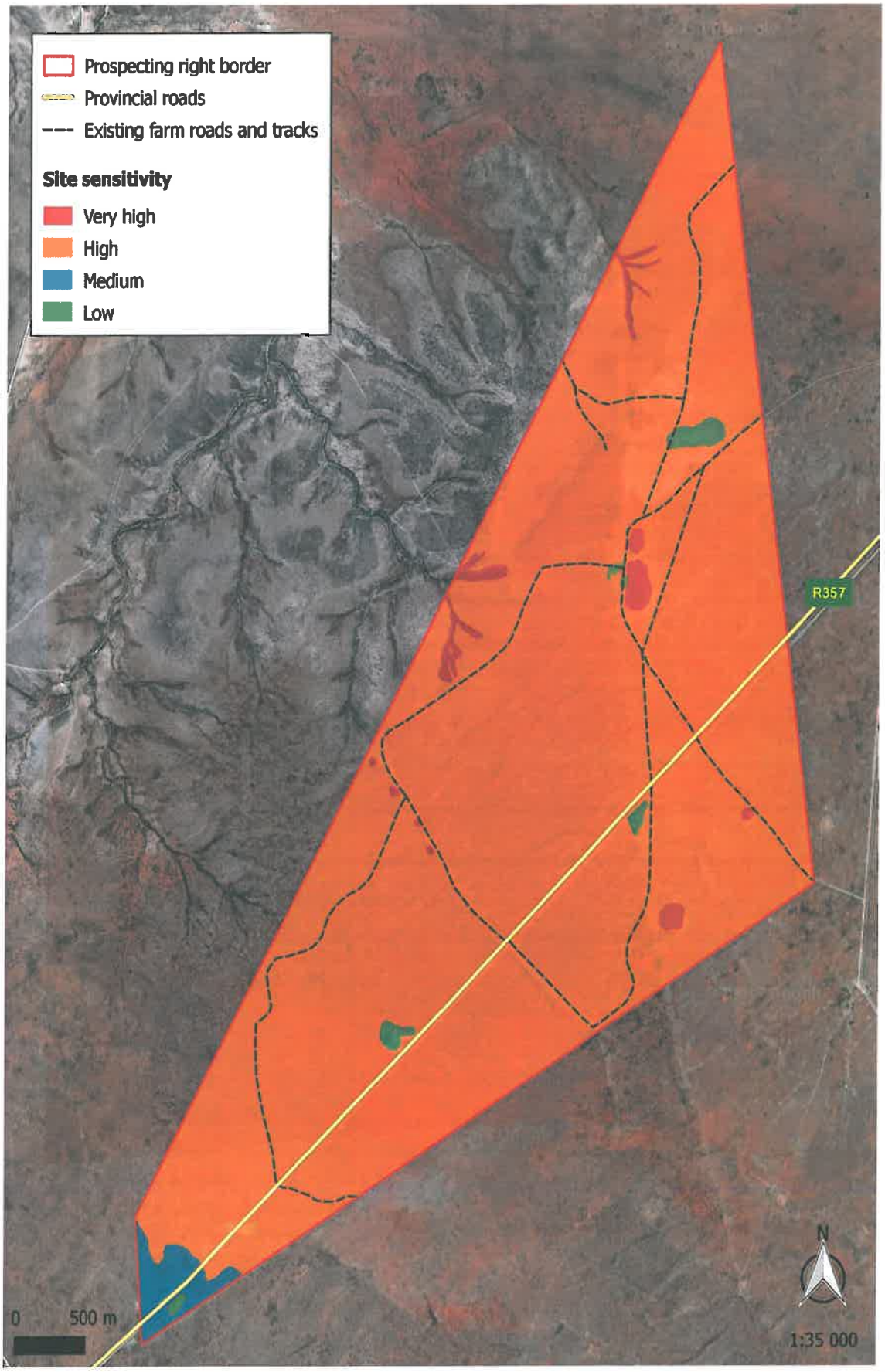


Figure 27: A sensitivity map for the proposed prospecting area. (Ecological Study by Boscia Ecological Consulting, August 2017)

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 in 2.4 herein)

The main closure objectives of the planned prospecting operation are:

- To restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any diamond reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained when a closure certificate is issued.
- To establish a stable and self-sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the prospecting activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the prospecting operation efficiently, cost effectively and in accordance with Government Policy.

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

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

- To ensure that 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.
- The removal, decommissioning and disposal of all prospecting infrastructure, will comply with all conditions contained in the MPRDA. To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:
- The plant and associated disused infrastructure will be dismantled or demolished. Any building foundations will be removed and land exposed to the demolition and dismantling of infrastructure and all other disturbed land will be rehabilitated.
- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.

- Any surface water management infrastructure will be maintained to ensure they are stable and functional.
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Mine Residue Dump (Porrel Dam)

The objectives pertaining to the effective management and rehabilitation of the Mine Residue Dump include:

- To ensure that the Mine Residue Dump deposit are stable and that there is an acceptably low risk of failure of these deposits during the decommissioning phase and following mine closure; To establish self-sustainable vegetation cover on the Mine Residue dump so that the visual impact of the Mine Residue dump is improved and in order to prevent erosion.

Management principles pertaining to Mine Residue dump include:

- The Mine Residue dump will continuously be inspected by a suitable qualified professional engineer to ensure their stability. If they are unstable, the appropriate remedial measures will be implemented.
- Inspection and monitoring should continue until a suitable qualified profession engineer has confirmed the long-term stability of the Mine Residue dump.
- Any infrastructure or facilities that serve the Mine Residue dump will be maintained to ensure that they are both stable and functional.

Maintenance

The necessary agreements and arrangement will be made by the Paul Thukgwi 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 Mine Residue dump, 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, as well as NEMA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Paul Thukgwi will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of this EMPR;
- Conduct performance assessments of this EMPR; and
- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will be annually. 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 and mine residue deposits to a state that facilitates compliance with applicable environmental quality objectives;
- Limit the impact on staff whose positions become redundant at the time of mine closure, as addressed in the SLP;
- 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:

- Paul Thukgwi will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.

- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic benefits of the project through development of alternative forms of income generation.
- Paul Thukgwi will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.
- The mine will fulfil the requirements for closure.

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

There is won't be a need for this, as based on the specialist reports.

iii) Potential risk of Acid Mine Drainage (Indicate whether or not the mining can result in acid mine drainage)

No potential risk for Acid Mine Drainage exists.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

There is no residual or cumulative impact that may result from acid mine drainage.

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation

The only activity relating to the cost of water in the prospecting operations relates to dust suppression in the prospecting area and on the roads when

hauling and transporting material to the processing plant, and doing continuous backfilling as part of the rehabilitation process.

It must however be noted that the water supply to the activities will be sourced from the nearby Orange River (10 km). There will be an industrial rate applied for water used and the cost will be the pumping cost.

The processing plant (diamond pan) scrubbers and final recovery will have an impact on the cost of water used. The cost of water will have an upward trend over time as a result of the national capacity and demand situation. Water are however recycled as far as possible and redirected to the processing plants. It must however be noted that the water supply to the activities will be sourced from the Orange River.

viii) Has a water use licence been applied for?

A new WULA application has been prepared and are in the final stages to be submitted. The EIA EMP is a minimum requirement for the application and therefor the application will be submitted shortly after the EIA EMP had been submitted to the competent authority. The Proof of submission will be sent onto the competent authority as soon as it is received.

ix) Impact to be mitigated in their respective phases

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

ACTIVITY Whether listed or not listed. (E.g. Excavations, blasting, 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.)	**PHASE** of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.	**SIZE AND SCALE** of disturbance (volumes, tonnages and hectares or m^2)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**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.
Processsing Plant 1 X 16 feet pan	Construction Commissioning Operational Decommissioning Closure	0.5 ha Steel, concrete, electric wires	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills **Rip disturbed areas to** allow re-growth of vegetation cover		Removal of processing plant upon closure of prospecting right.

Ablution facilities Chemical toilets	Construction Commissioning Operational Decommissioning Closure	25m² or 0.0025ha	Maintenance of container Plants Removal of container plants upon closure		Removal of container plant upon closure of the prospecting right.
Clean & Dirty water systems: Berms	Construction Commissioning Operational Decommissioning Closure	This area also includes the re-fuel and lubrication station, wash bay and office area.	Maintenance of berms and trenches Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.		Upon cessation of the individual activity (continuous rehabilitation)
Fuel Storage facility (Diesel tanks)	Construction Commissioning Operational Decommissioning Closure	250m² Concrete, bricks, and steel	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point Immediately clean hydrocarbon spill.		Removal of diesel tanks upon closure of Prospecting Right.
Prospecting Area	Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of 40 hectares of alluvial diamond bulk sampling sites and pits.	No dumping of materials prior to approval by exploration geologist; Proper planning of bulk sample sites and pits Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation Stormwater run-off control Immediately clean hydrocarbon spill		Upon cessation of the individual activity (continuous rehabilitation)

			Drip trays Dump control and monitoring Erosion control		
Salvage yard (Storage and laydown area)	Construction Commissioning Operational Decommissioning Closure	1000m² or 0.1 ha No construction material, area to be levelled with a grader and fenced with a gate and access control	Access control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill		Removal of fence around salvage yard and ripping of salvage yard area upon closure of the prospecting right.
Waste disposal site (domestic and industrial waste):	Construction Commissioning Operational Decommissioning Closure	15m x 30m = 450m²	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of prospecting right.
Roads (both access and haulage road on the mine site):	Construction Commissioning Operational Decommissioning Closure	Additional mine haul road = 5 000m²	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover		Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the prospecting right.
Workshop and Wash bay	Construction Commissioning Operational	300m² Concrete and Steel	Concrete floor with oil/water separator Storm water run-off		Removal of wash bay equipment, breaking and removal of rubble from the

	Decommissioning Closure		control Immediately clean hydrocarbon spills		concrete floors and bund walls upon closure of prospecting right
Water distribution Pipeline	Construction Commissioning Operational Decommissioning Closure	HDPE Pipes	Maintain water pipeline and structures		Removal of pipeline upon closure of the prospecting right.
Water tanks:	Construction Commissioning Operational Decommissioning Closure	3m X 3m = 9m²	Maintain water tanks and structures		Removal of water tank and steel structure upon closure of the prospecting right.

e) Impact Management Outcomes

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

ACTIVITY Whether listed or not listed.	**POTENTIAL IMPACT** (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	**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.
Processing Plant 1 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				distance and natural shielding; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Ablution facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Maintenance of sewage facilities on a regular basis. Removal of container on closure	Minimize the potential for a chemical spill on soil, which could infiltrate to groundwater.
Clean & Dirty water systems:	Surface disturbance Groundwater Contamination	Soil Groundwater Surface Water	Construction Commissioning Operational Decommissioning Closure	The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and

	Soil contamination Surface water contamination			that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. 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. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of	closure objectives to be met.

				disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. 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.	Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.
Prospecting Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography	Commissioning Operational Decommissioning Closure	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met.

	of fauna Soil contamination Surface disturbance Surface water contamination	Safety		Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	Erosion potential minimized.

				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 authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. 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. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall prospecting	

				footprint. The Footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to Prospecting; Snares & traps removed and destroyed; and Maintenance of firebreaks. It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage lines. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	of fauna Soil contamination Surface disturbance Surface water contamination				
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met.
Roads (both access and haulage road on the mine site):	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Workshop and Wash bay	Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Monitor pipeline for water leaks Maintenance of pipeline 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.	Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water tanks:	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Maintain water tanks and structures	Safety ensured. Rehabilitation standards and closure objectives to be met.

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)

ACTIVITY **Whether listed or not listed.**	**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 STANDARDS** (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)
Processing Plant: 1 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components;	Removal of processing plant upon closure of prospecting right.	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

		Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the non –perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		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.
Ablution Facilities Chemical Toilets.	Soil contamination Groundwater contamination	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Removal of container plant upon closure of the prospecting right.	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.
Clean & Dirty water systems: Berms	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the prospecting area. Bulk sampling sites and pits, where and when applicable, should be rehabilitated concurrently as prospecting progresses. The re-vegetation of disturbed areas is important to prevent erosion and	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of Prospecting Right	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

		improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. 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. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be		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.

		recycling and re-use as far as possible.		
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. 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.	Removal of diesel tanks upon closure of Prospecting Right.	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.

Prospecting Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the non-perennial streams and pans. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking	Upon cessation of the individual activity (continuous rehabilitation)	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.

		appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. 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 authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. 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. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall prospecting footprint. The Footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to		

		prospecting; Snares & traps removed and destroyed; and Maintenance of firebreaks. Bulk sampling sites and pits, where and when applicable, should be rehabilitated concurrently as prospecting progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away.		
Salvage yard (Storage and laydown area)	Surface Water contamination Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Removal of fence around salvage yard and ripping of salvage yard area upon closure of the prospecting right.	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.
Product Stockpile area	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination		Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

			respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Surface Water contamination Contamination of soil Surface water contamination	Storage of Waste within receptacles Storm water control Ground water monitoring Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of prospecting right.	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.
Roads (both access and haulage road on the mine site):	Dust Surface Water contamination	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits	Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of	The following must be placed at the site and is applicable to all activities:

	Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	the Prospecting Right.	• 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.
Workshop and Wash bay	Surface Water contamination Removal and disturbance of vegetation cover and	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of prospecting right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts;

	natural habitat of fauna Soil contamination			• 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.
Water distribution Pipeline	Surface disturbance	Monitor pipeline for water leaks Maintenance of pipeline 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.	Removal of pipeline upon closure of the Prospecting Right.	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.
Water tanks:	Surface disturbance	Maintain water tanks and structures	Removal of water tank and steel structure upon closure of the prospecting right.	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.

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 Regulation 22(2)(d) as described in 2.4 herein.

Closure:

The main closure objective of this mine is to rehabilitate the prospected 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.

Paul Thukgwi will ensure that the mine 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.

Paul Thukgwi 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.

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

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

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

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

Paul Thukgwi 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 (bulk sampling sites and pits, topsoil- & overburden stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

Historical and Cultural aspects:

Eighteen (18) sites were recorded (Fig 6). A significance ranking system has been applied as the basis for recommending appropriate mitigation in view of the potential impact of the proposed activities. The attributes of the sites are systematically documented with photo illustrations provided in a Catalogue in Section 8 of this report

The Stone Age
Fourteen (14) Stone Age sites were recorded all of which have a low density of lithics. The stone tools which comprise mainly scrapers, flakes and a few blades and cores are spread throughout the property without any significant concentrations to suggest regular human

activity. Thus no specific settlement locales could be defined to warrant further investigation.

The Iron Age
No Iron Age sites were found on the property.

Early commercial farming
Structures built of stonework at a ruined homestead include a terrace revetment wall, which appears to have been a landscaping feature. A swimming pool measuring 15m x 20m x 2.5m at the deepest end was built of stone with cement binding. The exterior has a false dry stone masonry appearance. A livestock enclosure measuring 15m x 25m x 1.2m high is also built of stones. In all instances the stonework is rough, none of the building blocks trimmed to a regular shape. There are no compelling circumstances in the development plan to get rid of these structures.

Burial ground
There are two graves located in a fenced plot on the periphery of the farmstead. One is a double grave of a couple, Schalk and Susanna Jacobs, the previous owners of the farm born in the 1880s. The second grave is of a juvenile. Graves / burial grounds are protected in terms of Section 34 of the National Heritage Resources Act.

The sites are of medium to high significance.

Finally, it should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts 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 or palaeontologist should 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 Paul Thukgwi and Mr. Burger the surface owner have been in consultation which is still ongoing. A public meeting was conducted on the closure objectives.

(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.

Please refer to Figure 2.

Infrastructure Areas:

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

- The MRD will be rehabilitated in situ. 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, screening plant, 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 and Stockpile Deposits:

- Disposal Facilities:-
  Waste material of all description inclusive of receptacles, scrap, rubble and tyres will be removed entirely from the prospecting area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.
- Ongoing Seepage, Control of Rain Water:-

Monitoring will be undertaken during the 3 year post rehabilitation aftercare and maintenance period.

- 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 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.

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 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 as no groundwater will be used or abstracted.
- 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 tailings 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 ultimate rehabilitation of the prospecting site that involves the sloping, levelling, replacement of topsoil and the seeding of an grass seed mix in areas that does not recover acceptably as agreed to by the land owner will ensure that the site could be regarded as safe for humans and animals and will also ensure that the site is stable from an erosion point of view and also ensuring that the site could be used for grazing again.

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 prospecting of alluvial diamonds and the backfilling and 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 year) 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.

The total cost to rehabilitate and mitigate the Paul Thukgwi Mine site as it stands currently (risking premature rehabilitation) is estimated to be R1 916 473 according to the DMR calculations. The detailed calculation DMR quantum is presented in Table 34. The total rehabilitation costing is based on the assumption that the prospecting operation will do continuous concurrent rehabilitation throughout the project.

Table 34: Financial Quantum

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0.13	13.72	1 1	1.1 1.1	1.96196
2 (A)	Demolition of steel buildings and structures	m2	700	191.16	1	1.1	147193.2
2(B)	Demolition of reinforced concrete buildings and structures	m2	250	281.71	1	1.1	77470.25
3	Rehabilitation of access roads	m2	9000	2	1	1.1	19800
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	332.01	1	1.1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	181.1	1	1.1	0
5	Demolition of housing and/or administration facilities	m2	0	382.32	1	1.1	0
6	Opencast rehabilitation including final voids and ramps	ha	4	194579.4	0.52	1.1	445197.6672
7	Sealing of shafts adits and inclines	m3	0	102.62	1	1.1	0
8 (A)	Rehabilitation of overburden and spoils	ha	2.45	133609.85	1	1.1	360078.5458
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha		166408.65	1 1	1.1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	483329.59	1 1	1.1 1.1	0
9	Rehabilitation of subsided areas	ha	0	111878.12	1	1.1	0
10	General surface rehabilitation	ha	3	105841.53	1	1.1	349277.049
11	River diversions	ha	0	105841.53	1	1.1	0
12	Fencing	m	0	120.73	1	1.1	0
13	Water management	ha	0	40243.93	1	1.1	0
14	2 to 3 years of maintenance and aftercare	ha	3	14085.38	1	1.1	46481.754
15 (A)	Specialist study	Sum	0			1.1	0
15 (B)	Specialist study	Sum	0			1.1	0
					Sub Total 1		[illegible]
1	Preliminary and General		86730.02567		weighting factor 2 1.05		91066.52696
2	Contingencies		144550.0428				144550.0428
					Subtotal 2		[illegible]
					VAT [illegible]		[illegible]
					Grand Total		1916473

(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 mine 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	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

	invasive plant species.			cover will be investigated.
SOURCE ACTIVITY	**IMPACTS REQUIRING MONITORING PROGRAMMES**	**FUNCTIONAL REQUIREMENTS FOR MONITORING**	**ROLES AND RESPONSIBILITIES** (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	**MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS**
Noise and Vibration	To ensure that the legislated noise and ground vibration levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant and that which may migrate outside the plant area.	The manager during the construction phase and the responsible person (Manager / Environmental Department) during the operational phase of the project.	Quarterly reports on fall-out noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
Surface Water	To conserve water; and To eliminate the contamination of run-off.	The Orange River are the nearest source in the vicinity of the mine. The Orange River will be monitored by collecting surface water samples quarterly.	Site Manager/Water Supply	The Orange River which may be impacted by the activity (The River is about 10km away from the site). Monitoring takes place by collecting surface water samples every quarter.

l) Indicate the frequency of the submission of the performance assessment report

This section of the report relates to Section 33 of the GNR543 published in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA. Regulation 33(e), proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon Furthermore, Regulation 55 (1) (2) of the MPRDA Regulations, R527 requires that the holder of a prospecting right conduct monitoring on a continuous basis.

Monitoring provides qualitative and quantitative information pertaining to the possible impacts of the development on the environment, and enables the measurement of the effectiveness of environmental management measures. The implementation of a monitoring plan is necessary to ensure compliance with the NEMA, MPRDA and NWA environmental authorisations which must be obtained before any of the proposed activities may commence. The key to the success of environmental management lies in the effective implementation of the proposed mitigation and management measures.

The monitoring programme will incorporate the following impacts and environmental components:

- Hydrological (surface water and bio-monitoring);
- Terrestrial ecology (fauna and flora); and
- Air quality (dust);

Mine environmental audits are also required to ensure that all proposed management and mitigation measures together with monitoring programmes are being implemented. These audits must be undertaken annually unless specified otherwise by the relevant authorities. This section of the report is compiled in accordance to the National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulation 543 of 2010, Section 31 (2) (b), and Section 33 (e), (g), (h) and (i).

Ongoing monitoring of the bio-physical and socio-economic environments will continue throughout the life of the project as per the approved EMP and the accepted monitoring programmes. Paul Thukgwi will monitor and assess the performance of the EMP on an ongoing basis. Monitoring of different environmental aspects/impacts takes place by means of quantitative and qualitative evaluation techniques in order to determine whether the requirements of the environmental management programme are being complied with. Monitoring is a continuous data-gathering and control procedure. It may range from routine visual inspections to in-depth investigative monitoring. All monitoring will be undertaken in terms of the approved EMP for the mine.

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 achieve 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 Paul Thukgwi should focus on the following:

- General environmental awareness
- 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

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

- An environmental, health and safety induction programme will be provided to all employees prior to commencing work, and they will sign acknowledgement of the induction.
- A daily "toolbox talk" will 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.

ENVIRONMENTAL AWARENES TRAINING PROGRAMME PROCEDURE

Natural resources are limited and not always renewable and it is the responsibility of management to ensure that all employees are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible.

Environmental awareness training must be given to new employees on site and any contractors who may come onto site for a short period of time. Refresher training must be given to permanent employees on an annual basis.

The objective of this procedure is to ensure that all employees on the mine, including contractors, are competent to perform their duties, thereby eliminating negative impacts on their safety, health and the environment.

The Environmental topics to be covered in awareness training should include the following:

- **RESOURCE MANAGEMENT**
    - The importance of saving water
        1. South Africa is a water scarce country and rivers are polluted;
        2. Do not throw litter into river or water drains;
        3. Do not dispose of oils in sewers.
    - Air pollution - Climate change
        1. The use of fossil fuels is increasing the amount of greenhouse gases that are discharged to the atmosphere. Share transport or use public transport;
        2. Don't burn any rubbish, the smoke pollutes the air;
        3. Plant trees, they clean the air, provide us with oxygen and remove the greenhouse gas carbon dioxide from the air.
    - Soil conservation
        1. Keep vegetation on the surface of the land to prevent soil erosion
        2. Plant trees.

- **HAZARDOUS SUBSTANCE USE AND STORAGE**
    - Solvents, petrol, diesel, insecticides, chlorine, detergents, chemical fertilisers are harmful to the environment and to your health. Use them sparingly and do not let them get into the water systems. Containers must be disposed of to a licensed hazardous waste disposal facility;

- Hazardous substances must be stored and used correctly;
- Ensure that 16 point Material Substances Safety Data Sheets (MSDS) are available at point of store;
- Compressed gas storage requirements;
- Flammable substances store requirement.

- **INCIDENT & EMERGENCY REPORTING**

  - The Applicant must have an emergency / incident reporting system whereby environmental incidents can be reported and actioned to mitigate and follow up on.

- **OIL / DIESEL/ PETROL SPILL CLEAN UP**

  - All employees who work with machines and vehicles must be instructed how to prevent and clean up an oil or diesel spill appropriately. Spill kits must be available on site, drip trays must be used when servicing vehicles.

- **CONSERVATION OF WATER**

  - Campaign to save water on site;
  - Clean water is expensive and potable water must be used carefully;
  - Prevent pollution of water by preventing spills and dispose of wastes properly.

- **CONSERVATION OF VEGETATION**

  Plants, grasses and trees are very important to our existence on the earth. They provide food, fuel, shelter, raw materials and they clean the air. Indigenous plants are especially important for traditional medicine as well as the whole ecology of life. Human activities are destroying the natural forests of the earth. The natural forests are the "lungs" of the planet and unfortunately they are being cleared faster than they can regenerated.

  - EIA's are to be done before virgin bush can be cleared;
  - Vegetation cover reduces water and topsoil loss from the ground, do not clear vegetation unnecessarily;
  - Indigenous trees provide shade, attract wild birds;
  - Do not chop down indigenous trees without good reason;
  - Implement a tree planting programme;
  - Remove alien invasive trees in your area such as Prosopis, Syringa and Pepper trees, cactus plants.

- **WASTE MANAGEMENT**

  - Employees must be instructed on how to determine the difference between hazardous waste and general waste;
  - They must know how to separate hazardous and general waste and where to dispose of these wastes in the correct manner;
  - Examples of hazardous waste which must be recycled or sent to Waste Tech for disposal:
    - Oil, diesel, batteries, acids, paint, thinners, electronic waste
    - Pesticides, jik, Handy Andy;

- Old oil, old oil filters, old paint is hazardous and must not be disposed of to a general land fill. Oilkol of the Rose Foundation will collect old oil;
- Mercury in fluorescent light bulbs is hazardous, fluorescent lights must be handled with great care so as not to break the glass and release the mercury vapour into the air which you breathe.

o Examples of general wastes which can go to the municipal landfill:
- Wood, paper, plastic, glass, old PPE.

o Recycle, Reuse, Reduce, and Recover where ever possible.

- **CONCLUSION**

The management of the Paul Thukgwi mine will utilize the Environmental Awareness Plan to assure that all employees and contractors are aware of the environment and know how to manage it correctly.

(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 environmental friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources.
- Pipe leakages should be minimized.
- 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 prospected 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 prospected 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 prospected 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 stockpiling topsoil and 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 site 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 prospected 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 construction phase and a permanent basis during the operational phase and the communities will have to be briefed and informed of this during the public participation process. Regular feed-back to the community during the operational phase of the project of the baseline noise and ground vibration monitoring must take place. 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 area, such as the WRD, 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.
  - Ensure that the design fits into the surrounding environment and it is aesthetically pleasing;
  - Reduce the construction period through careful planning and productive implementation of resources;
  - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads;
  - 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; and
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting or restrict lighting to certain areas.

- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- 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;
- Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the development. The correct specification and placement of lighting and light fixtures for the proposed development will go far to contain rather than spread the light. Additional measures include the following:
  - Limiting mounting heights of lighting fixtures by specifying foot-lights or bollard level lights;
  - Making use of minimum lumen or wattage in fixtures;
  - Making use of down-lighters, or shielded fixtures; and
  - Making use of energy efficient lighting or other types of low impact lighting.
  - Secondary impacts anticipated as a result of the proposed development (i.e. visual character, sense of place and tourism potential) are not possible to mitigate.

Soils:

Topography, soil erosion and associated degradation of ecosystems

- Backfill all bulk sampling sites and pits continuously.
- Employ effective rehabilitation strategies to restore surface topography of bulk sampling sites and pits and plant site.
- Stabilise the mine residue deposits.
  - 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 gravels and thereby prevent repeated and unnecessary dumping.
- The soil that is stripped during construction should be stock-piled in layers and protected by berms to prevent erosion.
- All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses.
- Stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate.
- Stockpiles susceptible to wind erosion are to be covered during windy periods.
- 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.
- The prospecting operation should avoid land with steep slopes.
- 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

- Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired.
- Topsoil stockpiles must be kept separate from sub-soils.
- 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 becontained in a bund wall.

  Vehicles and machinery should be regularly serviced and maintained.

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- 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.

Emergency Response Plan

Defining an Environmental Emergency Response Plan

An effective, comprehensive, well-considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to the Prospector and other property and to manage environmental risk in the event of a large chemical spill, oil spill, fuel spill, explosives spill or sewerage spill. Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, should have an Environmental Emergency Response Plan. If one does not exist then one should be compiled and disseminated to all employees and contractors and in the event of an emergency, the emergency response plan should be consulted. This plan should be placed around the mine where it can be viewed easily. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement. If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community must be informed, on a continuous basis, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies. Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine. A checklist of emergency response units must be consulted and the relevant units notified. The checklist includes:

- Fire department;
- Police;
- Emergency health services such as ambulances, paramedic teams, poisons centres;
- Hospitals, both local and further afield, for specialist care;
- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments, port and airport authorities; and
- Public information authorities and media organisations.

Emergency Procedures

Below are the possible environmental related emergencies, procedures and responses to be followed and incorporated into the Emergency Preparedness and Response Plan.

POSSIBLE ENVIRONMENTAL RELATED EMERGENCY	ACTION PLANS/REMEDIATION	TIME/PERIOD	RESPONSIBLE PERSON/PARTY
Spillage of oil, diesel by vehicles, tankers, storage tanks etc.	The spillage should be contained (bund earth walls) by all means. Depending on the amount of spillage it could be remediated in situ or in the case of large amount of spillage that is contained, could be removed, etc. • Leakage from the vehicle, tanker etc, that caused the emergency, should be stopped and the vehicle removed to the workshop area for repairs. • In all cases of spillage, irrespective of the chemical, remove or extinguish any fire (naked flame) to within at least 10 metres from the spill. • Cover the spills with absorbent material. The person who reported the spill must fill out an incident report, if applicable and forward it to the Department of Environmental Affairs and/or Department of Water and Sanitation after a thorough investigation.	Immediately	Paul Thukgwi Mine Manager
Sewerage Spills	The spillage should be contained	Immediately	Paul Thukgwi

	(bund earth walls) by all means. Depending on the amount of spillage it could be remediated in situ or in the case of large amount of spillage that is contained, could be removed, etc. • The leakage must be stopped and reason for spill must be rectified. • The person who reported the spill must fill out an incident report and forward it to the Environmental Department and/or Department of Water and Sanitation after a thorough investigation.		Mine Manager
Fires	All fires in the veld, buildings, diesel tanks, chemical fires, etc. should be extinguish and prevented to spread to any other piece of land, building, etc. The necessary equipment should be in place and ready to be used if an accidental fire is started. • There shall be an emergency preparedness plan in place in order to fight accidental fires and veld fires, should they occur. The adjacent land owners/users/managers should also be informed and/or involved. Immediately Environmental manager, Safety officer, Local Fire Brigade. • The use of branches of trees and shrubs for fire making purposes must be strictly prohibited. • All businesses shall ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services. • All businesses must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains. • The Atmospheric Pollution Prevention Act (No. 45 of 1965) states that burning is not permitted as a means of disposal.	Immediately	Paul Thukgwi Mine Manager

n) Specific information required by the Competent Authority

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

The following applies to the submission of information:
All procedures (emergency, environmental awareness, rehabilitation strategies, etc.) must be included into the mine's Environmental Management System (EMS). The mine's EMS will monitor and assess the performance of the EMP on an ongoing basis. Formal audits of the performance assessment of the EMP will take place every year as stipulated by law, or at any other period if required by government;

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

All information as required by the various government departments should be captured and be readily available for submission when required;

Surface water monitoring will be undertaken quarterly and annual reports will be submitted to the DWS (Department of Water and Sanitation); and

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

2) UNDERTAKING

The EAP herewith confirms

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

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

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

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the Environmental Assessment Practitioner:

Wadala Mining and Consulting (Pty) Ltd

Name of Company:

Date: 18 October 2017

- END –

APPENDIX 1

CURRICULUM VITAE – RH OOSTHUIZEN

PERSONAL DETAILS

FULL NAMES AND SURNAME	:	**Roelina Henriëtte** Oosthuizen
DATE OF BIRTH	:	18 April 1970
I.D. NO	:	700418 0037 08 2
MARITAL STATUS	:	Married
CITIZENSHIP	:	**Republic of** South Africa
RESIDENTIAL ADDRESS	:	Farm Oberon Kimberley
POSTAL ADDRESS	:	P.O. Box 110823 Hadisonpark Kimberley 8306
E-MAIL ADDRESS	:	roosthuizen950@gmail .com
CEL NO	:	084 208 9088
DRIVER'S LICENCE	:	EB
LANGUAGES	:	Afrikaans (home language) English

QUALIFICATIONS

2000	**UNIVERSITY OF THE ORANGE FREE STATE**
	Qualification: Master in Environmental Management.
1991	**NORTH WEST UNIVERSITY**
	Qualification: B – Comm: Industrial psychology.
1988	**BRITSHIGH SCHOOL (BRITS)** **Qualification: Matric**

COURSES and Conferences ATTENDED

I 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.

August 1994	Junior Managers (Public Service Training Institute)
November 1994	Mineral Laws Administration (Public Service Training Institute)
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 Enviro Mining-Ensuring Environmental Compliance and reporting
March 2014	4th Annual Enviro Mining Conference
March 2015	5th Annual Enviro Mining Conference

CAREER HISTORY

Wadala Mining and Consulting (Pty) Ltd:

ADDRESS	:	**Farm Oberon** Kimberley 8301
PERIOD OF EMPLOYMENT	:	01 August 2013 - Part time
POSITION HELD		**Mineral Law Administration and Environmental Manager**

Diacor Closed Corporation:

ADDRESS	:	**6 Mullin Street** Hadisonpark Kimberley 8306
PERIOD OF EMPLOYMENT consultancy work	:	01 October 2013 – Present and part time
POSITION HELD **Manager**		**Mineral Law Administration and Environmental**

Mentor Trading and Investments 52 (Pty) Ltd:

ADDRESS	:	2 Kekewich Drive Monridge Office Park no 6 Monument Heights Kimberley 8301
PERIOD OF EMPLOYMENT	:	01 October 2012 – 01 October 2013
POSITION HELD		**Mineral Law Administration and Environmental Manager**

Rockwell Diamonds Inc:

ADDRESS	:	PO Box 251 BARKLY-WES 8375

PERIOD OF EMPLOYMENT : 01 March 2005 – 30 September 2012

POSITION HELD **Mineral Law Administration and Environmental Manager**

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, investigate, audit and resolve environmental problems in conjunction with the Department of Water and Sanitation, 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.
- Evaluate Mining Rights and Prospecting Right 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.
- Calculate and verify financial provision for outstanding rehabilitation.

DEPT OF MINERALS & ENERGY:

ADDRESS : 43 Chapel Street
Standard Bank Building
KIMBERLEY

PERIOD OF EMPLOYMENT : 01 April 1997 to 01 March 2005

POSITION HELD **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.

DEPT. OF MINERALS AND ENERGY:

POSITION HELD : Assistant Mineral Laws Officer – Senior Mineral Laws Officer

PERIOD OF EMPLOYMENT : 01 November 1993 – March 1997

ADVISORY COMMISSION ON LAND ALLOCATION

POSITION HELD : Assistant Administrative Officer

PERIOD OF EMPLOYMENT : 10 February 1992 – October 1993

Experience Projects Completed

I am a dedicated professional Mineral Law Administration and Environmental Manager with 23 years extensive experience in the managing and mitigating of specifically mining related impacts. I started my career in 1993 in the Department of Minerals and Energy where I have done Environmental inspections with site visits on all mines in the Northern Cape. I have done Environmental Audits on operational and closed mining sites in collaboration with other Departments. I have also specifically looked at pollution control measures on mining sites and the effectiveness of these measures. I have evaluated submitted EIA /EMP documents and have worked closely with all other Departments and stakeholders to make sure that all environmental aspects have been dealt with adequately in submitted documents. I left the Department for the Private Sector in 2005. I have since worked for a Canadian Group of Companies in the Private Sector, started a consultancy where I provide various mining companies with professional advice and guidance on Mineral Law and Environmental Issues. I 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.

2005

Environmental Management Plan with an application for a Prospecting Right for diamonds on Portion 9 and 14 of the farm Lanyon Vale 376, Hay in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in August 2007 with the Prospecting Right
Client: HC van Wyk Diamonds Ltd

Environmental Management Plan with an application for a Prospecting Right for diamonds on Remainder of Portion 18 (a portion of Portion 10) of the farm Lanyon Vale 376, Hay in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in August 2007 with the Prospecting Right
Client: HC van Wyk Diamonds Ltd

Environmental Management Plan with an application for a Prospecting Right for diamonds on Remainder of Portion 1, Portion 2 (a Portion of Portion 1), Portion 3 and Portion 5 of the farm Zweet Fontein nr 76 and Remainder of Portion 1 and portion 3 of the farm Blaaubosch Drift nr 78, Herbert in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in August 2007 with the Prospecting Right
Client: HC van Wyk Diamonds Ltd

2006

Environmental Management Plan with an application for a Prospecting Right for Tin in Kakamas South Settlement, Kakamas in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in June 2011 with the Prospecting Right
Client: Douglas Mining and Exploration (Pty) Ltd

2007

Environmental Management Plan with an application for a Prospecting Right for diamonds on the Remaining Extent, Portion 1 and Portion 2 of Diamond Valley 29, Hopetown in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in April 2008 with the Prospecting Right
Client: HC van Wyk Diamonds Ltd

2008

Environmental Management Plan with an application for a Prospecting Right for diamonds on Portion 12, 13, 16, 24 & 25 Saxendrift 20 in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in June 2008 with the Prospecting Right
Client : HC van Wyk Diamonds Ltd

Environmental Management Plan with an application for a Prospecting Right for diamonds on Erf 1 Windsorton, Barkly-Wes in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in February 2009 with the Prospecting Right
Client: HC van Wyk Diamonds Ltd

2009

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT CONVERSION IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) for Wouterspan Mine (The Farm Lanyon Vale 376, Hay)
EIA/EMP approved on 25/01/2010
Client: HC van Wyk Diamonds Ltd

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT CONVERSION IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) for GW Ziegler on Remainder, Remainder of portion 1 (Amantia) and portion 2 (a portion of portion 1) of the farm Rietputs no. 15 and portion 1 (Spenceskop) of the farm Waterval no.14 in the district of Kimberley
EIA/EMP approved with conversion of the Mining Right
Client: GW Ziegler
2010

Basic Assessment Application
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
PROPOSED EXTENTION OF A ROOF OVER AN EXCISTING DECK WITH TWO WOOD PILLARS BY MEANS OF THE EXCAVATING OF 0.5m X 0.5m X 1m X 2 (½m^2) OF SOIL WITHIN 100M OF THE HIGH WATER MARK OF THE SEA

Falls within general notes under activities that requires basic assessment
Positive Record of Decision (ROD) Granted.
Client: Dr. Petrus van der Walt Vermeulen

REVISION OF ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT CONVERSIONS IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) for HC VAN WYK DIAMONDS LTD (204 MRC) ON REMAINING EXTENT OF HOLPAN 161, BARKLY-WES
AND KLIPDAM DIAMOND MINING CO (003MRC) ON REMAINING EXTENT OF KLIPDAM 157, BARKLY-WES
Client: HC van Wyk Diamonds Ltd and Klipdam Diamond Mining Company Ltd

2011

APPLICATION FOR A LICENCE REGARDING PROTECTED TREES [SECTION 15(1) OF THE NATIONAL FORESTS ACT, 1998, AS AMENDED] on PORTION 1 (PAARDE PAN) OF THE FARM ANNEX SAXES DRIFT 21, HOPETOWN, NORTHERN CAPE for 14 Shephards tree (Boscia albitunca)
Licence issued on 24 September 2011
Client : Saxendrift Mine Pty Ltd

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT CONVERSION IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) on Portion 2 of the farm Good Hope 286, Barkly-Wes
EIA/EMP approved February 2013 by the Regional Manager
Client: Diacor CC

APPLICATION FOR CLOSURE CERTIFICATE [in terms of sections 43(3) of the Minerals and Petroleum Resources Development Act, 2002 (Act No 28 of 2002)] AND A CLOSURE PLAN FOR MINING ACTIVITIES PERFORMED BY HC VAN WYK DIAMONDS LTD ON THE REMAINING EXTENT OF PORTION 1 (WILLOWBANK), PORTION 2 (A PORTION OF PORTION 1) (WILLOWBANK), PORTION 3 (A PORTION OF PORTION 1) (WILLOWBANK) OF KHOSOPSKRAAL 227 AND PORTION 5 (ROSCOMMON) AND PORTION 2 (BORDON) OF HARRISDALE 226 AND FARM 362, BARKLY-WES
CLOSURE WAS GRANTED IN JULY 2010
Client: HC VAN WYK DIAMONDS LTD

2012

APPLICATION FOR A LICENCE REGARDING PROTECTED TREES [SECTION 15(1) OF THE NATIONAL FORESTS ACT, 1998, AS AMENDED] on PORTION 1 OF THE FARM BRAKFONTEIN 276, HOPETOWN NORTHERN CAPE for 4Shephards tree (Boscia albitunca)
Licence NCU 2831112 issued in November 2012
Client: Jasper Mining Pty Ltd

2013

APPLICATION FOR A LICENCE REGARDING PROTECTED TREES [SECTION 15(1) OF THE NATIONAL FORESTS ACT, 1998, AS AMENDED] ON REMAINDER OF THE FARM NIEWEJAARSKRAAL NO 40, PRIESKA, NORTHERN CAPE. 30 SHEPPHARD'S TREES
Licence NCU 4290214 issued in February 2014
Client: Saxendrift Mine (Pty) Ltd (Niewejaarskraal Mine)

AMENDMENT OF ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR A SECTION 11 APPLICATION OF A MINING RIGHT CONVERSION IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) on The Farm Riets Drift no. 18, district
Client: Bo-Karoo Diamond Mining (Pty) Ltd to be ceded to Bondeo 140 CC.

2014

Application for a Water Users Licence Application in terms of Section 27 of the National Water Act no 36 of 1998 on the Farm Engelde Wilgeboomfontein 22, Prieska
Application still under review
Client: Thunderflex 78 (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT CONVERSION IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) on Portion 1 of the farm Brakfontein 276 district of Hopetown
EIA/EMP approved April 2015 by the Regional Manager
Client: Jasper Mining (Pty) Ltd

Environmental Management Plan with an application for a Prospecting Right for diamonds on REMAINING EXTENT OF THE FARM MARKSDRIFT 3, HOPETOWN in terms of Section 16(4) and Regulation 52 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
EMPlan was approved in April 2015 with the Prospecting Right
Client: BONDEO 140 CC

2015

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A PROSPECTING RIGHT IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) on Portion 1 of the farm Speculatie 217 district of Boshof
EIA/EMP has been acceptedby the Regional Manager Free State Region
Client: Thaba Thafita Diamond Prospecting CC

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A PROSPECTING RIGHT IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) on a Portion of Erf 1318, Galeshewe , and a Portion of the Remainder Erf 5336, Kimberley

EIA/EMP still under review by the Regional Manager Northern Cape Region
Client: Mystic Pearl 157 (Pty) Ltd

2016

ANNUAL REHABILITATION PLAN for Associated Manganese Mines of South Africa Ltd
Glosam Prospecting Area
February 2016

REFERENCES

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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