December 2016

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

NAME OF APPLICANT: HC VAN WYK DIAMONDS LIMITED

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FILE REFERENCE NUMBER: NC 30/5/1/1/2/11779 PR

Boscia
ECOLOGICAL CONSULTING

IMPORTANT NOTICE

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

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

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

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

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

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 reversed;
(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 ASSSSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

a) Details of the EAP

i) Details of the EAP

Name of the Practitioner:	Dr Elizabeth (Betsie) Milne
Tel No.:	082 992 1261
Fax No.:	N/A (*No fax)*
E-mail address:	BosciaEcology@gmail.com

ii) Expertise of the EAP

- **The qualifications of the EAP**

  PhD in Botany (NMMU)
  Masters in Environmental Management (UFS)
  BTech in Nature Conservation (TUT)

- **Summary of the EAP's past experience**

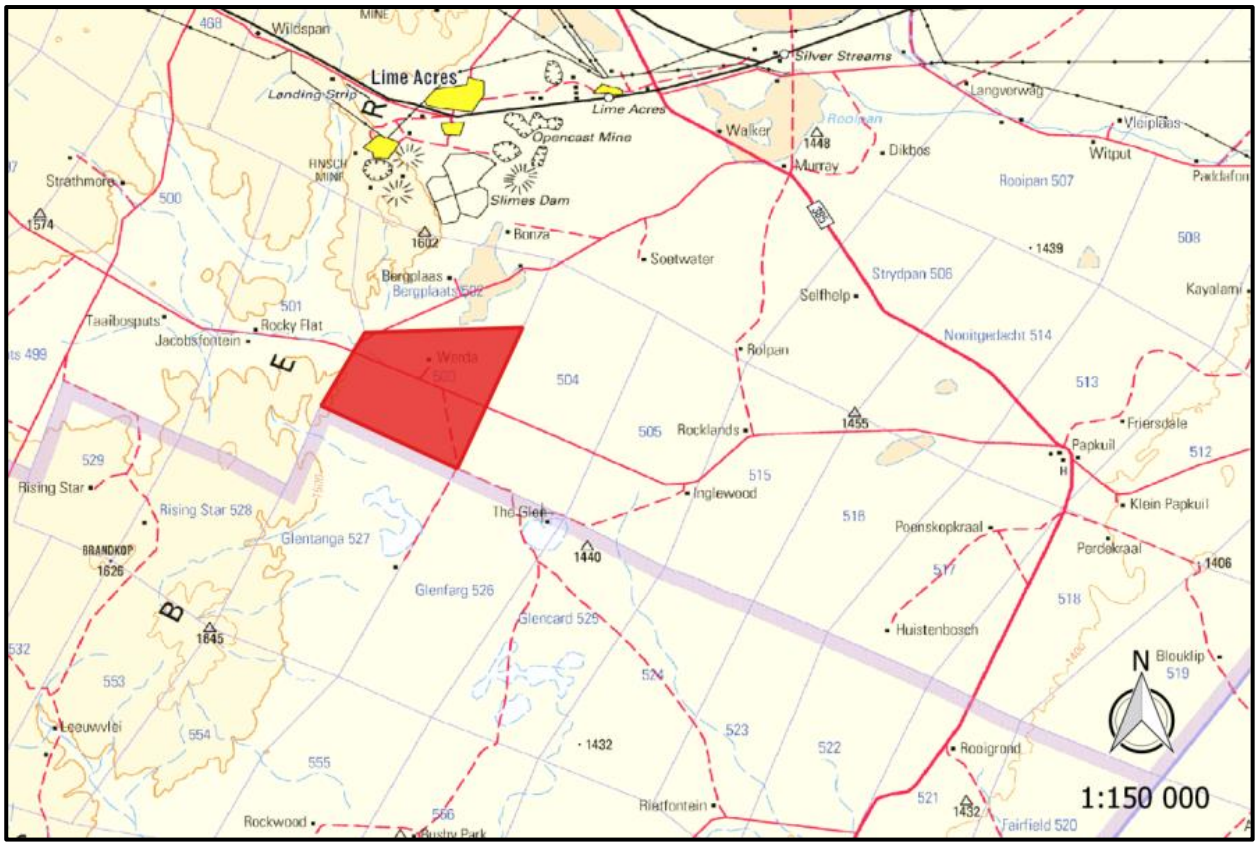
  Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Ecological assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Environmental Audits, etc.

  Please note: The EAP's resume and certificates were attached to the application for Environmental Authorisation

b) Description of the property

Farm Name:	**Farm No:** **Portions:** **Farm Name:** **Province:** **Title Deed No:**	503 Remaining Extent Farm 503 (Werda) Northern Cape T1209/1994 (JJ Oosthuizen)
Application area:	± 2 068.6718 ha	
Magisterial district:	Hay	
Distance and directions from nearest town:	The prospecting right area is located ± 10 km south of the town Lime Acres. The site is accessed via a secondary gravel road that turns from the R385.	
21 digit Surveyor General Code:	C03100000000050300000	

c) Locality map



d) Description of the scope of the proposed overall activity.

LISTED ACTIVITIES ON ABOVE MAP DESCRIBED	
MAP LEGEND ENTRY	**ASSOCIATED ACTIVITIES**
Prospecting right area	- The proposed operation on Werda directly relates to prospecting of a mineral resource (diamonds) and requires a prospecting right. - The operation directly relates to prospecting of a mineral resource (diamonds) and requires permission in terms of Section 20 (MPRDA), for the removal and disposal of bulk samples of any minerals.
Ephemeral pans and ephemeral drainage line	- The possible excavation of soil, sand, shells, shell grit, pebbles or rock of more than 5 m^2 from a watercourse.
Core diamond gravel deposits	- The clearance of an area of more than 20 ha of indigenous vegetation. - The development of haul roads 15 m wide with no reserve. - The continuous lengthening (and rehabilitation) of haul roads 15 m wide with no reserve. - The development of access roads 6 m in width with no reserve. - The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a prospecting right.
Plant site (fictional) The exact location of the plant site is directly related to locality of pits and trenches. This will only be determined once non-invasive prospecting activities have been completed.	- The operation on Werda directly relates to activities associated with the primary processing of a mineral resource. - The development of infrastructure for the storage and handling of dangerous goods (fuel), in containers with a combined capacity of 30 - 80 m^3. - The establishment of a residue deposit (slimes dam) resulting from activities which require a prospecting right. - General site infrastructure, including office complexes, workshop facilities, storage facilities, concrete bund walls and diesel depots, ablution facilities, water storage tanks and pipelines.

i) Listed and specified activities

ACTIVITIES TO BE AUTHORISED				
NAME OF ACTIVITY	**AERIAL EXTENT OF THE ACTIVITY**	**LISTED ACTIVITY**	**APPLICABLE LISTING NOTICE**	**WASTE MANAGEMENT AUTHORISATION**
Listed Activities:				
Activity 19: The possible excavation of soil, sand, shells, shell grit, pebbles or rock of more than 5 m^2 from a watercourse.	± 72 ha	**X**	NEMA: LN1 (GNR983)	
Activity 20: The operation on Werda directly relates to prospecting of a mineral resource (diamonds) and requires a prospecting right.	2 068.6718 ha	**X**	NEMA: LN1 (GNR983)	
Activity 24(iii): The development of haul roads 15 m wide with no reserve.	± 20 000 m^2	**X**	NEMA: LN1 (GNR983)	
Activity 56(ii): The continuous lengthening (and rehabilitation) of haul roads 15 m wide with no reserve.	± 20 000 m^2	**X**	NEMA: LN1 (GNR983)	
Activity 15: The clearance of an area of more than 20 ha of indigenous vegetation.	± 150 ha	**X**	NEMA: LN2 (GNR 984)	
Activity 19: The operation on Werda directly relates to prospecting of a mineral resource (diamonds) and requires permission in terms of Section 20 (MPRDA), for the removal and disposal of bulk samples of any minerals.	2 068.6718 ha	**X**	NEMA: LN2 (GNR 984)	
Activity 21: The operation on Werda directly relates to activities associated with the primary processing of a mineral resource.	± 400 m^2	**X**	NEMA: LN2 (GNR 984)	

ACTIVITIES TO BE AUTHORISED (cont.)				
NAME OF ACTIVITY	**AERIAL EXTENT OF THE ACTIVITY**	**LISTED ACTIVITY**	**APPLICABLE LISTING NOTICE**	**WASTE MANAGEMENT AUTHORISATION**
Listed Activities:				
Activity 2: A reservoir with a capacity of more than 250 m^3 for bulk water supply.	To be confirmed	**X**	NEMA: LN3 (GNR985)	
Activity 4: The development of access roads 6 m in width with no reserve.	± 4 000 m^2	**X**	NEMA: LN3 (GNR985)	
Activity 10: The development of infrastructure for the storage and handling of dangerous goods (fuel), in containers with a combined capacity of between 30 and 80 m^3.	± 80 m^2	**X**	NEMA: LN3 (GNR985)	
Activity 15: The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a prospecting right.	± 500 m^2	**X**	NEMWA: Category A (GNR 633)	**X**
Activity 15: The establishment of residue deposits (slimes dams) resulting from activities which require a prospecting right.	To be confirmed by specialist	**X**	NEMWA: Category A (GNR 633)	**X**
Linear Activities (associated infrastructures not considered to be listed activities):				
Pipelines for the bulk transportation of water with a diameter of < 0.36 m and a peak throughput of < 120 L /s.	To be confirmed			
Pipelines for the bulk transportation of slimes with a diameter of < 0.36 m and a peak throughput of < 120 L/s.	To be confirmed			
Pipelines for the bulk transportation of return water with a diameter of < 0.36 m and a peak throughput of < 120 L/s.	To be confirmed			

ACTIVITIES TO BE AUTHORISED (cont.)				
NAME OF ACTIVITY	**AERIAL EXTENT OF THE ACTIVITY**	**LISTED ACTIVITY**	**APPLICABLE LISTING NOTICE**	**WASTE MANAGEMENT AUTHORISATION**
Other activities (associated infrastructure not considered to be listed activities):				
Office complexes	± 200 m^2			
Temporary workshop facilities	± 300 m^2			
Storage facilities	± 3 000 m^2			
Concrete bund walls and diesel depots	± 250 m^2			
Ablution facilities	± 30 m^2			
Topsoil stockpiles	± 500 m^2			
Overburden stockpiles	5 000 m^2			
Return water dam	To be confirmed			

ii) Description of the activities to be undertaken

Prospecting

The prospecting operation is based on diamondiferous alluvial gravels which will be evaluated by means of a standard phased approach and according to a scheduled timeline. Prospecting activities are planned for five years.

PHASE 1:

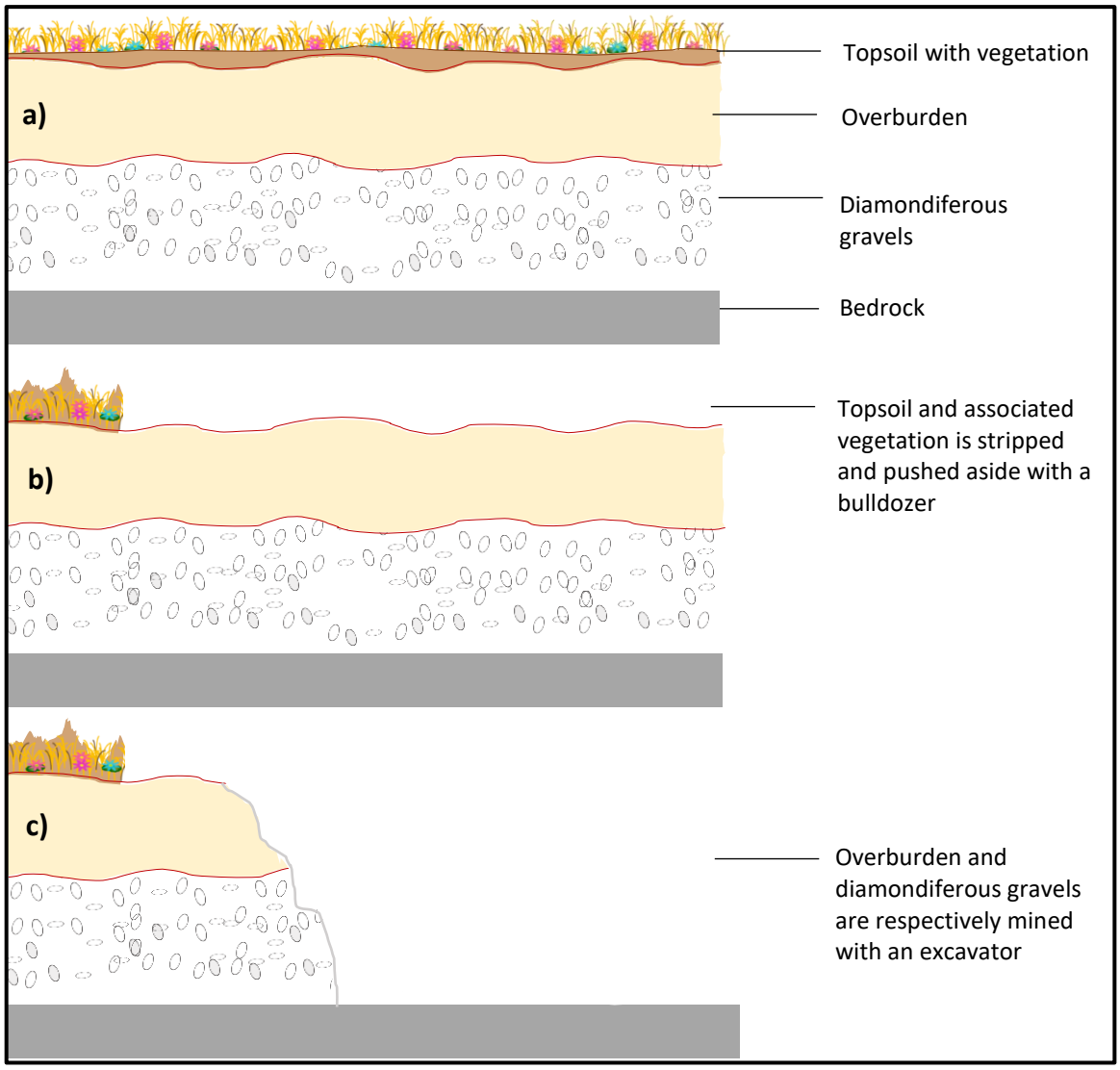
The initial prospecting activities (first six months) will be non-invasive. A desktop study will be performed, which include a literature review of all information gathered during previous explorations as well as interpreting high resolution aerial photographs and satellite images to delineate and define areas underlain by alluvial gravels. Thereafter, a site investigation of the target areas will be undertaken to validate desktop information.

PHASE 2:

Drilling, the first invasive prospecting activity to be undertaken will be performed over anomalous target areas using grids of 200 m x 200 m or 100 m x 50 m. At least 300 boreholes of ± 5 m in depth (depending on local depth to bedrock) are expected to be drilled.

PHASE 3 and 4:

Drilling will concurrently be followed by opencast pitting and trenching using heavy earthmoving machinery. Vegetated soil and overburden is stripped where required and the underlying gravels are excavated in the form of shallow (0.5 – 5 m) open pits, by means of hydraulic shovels and excavators (see figure below). Prospecting pits will be positioned along the same grid sizes as prescribed for drilling and it is envisaged that ± 150 pits of 2 m x 3 m will be excavated, while 20 trenches of 100 m x 50 m are planned. The location of the latter will be verified after pre-feasibility studies have been completed. A total ore volume of 250 000 m^3 for trenching and 1 350 m^3 for pitting is expected to be processed.



An illustration of (a) the delineation between the various strata affected by prospecting operations, (b) the removal of topsoil and vegetation, and (c) excavations.

PHASE 5:

The final phase of the prospecting operation involves a continuous process of analytical and desktop studies. Each invasive phase will be followed by interpretation and modeling of data gathered from sampling activities. Continuous monitoring will also be performed, by consolidating and processing gathered data and subsequently amending the prospecting programme, if necessary. A geospatial database will be created to portray exploration data.

Mineral processing

Excavated gravels will undergo on-site screening, scrubbing, crushing and processing, without requiring the use of any processing reagents (see figure below). Oversized material (> 150 mm) will be removed and stockpiled temporarily for backfilling. The screened gravel will then de-sanded at 4.5 mm, where after materials of +4.5 mm – 22 mm in size are treated through a diamond rotary pan plant. For final recovery, the +22 mm – 50 mm material and the concentrate from the pan plant will then be treated through a Bourevestnik X-Ray Machine. The rough diamond product will then be removed from site for further beneficiation.

Plant residue disposal

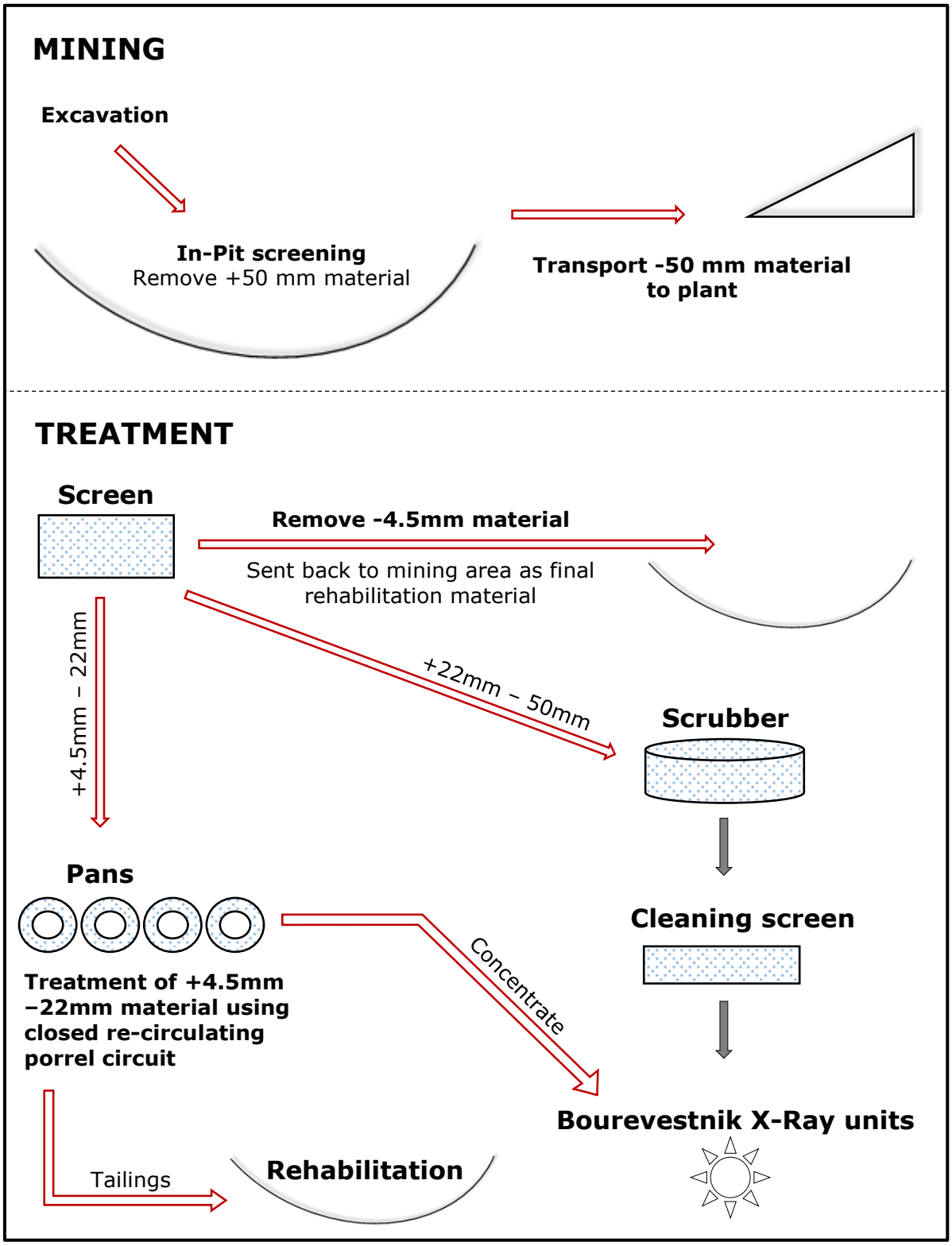
The residue from the pan plant will be pumped onto de-watering screens where the remaining -2 mm sand will be removed. The remaining slimes (sludge) thus consist of muddy water with minimum solids, which will be pumped from the plant onto the slimes dam and gravitated to the walls, providing time for settlement to take place and cleaner water to drain towards the walls.

The maximum holding capacity of a slimes dam should not exceed 50 000 m^3 and the maximum height of the dam should not exceed 5 m with a freeboard of 800 mm. If the dams exceed this capacity then the slimes dams should be registered at the Dam Safety Office of the DWS, which will have a significant cost implication on the project. Nevertheless, a Water Use License Application in terms of Section 21 (g) for disposing of waste in a manner which may detrimentally impact on a water resource will need to be lodged with Department of Water and Sanitation before processing activities commence.

Technical requirements for slimes dam are as follows:

- The embankments of the slimes dams will be constructed with the material excavated within the dam basin.

- A typical cross-section should have a 5 m wide crest, 1:2.5 slope both sides and access via ramp to the crest of the dam wall



An illustration of the mineral processing procedure.

- The indicated fill heights and excavation depths should be cut-in with a height of 1 m infill to ensure that the threat of storm water is alleviated. The material will be mixed and compacted to 95% Mod. AASHTO density in layers not exceeding 150 mm in thickness. Lining of the proposed dams will not be required. The existing embankment becomes impermeable with time during the very slow filling process due to the presence of sludge in the pumped water; and the water excreted during the mining process does not contain harmful substances and will therefore not contaminate the sub-surface water.

- A storm water channel will be constructed around the perimeter of the dam to ensure safe surface runoff towards the embankment, therefore protecting the embankment from erosion. The storm water channel will also serve a detection mechanism to detect any possible leakage through the embankment.

- The slimes dam will have to be fenced off to comply with the Health and Safety regulations, including the necessary signage.

Rehabilitation

In general, the prospecting method involves a continuous backfilling open cast pitting and trenching process. Topsoil will be stripped and hauled to already backfilled areas. If there are no backfilled areas available immediately, topsoil be temporarily stockpiled on the surface for later use. No materials will be permanently dumped on the surface. Washed and screened material will be backfilled into the already mined out areas and will be covered with the overburden and topsoil that has been allocated for this purpose. A more detailed rehabilitation plan is provided in the EMP report.

River diversions and disturbances of water courses

No river diversions are planned, but it is most likely that the ephemeral pans and stream on the ear-marked area will be subject to drilling, pitting and trenching in order to access gravels that occur below them. A Water Use License Application in terms of Section 21 (i) for altering the bed, banks, course or characteristics of a watercourse will need to be lodged with Department of Water and Sanitation before such activities commence.

Water use and management

Drinking water will either be brought onto site in containers or will be obtained from a local borehole, if the water quality is suitable. Process water will either be obtained from a suitable borehole, as there is no surface water available nearby, or will be sourced from local service providers, if available and feasible. Water will be pumped and transported via a number of pipelines to the processing area. Although it is not possible to confirm at this stage how much water will be used, it is estimated that a total volume of 18 000 L/hr and 40 000 m^3 per annum will be needed for the operation.

A Water Use License Application in terms of Section 21 (a) for taking water from a water resource will need to be lodged with Department of Water and Sanitation before any water from a borehole can be used, while a Section 21 (b) application will need to be lodged if any water will be stored in a dam with a capacity of more than 50 000 m^3 and if the dam wall will be > 5 m high. No pollution control dams will be established, because the processing and treatment are a chemical free process. There will therefore be no facilities for the treatment of polluted water, other than the slimes dams, which act as a settling dam.

Waste management facilities

A waste inventory is presented in the table below, which includes hazardous waste, general waste and industrial waste that will potentially be generated during the prospecting operation. Waste management will be performed as follows:

- General domestic waste will be gathered and stored in dedicated garbage bins, which will be assembled and transported regularly to the registered waste disposal facility in Lime Acres.

- The sites will be fitted with flush toilets that either drain into a septic tank or a French drain. The toilets will be serviced regularly.

- An industrial waste disposal facility will be located on site. Designated concrete wash bays will be used to clean vehicles, while fenced scrapyards will be erected to contain scrap material. Temporary workshop and storage facilities will be used for general repair and maintenance and to store tools and hazardous substances, e.g. oil and grease. Hazardous waste will be collected by registered service providers.

- No permanent waste rock dumps will be created as waste rock will continuously be used as backfill material for open pits and trenches.

A waste inventory for the prospecting operation on Werda.

Activity area	Waste types																
	Wastewater	Garden waste	Sewage	Food waste	Metal	Plastic / PVC	Rubber	Glass	Wood	Paper / Cardboard	Construction waste	Mechanical waste	Medical waste	Electronic waste	PPE waste	Used oil / filters	Waste rock / gravel
Office		X		X	X	X	X	X	X	X	X		X	X	X		
Stores				X	X	X	X	X	X	X	X	X		X	X	X	
Workshop	X			X	X	X	X	X	X	X	X	X	X	X	X	X	
Processing plant	X			X	X	X	X					X			X	X	X
Fuel storage areas	X										X	X			X	X	
Ablutions	X		X		X	X		X		X	X		X		X		
Kitchens	X			X	X	X	X	X	X	X	X		X		X		
Accommodation facilities		X	X	X	X	X	X	X	X	X	X		X	X	X		
Open areas		X		X											X		
Waste storage facilities		X			X	X	X	X	X	X	X	X	X	X	X	X	
Slimes dams	X					X											
Pits/Trenches				X								X			X	X	X

Transportation and access roads

The prospecting operation will make use of existing access roads to gain access to the prospecting right area. The property is accessed via a secondary gravel road which turns from the R385:

Road R385: This provincial road traverses in a north-south direction in the vicinity of the site. The road links the town of Lime Acres in the north, with Campbell in the south.

Secondary road: This secondary gravel road traverses in an east-west direction and bisects the site. The road links the R385 near Papkuil in the east, with R385, towards Postmasburg in the north-west.

Activities that is expected to make use of these roads include:

- the transportation of personnel to and from the site;
- delivery of supplies and materials;
- the transportation of the rough and uncut diamonds for further beneficiation.

These transport operations will make use of passenger vehicles, light delivery vehicles, security/armoured vehicles and mini-busses/busses and very limited heavy vehicles.

Existing farm tracks will initially be used for reconnaissance trips, but new roads will be created to access prospecting grids for drilling, pitting and trenching activities. These roads are expected to be approximately 6 m wide.

Haul roads will also be created for ore transport to the processing areas, which will be approximately 15 m wide. Dump trucks will be used to transport raw material from the excavations to the processing plants and to return waste rock to the excavations for backfilling. Access to open pits and trenches will be gained by low angle ramps.

Supporting infrastructure and machinery

There are no railway lines that traverse the study area. The nearest railway line lies 8 km to the north and intersects Lime Acres, where it traverses in an east-west direction. Electricity to the plant site areas will most likely be supplied by generators if no Eskom power can be sourced. Supporting infrastructure will include the following:

- Office complex
- Workshop facilities
- Storage facilities
- Security office
- Accommodation facilities
- Diesel depot
- Lightning rod

Machinery that will most likely be used during the operation includes the following:

- Drilling rig
- Hydraulic excavators
- Articulated dump trucks
- Front End Loaders
- Bulldozers
- Grader
- Water truck
- Diamond rotary pans

e) Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
The Constitution of South Africa (Act No. 108 of 1996) and the Bill of Rights states that everyone has a right to a non-threatening environment and requires that reasonable measures are applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development.	This document as a whole was designed in such a way that it complements the Bill of Rights.	The compliance of the operation rests solely on their implementation of the EMPr, which is evaluated with an Environmental Audit or performance assessment.
Section 4(a) of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) state that sustainable development requires the consideration of all relevant factors including the following: (i) Disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied; (ii) Pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; (iii) Disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided or where it cannot be altogether avoided, is minimised and remedied; (iv) Waste is avoided or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner; (v) Use and exploitation of non-renewable natural resources is responsible, equitable and considers the consequences of the depletion of the resource; and (vi) Development, use and exploitation of renewable resources and the ecosystems, of which they are part, do not exceed the level or 'critical limits' beyond which their integrity is jeopardised.	This is contained in Part B: Environmental Management Programme Report.	To be implemented upon the approval of the EMPR.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
According to the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) prospecting operations can only commence once the applicant has received authorisation from the Department of Minerals Resources (DMR) in terms of their Prospecting Right application.	The title page makes reference to the approved Prospecting Right.	A Preferent Prospecting Right has been issued (NC 01/2012 PPR) and a Section 102 amendment application has been submitted (NC-00047-PR/102).
According to the MPRDA (Act 49 of 2008) Environmental Authorisation is required before prospecting activities can commence.	This document was designed to serve that purpose.	The environmental authorisation process is pending and this document is being compiled in order to fulfil the requirements thereof.
Section 38(1) (a) of the MPRDA requires that effect be given to the general objectives of integrated environmental management laid down in the NEMA. Integrated environmental management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process in order to achieve a desirable balance between conservation and development.	This is contained in Part B: Environmental Management Programme Report (EMPR).	To be implemented upon the approval of the EMPR.
The required determination of a quantum of the financial provision as referred to in regulation 54 of the MPRDA, does not detract from the need for the EMP to identify all the environmental costs necessary to evaluate the achievement of the sustainable development objectives of the MPRDA. The EMP is, therefore, not merely a rehabilitation plan that identifies a quantum for financial provision, but rather a comprehensive programme that identifies all the costs necessary to inform the evaluation of the planning and implementation of a prospecting project.	This is contained in Part B: EMPR.	The current, preliminary outstanding financial provision of **R 1 900 367.83** is to be submitted to the DMR upon approval of the EIAr and EMPr.
Chapter 5 of NEMA (as amended), contain the EIA Regulations, as well as a schedule of activities that may have substantial detrimental effects on the environment and therefore require authorisation from the competent environmental authority.	This document was designed to serve that purpose. Listed activities are presented in Part A, Section d (i).	The environmental authorisation process is pending and this document is being compiled in order to fulfil the requirements thereof.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
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.	A specialist ecological assessment was performed by Dr Betsie Milne in order to identify any protected and/or threatened ecosystems. Results of the assessment are presented in Part A, section g, subsection iv (A).	Not applicable. The prospecting operation does not fall within any protected area listed under NEMPAA.
Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations.	A specialist ecological assessment was performed by Dr Betsie Milne in order to identify any protected and/or threatened ecosystems and/or nationally protected plant species that occur on the proposed mining right area. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: EMPR.	Not applicable. No Red Listed species were observed in the study area. However, if any are encountered in the footprint area, a permit application regarding protected plant species should be lodged with DENC at least three months before any invasive activities will occur. Control measures are to be implemented upon the approval of the EMPR.
According to Section 22(1) of Chapter 5 of NEMBA the following activities are also prescribed as restricted activities - (a) Allowing any specimen of an alien or listed invasive species to grow, breed or multiply; (b) Allowing the movement or spread of a specimen of an alien or listed invasive species; (c) Releasing a specimen of an alien or listed invasive species.	The specialist ecological assessment also identified any alien or listed invasive species that occur on the mine. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: EMPR.	Control measures are to be implemented upon the approval of the EMPR.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
In terms of the terms of Section 1 of the National Water Act, (Act No. 36 of 1998), a "water resource" includes a watercourse, surface water, estuary, or aquifer. 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; (d) engaging in a stream flow reduction activity (such as in section 36); (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1); (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (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; (k) using water for recreational purposes.	A surface water study was compiled by MojaTerre (Pty) Ltd., in order to evaluate the state of water sources in the prospecting right area. Results of the assessments are presented in Part A, section g, subsection iv (A).	A water use application is currently being compiled and will be lodged with DWS as soon as all the relevant accompanying documentation have been finalised. Control measures are to be implemented upon the approval of the EMPR.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
The World Heritage Convention Act (Act 49 of 1999) Recognises that the cultural heritage and the natural heritage are among the priceless and irreplaceable possessions, not only of the Republic, but of humankind as a whole. It also acknowledges that the loss, through deterioration, disappearance or damage through inappropriate development of any of these most prized possessions, constitutes an impoverishment of the heritage of all the peoples of the world and, in particular, the people of South Africa.	A specialist heritage impact assessment and palaeontological study was performed by Dr Edward Matenga in order to identify any potential cultural, heritage and/or palaeontological impacts related to the proposed activity. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: Environmental Management Programme Report	Control measures are to be implemented upon the approval of the EMPR.
The National Heritage Resources Act (Act No. 25 of 1999) legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha or linear development exceeding 300 m in length. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).	The specialist heritage impact assessment and palaeontological study identifies any potential heritage impacts related to the proposed activity. Results are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: Environmental Management Programme Report	Control measures are to be implemented upon the approval of the EMPR.
Section 7 of the National Forests Act (No. 84 of 1998) state that no person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under Section 7(4) or Section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette. Section 15 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.	The specialist botanical assessment identifies all protected tree species that occur on the proposed prospecting right area. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: Environmental Management Programme Report.	A permit application regarding protected tree species need to be lodged with DAFF if the footprint of the operation expands to those areas where the identified protected trees occur. This application should ideally be lodged three months before such activities commence. Control measures are to be implemented upon the approval of the EMPR.

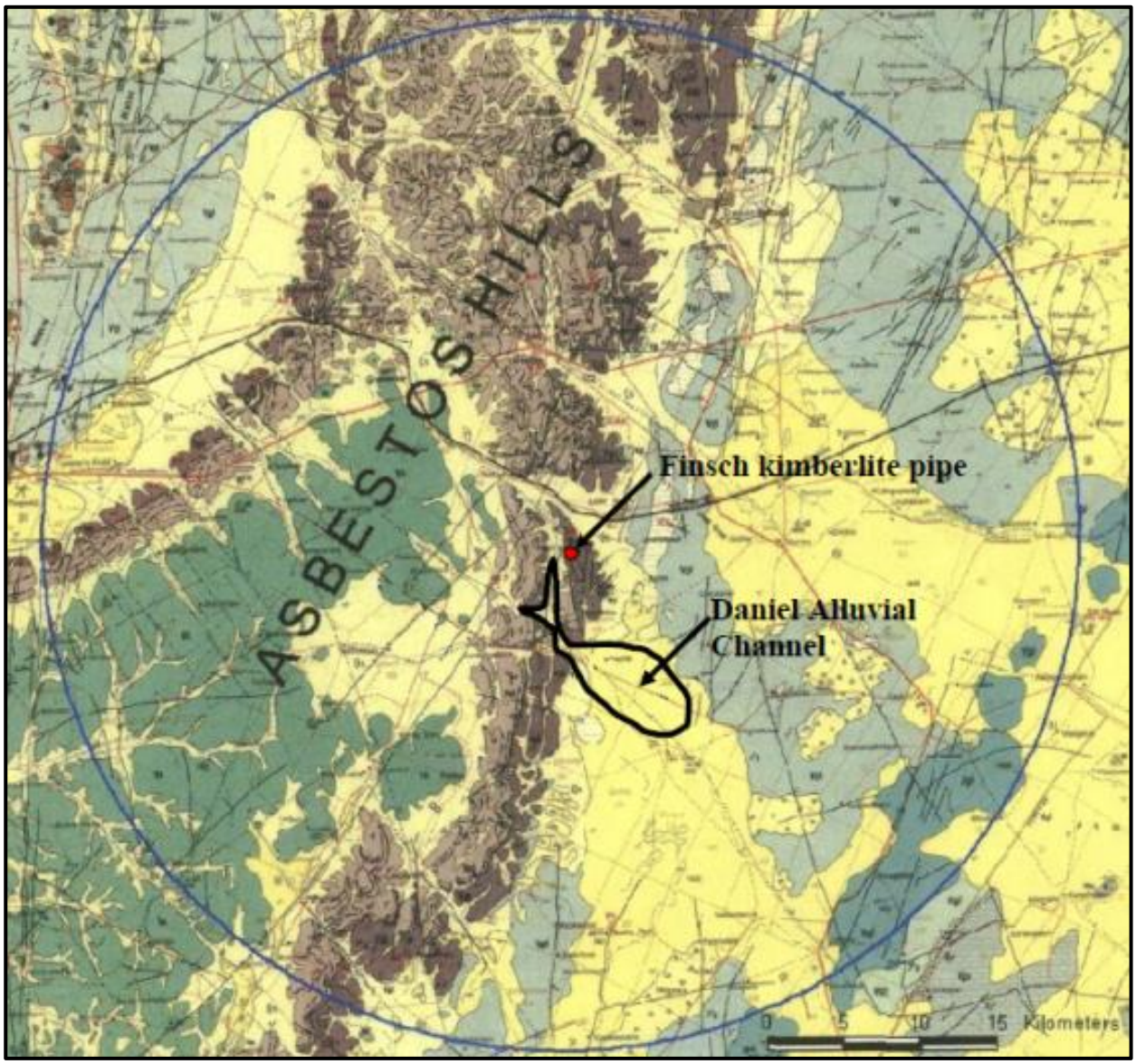
APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
The Northern Cape Nature Conservation Act (Act No. 9 of 2009) aims to provide for the sustainable utilisation of wild animals, aquatic biota and plants. Section 3(a) and 4(a) states that no person may, without a permit by any means hunt, kill, poison, capture, disturb, or injure any protected or specially protected animals. Section 12 (1) 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. Section 49 (1) and 50 (1) 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. 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.	The specialist ecological assessment identifies all provincially protected plant species that occur on the proposed prospecting right area. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: Environmental Management Programme Report.	A permit application regarding provincially protected plant species as well as for large-scale harvesting of indigenous flora should be lodged at least three months before invasive prospecting activities commence. Control measures are to be implemented upon the approval of the EMPR.
The Conservation of Agricultural Resources Act (Act No. 43 of 1983) makes provision for the conservation of agricultural land. Section 5 prohibits the spreading of weeds, while Section 6 and Regulation 15 and 15 E of GNR 1048 addresses the implementation of control measures for alien and invasive plant species. Bush encroacher species are controlled in terms of Regulation 16; 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.	The specialist ecological assessment identifies alien or listed invasive species and potential encroacher species that occur on the proposed mining right area. Results of the assessment are presented in Part A, section g, subsection iv (A). Control measures are contained in Part B: Environmental Management Programme Report	Control measures are to be implemented upon the approval of the EMPR.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
Section 17 of the Fencing Act (Act No. 31 of 1963) states that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 m 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 contained in Part B: Environmental Management Programme Report	Control measures are to be implemented upon the approval of the EMPR.
The National Environmental Management Act: Waste Act (NEMWA), 2008 (Act 59 of 2008) reforms the law regulating waste management in order to protect human health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.	This document was designed to serve that purpose. Listed activities are presented in Part A, Section d (i). Control measures are contained in Part B: Environmental Management Programme Report.	Control measures are to be implemented upon the approval of the EMPR.
Section 25 of the Environmental Conservation Act (Act 73 of 1989) as well as the National Noise Control Regulation GNR 154 of 10 January 1992, regulate activities regarding noise, vibration and shock.	Control measures are contained in Part B: Environmental Management Programme Report.	Control measures are to be implemented upon the approval of the EMPR.
Section 8 of the Atmospheric Pollution Prevention Act (Act No. 45 of 1965) regulates controlled areas, and Section 27 regulates activities with regard to dust control.	Control measures are contained in Part B: Environmental Management Programme Report.	Control measures are to be implemented upon the approval of the EMPR.
The Occupational Health and Safety Act, Act No. 85 of 1993 GNR 2281 of 1987 – 10-16 regulates environmental regulations for the workplace.	Control measures are contained in Part B: Environmental Management Programme Report	Control measures are to be implemented upon the approval of the EMPR.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
The Mine Health and Safety Act (29 of 1996) provide for protection of the health and safety of employees and other persons at mines.	Control measures are contained in Part B: Environmental Management Programme Report.	Control measures are to be implemented upon the approval of the EMPR.
The Explosives Act (26 of 1956) restricts activities regarding possession and handling of explosives.	Part A, section d (ii) promulgates the various planned activities and associated infrastructure. Control measures are contained in Part B: EMPR.	Not applicable.
The Advertising on Roads and Ribbon Development Act (21 of 1940) regulates display of advertisements outside certain urban areas at places visible from public roads (Section 2), and the deposition or leaving of disused machinery or refuse (Section 8) and the erection, construction or laying of structures and other things near certain public roads (Section 9), and the access to certain land from such roads (Section 10).	Control measures are contained in Part B: EMPR.	Control measures are to be implemented upon the approval of the EMPR.
The Roads Ordinance (19 of 1976) regulates matters relating to public roads and public paths. Section 17 restricts the erection and installation of structures within the statutory road reserve or within 5 m from the statutory boundary of any public road.	Control measures are contained in Part B: EMPR.	Control measures are to be implemented upon the approval of the EMPR.
The National Road Traffic Act (93 of 1996) and the National Road Traffic Regulations (2000) regulates general road safety rules.	Control measures are contained in Part B: Environmental Management Programme Report.	Control measures are to be implemented upon the approval of the EMPR.
The South African Civil Aviation Regulation Act (Act 13 of 2009) controls markings of structures that may influence aviation through the Civil Aviation Technical Standard, SA-CATS-AH 139.01.33 Obstacle Limitations and Markings outside Aerodrome or Helicopters.	The project information is contained in Section d.	Not applicable.

f) Need and desirability of the proposed activities

The activity is based on alluvial diamondiferous gravels that are found in the Daniel Alluvial Channel (see figure below), which are believed to have derived from eroded diamondiferous Finsch kimberlite material. The Finsch pipe was emplaced in the Kuruman Member of the Asbesheuwels Subgroup on the north-eastern edge of the syncline and considerable erosion has taken place since its emplacement. This suggests that rivers would have carried many millions of carats into the surrounding area over that time.



An indication of diamondiferous deposits in the vicinity of the study area.

The diamond industry is an international trade and the consumer demand for diamonds has shown positive nominal US Dollar (USD) growth, with annual growth of almost 5 % from 2008 to 2013. South Africa was the fifth biggest producing country, with its production increasing with 15% to a value of USD 1.19 billion. The diamond value or its selling price depends on a number of factors: colour, clarity, stone size and shape. An average value can only be determined from the valuation of a large representative parcel of diamonds recovered from the deposit.

Prospecting with bulk sampling will assist in indicating the grade and quality of diamond resources on Werda. The proposed project is envisaged to have a positive socio economic impact on the local, regional and national economy.

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.

This section converses the determination of the specific site layout having taken into consideration the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.

i) Details of all alternatives considered

In order to ensure that the proposed activity enables sustainable development, a number of feasible options must be explored. With reference to the site plan provided as **Appendix 1** and the location of the individual activities on Werda, alternatives were considered with respect to the following:

<u>The property on which or location where it is proposed to undertake the activity</u>

The property on which the prospecting operations (i.e. excavations) are being undertaken is determined by the geological location of the mineral resource (as discussed in section f). This also applies to any minerals associated with the ephemeral stream or the endorheic pans. 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 type of activity, technology and operational aspects

The current prospecting activities, as discussed in section d) ii), include the excavation of open pits and trenches, with continued backfilling. 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 extraction of alluvial diamonds.

Further alternatives in terms of operational aspects include the slimes dams, excavation of watercourses and water use. These are discussed below.

The design or layout of the activity

The **site infrastructure** will be strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the prospecting right application process. Thus, the site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for initial pitting and trenching after the non-invasive phase is completed, as well as limited additional impact on the environmental and heritage resources. The benefit of typical alluvial diamond prospecting sites is that they are generally transient in nature and therefore renders the consideration of further alternative layouts unnecessary.

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. Mobile tanks are viable option for infield screening activities, but 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 site operations.

In terms of **water use** alternatives; the absence of any perennial surface water resource renders ground water the best water source for the operation. Alternatives include sourcing from service providers, but these are not currently available or feasible. The hydrocensus revealed that numerous boreholes occur on site, but that only a few have high reported yields. These high yielding boreholes will most likely be the best alternative water source to fulfil operational needs, but their use depend on negotiations with the landowner and site locality.

Mobile pumps and pipelines are considered to be the best long term option for **transferring water** from the borehole, due to the temporary nature of these pumps and plastic pipes; which causes minimum environmental disturbances. Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment and to avoid the disturbance of heritage resources. This is however dependent on the preferred borehole and site locations.

Alternatives in terms of altering the characteristics of the **ephemeral stream or endorheic pans** include avoidance and demarcation as no-go zones.

A **residue deposit** (slimes dams) will be established, with its selected locality being based on the following considerations:

- Historic anthropogenic activities and existing infrastructure on the property;
- Proximity to the processing plant;
- No underlying ore bodies.

The slimes dams typically used for alluvial diamond mining are believed to be the most viable option for the operation. These slimes dams are in line with ECSA registered engineering designs and take all of the relevant standards and legislation into account. Therefore no alternatives were considered.

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

Potential **land use** includes grazing and mining. The majority of the area is classified to have low to moderate potential for grazing land and no suitability for crop yield. Apart from the diamond deposits, there are also potential for limestone, manganese and iron ore mining on the property. Therefore, mining activities are believed to be the most economically beneficial option for the area. Whether the proposed diamond prospecting operation continues or not, the other prospecting operations will most likely persist. The farming of livestock will only be able to continue in areas not affected by prospecting operations. The most significant impacts associated with grazing activities include the provision of water. These are not expected to have a serious impact on the existing groundwater features. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that agriculture might have.

The HC van Wyk prospecting project aims to **uplift** the local community. If the operation does not continue it would hold back any potential employment for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a stagnant effect on the economy of South Africa and the diamond industry as a whole. Substantial tax benefits to the State and Local Government will also be inhibited.

The implementation of the operation is believed to have a significant impact on the **biodiversity** through the removal of indigenous vegetation, destruction of habitats and disturbances of ephemeral pans. If activities were not to continue, the status quo would apply and no damage would accrue to the environment. This means that the ecological integrity and functionality on site will be preserved and potential natural corridors available to species in the surrounding areas will continue to exist.

In the event that the prospecting operation does not proceed, the **heritage resources** will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the operation continues, any potential heritage resources will have to be protected through the demarcation of no-go zones.

ii) Details of the Public Participation Process Followed

The consultation process as described by NEMA for Environmental Authorisation was followed and remains an on-going process. Please refer to the table in section d) iii) below, which lists the identified Interested and Affected Parties. All proof of consultation was attached with the Scoping Report, but any additional information will be attached as **Appendix 2**. This will however only be submitted after the 5th of January 2017 to accommodate the PP exclusion period for between 15 December and 5 January. The following procedures were followed:

- **Meeting with landowner**

  A meeting was held with Mr Oosthuizen on 4 July 2016 to discuss the proposed project with him and to provide him with an opportunity to raise any issues and concerns. Furthermore, this meeting served to provide the company with information on available infrastructure that could potentially be used for the project in order to limit environmental disturbances.

- **Notice boards**

  A site notice was placed at the proposed farm along the public gravel road. This notice provided a legal background, brief project description and all passers-by were requested to submit any written comments, to request additional information or to register as IAPs by contacting the designated consultant on or before 19 December 2016 of the date of the notice.

- **Published notice**

  An advert was published in the Diamond Fields Advertiser on 21 June 2016 to notify the general public of the proposed prospecting operation. With this advert, a legal background and project description were provided and all readers were requested to submit any written comments, to request additional information or to register as IAPs by contacting the designated consultant; within 30 days of the publication date of the notice.

- **Notice letters to authorities, neighbours and other affected parties**

  All of the relevant authorities, neighbouring landowners and other potential affected parties were notified through notice letters that were sent with registered post on 17 June 2016. With these letters, a legal background and project description were provided. The recipients were requested to submit any written comments, to request additional information or to register as IAPs by contacting the designated consultant; within 30 days.

- **Project registration on SAHRIS**

  A heritage case titled “FARM 503 DIAMOND PROSPECTING OPERATION” was listed on the SAHRIS database. Through SAHRIS, the South African Heritage Resource Agency is able to provide a heritage management tool to all heritage bodies and custodians of heritage, as well as to local planning authorities and provincial heritage resources authorities. The system enables the efficient and coordinated management of our heritage, and the maximum benefit to heritage resources by appropriate promotion and use of these resources. SAHRIS is the first online government service, worldwide, which allows the public to view and comment on developments in their area on a GIS platform.

- **Public meetings**

  None of the public notices attracted any additional interested and affected parties, none applied to register as IAPs for the consultation process and no interest for a public meeting was received. Therefore, no public meeting was held.

- **Ongoing liaison process and draft documentation review**

  Very little response and interest were received from the relevant authorities, adjacent communities and general public. The lack of interest led to the assumption that there are no objections. Those comments received were addressed accordingly (see table below). Please take note that significant delays were experienced during the course of the EA process (e.g. limited specialist availability), which led to the fact that this report has not yet been fully reviewed by all of the potential IAPs and therefore not all comments have yet been incorporated into this report.

  The EIAr & EMPr will be made available to the public for 30 days at the Postmasburg Library for comments after the 5th of January 2017. At the same time, the report will also be sent to the relevant authorities on CD. If any comments/objections arise from this process, these will immediately be submitted to the DMR, along with the applicable amendments (if any).

iii) Summary of issues raised by I&Aps

A list of all Interested and Affected Parties. X indicates that IAPs were consulted with		Date comments received	Issues raised	Consultant's response to issues as mandated by the applicant	Consultation status
AFFECTED PARTIES					
Landowner/s					
JJ Oosthuizen P.O. Box 1309 Postmasburg 8420	X	4 July 2016	He requested the option to retain any permanent structure erected during the project; raised his concerns on the safety of personal and animals; He is concerned about the welfare of the farm workers and residents, e.g. dust pollution and damages to their houses; Requested consultation before any placement/ erection of facilities, infrastructure, new roads; requested that existing roads be maintained; no dogs will be allowed on his farm and no hunting will be tolerated.	His concerns and requests were noted during the meeting. All issues raised were added to the scoping report and control measures will be included in the EMPR. The Scoping Report was forwarded to him on 19 July 2016. No comments were received,	The process of drafting a landowner's agreement is still in progress.
Lawful occupier/s of the land					
Not applicable					
Landowners or lawful occupiers on adjacent properties					
JJ Oosthuizen & PLMA Els P.O. Box 1307 Postmasburg 8420	X	No comments received yet			
Rudolf Lombaard P.O. Box 1398 Postmasburg 8420	X	No comments received yet			
Gous Boerdery CC P.O. Box 1422 Postmasburg 8420	X	25 July 2016	Concerned about water use, pollution, safety of local residents and deterioration of access roads.	His concerns were noted and control measures are be included in the EMPR.	The EIAr & EMPr will be forwarded to him.

A list of all Interested and Affected Parties. X indicates that IAPs were consulted with		Date comments received	Issues raised	Consultant's response to issues as mandated by the applicant	Consultation status
AFFECTED PARTIES (cont.)					
Landowners or lawful occupiers on adjacent properties (continued)					
PW Scholtz P.O. Box 116 Campbell 8360	X	No comments received yet			
EJ Rossouw Familie Trust 8 Duvenhage Street Postmasburg 8420	X	No comments received yet			
Postmasburg Engineering (Pty) Ltd P.O. Box 1455 Postmasburg 8420	X	No comments received yet			
Rudolf Lombaar & Heibrecht Lombaard P.O. Box 165 Lime Acres 8410	X	No comments received yet			
Glentanga Landgoed CC P.O. Box 11105 Hadisonpark Kimberley 8306	X	No comments received yet			
Municipality					
Kgatelopele Local Municipality Private Bag X5 Barkly West 8375	X	No comments received yet			
Organs of State Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA					
ESKOM NC: Land Development P O Box 606 Kimberley 8300	X	No comments received yet			
Department of Water and Sanitation NC Private Bag X6101 Kimberley 8300	X	No comments received yet			
Transnet Private Bag X19 Bellville 7535	X	No comments received yet			
SANRAL P O Box 1389 Bloemfontein 9300	X	No comments received yet			
Communities					
Not applicable					

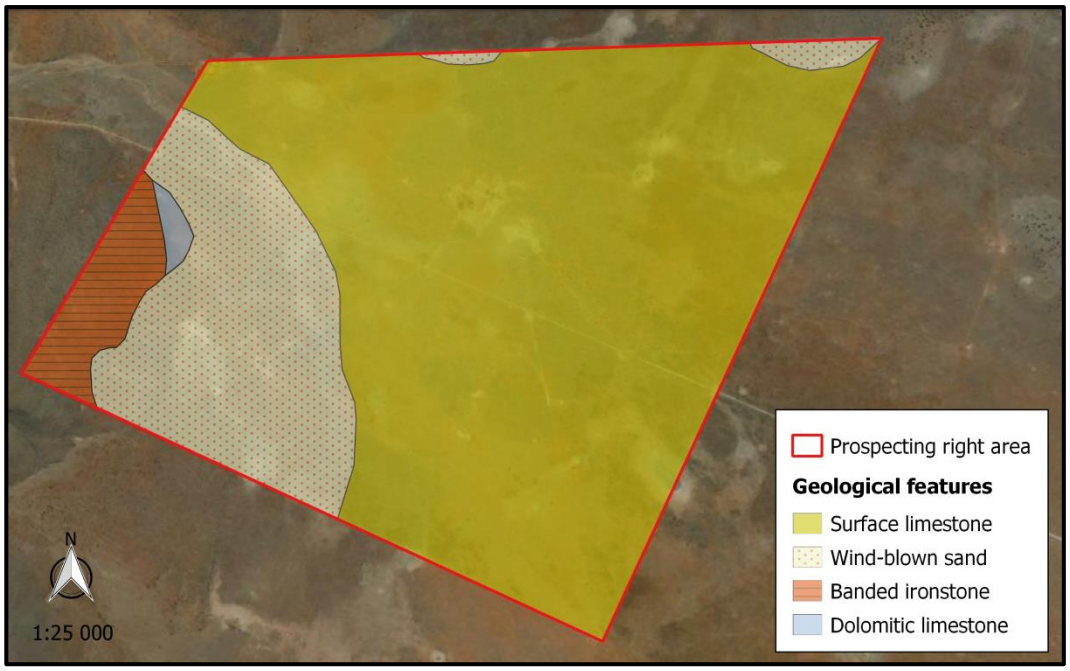
A list of all Interested and Affected Parties. X indicates that IAPs were consulted with		Date comments received	Issues raised	Consultant's response to issues as mandated by the applicant	Consultation status
AFFECTED PARTIES (cont.)					
Dept. Land Affairs					
Department of Agriculture, Land Reform and Rural Development Private Bag X5018 Kimberley 8300	X	No comments received yet			
Traditional Leaders					
Not applicable					
Dept. Environmental Affairs					
Northern Cape Department of Environment and Nature Conservation Private Bag X6102 Kimberley 8300	X	No comments received yet			
Other Competent Authorities affected					
Department of Agriculture, Forestry and Fisheries: Forestry Management P O Box 2782 Upington 8800	X	No comments received yet			
SAHRA P.O. Box 4637 Cape Town 8000	X	No comments received yet			
OTHER AFFECTED PARTIES					
None registered yet					
INTERESTED PARTIES					
None registered yet					

iv) The Environmental attributes associated with the sites (Baseline Environment)

(A) Type of environment affected by the proposed activity

GEOLOGY, TOPOGRAPHY AND SOILS

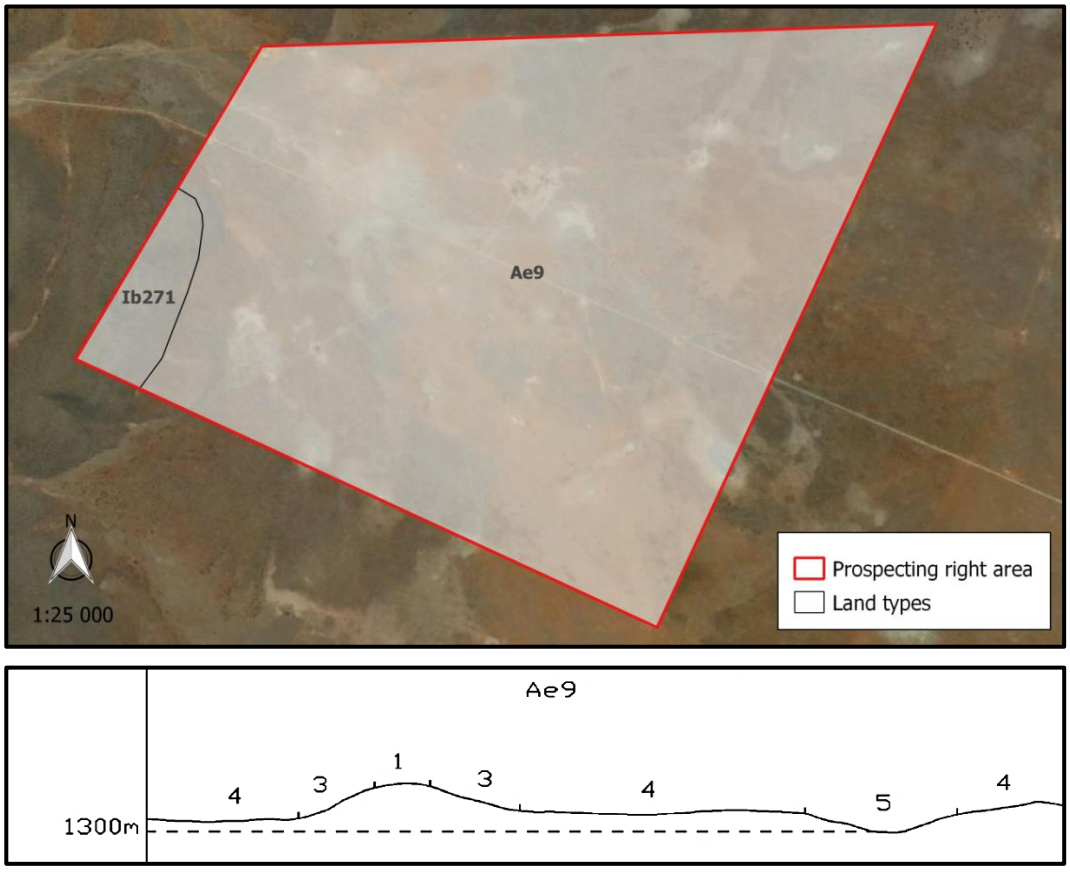
According to Hornsveld (1977) the geological features on Werda mainly comprise quaternary deposits, where surface limestone and wind-blown sand cover almost the entire area (see figure below). The area in the vicinity of the hill in the west comprises rocks from the Griqualand West Sequence. The hill itself is associated with Kuruman banded ironstone of the Asbestos Hills Formations from the Griquatown Group; while a small section north-east of the hill consist of Lime Acres dolomitic limestone of the Ghaapplato Formation from the Campbell Group. Diamondiferous gravels are mainly associated with the quaternary deposits, which are confined to the Daniel Alluvial Channel. It is important to note that the map of Hornsveld (1977) does not accurately reflect the geology on site and should be revisited by a geological survey. However, surface features are portrayed in the plant community descriptions.



An indication of geological features in the study area.

The area is generally flat, characterised by level plains with some relief and altitudes around 1 440 m above sea level. Hills protrude in the west, with a maximum altitude of 1 536 m. The terrain of the plains is indicated by a very gentle slope of less than 1 % running east, while steeper slopes (9 %) are associated with the hills.

The plains are closely associated with unit 4 of the Ae9 landtype (see figure below). Here, well drained red sandy soils with a high base status and a depth of more than 300 mm are found. The hills represent the Ib271 landtype, where rock with limited to very shallow soils occurs. Soils of the study areas predominantly constitute Hutton and Mispah forms.



Land types associated with the study area (top) and a terrain form skectch for the Ae9 landtype (bottom). No terrain form sketch is available for the Ib271 landtype.

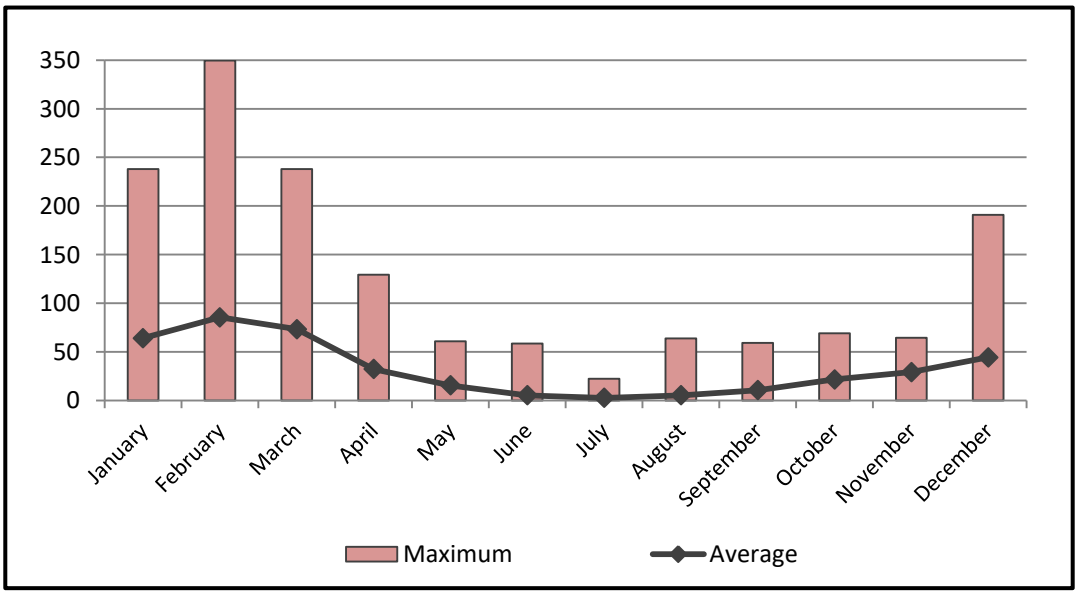
CLIMATE

Regional Climate

The prospecting right area is located in a semi-arid region. Rainfall is on average about 200 mm in the west to 500 mm on its eastern boundary. The rainfall is largely due to showers and thunderstorms falling from October to March, with the peak of the rainy season normally in March or February. The summers are very hot with cold winters. The nearest station of the South African Weather Bureau is found in Postmasburg. The Finsch mine installed a metrological station at the Lime Acres Air Field in 1998, but data is not continuous.

Rainfall

Monthly rainfall recorded at Lime Acres is presented in the figure below. The highest rainfall was recorded in February, while July received the lowest amount of precipitation. The average annual rainfall recorded for the area is 390 mm.



Monthly rainfall (mm) for Lime Acres.

Temperatures

Monthly temperatures recorded at Postmasburg are presented in the table below. November to March are the warmest, while June and July are the coldest.

MONTH	AVERAGE °C	MAXIMUM °C	MINIMUM °C
January	23.7	32.7	16.1
February	22.8	31.7	16.1
March	21.3	30.3	14.6
April	17.0	26.4	11.0
May	11.9	22.2	5.5
June	8.9	20.0	2.3
July	8.4	19.5	1.3
August	11.3	22.3	3.5
September	15.7	26.5	7.0
October	19.7	29.7	10.9
November	21.7	31.4	12.9
December	23.8	33.3	15.5

Wind

The prevailing wind direction for Postmasburg is north-east, but north-north-west in Lime Acres. Average wind speeds of up to 8 m/s for Postmasburg and 10 m/s for Lime Acres can be expected. The strongest wind speeds can generally be expected during the early summer months. In a year, approximately 18 % of the days in Postmasburg are wind free.

Incidents of Extreme Weather Conditions

- **Thunderstorms and hail**

  Hail is sometimes associated with thunderstorms and mainly occurs in early to late summer (November to February). Although thunderstorms can occur around 27 days per year, hail only occurs on average three times a year. These storms may sometimes be severe and cause much damage, but they usually only impact on a relatively small area.

- **Frost**

  The period during which frost can be expected lasts for about 120 days (May to August). With extreme minimum temperatures to below -8 ºC at night in the winter, frost development can be severe.

- **Droughts:**

  Droughts are common and may vary from mild to severe. During these periods dust storms sometimes occur, depending mainly on denudation of the surface.

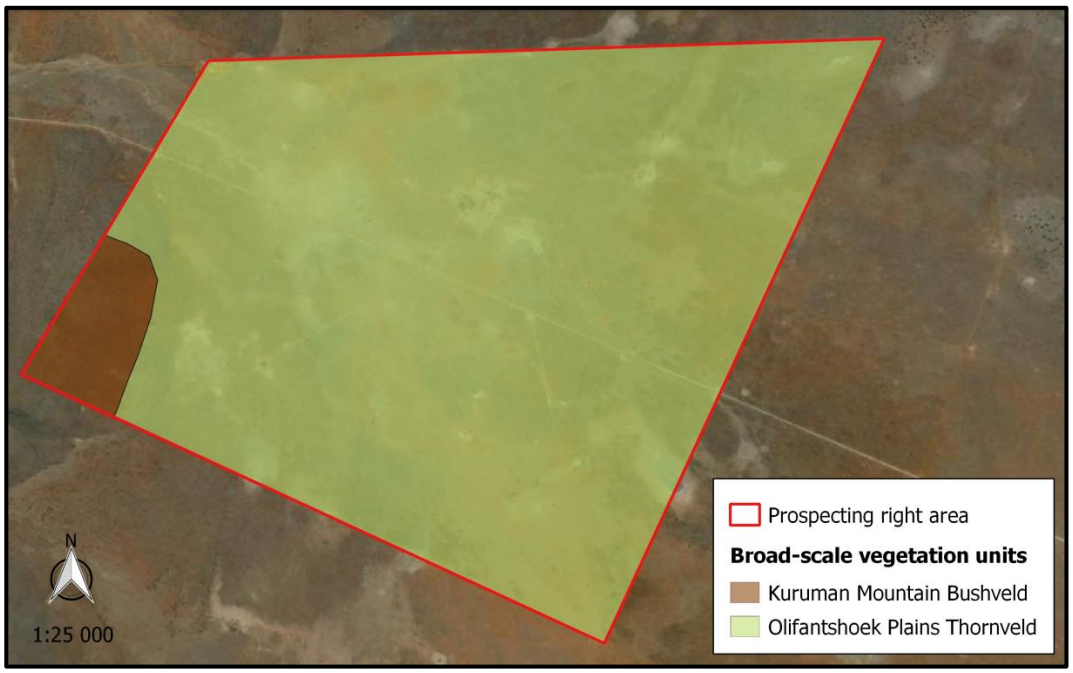
- **Wind**

  High winds are unusual and the highest wind speeds recorded for the region are around 90 km/hr, which occur once or twice a year. At these speeds, the winds are classified as whole gale winds. When they occur they can uproot trees and take off roofs.

NATURAL VEGETATION

Broad-scale vegetation patterns

The study area falls within the Savanna Biome (Mucina and Rutherford 2006). According to the vegetation map of Mucina et al. (2005) two broad-scale vegetation units are present on site, i.e. Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld.



Broad-scale vegetation units found in the prospecting right area.

Kuruman Mountain Bushveld is distributed in the Northern Cape and North-West Provinces at altitudes between 1 100 and 1 800 m. It stretches from the Asbestos Mountains southwest and northwest of Griekwastad, along the Kuruman Hills north of Danielskuil, passing west of Kuruman and re-emerging as isolated hills. The unit is typically presented as rolling hills with gentle to moderate slopes and hill pediment areas with an open shrubveld. Here, *Calobota cuspidosa* is conspicuous within a well-developed grass layer.

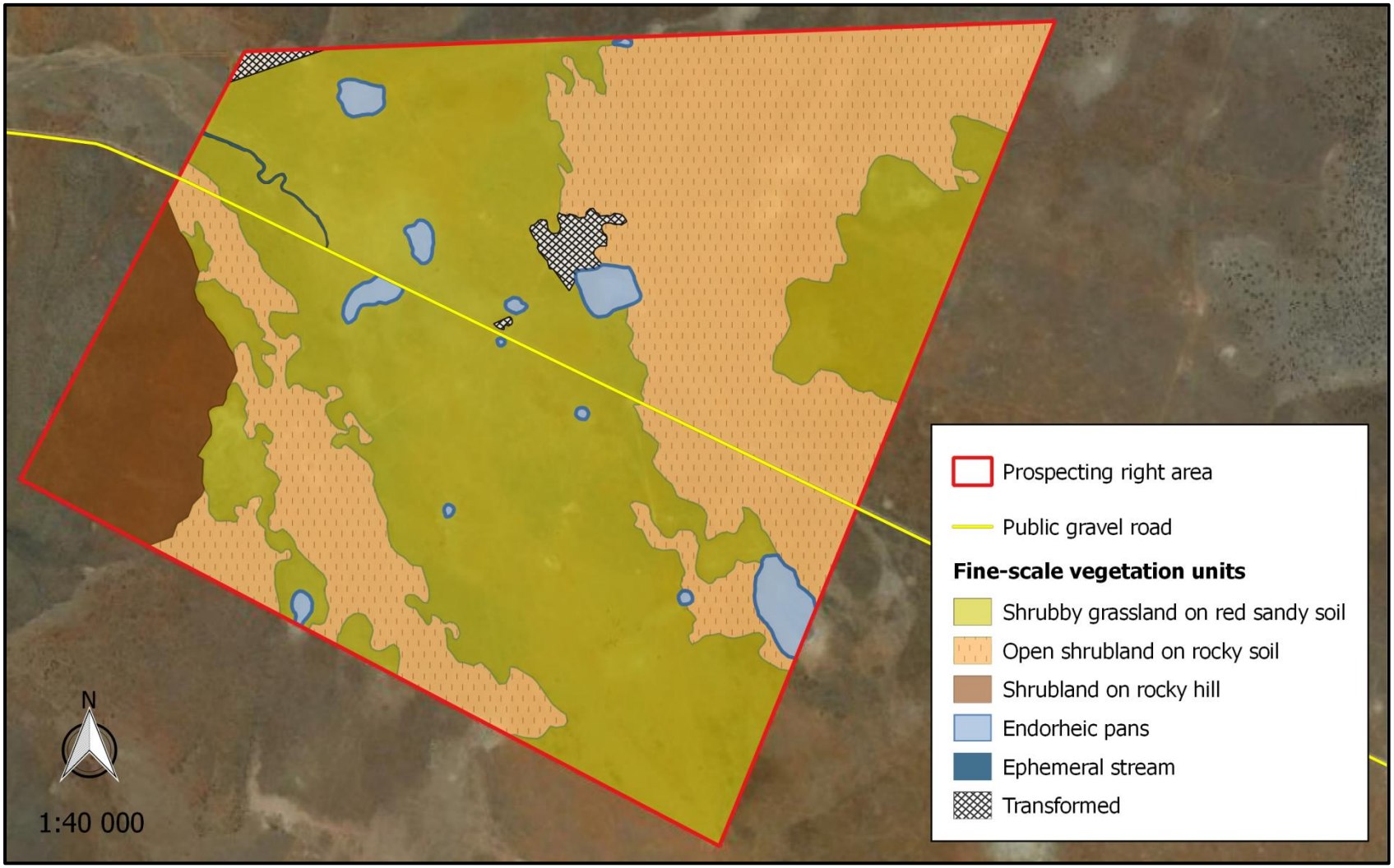
The Hills consist of banded iron formation, with jasper, chert and riebeckite-asbestos of the Asbestos Hills Subgroup of the Griqualand West Supergroup. Soils are shallow sandy soils of the Hutton form, with the most common land type being Ib, followed by Ae, Ic and Ag. The unit is classified as being least threatened with very little being transformed and with little erosion being present. It is not currently conserved within any formal conservation areas and the succulent *Euphorbia planiceps* is the only endemic species known from this unit.

Olifantshoek Plains Thornveld is found in the Northern Cape at altitudes between 1 000 and 1 500 m. It is mostly restricted to the pediments of the Korannaberg, Langeberg and Asbestos Mountains. The plains are typically represented by an open tree and shrub layer, with a usually sparse grass layer. The unit occurs on red aeolian sand of the Kalahari Groups with silcrete and calcrete and some andesitic and basaltic lava of the Griqualand West Supergroup. Soils are deep and the most dominant landtype is Ae, but Ah also occur. Only 1 % of the unit has been transformed and erosion is very low. It is classified as being least threatened and a very small proportion is being conserved in the Witsand Nature Reserve. The shrub *Amphiglossa tecta* is the only endemic plant species known from this unit.

An ecological assessment was performed by Dr Betsie Milne, during which small-scale vegetation patterns and species of conservation concern were identified. Alien invasive species and bush encroachers were also identified. The assessment report is attached as **Appendix 3** and results of this assessment is summarised below:

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 (see below figure) and are described below. 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 specialist report.



The distribution of fine-scale plant communities in the study area.

1. ***Aristida congesta – Eriocephalus ericoides*** **shrubby grassland on red sandy soil**

This community falls within the valley plain of the historic Daniel Alluvial channel and has been filled with red sandy soil, which constitute 15 % of the ground cover. Grazing practises have created a variably patchy plant community across the plain, with the grassland being interrupted by low shrub patches (see figures below). Trees and tall shrubs are also widely scattered across the grassland, but forms dense patches at stock watering points.

Overall, the grass layer is dominated by *Aristida congesta* subsp. *congesta* and *A. congesta* subsp. *barbicollis*, but *Enneapogon desvauxii, Eragrostis lehmanniana* and *Stipagrostis uniplumis* are intermittently dominant. Other common grasses include *Themeda triandra* and *Brachiaria marlothii,* while *Sporobolus fimbriatus, Tragus racemosus, Anthephora pubescens, Eragrostis truncata, E. trichophora, Cynodon dactylon* and *Schmidtia pappophoroides* occur more sporadically.

The low shrub layer is dominated by *Eriocephalus ericoides* subsp. *griquensis*, with *Pentzia incana*, *Rosenia humilis* and *Gnidia polycephala* also being very common and dominant in some places. Other conspicuous species include *Aptosimum albomarginatum, A. marlothii, Lycium horridum, Osteospermum microphyllum, Thesium lacinulatum, Wahlenbergia nodosa* and *Chrysocoma ciliata,* while *Melolobium microphyllum*, *Ruschia griquensis, R. hamata, Amphiglossa triflora, Hertia pallens, Pentzia calcarea, Solanum namaquense, Berkheya* sp., *Selago* sp. are less common.

The herb layer is well developed and includes Senna italica subsp. arachoides, Sesamum triphyllum, Harpagophytum procumbens, Helichrysum cerastioides var. cerastioides, Hermannia comosa, and Osteospermum scariosum var. scariosum.

The scattered tall woody layer is dominated by *Olea europaea* subsp. *africana* trees, with *Searsia lancea, S. tridactyla, Vachellia tortilis, V. erioloba, Tarchonanthus camphoratus, Ziziphus mucronata, Lycium hirsutum, Diospyros austro-africana* var. *microphylla* and *Asparagus exuvialis* also found here.

Species of conservation concern include the nationally (NFA) protected tree *Vachellia erioloba*, while *Ruschia griquensis, R. hamata* and *Olea europaea* subsp. *africana* are protected according to NCNCA. Exotics include *Prosopis glandulosa, Opuntia ficus-indica, Cymbopogon pospischilii* and *Bidens* sp.

The plains are predominantly presented by a shrubby grass community, but denser low shrub patches occur at places.

2. ***Tarchonanthus camphoratus – Stipagrostis uniplumis*** **open shrubland on rocky soil**

This community is mainly found on red sandy soil mixed with jaspelite on the plains, but a section with shallow red sandy soil on dolomitic limestone outcrops and crystalline chert also occurs on the north-eastern ridge. The vegetation is presented as an open shrubland, where *Tarchonanthus camphoratus* shrubs are scattered in a shrubby grassland matrix.

The open shrubland community occurs on red sandy soil mixed with jaspelite on the plains (top), as well as on shallow red sandy soil on dolomitic limestone outcrops and crystalline chert on the north-eastern ridge (bottom).

Tarchonanthus camphoratus is the most conspicuous shrub in this community, but *Calobota cuspidosa*, *Grewia flava, Olea europaea* subsp. *africana, Searsia tridactyla* and *S. lancea* are also abundant. Other tall shrubs include *Diospyros austro-africana* var. *microphylla, Ehretia alba, Gymnosporia buxifolia, Vachellia tortilis*, *V. hebeclada* subsp. *hebeclada, Ziziphus mucronata* and *Asparagus exuvialis.*

The low shrub stratum is dominated by *Eriocephalus ericoides* subsp. *griquensis*, with *Gnidia polycephala, Amphiglossa triflora, Rosenia humilis, Wahlenbergia nodosa, Chrysocoma ciliata* and *Pentzia incana* also being very common. Other low shrubs that occur at lower densities include *Felicia filifolia* subsp. *filifolia, Melolobium microphyllum, Aptosimum albomarginatum, A. marlothii, Lycium horridum, Leonotis pentadentata, Euryops dregeanus, Thesium lacinulatum, Peliostomum leucorrhizum, Euphorbia duseimata, Deverra burchellii, Asparagus* sp. and *Berkheya* sp.

The grass layer is well developed and is dominated by *Stipagrostis uniplumis* and *Enneapogon scoparius*, with *Aristida congesta* subsp. *congesta* and *Eragrostis lehmanniana* also being very common. Other abundant species include *Aristida vestita, Fingerhuthia africana* and *Heteropogon contortus. Digitaria eriantha*, *Enneapogon cenchroides, Sporobolus fimbriatus, Aristida congesta* subsp*. barbicollis, A. stipitata, Eragrostis trichophora, Schmidtia pappophoroides* and *Tragus racemosus* are found sporadically.

No nationally protected trees were ecountered in this community, but species protected under the NCNCA include *Olea europaea* subsp. *africana*, *Gymnosporia buxifolia, Deverra burchellii* and *Euphorbia duseimata. Prosopis glandulosa* and *Cymbopogon pospischilii,* were the only exotic found in the open shrubland.

3. *Searsia tridactyla - Sporobolus fimbriatus* shrubland on rocky hill

This community is located on the slopes of the hill in the south-western corner of the study site and grows among banded ironstone rocks. The community composition between the foot slopes and upper slopes are similar, but the dominant grass species shifts from *Stipagrostis uniplumis* at the bottom, to *Sporobolus fimbriatus* at the top. *Senegalia mellifera* and *Tarchonanthus* also forms denser stands on the footslopes, whereas the woody layer becomes more diversely dispersed toward the upper slopes. Rocks and red sandy soil constitute between 10 % and 30 % of the ground cover.

The vegetation on the hill transitions from the footslopes (top) to the upper slopes (bottom) by the dominant grass species as well as by the woody layer becoming more diversely dispersed towards the upper slopes.

The tall woody layer is presented as trees and tall shrubs. Here, *Searsia tridactyla* dominates, but *S. burchellii, Senegalia mellifera, Tarchonanthus camphoratus, Boscia albitrunca* and *Calobota cuspidosa* are also common. *Ziziphus mucronata, Gymnosporia buxifolia, Ehretia alba, Vachellia tortilis, Asparagus exuvialis, Grewia flava* and *Olea europaea* subsp*. africana* occur at lower densities.

The lower shrub layer is dominated by *Chrysocoma ciliata, Eriocephalus ericoides* subsp*. griquensis, Pentzia incana, Felicia filifolia* subsp*. filifolia* and *Asparagus* sp*.,* but *Lycium horridum, Aptosimum marlothii, Rosenia humilis, Monechma divaricatum, Leonotis pentadentata* and *Selago* sp. are also common.

The grass layer is well developed and diverse. Apart from the dominant grasses mentioned above, other common species include *Tragus racemosus, Aristida congesta* subsp*. congesta, A. vestita, Enneapogon scoparius, Schmidtia pappophoroides, Eragrostis homomalla* and *Fingerhuthia africana.* Other species include *Enneapogon cenchroides, Heteropogon contortus, Digitaria eriantha, Brachiaria serrata* and *Eragrostis nindensis.*

Herbs include *Hermannia comosa, Sesamum triphyllum* and *Phyllanthus parvulus*.

Regarding species of conservation concern; *Boscia albitrunca* is nationally (NFA) and provincially (NCNCA) protected, while *Gymnosporia buxifolia* and *Olea europaea* subsp. *africana* are also protected according to NCNCA. *Cymbopogon pospischilii* was the only exotic species found here.

4. *Leptochloa fusca* dominated endorheic pans

Numerous pans occur on Werda. All of them are ephemeral and endorheic. Their surfaces are densely dominated by *Leptochloa fusca*. This species has a high tolerance for saline and waterlogged soils and has proven to be a significant source of fodder. This explains the considerable utilisation by cattle and harvester termites that were evident during the site visit.

Other grasses that occur mostly towards the periphery of the pans include *Aristida congesta* subsp. *barbicollis*, *A. congesta* subsp. *congesta*, *Eragrostis bicolor, E. truncata, E. trichophora, Themeda triandra* and *Enneapogon desvauxii.*

Platycarphella parvifolia and *Cullen tomentosum* are common herbs on the pans, while *Ziziphus mucronatus, Osteospermum microphyllum, Galenia sarcophylla* and *Gnaphalium* spp. are associated with some. No exotics or species of conservation concern were encountered on the pans.

An example of endorheic pans found on Werda.

The high density of dung (top) and large amounts of frass (bottom) respectively indicate cattle and harvester termite utilisation.

5. Ephemeral stream

The ephemeral stream enters the property in the north-western corner and meanders in a south-easterly direction, but is modified by the public gravel road that traverses the property, where it dissolves into the plains. It has a defined channel low in species richness and dominated by a monotonous, short grass layer (**Error! Reference source not found.**).

Here, *Eragrostis bicolor* occupies most of the channel, but *Chloris virgata* is also very common. *Themeda triandra* and *Tragus racemosus* occurs sporadically.

Other species observed here include *Cullen tomentosum*, *Platycarphella parvifolia*, *Salvia verbenaca* and the weed *Schkuhria pinnata.* No species of conservation concern were encountered here.

The channel of the ephemeral stream is well defined and characterised by a monotonous short grass layer.

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.

All species recorded in the area are classified as least concern; a category which includes widespread and abundant taxa.

Species from the study area that are protected in terms of the National Forests (NFA) Act No 84 of 1998 includes *Vachellia haematoxylon, V.erioloba* and *Boscia albitrunca*. The latter species is also protected according the NCNCA. It is restricted to the hill and occurs widespread at a low density of two individuals per hectare, as stunted individuals and medium-sized trees. Only one young *V. erioloba* tree was encountered on site during the ecological assessment and it occured in the south-eastern corner of the grassland, near the gate of a neighbouring game farm. However, MojaTerre identified two more individuals (with coordinates S28° 26.333' E23° 26.869' and S28° 26.347' E23° 26.828'). No *Vachellia haematoxylon* individuals were seen during the survey. It is not foreseen that any individuals of these protected tree species will be affected by the Werda prospecting operation. Nevertheless, 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 that are known from the study area include *Lessertia affinis, Pelargonium multicaule* subsp. *multicaule* and *Harpagophytum procumbens*. Of these, only *Harpagophytum procumbens* were found on site, and are associated with the grassland on the plains. It only occurs sporadically at densities less than one individual per hectare.

The protected tree *Boscia albitrunca* is restricted to the hill and occurs widespread at a low density of two individuals per hectare, as stunted individuals (left) and medium-sized trees (right).

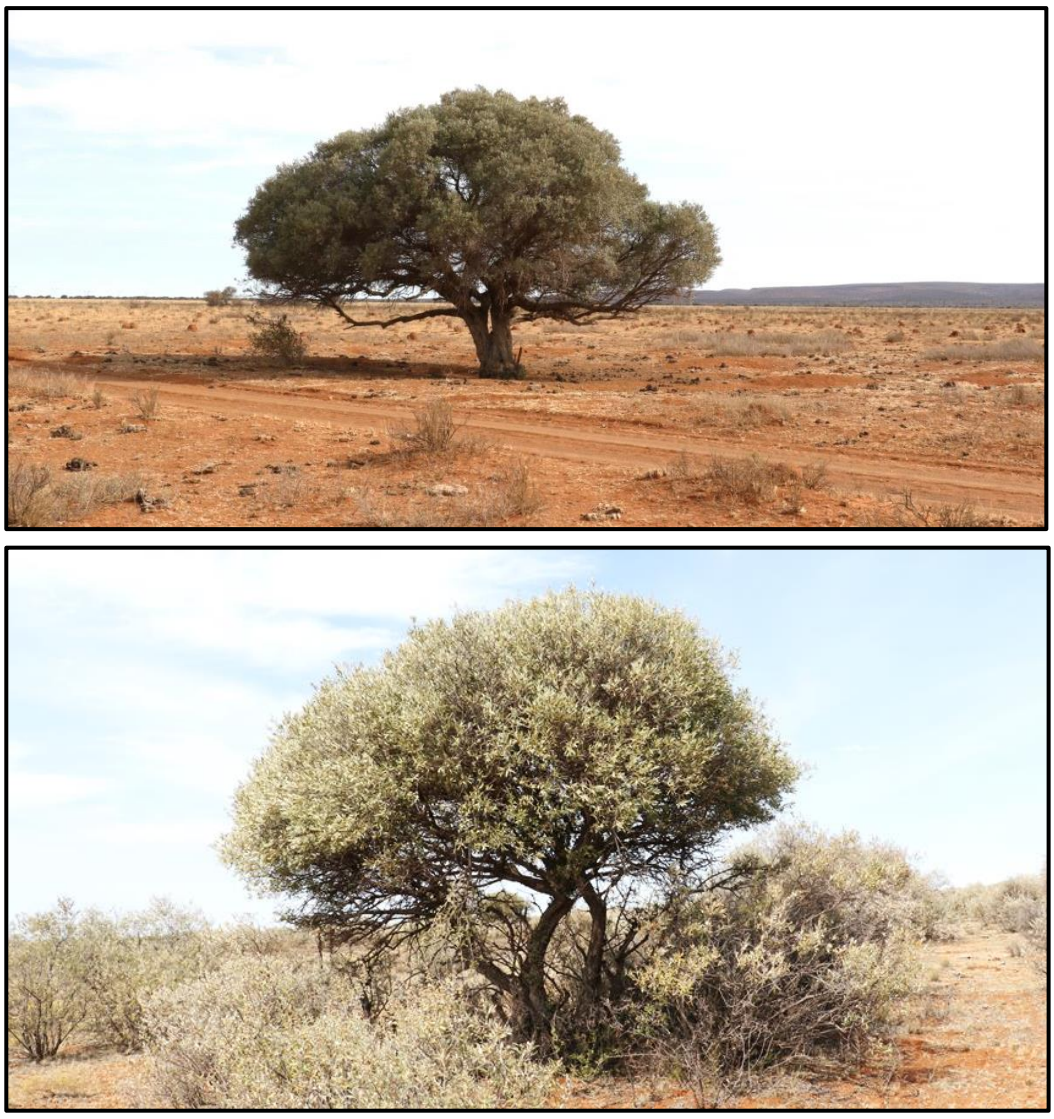
The only *Vachellia erioloba* tree encountered on site occurs as a young individual in the south-eastern corner of the grassland, near the entrance gate to a neighbouring game farm.

Plant species found in the study region that are of conservation concern. Those encountered during the survey is indicated with *.

FAMILY	Scientific name	Status	NFA	NCNCA
APIACEAE	*Deverra burchellii**	LC		S2
APOCYNACEAE	*Pachypodium succulentum*	LC		S2
APOCYNACEAE	*Pentarrhinum insipidum*	LC		S2
CAPPARACEAE	*Boscia albitrunca**	LC	X	S2
CELASTRACEAE	*Gymnosporia buxifolia**	LC		S2
EUPHORBIACEAE	*Euphorbia duseimata**	LC		S2
EUPHORBIACEAE	*Euphorbia mauritanica* var. *mauritanica*	LC		S2
FABACEAE	*Lessertia affinis*	LC		**S1**
FABACEAE	*Vachellia erioloba**	LC	X	
FABACEAE	*Vachellia haematoxylon*	LC	X	
GERANIACEAE	*Pelargonium multicaule* subsp. *multicaule*	LC		**S1**
MESEMBRYANTHEMACEAE	*Ruschia griquensis**	LC		S2
MESEMBRYANTHEMACEAE	*Ruschia hamata**	LC		S2
OLEACEAE	*Olea europaea* subsp. *africana**	LC		S2
OXALIDACEAE	*Oxalis depressa*	LC		S2
OXALIDACEAE	*Oxalis lawsonii*	LC		S2
PEDALIACEAE	*Harpagophytum procumbens**	LC		**S1**
SCROPHULARIACEAE	*Jamesbrittenia atropurpurea* subsp. *atropurpurea*	LC		S2
SCROPHULARIACEAE	*Jamesbrittenia aurantiaca*	LC		S2
SCROPHULARIACEAE	*Jamesbrittenia tysonii*	LC		S2
SCROPHULARIACEAE	*Nemesia lilacina*	LC		S2

Protected species in terms of Schedule 2 of the NCNCA are listed in the above table. Apart from the already mentioned *Boscia albitrunca,* others that were found on site include *Deverra burchellii, Gymnosporia buxifolia, Euphorbia duseimata, Ruschia griquensis, Ruschia hamata* and *Olea europaea* subsp. africana. These all occur at very low densities of less than one individual per hectare. *Olea europaea* subsp. *africana* is however the most abundant and occurs on the hill, in the open shrubland and the grassland. Its presence is most profound in the latter two communities, where it is widespread in the form of tall trees and shrubs. *Deverra burchellii* is restricted to the open shrubland patches that occur in the vicinity of the ephemeral stream, while *Gymnosporia buxifolia* occurs widespread on the hill and in the open shrubland. *Euphorbia duseimata* is restricted to the latter community, while *Ruschia griquensis* and *Ruschia hamata* is restricted to the grassland on red sandy soil.

A projection for species of conservation concern is presented in the below table and a photographic guide to those species encountered during the survey is attached as Appendix 3 of the specialist report.



The protected Olea europaea subsp. africana is widespread in the grassland and open shrubland and occur as tall trees (top) and shrubs (bottom).

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.

A projection of community sizes and species of conservation concern found in the study area.

Communities	Total size	Predicted extent to be affected	Associated species of conservation concern	Population density (ind/ha)	Estimated population to be affected
Aristida congesta – Eriocephalus ericoides shrubby grassland on red sandy soil	± 1 000 ha	± 1 000 ha	*Vachellia erioloba*	< 1	None predicted
			Olea europaea subsp. *africana*	< 1	± 100
			Ruschia griquensis	< 1	± 50
			Ruschia hamata	< 1	± 50
			Harpagophytum procumbens	< 1	± 50
Tarchonanthus camphoratus – Stipagrostis uniplumis open shrubland on rocky soil	± 730 ha	± 730 ha	*Olea europaea* subsp. *africana*	< 1	± 70
			Gymnosporia buxifolia	< 1	± 30
			Euphorbia duseimata	< 1	± 20
			Deverra burchellii	< 1	± 10
Searsia tridactyla - Sporobolus fimbriatus shrubland on rocky hill	± 140 ha	0 ha	*Boscia albitrunca*	± 2	None predicted
			Gymnosporia buxifolia	< 1	None predicted
			Olea europaea subsp. *africana*	< 1	None predicted
Leptochloa fusca dominated endorheic pans	± 40 ha	0 ha	None encountered	-	N/A
Ephemeral stream	± 1.5 ha	0 ha	None encountered	-	N/A

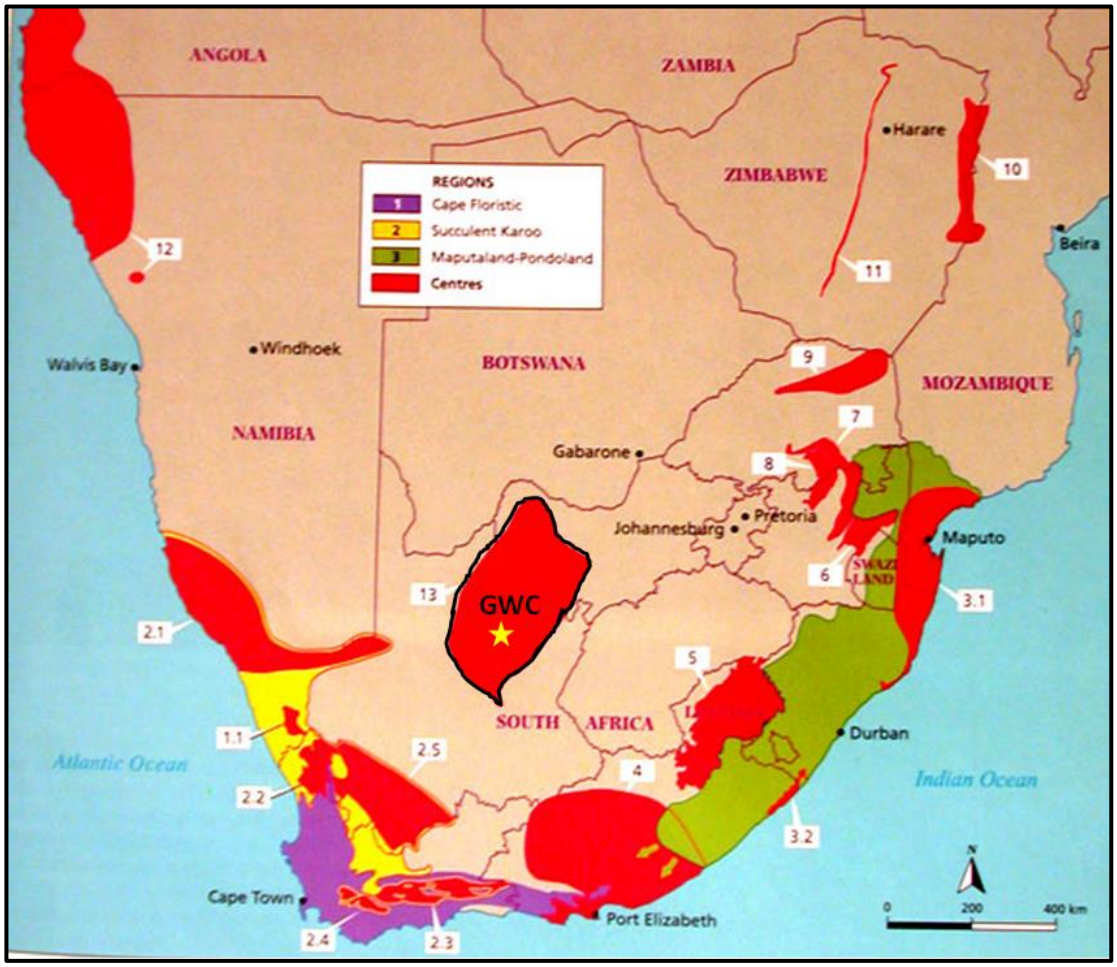
Critical biodiversity areas and broad-scale processes

The proposed prospecting site does not fall within a Critical Biodiversity Area, any formally protected area, or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation units of the study area (Kuruman Mountain Bushveld and Olifanthsoek Plains Thornveld) are classified as least threatened and therefore no formal fine-scale conservation planning has been conducted. These vegetation units have however been identified as a medium conservation priority area within the Siyanda Environmental Management Framework, but the study area does not fall within a proposed conservation area for the District Municipality.

Nevertheless, Werda has been included within the Siyanda Environmental Control Zone 1; i.e. a zone with potential sensitive groundwater resources. The karst aquifers that occur in the dolomite and lime stone rocks in the area represent a major strategic water resource. It is sensitive both in respect to the abstraction and potential pollution of groundwater. Therefore, a suggested management parameter is to prohibit the bulk storage of hazardous substances as well as unrehabilitated spoil heaps and mine dumps.

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.

Furthermore, the study area falls within the Griqualand West Centre (GWC) of Endemism (Van Wyk and Smith 2001). A centre of plant endemism is an area with high concentrations of plant species with very restricted distributions, known as endemics. They are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range restricted species. The GWC is considered a priority in the Northern Cape, because the number of threats to the area is increasing rapidly. This is a cause of concern, because the GWC is still greatly misunderstood and under researched.



A map indicating the regions of floristic endemism in southern Africa, according to (Van Wyk and Smith 2001). The location of the study area is presented by the yellow star.

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.

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

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

All declared weeds and invasive species recorded in and around the study area are listed in the table below, along with their categories according to CARA, NEMBA and NCNCA.

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

Scientific name	Common name	CARA	NEMBA	NCNCA
Cirsium vulgare	Scotch thistle	1	-	S6
Datura inoxia	Large thorn apple	1	-	S6
Opuntia ficus-indica	Sweet prickly pear	1	1b	S6
Prosopis glandulosa var. *glandulosa*	Honey mesquite	2	3	S6
Eucalyptus camaldulensis	Red river gum	2	1b	S6

Indicators of bush encroachment

Bush encroacher species are controlled in terms of Regulation 16 of CARA; where land users of an area in which natural vegetation occurs and that contains communities of encroacher indicator plants are required to follow sound practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs. Declared indicators of bush encroachment in the Northern Cape, which were recorded in and around the study area, are listed below.

A list of declared indicators of bush encroachment recorded in the study area.

Scientific name	Common name
Senegalia mellifera	Black thorn
Vachellia tortilis subsp. *heteracantha*	Umbrella thorn
Grewia flava	Wild raisin
Tarchonanthus camphoratus	Camphor bush

NATURAL FAUNA

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 ecological assessment performed by Dr Betsie Milne also identified faunal distribution, habitats and species of conservation concern within the study area. The results of this assessment are provided below.

The landscape features, i.e. plains, hills and ephemeral pans 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, while the ephemeral pans are likely to accommodate a number of aquatic species and important bird species when inundated.

Mammals

As many as 50 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2 of the specialist report), of which the Greater Kudu, South African Ground Squirrel, Suricate, Springbok, Blesbok and signs of recent Aardvark, Cape Porcupine and Springhare 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. Eighteen mammal species of conservation concern potentially occur in the area, of which 12 are listed either in the IUCN or South African Red Data Book.

Of these, Aardvark activities were evident on site, especially in the shrubby grassland near the ephemeral stream, where many active aardvark holes occur. Termitaria are also scattered across the plains and are prominent features on the study area and are strongly linked to aardvark activities. The protected bat species, Bushveld Gerbil, Aardwolf, Cape Fox, Bat-eared Fox, African Striped Weasel, African Wild Cat, Honey Badger and Striped Polecat all have a high chance of occurring across the site, given their wide habitat tolerances and preference for the habitat found on site. The Lesser Dwarf Shrew also has a high possibility to occur on site based on its termite mound affinity.

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

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

One of the Aardvark burrows that were encountered on site.

Termitaria are prominent features on the plains of the study area.

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.

The core prospecting activities are associated with the alluvial channel, which include the shrubby grassland and the open shrubland. Listed mammals that are most likely to be impacted in the form of species- and/or habitat loss resulting from the prospecting activities include those that are associated with these habitats.

Reptiles

The Werda prospecting area lies within the distribution range of at least 36 reptile species (see Appendix 2 of the specialist report). No listed species are known to occur in the area, but most reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA. Specially protected species include *Karusasaurus polyzonus* (Southern Karusa Lizard) and *Chamaeleo dilepis dilepis* (Namaqua Chamaeleon).

The habitat diversity for reptiles in the study area is fairly high, with the rocky hills considered to be the most important habitat for reptiles at the site. It is however not foreseen that the prospecting activities will take place here and therefore the prospecting operation is not considered to cause significant habitat loss for the local reptile population.

Amphibians

Eleven amphibian species are known from the region (Appendix 2 of the specialist report), 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.

Impacts on amphibians are however likely to be low and restricted largely to habitat loss from prospecting, but if any of the ephemeral pans are destroyed the impacts will be more profound, because these pans are not well known and could potentially host unique species assemblages that are currently dormant due to their adaptations to ephemerality.

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 of the specialist report). 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. All birds are protected either according to Schedule 1, 2 or 3 of NCNCA. A number of these are expected to occur on site either as residents or by occasionally passing over the area.

In general, bird species of the study area are likely to experience habitat loss as a result of the Werda prospecting activities. The most significant impacts are expected to be on the plains as well as in the pan habitats, which will also lead to the subsequent loss of ecological connectivity. This will especially impact the wetland birds that rely on these habitats for breeding, nesting and foraging during wet periods.

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

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

Direct disturbances will be very local and confined to the core sites and will be in the form of noise and movement. Birds are however highly mobile and are expected to move to similar adjacent habitats, if necessary.

Apart from general disturbances and habitat loss, other potential impacts would come from electrocution and collisions with power lines and the accidental or intentional killing of birds. Not all species are vulnerable to powerlines, but flamingos, bustards and storks are highly vulnerable to collisions, while many of the raptors, including vultures, are susceptible to electrocution and collision. Furthermore, owls and vultures are often killed due to cultural believes and practises. Monitoring during the prospecting operation would be vital in order to ensure no or low impact.

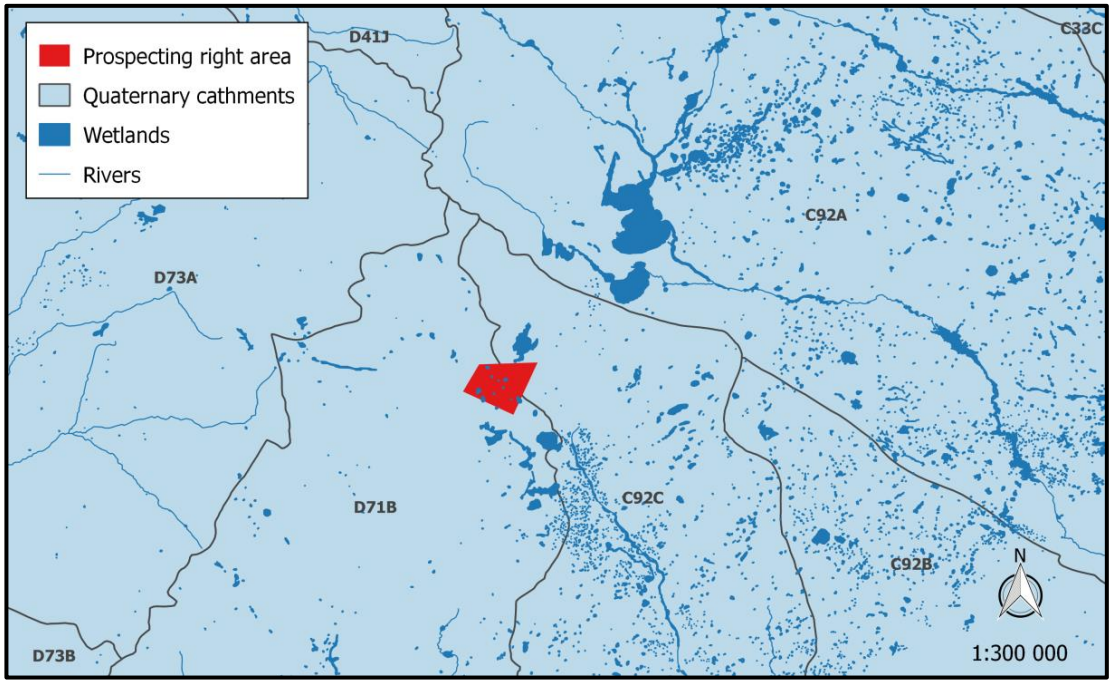
SURFACE WATER RESOURCES

The prospecting operation is situated within two quaternary catchments, from two Water Management Areas (WMAs). The western half falls within D71B of the Lower Orange WMA, while the eastern half falls within C92C of the Lower Vaal WMA (see figure below). Quaternary catchment D71B has been allocated a Present Ecological State (PES) of 'largely natural' (B), and C92C a PES of 'moderately modified' (C), during the Water Resources Situation Assessment Studies that were conducted by DWS in 2002.

Information regarding mean annual precipitation (MAP), evaporation potential (MAE) and runoff (MAR) for the respective quaternary catchments are provided in the table below:

Quaternary Catchment	MAP (mm)	MAE (mm)	MAR (million m^3)
C92C	326	2 300	10.18
D71B	315	2 350	20.01

A surface water resource assessment was performed by MojaTerre, during which watercourses were delineated and classified. Their conditions were also determined in terms of PES, EIS and EC. The assessment report is attached as **Appendix 4** and results of this assessment are presented below.

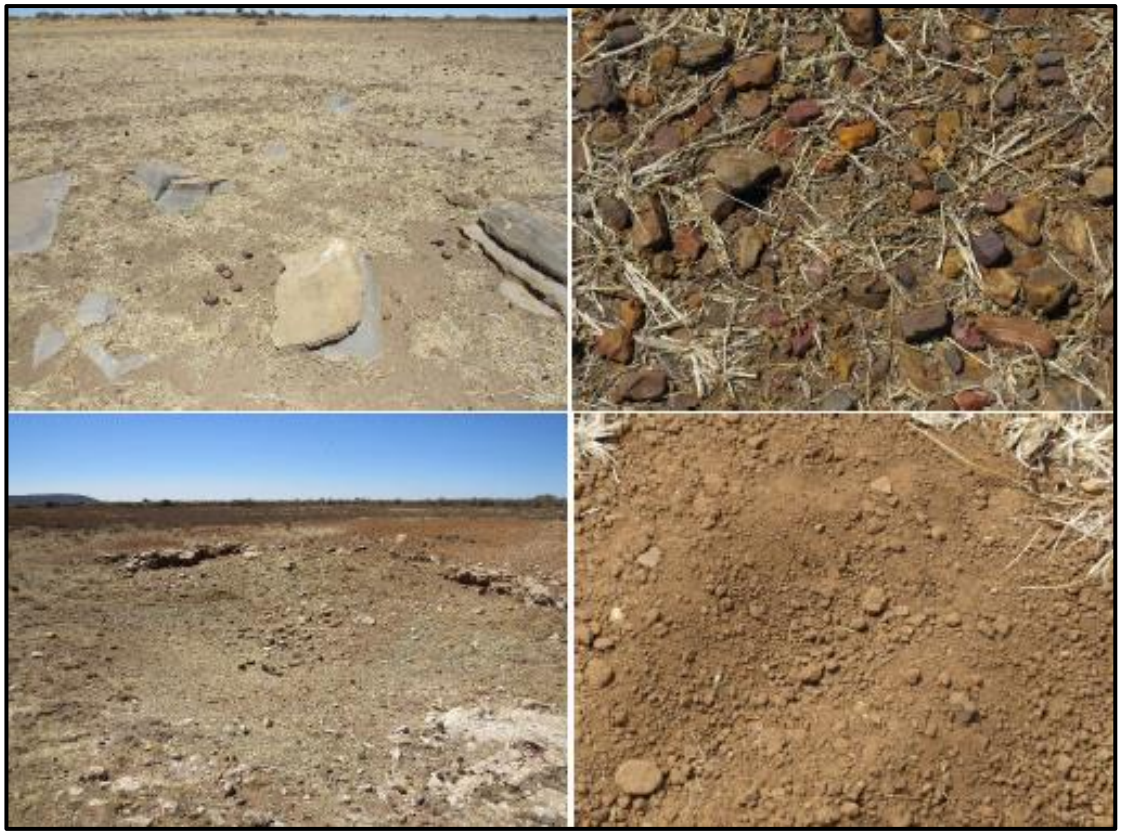


The locality of the prospecting right area in relation to the quaternary catchments of the Lower Orange and Lower Vaal Water Management Area.

Wetland indicators

Due to the very low annual rainfall and the long intervals between major rainfall events within the area, the wetlands on-site showed very few wetland indicators. Obligate wetland plants were not found in any of the surface water features. The features were instead dominated by grass, dwarf shrubs and succulent herbs including species adapted to growing on calcrete pans (Ruschia calcarea). Signs of wetness in the soil were also limited. Wetland areas downstream of the study site were inundated during the site visit with dominant obligate wetland species such as *Juncus rigidus* and *Schoenoplectus muricinux* recorded in the wetland. It is likely that these species will occur in the pans in the study site when the pans are inundated. Pan 8 had large scattered boulders within the pan and pan 4 was characterised by numerous small rocks and pebbles.

The pans found throughout the studied area can stand dry for years between temporary flooding. This is due to a high evaporation rate and a low precipitation rate associated with the area. The vast number of dry pans found throughout the study site suggests that the water table is not close to the surface but that the pans rather fill up with water in seasons of heavy rain and subsequently dry out over time. Because of the dry nature of these pans, it could be expected that impacts associated with infrastructure should be less extensive compared to permanently inundated pans.



Soil, rocks and bedrock recorded in the pans in the study site.

Topography and vegetation structure were good indicators of the pan boundaries. The absence of trees within the pans, in combination with changes in slope allowed for delineating the edge of these features.

The non-perennial river identified on-site was delineated by shrubs and taller grasses on the banks compared with the sparse vegetation growth of the main channel. Alluvial deposits were also found in the river channel.

It is also important to note that a large number of animals and birds were recorded in the study site and within some of the pans. Evidence of animals include large meerkat manors in the pans, numerous antelope observed, porcupine holes, as well as signs of larger animals.

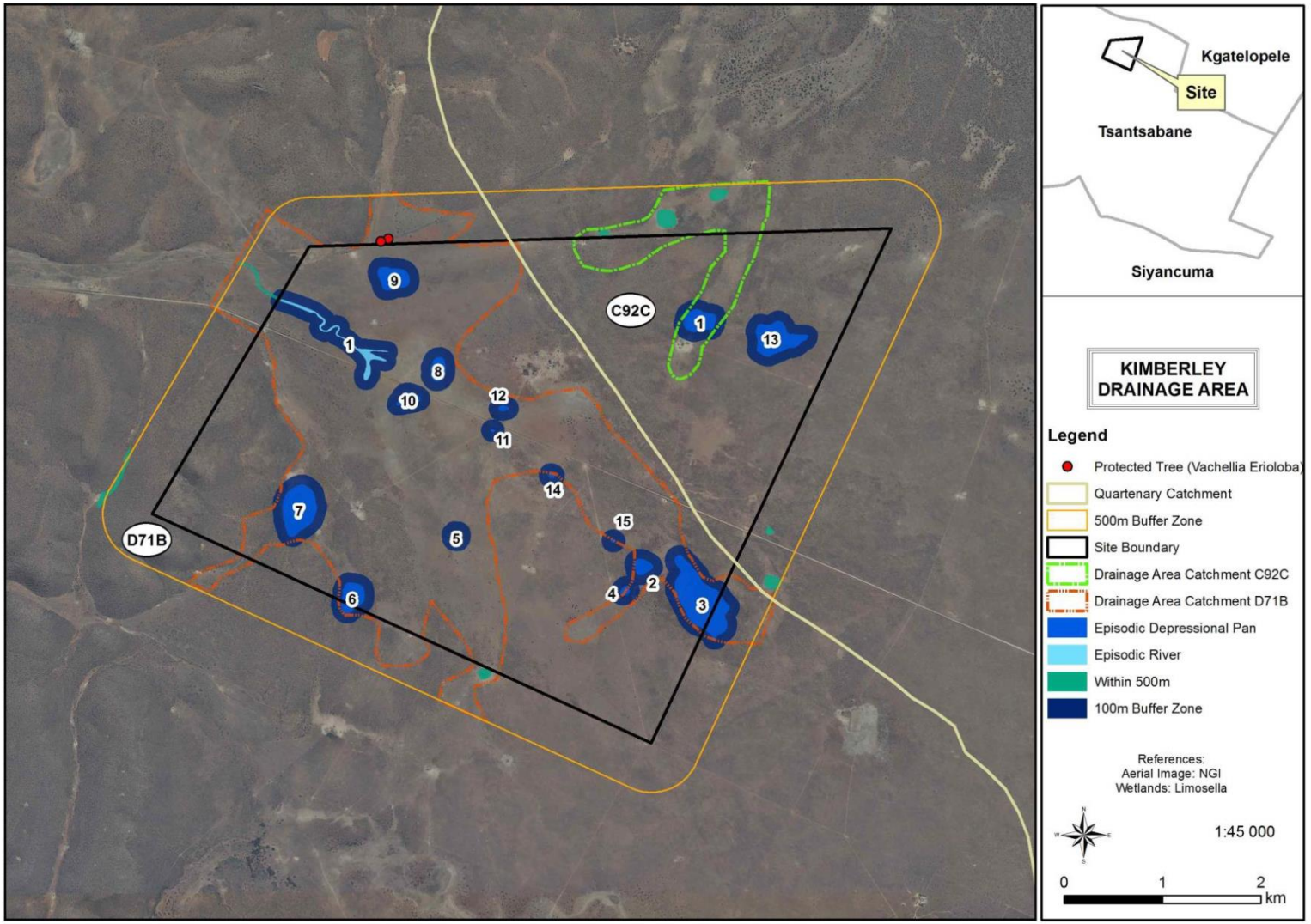
A) Photograph Indicating the Edge of an Identified On-Site Pan (Orange line). B) Aerial Imagery of the Same Pan Showing the Edge of the Pan (Orange Line).

Sparse Vegetation and Alluvial Deposits of the Episodic Non-Perennial River Identified On-Site with Shrubs and Taller Vegetation Growth on the Banks.

Surface water feature classification and delineation

A total of 15 water features were identified within the study site. The features can be classified as 14 episodic pans and one episodic non-perennial river. Although the study was conducted in the dry season in a year of extreme drought some wetland indicator species were recorded although the topography of the pans was used as the main characteristic feature. Pans are generally easy to identify due to their typically circular to oval shape, and their shallow slopes. Furthermore, the absence of an indicator does not necessarily equate to the absence of a wetland and that detailed delineation of cryptic wetlands is unlikely to be achievable with any useful degree of confidence based on a dry season assessment only and thus a follow up study is suggested during the wet season.

During high rainfall events in the D71B catchment, run-off water is anticipated to drain from the Rooiberge located north-west and west of the study site, towards pan numbers 2-12, 14, 15, via the non-perennial river (no. 1). It is anticipated that pan numbers 1 and 13 would receive water from run-off coming from the north in the catchment C92C.



Map of potential watercourses identified by MojaTerre.

Some pans are considered to be newly formed as a result of grazing and trampling of animals and/or erosion which leads to the formation of depressions which, in an area with a high concentration of pans, can also in itself become a place where water collects during rainfall events and thus becomes a pan. The hydro-period of the wetlands were determined using different years of aerial imagery (historical photographs and google earth time-line function) to determine the time and period in which the pans are inundated. Furthermore, the farmers living on the land were invaluable with their knowledge in the hydro-period of the pans on their farms.

On-site surface water features are classified up to level 6 per the SANBI wetland guidelines (Ollis et al. 2013) as summarised in the tables below:

Level 1: System Type	Level 2: Regional Setting	Level 3: Landscape Setting	Level 4: HGM Unit		
System	DWS Ecoregion	Landscape Unit	Level 4A:Wetland Type	Level 4B: Longtitudinal Zonation	Level 4C: Inflow Drainage
Inland.	Ghaap Platue.	Valley Floor & Slope.	Depressions (1-4, 9, 13, and 15).	Endorheic.	With channelled inflow.
			Non-Perennial River (1).	Lower-Foothills.	Active Channel.
	Southern Kalahari.	Valley Floor & Slope.	Depressions (5-8, 10, 11, 12, 14).	Endorheic.	With channelled inflow.

Level 5: Hydroperiod and depth of inundation		
Level 5A	Proportional Rating (0-6) for Water Features On-Site	
Inundation Peroid	Depressions	Non-Perennial River
Permanently Inandated		
Seasonally Inandated	4	5
Intermittently Inandated	4	4
Never/Rarely Inandated	1	1
Unknown		
Level 5B	Proportional Rating (0-6) for Features On-Site	
Saturartion Periodicity (within 50 cm of the Soil Surface)		
Permanently Inandated		
Seasonally Inandated	3	3
Intermittently Inandated	5	5
Never/Rarely Inandated	1	1
Level 5C: Inundation Depth-Class		
	Littoral	Littoral

Component	Dominant categories for selected descriptorss (Level 6)							
	Natural vs Artificial		Substratum Type	Vegetation Cover, Form and Status				
	6A: NAtural vs Artificial	6B: Artificial Categories	6A: Primary Categories	6A: Vegetation Cover	6B: Primary Vegetation Cover	Detailed Vagetation From		6E: Vegetation Status
						6C: Herbaceous Vegetation	6D: Forest Vegetation	
Depressions.	Natural.	n/a.	Sandy, Rocky, Carbonate.	Sparsely Vegetated.	Grasses & Herbaceous with shrubs on edge.	No obligate wetland species.	n/a.	Natural.
Non-Perennial River.	Natural.	n/a.	Alluvial Deposits.	Sparsely Vegetated.	Grasses & Herbaceous with shrubs on edge.	No obligate wetland species.	n/a.	Natural.

Surface water feature classification and delineation

1. **Present Ecological State (PES)**

The depressional pan wetlands delineated in this report are similar to each other in hydrology, geomorphology and vegetation growth. One of the main difference between the identified pans are that some have been more grazed, even over-grazed, while others have good robust vegetation growth. This is likely due to the farmer's rotation of cattle and as such all the pans are likely to have enough time to recover the grazed vegetation while not actively being grazed on. The pans number 1, 2, 3, 6, 9, 13, 14 and 15 were more impacted by grazing compared to the other pans. Pan 4 were impacted somewhat by Eskom pylons within the pan. The pans numbered 1 and 2 were impacted by a dirt road that crosses through the wetlands.

Although exotic vegetation was recorded on the study site, it was very sparse and usually confined to the disturbed areas such as adjacent to roads. Further impacts associated with the pans are dirt roads and powerline cables that transect some pans. The pans in the study area are generally small to medium sized with small direct catchment areas. The area available for impacts are thus small and not as susceptible to impacts compared to other wetland systems such as valley bottoms that can be affected by many upstream activities. The impacts associated with the pans are indicated in the images below.

The pans on the study site scored either an A - Unmodified, natural or a B - Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. The trajectory of the wetlands are all likely to remain stable over the next 5 years (→).

2. **Ecological Importance and Sensitivity (EIS)**

All the depressional pans scored between 2 – 3, and thus falls into a category characterised by high ecological importance and sensitivity. Surface water features that fall into this category are considered to be ecologically important and sensitive. The biodiversity of these features may be sensitive to flow and habitat modifications. The pans scored low on key features such as sensitivity in changes in flood and sensitivity in changes in dry season as pans are generally not sensitive to such changes.

Impacts associated with the pans including overgrazing, fences within the wetland, exotic vegetation and inadequate storm water drains.

However, the pans scored high for direct human benefits as they provide water, grazing area potential tourism area (such as birding) as well as potential educational value. Furthermore, the pans contribute positively to the hydro-functionality of the area and helps trap sediment and aids in flooding events. The Recommended Ecological Management Class for the identified water features is thus a B.

No.	Affected Watercourse	PES	EIS
1	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
2	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
3	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
4	Depressional Pan.	A - Unmodified, natural. →	B – High.
5	Depressional Pan.	A - Unmodified, natural. →	B – High.
6	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
7	Depressional Pan.	A - Unmodified, natural. →	B – High.
8	Depressional Pan.	A - Unmodified, natural. →	B – High.
9	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
10	Depressional Pan.	A - Unmodified, natural. →	B – High.
11	Depressional Pan.	A - Unmodified, natural. →	B – High.
12	Depressional Pan.	A - Unmodified, natural. →	B – High.
13	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
14	Depressional Pan.	B - Largely natural with few modifications. →	B – High.
15	Depressional Pan.	B - Largely natural with few modifications. →	B – High.

3. Ecological Category (EC)

The episodic nature of the riparian areas provided some difficulty to the determination of the EC using VEGRAI assessment, due to the majority of the vegetation being terrestrial. The confidence for the VEGRAI component is thus low. Currently no tools are available to rapidly assess non-perennial systems other than long term monitoring.

The instream biota score was also not available during the time of the site assessment to use in the QHI calculations and was thus omitted from the calculations. Although it is unlikely that the episodic streams provide sufficient habitat for these animals to thrive while the pools in the ephemeral streams might provide some limited habitat.

The non-perennial river located on the study site has limited impacts which includes grazing and dirt road crossing. Furthermore, the vegetation composition of the non-perennial river was generally characterised by indigenous shrubs. No riparian woody vegetation was recorded in the river area.

The VEGRAI EC and QHI is summarised in the table below. The combined EC scores for the riparian area on the study site is a B - largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.

Level 3 Assessment					
Metric Group	**Calculated Rating**	**Weighted Rating**	**Confidence**	**Rank**	**% weight**
Marginal	100,0	23,1	2,5	2,0	30,0
Non -Marginal	80,5	61,9	0,0	1,0	100,0
Level 3 VEGRAI (%)				85,0	
VEGRAI EC				B	
Average confidence				1,3	

Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. The combined QHI score for the episodic non-perennial streams on the study site is a B - Largely natural with few modifications.

The quick habitat integrity (QHI) score is summarised in the table below.

Quaternary Catchment	River	Bed Modification (0-5)	Flow Modification (0-5)	Introduced Instream Biota (0-5): Only Enter Value if Rating is Higher than any of the other Metrics	Inundation (0-5)	Riparian/Bank Condition (0-5)	Water Quality Modification (0-5)	Desktop Habitat Integrity	Invertebrate Rating (0-5)	Fish Rating (0-5)	Instream EC%	Instream EC	Vegetation Rating (0-5)
D71B	Non-Perennial	0	2	-	1	0	2	83,0	-	-	83,0	B	1

GROUND WATER

A specialist hydrogeological assessment was performed by MojaTerre to identify site sensitivities and constraints related to the hydrogeology. The assessment report is attached as **Appendix 5** and results of this assessment is summarised below.

Underlying aquifers

The following aquifers were identified from the available information. These include:

- **Unconsolidated intergranular aquifers:** The Quaternary Aeolian, alluvial and surficial limestone deposits present typically form unconsolidated intergranular aquifers. The thickness of these aquifers is expected to vary significantly and could be a thin cover of soil and calcrete in places, but also thicker than 50m where Aeolian sand dunes are present. Where present, the aquifers typically have a higher permeability (1 m/d – 100 m/d) and receive recharge from direct rainfall. As such, it can act as a preferential flow path to groundwater and potential contamination from surface sources associated with the project. The rate of recharge to these aquifers can be high (10 % – 20 % of the MAP) due to the unconsolidated nature of the sediments, but is expected to take place at irregular intervals as rainfall patterns vary in this arid part of South Africa. High rates of evapotranspiration in this region will reduce the volume of water that is available for infiltration to the aquifer. The extent to which the Quaternary deposits are water-bearing is often dependent on the presence of perennial streams. These formations are not often exploited on their own, but generally in conjunction with the underlying fractured rock aquifers. For this reason, the aquifers are considered minor in the project area.

- **Weathered and fractured rock aquifers**: These are formed in zones of weathering, fracturing, intense jointing, breciation and shearing in the BIF and dolomite of the Asbestos Hills Subgroups. Dolerite intrusions (dykes and sills) can occur, but there is no evidence of intrusions within the project area. The depth of the water-bearing geological structures in the region varies between 16 m and 129 m below surface.

Groundwater occurs typically in fresh rock at these depths, below the weathered zone, and not in the transition between weathered and fresh rock, as in the case in higher rainfall areas. The permeability of the fractured rock aquifers varies significantly, depending on the nature of fractures. In this region, silicification and chertification of fracture zones can significantly reduce fracture permeability. Typically, permeability can vary between 0.01 m/d and 10 m/d and the aquifers are expected to be highly heterogeneous. Major fault zones can yield groundwater at high rates. The rate of recharge to the fractured rock aquifer is expected to be lower than that discussed for the primary aquifers above, probably in the region of 1 % – 3 % of the MAP. Farmers and landowners typically target these aquifers for water supply. As groundwater is often the sole source of water available to farmers in the area, the weathered and fractured rock aquifers are classified as minor and they seldom produce large quantities of groundwater and have variable permeability. The aquifers are however important for supply of water locally and supply baseflow to rivers and streams in the area.

- **Karst aquifers:** These could be associated with the dolomites of the Lime Acre Formation in the region. The dolomites in the project area are expected to be coarse recrystallized dolomite with interbedded chert. Karst aquifers are characterised by conduits, dolines, caverns and even sinkholes. Such structures can store large volumes of water and often result in intermittent or permanent springs. Although dolomite has a relatively low primary permeability, the development of karstic features due to dissolution of the carbonate rock along faults and fractures, results in a high secondary permeability, which controls the storage and movement of groundwater. Dolomitic karst aquifers typically form high-yielding aquifers and are therefore form important water resources. For this reason, they are classified as major aquifers. These aquifers are vulnerable to pollution due to high associated permeability and rapid groundwater flow rates. Dolomite also has a low capacity to attenuate pollution. The permeability of dolomites is highly variable and can range from 1 m/d – 1000 m/d or even higher, depending on the presence of cavities. The rate of recharge to these aquifers are also expected to be high, typically >20 % of the MAP. Within the project area, only a small dolomitic outcrop is present in the western part of the property.

Boreholes and springs

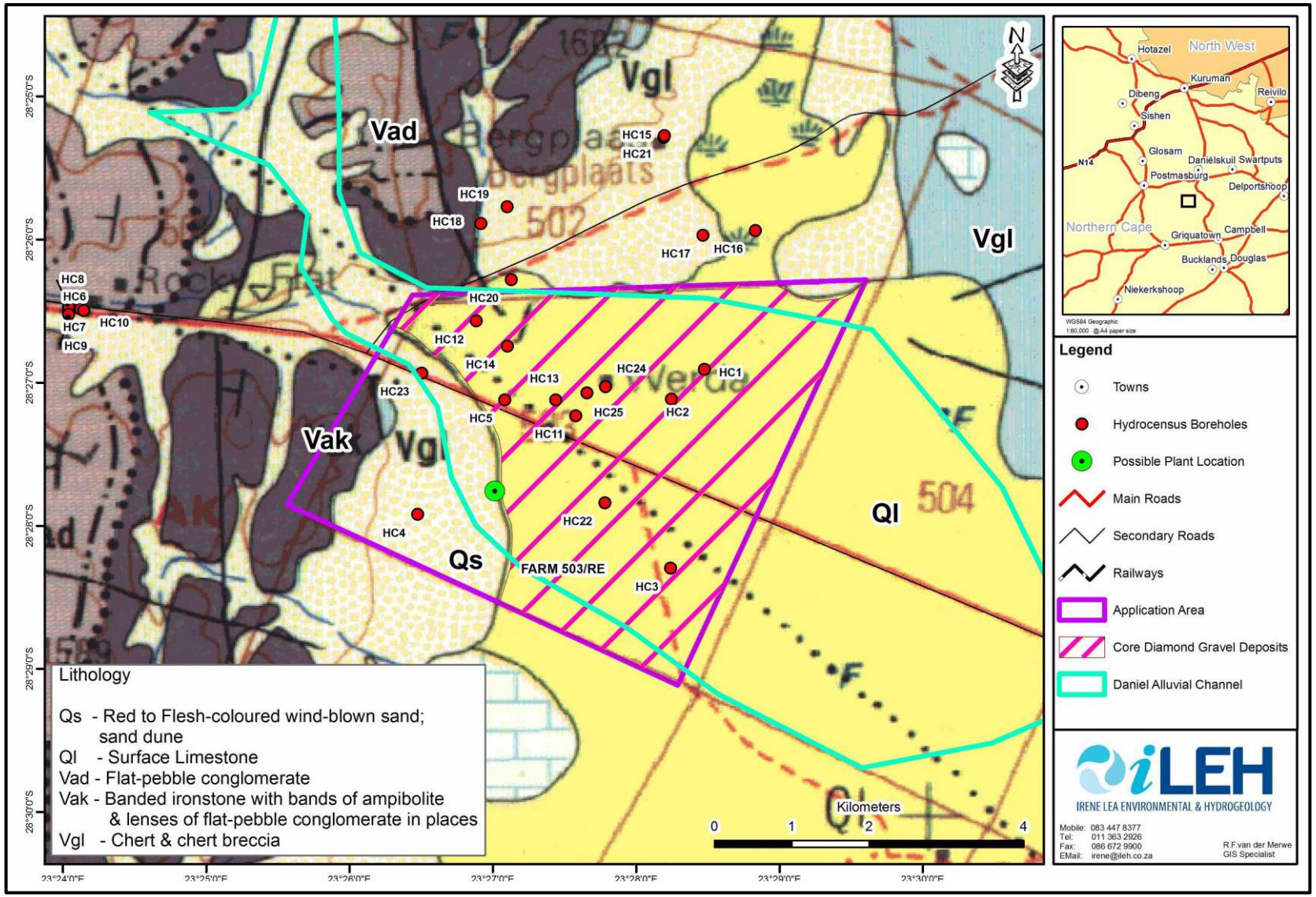
A hydrocensus was completed around the project area with the objective of establishing regional groundwater use patterns and ambient groundwater quality. A total of 25 boreholes were identified and visited during the hydrocensus. The locations of these boreholes are indicated in the figure below.

Thirteen of the boreholes visited during the hydrocensus are currently in use. Groundwater is mainly used for livestock and game watering, but two of the boreholes (HC15 and HC16) are used for domestic supply. The average depth of the boreholes drilled is 60 m, but the drilling depth varies between 26 m and 100m, excluding the hand-dug pit (HC7).

Groundwater is abstracted from all boreholes using windpumps. The rate at which groundwater abstracted is variable. Three of the boreholes on the farm Werda (HC2, HC3 and HC20) have comparatively high reported yields, as indicated in the below table. It is possible that the higher yielding boreholes are associated with the chert and chert breccia that underlies the surficial limestone and unconsolidated sands. These boreholes are currently used by Mr. Oosthuizen and Mr. Lombard for livestock watering.

The yields of other boreholes identified during the hydrocensus are below 1 L/s (3600 l/hr).

The depth to groundwater varies between 3 m and 31 m, with an average depth of 22 m, in boreholes visited during the hydrocensus. The depth to groundwater is affected by the geology as well as by the effects of pumping. Shallower groundwater levels (shallower than 10 m) were measured in boreholes west of the project area and is associated with the Danielskuil Formation outcrops. These boreholes are not currently in use. The depth to groundwater in boreholes within the project area is around 30 m below surface. Most of these boreholes are currently in use and are fitted with wind pumps.



The location of hydrocensus points on and near the Werda prospecting area.

Hydrocensus borehole information

BH ID	Latitude	Longitude	Diameter (m)	Casing Height (m)	Depth (m)	Fitted equipment	Static water level (mbgl)	Ground water use	Extraction rate (l/s)	Dependents	Land owner
HC1	28°26’54.5”S	23°28'28.7"E	0.140	0.5	26.25	None	Dry	None	-	-	Jerg Oosthuizen 082 789 3201
HC2	28°27'07.0"S	23°28'14.9"E	0.140	2.1	47.9	Wind pump	27.12	Game	10	20 springbuck 15 blesbuck 2 donkeys	
HC3	28°28'17.9"S	23°28'14.5"E	0.140	0.33	No access	Wind pump	No access	Livestock	13.33	50 cattle	
HC4	28°27'55.3"S	23°26'28.5"E	0.140	0.45	No access	Wind pump	No access	Livestock	Unknown	70 cattle	
HC5	28°27'07.3"S	23°27'05.0"E	0.180	0.5	>60	None	28.72	None	-	-	
HC6	28°26'29.1"S	23°24'07.2"E	0.180	0.83	>60	None	3.81	None	-	-	
HC7	28°26'29.1"S	23°24'07.3"E	0.180	0.43	5.69	None	2.94	None	-	-	
HC8	28°26'28.1"S	23°24'02.4"E	0.180	0.00	>60	None	3.94	None	-	-	
HC9	28°26'31.4"S	23°24'02.4"E	0.180	0.00	>60	None	9.41	None	-	-	
HC10	28°26'29.9"S	23°24'08.7"E	0.180	0.30	No access	None	No access	Livestock	Unknown	Unknown	
HC11	28°27'13.9"S	23°27'34.7"E	0.180	0.30	No access	None	No access	Livestock	Unknown	Unknown	
HC12	28°26'34.2"S	23°26'53.1"E	0.180	0.30	No access	None	No access	Livestock	Unknown	Unknown	
HC13	28°27'07.3"S	23°27'26.4"E	0.180	0.30	No access	None	No access	Livestock	Unknown	Unknown	
HC14	28°26'44.7"S	23°27'06.2"E	0.165	0.25	37.75	None	30.12	None	-	-	
HC15	28°25'17.2"S	23°28'11.6"E	0.165	0.25	35	Wind pump	No access	Domestic	0.20	2 people 20 cattle 800 sheep + 200 goats	Rudolph Lombard 0533133447
HC16	28°25'56.3"S	23°28'50.0"E	0.165	0.25	40	Wind pump	30	Domestic Livestock	0.04		
HC17	28°25'58.3"S	23°28'28.0"E	0.165	0.25	100	Wind pump	30	Livestock	0.28		
HC18	28°25'53.3"S	23°26'55.0"E	0.165	0.25	100	Wind pump	30	Livestock	0.83		
HC19	28°25'46.3"S	23°27'06.0"E	0.165	0.25	100	Wind pump	Dry	-	-		
HC20	28°26'16.9"S	23°27'07.7"E	0.165	0.30	80	None	31.47	-	5.56		
HC21	28°25'16.5"S	23°28'11.9"E	0.165	0.30	40	Wind pump	30	Livestock	0.33		
HC22	28°27'50.4"S	23°27'46.9"E	0.165	0.50	-	None	-	-	-	-	J. Oosthuizen
HC23	28°26'56.1"S	23°26'30.3"E	0.165	0.50	-	None	-	-	-	-	
HC24	28°27'01.8"S	23°27'47.2"E	0.165	0.50	-	None	-	-	-	-	
HC25	28°27'04.3"S	23°27'39.4"E	0.180	0.62	>60	Wind pump	30.37	Livestock	-	Unknown	

In addition to the hydrocensus, the NGDB was consulted to identify boreholes recorded by the DWS in the region. A total of 47 boreholes were identified within or near the application area. The complete dataset evaluated is presented in Annex C of the specialist report.

The information suggests that regionally, the average depth to groundwater is 28 m, varying between 2 m and 129 m below surface. The depth to water strikes also vary, but is on average 64 m. If HVWD intend to drill boreholes for water supply to the project, these should be a minimum of 100 m deep, based on this information.

The average discharge rate from the boreholes in the NGDB is comparable to that recorded during the hydrocensus. The average pumping rate in the database is 1.4 L/s (5040 L/hr), varying between 0.01 L/s – 5 L/s (36 L/hr and 18000 L/hr). The water strikes are associated with dolomite, and quartzite, but also with intrusions like dolerite and diabase.

Groundwater quality

Six groundwater samples were taken during the hydrocensus for chemical analysis. The results of the analyses are presented in the table below. The certificates of analyses are provided in Annex D of the specialist report.

The groundwater results are compared to the SANS 241:2015 Drinking Water Standards. Results indicated that the water quality is generally fit for domestic use. The exceptions are iron and manganese in HC8 and HC9 and ammonia in HC9.

Iron is an abundant element in the BIF formations present in the project area. The elevated iron and manganese concentrations could therefore be a natural occurrence. It could also be because of rusted pipes in the boreholes sampled. Excessive ingestion of iron may result in haemochromatosis. It could also result in the proliferation of iron-oxidising bacteria, which manifests as a slimy coating on the pipes. Elevated iron concentrations can also result in discolouration of water supplies and other aesthetic impacts. Iron concentrations between 1mg/L – 10mg/l may have an impact on the taste of the water and will stain plumbing. It may also result in slight health effects in young children and sensitive individuals.

Ground water quality

Analyses (mg/l)	SANS	HC2	HC3	HC8	HC9	HC15&21	HC6
pH – Value at 25°C	5 – 9.7	7.3	7.3	7	7.1	7.1	7.4
EC (mS/m) at 25°C	170	83.6	62.9	36	44	118	49.8
TDS at 180°C	1200	538	356	248	218	810	326
Alkalinity ($CaCO_3$)	NS	328	264	164	180	320	240
Bicarbonate (HCO_3)	NS	400	322	200	219	390	293
Chloride (Cl)	300	60	40	22	25	99	15
Sulphate (SO_4)	250	48	28	<2	<2	209	12
Fluoride (F)	1.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nitrate	11	7.5	3	0.1	0.1	7.5	2.8
Nitrite	0.9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphate (P)	NS	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Total Cyanide (CN)	0.2	0.01	0.01	0.01	<0.01	0.01	<0.01
Oxygen Demand (O_2)	NS	<10	<10	44	94	<10	<10
Ammonia (N)	1.5	0.1	<0.1	1.0	**11**	<0.1	<0.1
Sodium (Na)	200	15	18	15	14	41	9
Potassium (K)	NS	2.6	2.5	3.4	5	3.1	2.6
Calcium (Ca)	NS	126	82	31	30	165	65
Magnesium (Mg)	NS	28	24	16	15	37	23
Aluminium (Al)	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Antimony (Sb)	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (As)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium (Ba)	0.7	<0.025	<0.025	0.148	0.177	<0.025	<0.025
Beryllium (Be)	NS	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Boron (B)	2.4	0.049	0.029	0.049	0.061	0.05	<0.025
Cadmium (Cd)	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (Cr)	0.05	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Cobalt (Co)	NS	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Copper (Cu)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (Fe)	0.3	<0.025	<0.025	**6.25**	**3.06**	<0.025	<0.025
Lead (Pb)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (Mn)	0.1	<0.025	<0.025	**0.718**	**1.68**	<0.025	<0.025
Uranium (U)	0.03	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Vanadium (V)	NS	<0.025	<0.025	<0.025	0.025	0.028	<0.025
Zinc (Zn)	NS	0.099	0.065	<0.025	<0.025	0.114	0.058

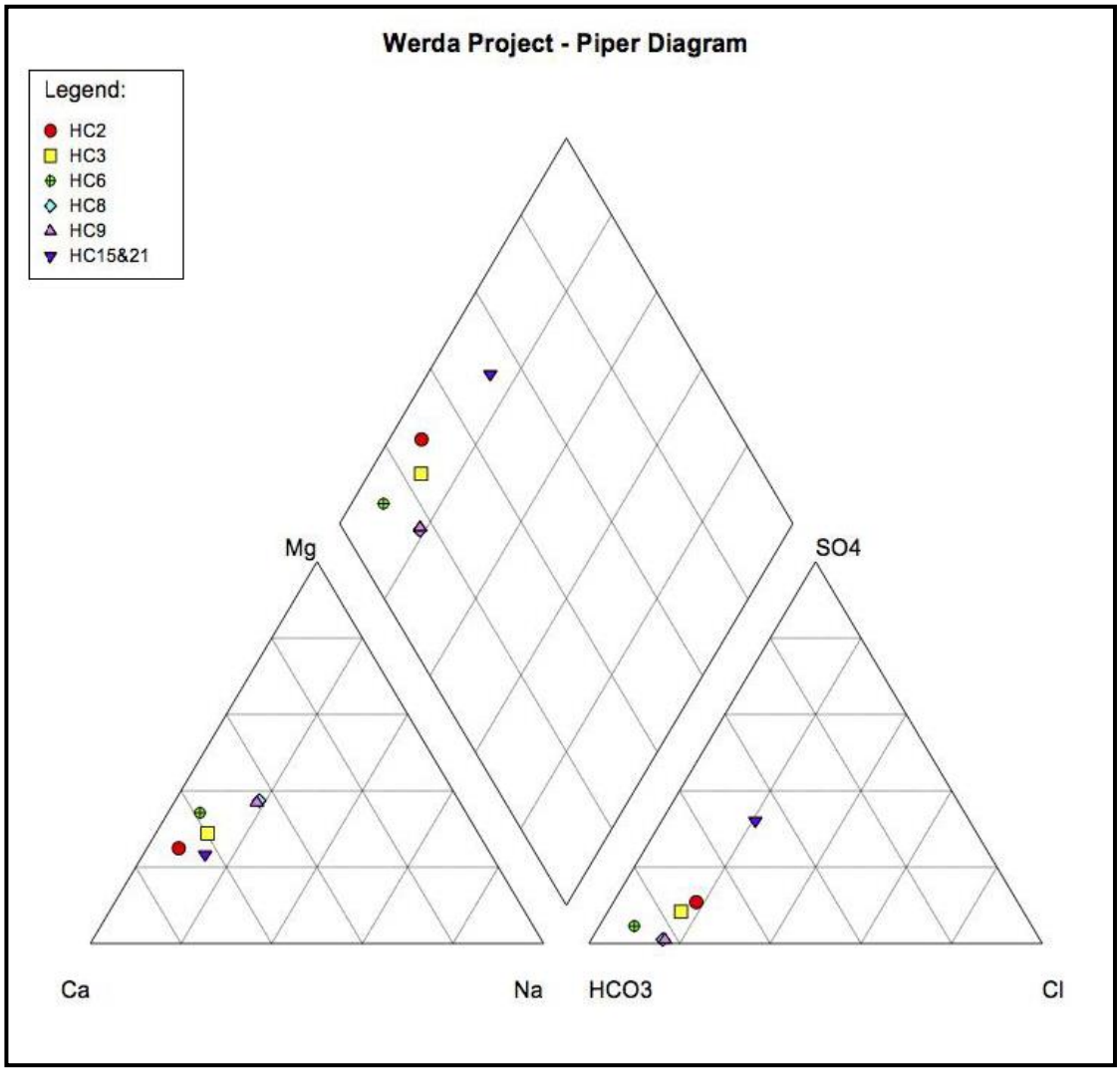
Elevated manganese concentrations could indicate anaerobic conditions where soluble manganese has been mobilised. The concentrations recorded in H8 and 9 may cause severe staining and taste effects, but is not expected to have negative health effects. This water can be treated with an oxidising process, like the addition of chlorine, to convert soluble manganese to an insoluble oxide, which can be filtered from the water.

Ammonia tends to be elevated where organic decomposition under anaerobic conditions takes place and could be an indication of the impact of agricultural activities on groundwater quality. Ammonia is not toxic to man, but can lead to nitrate formation, which may affect taste and odour in the water. A concentration exceeding 10mg/l is generally thought to be unacceptably high for domestic use and can compromise chlorination of the water.

The groundwater sampled has a neutral to slightly alkaline pH. The total dissolved salts, indicated by the EC and TDS concentrations, are low and comply with drinking water standards. The groundwater sampled is hard and will result in scaling of pipes and plumbing. Hardness is determined by the calcium and magnesium concentrations in the water. Excessive hardness can give rise to scaling and results in an increase in soap required to produce lather when bathing and in household cleaning. The natural hardness of groundwater is influenced by the geology and the presence of soluble calcium and magnesium minerals. The water can be softened by the addition of lime.

The results of the groundwater analyses are presented graphically in a Piper diagram below. This trilinear diagram is used to plot the equivalent concentrations of several elements to characterise the types of groundwater in the project area. The diagram indicates that the groundwater is calcium-bicarbonate dominant, which is expected in the geological setting.

The groundwater samples plot in an area on the Piper diagram that indicates mixing chemical processes, typically of recently recharged water.



Piper Diagram.

Groundwater sensitivity

Three of the boreholes identified during the hydrocensus have reported yields higher than the regional average, including HC6, HC8 and HC9. The reported yields for the three boreholes range between 5 L/s and 10 L/s. Based on the hydrocensus information; groundwater is extracted from the underlying fractured and possibly karst aquifers in these boreholes. These rocks underlie the superficial limestone and unconsolidated sediments. Groundwater levels in these boreholes are shallower than 10 m. It is likely that the surficial limestone formations in the vicinity of the boreholes may be water-bearing, especially after a rainfall event.

In this case, the limestones will contribute to the volume of groundwater that is available for abstraction from the underlying fractured rock aquifers and care should be taken not to unnecessarily disturb the formation during diamond prospecting.

A high level assessment of the zone of impact of groundwater abstraction from these boreholes, based on literature based permeabilities, indicates that the borehole capture zones are roughly 3 km around each borehole. This means that groundwater abstracted from the three boreholes may be attracted from aquifers within a 3 km radius around each borehole. It is acknowledged that combined abstraction from the three boreholes will result in interception between the borehole capture zones, but this cumulative impact cannot be assessed with the available dataset. The borehole capture zones may therefore be slightly larger due to the cumulative impact of groundwater abstraction.

Trenching and excavations during diamond prospecting will not extend to the depths of the water bearing fractures intercepted in the three high-yielding boreholes. Diamond prospecting may however affect the rate of recharge to the fractured rock and possibly karst aquifers, thus affecting groundwater levels and ultimately groundwater availability. The surficial limestones and alluvium are expected to play an important role in the rate of recharge to the underlying aquifers due to their unconsolidated nature and anticipated high permeabilities. Please note that these calculations are not based on-site-specific aquifer parameters and only a low level of confidence can therefore be assigned to the impact assessment. The calculations do however indicate that groundwater yield within the project property could potentially be negatively affected during prospecting, due to the disturbance of surficial sediments. For this reason, borehole yields reported during the hydrocensus may be reduced during the life of the project.

The extent to which this impact will affect borehole yield cannot be estimated with the available dataset and should be confirmed through on-going monitoring in the boreholes identified. Two of the private boreholes identified during the hydrocensus fall within the 3 km zone around the earmarked abstraction boreholes. One of these, HC10, is used for livestock watering by the landowner. This borehole is ranked as high sensitivity boreholes for the purpose of the impact assessment. This is due to the fact that potential abstraction of groundwater to supply diamond-prospecting activities may impact on regional groundwater availability as mentioned above.

Boreholes that are in use may therefore experience reduced yield as a result. As groundwater is the sole source of water supply to landowner, a negative impact on borehole performance will result in a significant impact and they are therefore highlighted as high sensitivity boreholes.

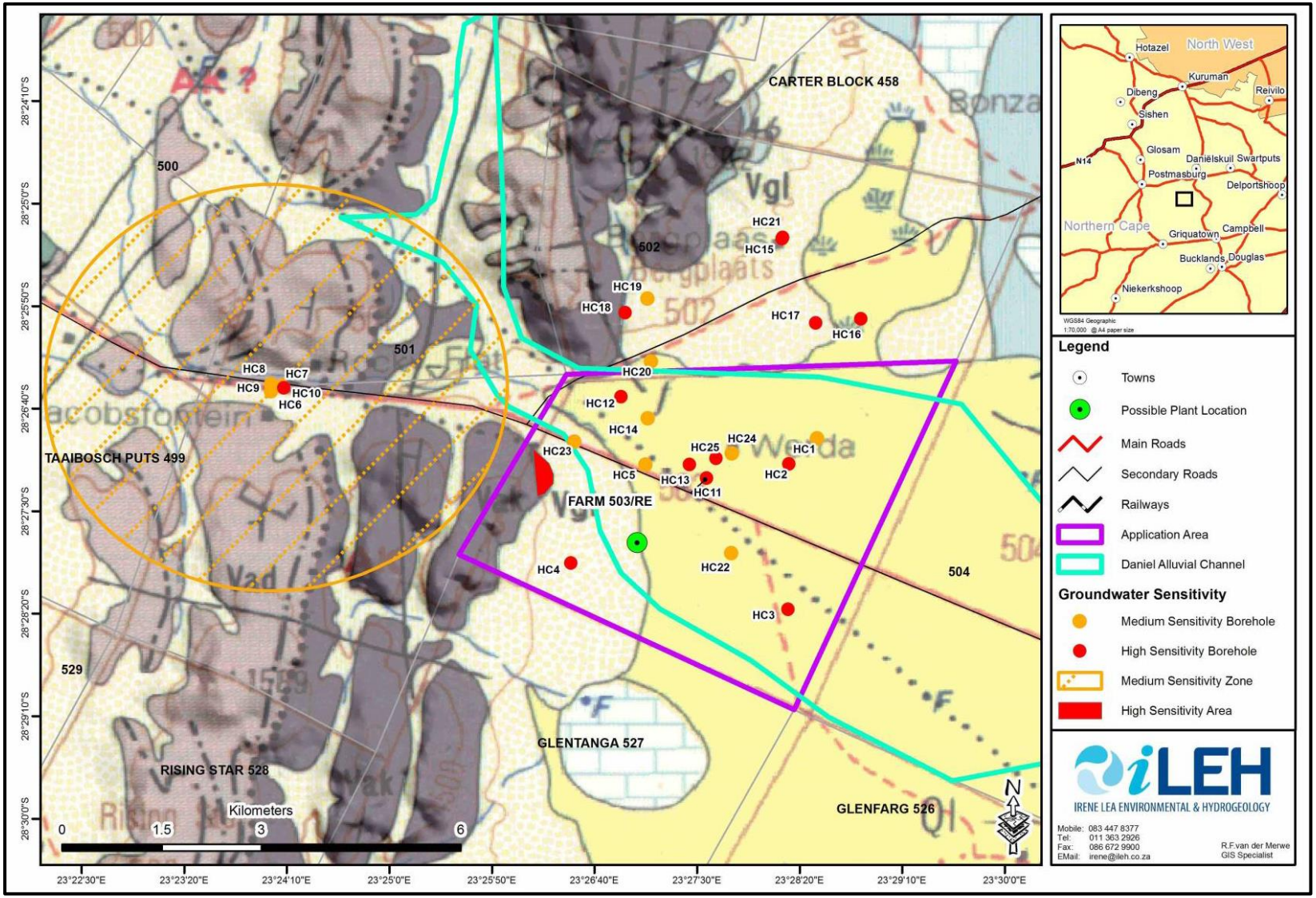
It is noted that the expected zone of impact as a result of groundwater abstraction for water supply to the diamond prospecting activities is unlikely to extend onto the application area. Other boreholes used for private groundwater abstraction, and not on Mr. Oosthuizen's farm, should therefore not be affected by the proposed groundwater abstraction.

Disturbance of the surficial limestone and the unconsolidated sediments during prospecting may affect the rate of recharge to the underlying fractured rock aquifers. There is a small possibility that this could impact on the yield of boreholes that are currently in use within the application area. For this reason, these boreholes are assigned a high sensitivity.

It is important that no prospecting takes place in the immediate vicinity of such boreholes and that unnecessary surface disturbance is avoided. Other boreholes present in the project area that are not currently in use are assigned a medium sensitivity from a groundwater perspective due to their presence and potential for use in future.

The Aeolian sand, surficial limestone and alluvial aquifers present within the project area are vulnerable to surface sources of contamination due to their perceived high expected permeability, unconfined nature and role in the rate of recharge to the underlying fractured rock aquifers. Groundwater contamination may therefore occur.

The outcrop of dolomite to the west of the project area is designated as a high sensitivity area from a groundwater perspective. This is because the dolomitic aquifer is considered a major aquifer and that it is vulnerable to groundwater contamination, as discussed above. This area should therefore be avoided during prospecting.



Groundwater sensitivity map.

HERITAGE AND PALAEONTOLOGICAL RESOURCES

Specialist information on cultural and heritage resources on Werda was obtained from a Phase 1 Heritage Impact Assessment performed by Dr Edward Matenga, while palaeontological information was obtained from a report compiled by Dr Nonhlanhla Vilakazi. The reports are attached as **Appendix 6** and results of these assessments are provided below.

Archaeological and historical context

4. Appearance of Hominids

Hominid or proto-humans appeared in South Africa more than 3million years ago. Hominid sites and their fossil remains are largely confined to dolomite caves on the highveld in Gauteng, Limpopo and Northwest Provinces. Hominid refers to primate species which are the immediate ancestors of man.

The Sterkfontein Caves lie far to the west of the development area. It is home to one of the better known hominid sites in Southern Africa, featuring the genus *Australopithecus africanus* and preserved in limestone caves. The nearest hominid site is Taung near Vryburg (300 km to the north). This site is inscribed on the UNESCO World Heritage Site in a serial nomination with the Sterkfonteing (Krugersdorop) and Makapans Valley (Mokopane). The preservation of hominid remains is a function of geology and in the South African experience these are almost always found in association with limestone deposits.

5. The Stone Age

The Stone Age dates back more than 1.5 million years, and marks a more diagnostic appearance of the cultural sequence divided into three epochs, the Early, Middle and Late Stone Ages. Stone and bone implements manifest the technological development and typologies indicating chronological development. Material evidence occurs in caves, rock-shelters and on the edge of riverside and streams, and very rarely seen in open country.

The Early Stone Age marks the earliest appearance of stone artefacts about 1.4 million years ago. Such tools bore a consistent shape such as the pear-shaped handaxe, cleavers and core tools.

These tools, which have been called Acheulian after a site in France, were probably used to butcher large animals such as elephants, rhinoceros and hippopotamus. Acheulian artefacts are usually found near sites where they were manufactured and thus in close proximity to the raw material or at butchering sites. The early hunters are classified as hominids or proto-humans, meaning that they had not evolved to the present human form.

Progressively a good profile of the Stone Age is emerging. According to the late Peter Beaumont an Early Stone Age Site was recently discovered at the farm Fullller near Olifantshoelk. The area around Khathu is reportedly quite rich with Stone Age.

The Middle Stone Age (MSA), which appeared 200 000 years ago, is marked by the introduction of a new tool kit which included prepared cores, parallel-sided blades and triangular points hafted to make spears. By then humans had become skilful hunters, especially of large grazers such as wildebeest, hartebeest and eland. It is also believed that by then, humans had evolved significantly to become anatomically modern. Caves were used for shelter suggesting permanent or semi-permanent settlement. Furthermore there is archaeological evidence from some of the caves indicating that people had mastered the art of making fire. These were two remarkable steps in human cultural advancement. The fossil site of Kathu pan yielded early Stone Age (Acheulian) hand axes) that were dated to nearly 100 000 years ago. Specularite mine works near Postmasburg, Doornfontein and Tsantsabane confounds theory on the antiquity of mining. Extraction might date back to the MSA.

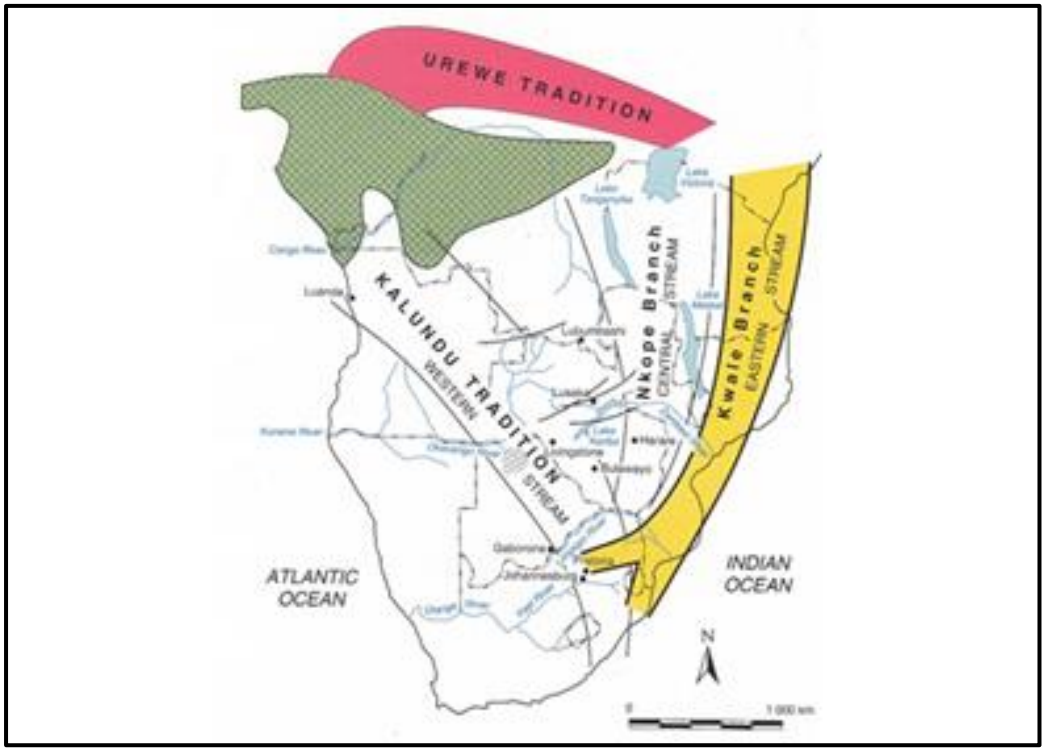
By the beginning of the Later Stone Age (LSA), humans are classified as Homo sapiens which refer to the modern physical form and thinking capabilities. Several behavioural traits are exhibited, such as rock art and purposeful burials with ornaments, became a regular practice. The practitioners of rock art are definitely the ancestors of the San and sites abound in the whole of Southern Africa. LSA technology is characterised by microlithic scrapers and segments made from very fine-grained rock. Spear hunting continued, but LSA people also hunted small game with bows and poisoned arrows. Because of poor preservation, open sites become of less value compared to rock shelters.

Stone Age material of all periods has been reported in the farm Paling which lies southeast of Olifantshoek and northwest of Postmasburg. Rock engravings have also been reported in the same area at Beeshoek Mine and Paling Farm where core flakes, blades, segments and scrapers made out of silcrete, jasper and quartzite have been seen. Rock paintings have been documented at Inglesby Farm neighbouring Gamayana 532, ca 25 km east of Makukukwe 522.

6. The Iron Age Culture

The Iron Age culture supplanted the Stone Age at least 2000 years ago, associated with the introduction of farming (peoples practiced agriculture and kept domestic animals such as cattle, sheep, goat and chicken amongst others) and use of several metals and pottery. There is however increasing evidence that sheep might have moved into the area much earlier than the Iron Age. A dominant school of thought has postulated a sudden synchronized appearance of these technologies in South Africa, and the whole region of Eastern and Southern Africa, perhaps suggesting a fairly rapid movement of people which has been traced to speakers of Bantu languages. Pottery styles have been isolated identifying archaeological traditions within the broad Iron-using culture and geographical variations called facies reconstructed. Coexistence and amalgamation pre-existing Stone Age communities certainly happened, the cultural encounters producing the hybrid people and languages found in the area today.

There were two streams of Early Iron Age expansion converging in South Africa, one originating in eastern Africa which has been called the Urewe-Kwale Tradition (or the eastern stream) and another from the west, spreading through Zambia and Angola, which he termed the Kalundu Tradition (or western stream).



Spread of the Urewe and Kalundu Early Iron Age Traditions in Southern Africa.

Existing theory shed little light on what was happening in the western parts of the country (the study area). Settlement preference for the relatively wetter woodlands to the east and eastern seaboard, compared to the arid west was a logical response to environmental opportunities and constraints. Perhaps we need now to postulate possible transhumant pastoralism / seasonal hunting camps in the western regions from the Stone Age through to the Iron Age in order to explain the long presence of Khoisan and Tswana communities in the area and their place in the transition to the Iron Age and the arrival of the British and the Afrikaners.

7. Historical context

The study area is historically home to the various ethnic groups of Tswana stock - Tlokwa, Fokeng, Hlakwana and Phuting, Tlhaping, Tlaro, Griqua and Korana certainly descending from the Iron Age and probably some with Stone Age roots. The early 19th century was a political turning point characterised by increasingly uncertain security situation and internal displacement exacerbated by the arrival of Europeans in the area.

8. The European Contact Period

The London Missionary Society (LMS) established a mission station at Kuruman in 1817 in the prelude to colonial occupation. Europeans traders, hunters and explorers followed on their tracks. The Great Trek brought in the Voortrekkers and a conflict situation began to unfold. One of the important triggers of European interest in the area was the discovery of diamonds at Kimberley in 1867. With increasing mining activity there, the British annexed Griqualand West in 1871, its northern boundary set 30km south of present day Olifantshoek.

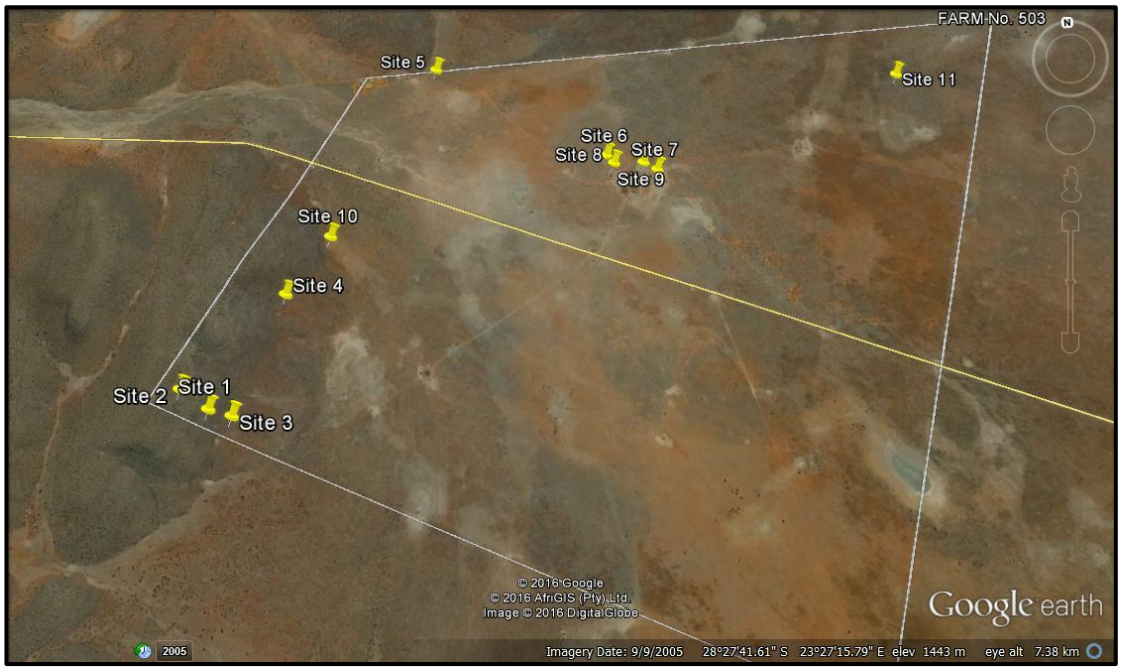
In 1878 there was a revolt against the British in Griqualand West which spread beyond into the Oilfantshoek area. The British sent a force under Sir Charles Warren to put down the revolt.

Between 1881 and 1883 the Tlaro and Tlhaping mounted resistance against Boer encroachment. In the ensuing fights the Boers prevailed leading to the establishment of the Republics of Stellaland and Goosen. These state systems were however short-lived as the British annexed the two Republics and declared Bechuanaland (land of the Tswana) as a crown land. In 1895 Bechuanaland was incorporated into the Cape Colony. There are a number of conflict sites in the Langeberg area to the northwest.

The features identified on Werda were ranked according to the criteria listed in the table below, with the location of the sites depicted in the below map.

Ranking of sites.

Ranking		Significance	No of sites
1	High	National and Provincial heritage sites (Section 7 of NHRA). All burials including those protected under Section 36 of NHRA. They must be protected.	1
2	Medium	Substantial archaeological deposits, buildings protected under Section 34 of NHRA. These may be protected at the recommendations of a heritage expert.	1
3	Low	Heritage sites which have been recorded and are deemed of minor importance.	9
		TOTAL	11



Google-earth map showing location of heritage sites on the farm Werda

All the eight potential Stone Age localities examined on Werda have a low density of lithics and none crosses the threshold to concentrated and regular activity. In other words no Stone Age settlements were seen. A pattern emerges that the eastern base of the ridge was a source for tool making with many ad hoc workshop sites, none used on a regular or long-term basis. Chert was the raw material for making tools. Red jaspilite commonly occurs on the ridge and below; quartz is very rare. None of the stones examined appear to have been worked into tools.

Evidence of tool manufacturing on Werda.

The locus of activity would have been the perennial fountain on Jacobsfontein (not located on Werda Farm) 2km to the northwest. Water is an important natural resource, and throughout the ages the fountain would have been a focal point of sustainability. Looking at the superficial geology, there were no suitable places for Stone Age painters on Werda. No Iron Ages sites were found on the farm either.

The farmhouse on Werda is significant as an example of the architectural motifs common on commercial farms. But it is in a poor state in which rehabilitation might be expensive. It may be refurbished and incorporated into the mine housing stock or disposed of.

The farmstead on Werda.

The mining holes, trenches and walls located on the ridge are considered to be of medium significance. These are of banded ironstone, used as stabilising revetments or ramps. They date to the 19th century European Pioneering period, part of which may be preserved as heritage.

A complex of mining holes, trenches and walls built from banded ironstone.

There are at least eight graves located near the farmstead of which all are of high significance. All burials must be respected and protected.

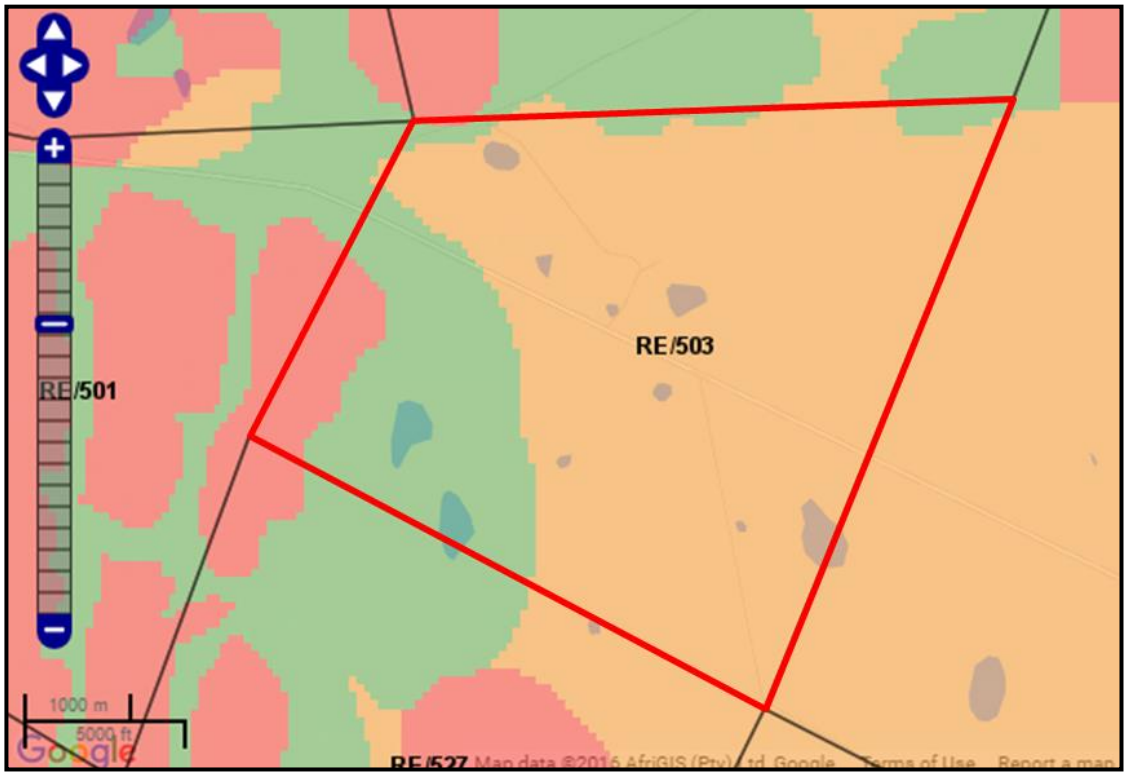
Graves of farmworkers on Werda.

A section of the old wagon road from Kimberley to Postmasburg and Upington is visible in the north-eastern part of the farm. This might not need to be protected if the ideal place for its preservation is near the fountain on the neighbouring farm Jacobsfontein.

Visible sections of the old wagon route from Kimberley to Postmasburg.

Palaeontological context

According to the regional PaleoMap available from the South African Heritage Resources Information System, the areas of the study area associated with surface limestone is of high palaeontological sensitivity (see map below), while the hills in the west are of very high sensitivity. The areas primarily associated with wind-blown sand are of moderate sensitivity. Most of the ephemeral pans are considered to be insignificant, but two in the south-western corner are of low sensitivity.



A palaeontological sensitivity map of the study area, with the proposed prospecting area indicated in red. Sensitivity is indicated with RED = VERY HIGH, Orange = HIGH, Green = MODERATE, BLUE = LOW, Grey = INSIGNIFICANT.

The shallow shelf and intertidal sediments of the carbonate-dominated lower part of the Ghaap Group are well known for their rich fossil biota of stromatolites or microbially-generated, finely-laminated sheets, mounds and branching structures. Some stromatolite occurrences on the Ghaap plateau of the Northern Cape are well preserved.

The Tsineng Formation at the top of the Campbell Rand carbonate succession has yielded both stromatolites which were previously assigned to the Tsineng Member of the Gamohaan Formation, as well as filamentous microfossils named *Siphonophycus*.

Therefore, there is most likely to be good material around the proposed area. Once construction has begun, and if good exposures are found/uncovered, these should be safeguarded preferably *in situ* and reported as soon as possible to the relevant heritage management authority (SAHRA).

Photo showing a possible fossil imprint.

AIR QUALITY

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

The current source of air pollution in the area stems from mining operations near Lime Acres and from vehicles travelling on the gravel roads of the area. No farming activities related to dust generation, such as ploughing, are known occur in the area.

The potential source of air pollution on Werda will be nuisance dust generated by the opencast excavations, the loading of gravels onto the transport trucks, the dumping of gravels over each sites primary screen as well as from the movement of trucks and vehicles on the site roads. Gas emissions from machinery will be negligible and within legal limits. Generated dust will be visible from the secondary gravel road and to local farm residents. Any potential fall-out dust will impact those who reside on the farm.

NOISE

Noise on site will be generated by the large vehicles (tip trucks, front-end loaders, back actors and bulldozers) and from the working pans. Although these activities do generate noise, the overall impact can be described as negligible. The most susceptible receptors of noise will be the local farm residents.

VISUAL ASPECTS

The Werda prospecting area lies in a remote and pristine setting (see photo below). The proposed activities and any potential dust associated with these activities will be visible from the secondary gravel road and from the adjacent farms and local farm residents. No significant tourist routes occur in the vicinity of Werda.

The prospecting area lies in a remote and pristine setting.

SOCIO-ECONOMIC STRUCTURE OF THE REGION

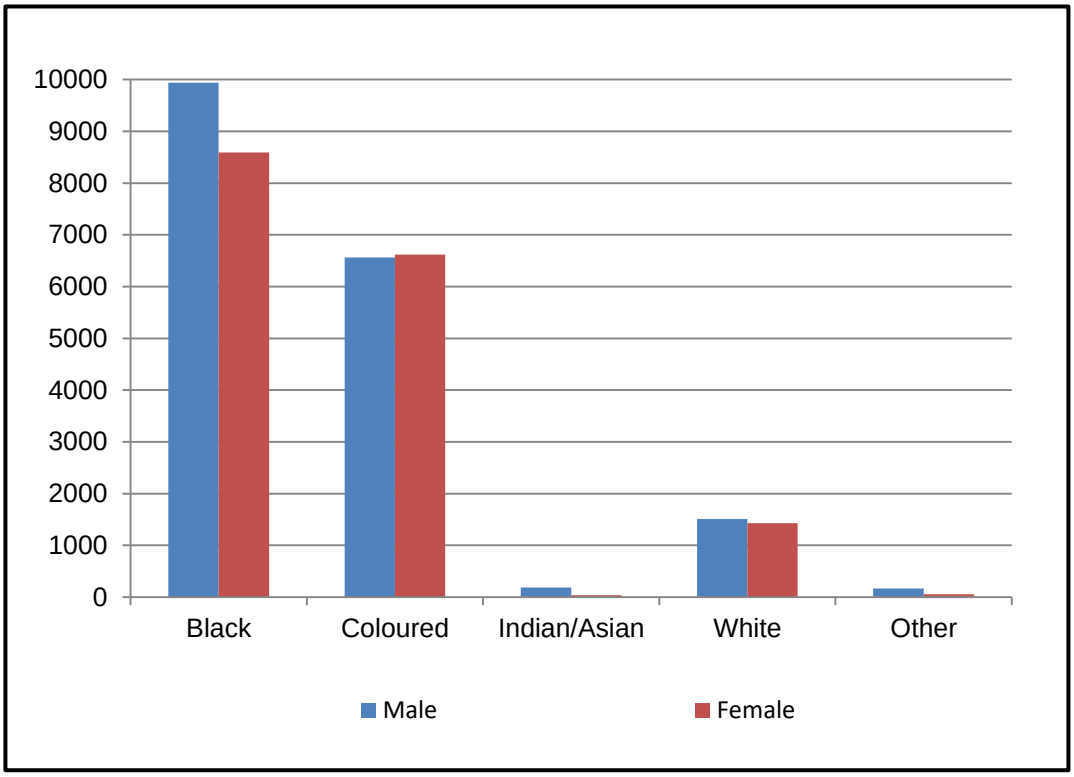
Werda is located within the Tsantsabane Local Municipality and form part of the ZF Mgcawu District Municipality in the Northern Cape Province. It comprises the towns of Beeshoek and Postmasburg and covers an area of 18 333 km^2. Tsantsabane is known for being rich in minerals, and for its mining, agriculture, manufacturing and farming sectors. The following socio-economic information was obtained from the most recent records in the Local Government Handbook and from the Spatial Development Framework (2015) of the local municipality.

Demographic elements

DEMOGRAPHICS	
Population	35 093
Age Structure	
Population under 15	27.90%
Population 15 to 64	67.60%
Population over 65	4.40%
Dependency Ratio	
Per 100 (15-64)	47.80
Sex Ratio	
Males per 100 females	109.80
Population Growth	
Per annum	2.59%
Labour Market	
Unemployment rate (official)	26.10%
Youth unemployment rate (official) 15-34	32.30%
Education (aged 20 +)	
No schooling	13.70%
Higher education	6.30%
Matric	25.30%

DEMOGRAPHICS	
Household Dynamics	
Households	9 839
Average household size	3.50
Female headed households	31.30%
Formal dwellings	71.80%
Housing owned	44.70%
Household Services	
Flush toilet connected to sewerage	66.70%
Weekly refuse removal	57.40%
Piped water inside dwelling	45.30%
Electricity for lighting	83.50%

Ethnic profile



Health and HIV/AIDS

Tsantsabane has four fixed clinics, 1 hospital, and the 4 rural settlements have access to mobile clinic services. The table below provides an overview of HIV prevalence in the district.

Indicator	Northern Cape 2011			ZF Mgcawu DM 2011		
	Sample	Count	%	Sample	Count	%
Antenatal client tested for HIV	30 194	22 563	75	5 548	4 665	84
Antenatal Clients HIV 1st test positive	22 563	2 276	10	4 665	417	18
Estimated no. of infants born to HIV positive woman	3 630	2 458	68	523	272	11
HIV positive infants (tested at 6 weeks)	2 912	155	5	381	18	12
HIV pre-test counselled (excluding antenatal)	175 784	172 035	98	35 784	35 685	21

Employment sector

The table below provides employment distribution by industry for 2002 and 2012. Mining is the largest employing sector, employing 6 618 persons, while community services is the second largest employer, employing 15.2 % of the population. The agriculture, hunting, forestry and fishing, electricity and transport sectors reported a nett loss in jobs.

Industry	2002		2012		% Change
	Number	% Share	Number	% Share	
Agriculture	1 062	13.6	884	7.2	-1.8
Mining	2 821	36.1	6 648	54.5	9
Manufacturing	316	4	322	2.6	0.2
Electricity	41	0.5	37	0.3	-1
Construction	207	2.7	250	2	1.9
Trade	728	9.3	800	6.6	0.9
Transport	255	3.3	244	2	-0.5
Finance	235	3	275	2.2	1.6
Community Services	1 325	16.9	1 850	15.2	3.4
Households	828	10.6	899	7.4	0.8
Total	**7 819**	**100**	**12 209**	**100**	**4.6**

Economy

The table below shows the contributions of the various sectors to the GDP of Tsantsabane from 2002 to 2012. During 2012 the primary sector contributed 76 %. Mining is the single biggest contributor of all industries to the GDP, having contributed 74 %, and R 3,9 bn. The secondary and tertiary sectors contributed 4 % and 20 %, respectively.

Sectors	2002	2004	2006	2008	2010	2012
Primary	**1 568 894**	**1 696 589**	**2 257 167**	**3 619 731**	**3 739 489**	**4 052 229**
Agriculture	41 660	69 778	75 926	107 779	112 061	121 416
Mining	1 527 235	1 626 811	2 181 241	3 511 952	3 627 428	3 930 813
Secondary	**74 719**	**99 399**	**116 832**	**164 227**	**192 202**	**238 973**
Manufacturing	40 491	59 191	57 632	79 251	70 490	85 901
Electricity	27 126	41 116	46 253	65 618	95 508	119 498
Construction	7 102	9 092	12 947	19 358	26 204	33 574
Tertiary	**314 144**	**318 286**	**492 454**	**617 255**	**790 801**	**1 040 974**
Trade	58 122	83 561	112 974	126 131	169 674	235 921
Transport	60 131	70 094	92 466	109 703	130 064	206 489
Finance	39 124	49 449	69 752	89 760	117 608	152 756
Community Services	156 767	178 182	217 262	291 661	373 454	445 809
Total Industries	**1 957 757**	**2 177 273**	**2 866 453**	**4 401 214**	**4 722 491**	**5 332 177**
Taxes less Subsidies	67 561	95 046	135 235	296 916	341 092	399 463
Total (GDP)	**2 025 318**	**2 272 320**	**3 001 688**	**4 698 130**	**5 063 584**	**5 731 640**

Income levels and poverty

In 2011, the average annual household income was R 103 204 in South Africa and R86 157 in the Northern Cape, while the average annual household income in Tsantsabane was R 110 329; higher than the Northern Cape average. The annual household income of Tsantsabane can be summarised as follows:

- 16 % no income;
- 13 % have an income of between R 1 and R9 600;
- The majority have an income of between R 9 601 and R 38 200;
- 15 % have an income of between R 38 201 and R 76 400; and
- 21 % have an income of R 76 401 or more.

Service delivery

SERVICE DELIVER FOR 2014/2015	
Water	
Number of households and non-domestic customers	11 783
Number of domestic households/delivery points	11 733
Inside the yard	7 278
Less than 200m from yard	755
More than 200m from yard	3 700
Domestic households with access to free basic service	835
Electricity	
Number of households and non-domestic customers to which provided	12 561
Domestic households with access to free basic service	835
Sewerage and Sanitation	
Number of households and non-domestic customers to which provided	9 603
Number of households using	
Flush toilet - public sewerage	7 278
Flush toilet - septic tank	85
Ventilated pit latrine	368
Bucket system	373
Other	1 349
Domestic households with access to free basic service	835
Solid Waste Services	
Number of households and non-domestic customers to which provided	10 089
Domestic households with access to free basic service	835

Local economic development

The table below presents the main areas of investment potential that has been identified in the Local Economic Development Strategy of Tsantsabane.

ECONOMIC SECTOR	MAIN OPPORTUNITUES
Agriculture	▪ Small-scale farming (emerging farmers) ▪ Informal trading areas for agricultural produce ▪ Skills training and support programmes for emerging farmers ▪ New technological improvements that could increase production (e.g. aquaculture & hydroponics) ▪ Irrigation support for emerging farmers ▪ CSIR support programme (new technology) ▪ Make land available to emerging farmers
Manufacturing	▪ Provision of hard services (e.g. manufacturing of mining supplies, mining construction, engineering works) ▪ Mining recycling plant ▪ Production of mining supplies (e.g. tools, protective clothing, steel products, and chemical products) ▪ Agro-processing ▪ Provision of serviced industrial plots ▪ Establish an industrial development group as a sub-committee of the LED forum
Utilities and construction	▪ Water treatment of polluted mining water ▪ Provision of services industrial, retail and residential plots ▪ Upgrading of water and electricity supply infrastructure to Postmasburg and surrounding farms in Tsantsabane ▪ Improvement of road infrastructure to increase economic activity
Wholesale and retail trade	▪ Establish a Local Business Support Centre for SMMEs ▪ Development of an informal traders market in Postmasburg ▪ Promotion and marketing of local Arts & Crafts as an opportunity for SMMEs ▪ Development of an Informal Trader Development Strategy ▪ Trade of small scale agricultural produce ▪ Development of a local business web portal
Government / community services	▪ Skills development and training of municipal staff ▪ Local Economic Development ▪ Providing support to entrepreneurs and established businesses ▪ Providing support to small scale miners ▪ Providing support to emerging farmers ▪ Maintaining databases on local SMMEs and skills ▪ LED Place Marketing and communication with potential investors ▪ Establishment of the LED Forum ▪ Ensuring that infrastructure is implemented (serviced industrial, business and residential plots) ▪ Creating and enabling business investment environment
Tourism	▪ Marketing and packaging of local tourism opportunities and attractions ▪ Training of local tourist guides ▪ Promotion of mining tourism ▪ New tourism product development (such as military tourism) ▪ A tourism sub-committee should be established as part of the LED Forum

(B) Description of the current and historic land uses

Currently, the major land uses in the area are mining and agriculture. According to the Southern African Agricultural Geo-referenced Information System, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land, while the hills in the west are classified as wilderness. The grazing capacity is between 14 and 21 ha/AU, with the agricultural region being demarcated for cattle farming. Werda is categorised to have no suitability for crop production.

The Werda prospecting right area is mainly used for grazing by cattle, sheep, donkeys and wildlife. Apart from the current HC van Wyk prospecting application for diamonds, the farm is also subject to the following prospecting applications:

Applicant	Mineral	DMR Reference
Mukope Group (Pty) Ltd	Limestone	NC 30/5/1/1/2/11049 PR
Manngwe Mining (Pty) Ltd	Manganese and Iron Ore	NC 30/5/1/1/3/2/1/10162 EM

(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 methodology discussion and a basic description of the environment was presented in section h iv) (A) as part of the baseline report. Specific environmental features and infrastructure will be comprehensively discussed in the EIA report after all specialist assessments have been completed. These include:

Ephemeral pans and streams potentially to be disturbed by excavations

The endorheic pans and ephemeral stream on site are natural watercourses protected under the NWA. These features and their habitats are primarily in a pristine condition. The pans are impacted in terms of grazing and trampling by livestock, while the final reaches of the ephemeral stream has been modified by the public gravel road that traverses the property. The excavations within the pans and the ephemeral stream will destroy their ecological integrity and ecosystem functioning.

Groundwater abstractions

Process water will most likely be obtained from a suitable borehole, as there is no surface water or any alternative infrastructure from service providers nearby. There are three high yielding boreholes on site that could possibly be used for this purpose. The dolomitic outcrop situated in the western part of the application area must be avoided as it is vulnerable to surface sources of contamination. Disturbance of the surficial limestone and the unconsolidated sediments during prospecting may affect the rate of recharge to the underlying fractured rock aquifers.

Heritage resources

At least eight graves were recorded within the proposed operation area, which are considered to be of high significance and should be avoided and conserved. A complex of mining trenches and walls were also observed, which are considered to be of medium significance. Some Stone Age tools were observed, but are considered to be of low significance, along with an old farmstead and wagon route. In terms of palaeontological resources, the Campbell Rand Subgroup has yielded well preserved stromatolites as well as filamentous microfossils. Although this geological features do not fall within the earmarked area, if any good fossil exposures are found/uncovered, these should be safeguarded preferably in situ and reported as soon as possible to SAHRA.

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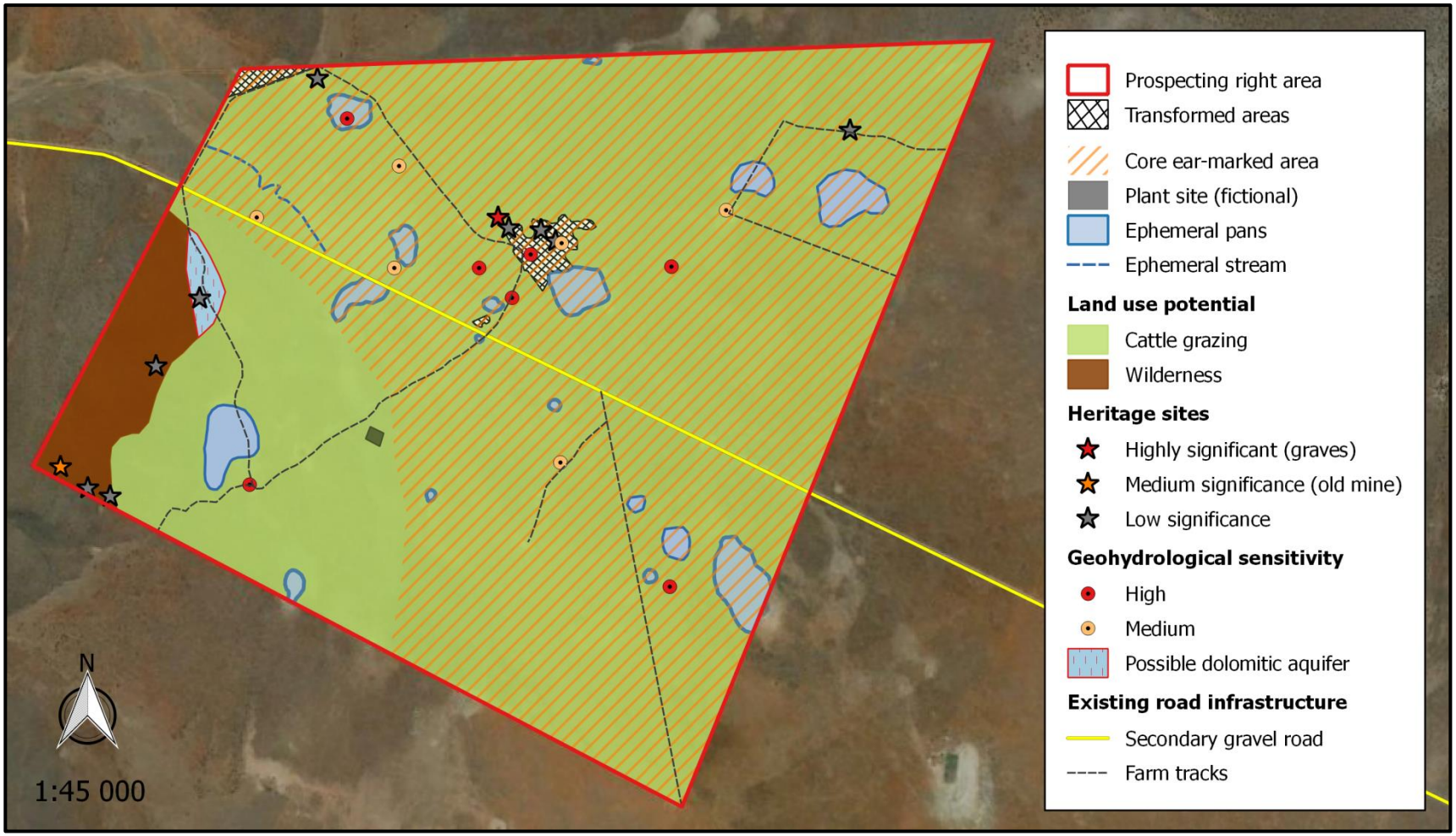
(D) Environmental and current land use map



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

Environmental factor	Nature of impact	S	E	D	P	Significance	Reversibility	Management
PHYSICAL								
Geology	Alteration of geochemical, geophysical and geotechnical conditions.	2	2	5	10	90 (MEDIUM – HIGH)	Moderate	Employ effective rehabilitation strategies.
Mineral resources	Sterilisation of mineral resources.	3	4	4	2	22 (VERY LOW)	High	Apply modern technologies and methodologies; accurate planning.
Topography	Changes to surface topography due to topsoil removal, excavations, placement of infrastructure and development of residue deposits.	3	2	3	10	80 (MEDIUM – HIGH)	High	Employ effective rehabilitation strategies to restore surface topography of the site by dismantling infrastructure, and stabilisation mine residue deposits.
Soils	Soil erosion by water / wind on disturbed and exposed soils; compaction; potential for dust production and soil microbial degradation; potential contamination of soils due to spillages.	2	2	4	4	32 (LOW)	Moderate - High	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources.
Land capability	Loss of land capability through topsoil removal, disturbances and loss of soil fertility.	4	3	4	9	99 (MEDIUM – HIGH)	Moderate - High	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation.	4	2	2	8	64 (LOW – MEDIUM)	Moderate - High	Carefully plan the footprint of activities and employ rehabilitation strategies to restore land capability.
Ground water	Deterioration of groundwater resources through excavations, which could potentially affect the rate of recharge to the fractured rock and possibly karst aquifers.	4	3	4	9	99 (MEDIUM – HIGH)	Low	Apply measures to prevent direct contamination of- and seepage into the groundwater by biological and engineering means; implementation of the necessary management programs to ensure the integrity of ground water resources; abide by legal requirements; controlled abstractions. Frequent monitoring.
	Deterioration in ground water quality through seepage of hazardous substances from site surfaces.	4	3	4	5	55 (LOW – MEDIUM)	Low	
	Deterioration in groundwater quantity through abstractions from boreholes.	4	3	4	9	99 (MEDIUM – HIGH)	Moderate	

Environmental factor	Nature of impact	S	E	D	P	Consequence	Reversibility	Management
PHYSICAL (cont.)								
Surface water resources	Deterioration of surface water resources through excavations in the ephemeral pans and stream.	4	3	4	9	99 (MEDIUM – HIGH)	Low - Moderate	Limit operational footprint within the watercourses; accurate planning; effective rehabilitation strategies to restore resource characteristics; contamination control measures and storm water management.
Indigenous flora	The clearance of vegetation; potential loss of ecosystem function.	3	2	4	10	90 (MEDIUM – HIGH)	Moderate	Limit/control operational footprint; environmental awareness; effective rehabilitation strategies.
Species of conservation concern	Potential loss of floral species with conservation value.	3	2	4	8	72 (LOW – MEDIUM)	Moderate - High	Environmental awareness; abide by legal requirements; effective rehabilitation strategies.
Alien invasive plants	Proliferation of alien invasive plants species.	3	2	4	9	84 (MEDIUM – HIGH)	High	Eradicate and control the spread of alien invasive species.
Bush encroachers	Proliferation of encroaching plants species.	2	2	4	8	64 (LOW – MEDIUM)	High	Control encroaching species.
Fauna	Displacement of faunal species through disturbances.	2	2	3	9	64 (LOW – MEDIUM)	Moderate	Limit/control operational footprint in pristine areas; environmental awareness; effective rehabilitation strategies; abide by legal requirements.
	Loss of fauna through accidental or deliberate killing.	2	2	4	6	48 (LOW)	Low	
Habitat	The loss, damage and fragmentation of floral and faunal habitats; potential loss of connectivity and ecosystem function.	3	3	4	9	90 (MEDIUM – HIGH)	Moderate	Limit/control operational footprint in pristine areas; environmental awareness; effective rehabilitation strategies.
Air quality	Sources of atmospheric 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.	1	2	2	9	45 (LOW)	High	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels; air-quality monitoring; adherence to speed limit.

Environmental factor	Nature of impact	S	E	D	P	Consequence	Reversibility	Management
SOCIAL SURROUNDINGS								
Noise and vibration	Increase in continuous noise levels; the disruption of current ambient noise levels; and the disruption of sensitive receptors by means of increased noise and vibration.	1	2	2	9	45 (LOW)	High	Minimise the generation of excessive noise and vibration; ensure all vehicles and equipment is in a good working order.
Visual impacts	Visual impact of the site infrastructure, excavations and slimes dams; visibility of dust.	1	2	2	9	45 (LOW)	High	Effective operational control measures and rehabilitation strategies.
Traffic and road safety	Potential negative impacts on safety of road users.	4	0	5	6	54 (LOW – MEDIUM)	Low	Implement measures that ensure adherence to traffic rules and road legislation.
	Deterioration of the existing road network infrastructure.	1	0	2	9	27 (LOW)	High	
Heritage resources	The deterioration of sites of cultural and heritage importance.	3	2	5	6	60 (LOW – MEDIUM)	Low	Preservation and protection of heritage and cultural resources identified within a no go zone; further resources uncovered during activities need to be reported to a suitably qualified archaeologist; abide by legal requirements.
Socio-economic environment (Negative)	Loss of agricultural/land use potential; influx of workers to the area increases health risks and loitering (resulting in lack of security and safety); negative impact of employment loss during mine closure.	2	3	3	9	72 (LOW – MEDIUM)	Moderate	Avoid creating false expectations; prevent uncontrolled activities and settlement of contractors and workers outside of the site; ethical retrenchment procedures; effective rehabilitation strategies.
Socio-economic environment (Positive)	Increased local procurement; increased employment; upliftment of previously disadvantaged communities.	3	3	2	10	80 (MEDIUM – HIGH)	Low	Allocate employment and procurement in so far as is possible to local inhabitants; employ ethical operational policies.
Interested and affected parties	Loss of trust and a good standing relationship with the IAPs.	2	0	3	8	40 (LOW)	Moderate - High	Ensure continuous and transparent communication with IAPs; employ ethical operational policies.

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

The identification of potential impacts of the prospecting activity was based on the legal requirements; the nature of the proposed activity; the nature of the receiving environment; and issues raised during the public participation process. 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 criteria used to assess the significance of the impacts are shown in the table below. The significance of the impacts was calculated by using the following formula:

CONSEQUENCE		*PROBABILITY*
(Severity + Spatial Scope + Duration)	*X*	(Frequency of activity + Frequency of impact)

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.

Low – Medium: 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 – High: Impact would be real and rather substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible, but not necessarily possible without difficulty.

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

Very High: Of the highest order possible within the bounds of impacts which could occur. There would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted.

Weight	Severity	Spatial scope (Extent)	Duration
5	Disastrous	Trans boundary effects	Permanent
4	Catastrophic / major	National / Severe environmental damage	Residual
3	High/ Critical / Serious	Regional effect	Decommissioning
2	Medium / slightly harmful	Immediate surroundings / local / outside mine fence	Life of operation
1	Minimal/potentially harmful	Slight permit deviation / on-site	Short term / construction (6 months – 1 yrs)
0	Insignificant / non-harmful	Activity specific / No effect / Controlled	Immediate (0 – 6 months)

Weight number		1	2	3	4	5
Frequency						
Probability	Frequency of impact	Highly unlikely	Rare	Low likelihood	Probable / possible	Certain
		Practically impossible	Conceivable but very unlikely	Only remotely possible	Unusual but possible	Definite
	Frequency of activity	Annually or less	6 monthly / temporarily	Infrequent	Frequently	Life of operation

CONSEQUENCE
(Severity + Spatial Scope + Duration)

PROBABILITY (Frequency of activity + Frequency of impact)														
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Colour code	Significance rating	Value	**Negative impact** Management strategy	**Positive Impact** Management strategy
	VERY HIGH	126 – 150	Improve current management	Maintain current management
	HIGH	101 – 125	Improve current management	Maintain current management
	MEDIUM – HIGH	76 – 100	Improve current management	Maintain current management
	LOW – MEDIUM	51 – 75	Improve current management	Maintain current management
	LOW	26 – 50	Improve current management	Maintain current management
	VERY LOW	1 – 25	Improve current management	Maintain current management

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

During the operational stages, the prospecting activities will most likely destroy the stratification of alluvial gravels. However, the excavated material can also be returned concurrently during the operation and therefore the impact of current proposed activities will be moderate. The overall risk of mineral ore sterilisation is possible through improper placement of infrastructure or as a result of any development footprints, however most infrastructure will be transient in nature.

The infrastructure and slimes dams will alter the topography by adding features to the landscape. Topsoil removal and excavations will unearth 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 excavations, 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 and fuel may be spilled; thus causing surface spillages. The hydrocarbon soil contamination will render the soil unusual 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. The site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for mining, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater will be directly affected by extraction from boreholes and excavations into the karst aquifer. Furthermore, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will also cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles and excavations during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect watercourse characteristics.

Excavations in the ephemeral pans and stream will impact on the surface water environment by altering the physical characteristics of the watercourses. These impacts include the alteration of surface hydrology, removal of the dormant egg banks and destruction of the ephemeral habitats. Furthermore, excavations can cause bank destabilization, increased erosion, and sediment and nutrient inputs.

Prospecting activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. It is likely that the wetland vegetation and any protected species will be destroyed during the 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 plant establish in disturbed areas, it may cause an impact beyond the boundaries of the mining 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. Excavations and operational infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected population’s genetic make-up. Similarly, the destruction of ephemeral pans, which act as migratory stepping stones, will cause habitat fragmentation on a landscape level. This will result in a subsequent loss of genetic variability between meta-populations. Pockets of fragmented natural habitats hinder the growth and development of populations.

Increased noise and vibration 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 there is also 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 site is situated in a rural setting and therefore the proposed operation will add a certain amount of noise to the area. However, levels of noise generated by alluvial operational activities are low.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate, especially for the transport on the public gravel road. 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. Economic slump of the local towns after site closure is not considered to be an associated potential impact, because the operation is rather small. 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.

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

GEOLOGY AND MINERAL RESOURCE

Level of risk: Low

Mitigation measures:

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The excavation blocks should be delineated first 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 exploration geologist.
- Apply modern technologies and methodologies.
- Employ effective rehabilitation strategies in order to restore geological conditions to their closest natural state as possible.

TOPOGRAPHY

Level of risk: Low

Mitigation measures:

- Backfill all excavations continuously.
- Employ effective rehabilitation strategies to restore surface topography of excavations and plant sites.
- Stabilise the residue deposits.
- All temporary infrastructures should be removed and those in disuse should be demolished during closure.

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.

SOIL EROSION

Level of risk: Moderate

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.
- Ground exposure should be minimised in terms of the surface area and duration.
- The operation must co-ordinate different activities in order to optimise the utilisation of the excavated trenches and thereby prevent repeated and unnecessary excavations.
- Activities requiring large-scale clearance of vegetation should ideally occur in dry seasons.
- Construction during the rainy season (Nov - Mar) should be closely monitored/ controlled.
- The run-off from the exposed ground should be controlled with flow retarding barriers.
- Any excavated soil should be stock-piled in layers and bermed 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.
- Excavated/stockpiled soil should be stored and bermed on higher lying areas and not in any storm water run-off channels, areas prone to erosion, or where water accumulates.
- 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.
- Activities on steep slopes should be avoided, but if not, these areas should be closely monitored and erosion controlled.
- Linear infrastructure (roads/pipelines) should be inspected weekly to check that the associated water management infrastructure is effective in controlling erosion.

LAND CAPABILITY AND LAND USE

Level of risk: Low

Mitigation measures:

- Ensure that optimal use is made of the available land through proper planning of activities.
- Employ effective rehabilitation strategies to restore land capability and land use potential.
- All activities to be restricted within the demarcated areas and pristine areas should be avoided as far as possible.
- Ensure that land which is not used during prospecting is made available for grazing.

GROUND WATER

Level of risk: Moderate

Mitigation measures:

- Daily operational tasks water care works;
- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Drip trays must be available on site and installed under all vehicles during maintenance.
- Spill kits to clean up accidental spills from earthmoving machinery or any accidental spillages 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.
- Monitor and control water use and perform regular monitoring on pumps for leakages/spillage.
- The alluvial, surficial limestone and aeolian sands must be protected against groundwater contamination in the plant area.
- No diamond prospecting should be undertaken in the immediate vicinity of existing private boreholes that are in use
- Monitor the quality of the boreholes located in a 3 km radius of the operational activities.
- Continually monitor the effect of excavations and groundwater withdrawal on the groundwater aquifers.
- Establish the localities of all dolomitic outcrops on the property through a fine-scale geological survey. These should then be considered as a no-go zones.

DIRECT SURFACE WATER RESOURCE IMPACTS

Level of risk: Moderate

Mitigation measures:

- Limit operational footprint within the ephemeral pans and stream as far as is practically possible.
- Careful management of operations within the wetlands and riverine zones to minimize disturbances and contamination.
- Employ effective rehabilitation strategies to restore watercourse characteristics.
- Adjust operation plans to exclude any potential sensitive wetland areas, if possible.
- No uncontrolled discharges from the sites to any surface water resources shall be permitted.

INDIRECT SURFACE WATER IMPACTS

Level of risk: Moderate

Mitigation measures:

- Sufficient care must be taken when handling hazardous materials to prevent pollution.
- Under no circumstances may ablutions occur outside of the provided facilities.
- If servicing and washing of the vehicles occur on site, there must be specific areas constructed for these activities, which must have concrete foundations, bunding as well as oil traps to contain any spillages.
- A walled concrete platform, dedicated store with adequate flooring or bermed area and ventilation must be used to accommodate chemicals such as fuels, oils, paints, herbicide and insecticides.
- Oil residue shall be treated with oil absorbent and this material removed by approved contractor.
- Spill kits must be easily accessible and workers must undergo induction on how to use them.
- At all times care should be taken not to contaminate surface water resources.
- Store all litter carefully to prevent it from washing away or blown into any of the water courses within the study area.
- Provide bins for staff at appropriate locations, particularly where food is consumed.
- Conduct on-going staff awareness programmes in order to reinforce the need to avoid littering, which contributes to surface water pollution.

INDIGENOUS FLORA

Level of risk: Low to moderate

Mitigation measures:

- Minimise the footprint of transformation and avoid sensitive habitats as far as possible.
- Encourage proper rehabilitation of impacted areas and the growth of natural plant species.
- Scan earmarked areas for species of conservation concern prior to impact. Mark these plants and include them in the design layout plan (to be left in situ if possible). If they are to be removed, the relevant permits should be obtained and species should be relocated (if possible). Implement a management plan to ensure ex situ establishment and a monitoring programme (two years after re-establishment) in order to ensure successful translocation.
- Appoint a full-time ECO to render guidance to staff and contractors with respect to flora.
- Everyone working on site must be educated about the conservation importance of flora occurring on site.

ALIEN INVASIVE PLANTS

Level of risk: Low

Mitigation measures:

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of impacted 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 in order to ensure effective control of invasive species.

FAUNA

Level of risk: Low

Mitigation measures:

- Careful consideration and planning of the operation in order to avoid the destruction of pristine habitats and minimise the overall prospecting footprint.
- The extent of the proposed activities should be demarcated on site layout plans, and no persons 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.
- Appointment a full-time ECO to render guidance to the staff and contractors with respect to faunal matters. The ECO must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site and should be in the appropriate languages.
- All those working on site must be educated about the conservation importance of the fauna occurring on site.
- Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Birds should be monitored in terms of collision and electrocution.
- Employ measures that ensure that no staff, contractors or visitors will hunt or kill any fauna.
- Employ measures that ensure adherence to the speed limit.

HABITAT

Level of risk: Moderate

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 and ecological stepping stones, i.e. ephemeral pans.
- 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 staff, contractors, visitors or vehicles may leave the demarcated area except those authorised to do so.
- Appointment a full-time ECO to render guidance to the staff and contractors with respect to connectivity and ecosystem functionality. The ECO must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site and should be in the appropriate languages.

AIR QUALITY

Level of risk: Low

Mitigation measures:

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for excavations 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. Excavations should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods, where logistically possible, must be implemented at all areas that may be exposed for long periods of time.
- For all activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees.
- Environmental air quality monitoring should be carried out at regularly to detect deviations from normal levels and enable corrective measures to be taken where warranted.

NOISE AND VIBRATION

Level of risk: Low

Mitigation measures:

- Restrict prospecting activities to daytime unless agreements obtained to do 24 hr operations.
- Systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Environmental noise monitoring should be carried out at regularly to detect deviations from normal noise levels and enable corrective measures to be taken where warranted.

VISUAL IMPACTS

Level of risk: Low

Mitigation measures:

- Infrastructure should be placed to optimise the natural screening capacity of the vegetation.
- Where practical, protect existing vegetation clumps during in order to facilitate screening during the operation.
- Remove rubble and any other scrap / rubbish off site as soon as possible or place it in a container in order to keep the site free from additional unsightly elements.
- Locate any material stockpiles outside of the visual field of sensitive visual receptors.
- Dust suppression procedures should be implemented especially on windy days during earth works.
- Rehabilitation should aim to establish a diverse and self-sustaining surface cover that is visually and ecologically representative of naturally occurring vegetation species.
- Implement a management plan for the post-operation site in order to control the invasion of alien vegetation and to manage erosion, until the site is fully rehabilitated.

TRAFFIC, ROAD SAFETY AND ROAD INFRASTRUCTURE

Level of risk: Moderate

Mitigation measures:

- Implement measures that ensure the adherence to traffic rules.
- Implement measures that ensure the adherence to the relevant roads legislation.

HERITAGE RESOURCES

Level of risk: Moderate to high

Mitigation measures:

- A management plan should be submitted for all the graveyard sites to ensure that they are properly maintained and protected from vandalism or damage. Each cemetery should be enclosed by a wire fence that includes a 10m wide no-go buffer zone against vehicle traffic.
- The old pioneer mine should be avoided. It must be clearly demarcated as a no-go area for mining operations with at least a 10m - wide no-go buffer zone against vehicle traffic.
- Should the operation necessitate impact on any heritage resources, the company should apply for a SAHRA destruction permits prior to commencement of such activity.
- If any disturbances are to occur on the Campbell Rand Subgroup, and if any good fossil exposures are uncovered, these should be safeguarded preferably in situ and reported as soon as possible to SAHRA.

SOCIO-ECONOMIC

Level of risk: Low

Mitigation measures:

- The operation must ensure that false expectations are not created regarding job creation.
- Jobs must be allocated as advertised and in so far as is possible to local inhabitants.
- Procurements should be sources locally in so far as possible.
- Ethical retrenchment procedures should be followed during closure.
- Contractors and employees should not be permitted to wander outside the operation area.
- Uncontrolled settlement of contractors and workers outside of the site should be prevented.
- The expectations of what benefits can accrue to the community must be managed from the initiation of the project.
- The rehabilitation guarantee should be revised annually and updated if necessary.

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 operation.
- A complaints management system should be maintained by the operation to ensure that all issues raised by IAPs are followed up and addressed appropriately.
- Ethical operational policies/procedures should be adhered to in all aspects and at all times.

ix) Motivation where no alternative sites were considered.

The locality of the prospecting operation is based on the location of the diamondiferous deposits that have been identified through previous mining activities. There is therefore no other alternative with regard to the overall operation footprint.

The location of the site infrastructure will be strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the Environmental Authorisation process. Thus, the site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for initial pitting and trenching after the non-invasive phase is completed, as well as limited additional impact on the environmental and heritage resources. The benefit of typical alluvial diamond prospecting sites is that they are generally transient in nature and therefore renders the consideration of further alternative layouts unnecessary.

The activities and methodologies associated with alluvial diamond bulk sampling (i.e. open pits with continued backfilling) is the only economic viable method currently being used by the diamond fraternity. There is no other better alternative method.

x) Statement motivating the alternative development location within the overall site.

Not applicable. It is not possible to determine the development location of the site infrastructure at this time. The site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for initial pitting and trenching after the non-invasive phase is completed.

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.

Not applicable. There is no alternative development location for the site and the final site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for initial pitting and trenching after the non-invasive phase is completed. The impact assessment provided in Part A: section g (v) is therefore sufficient and the process undertaken to identify impacts is the same as in Part A: section g (vi). Similarly, the risks and mitigation measures as provided in Part A: section g (viii) are believed to be sufficient.

i) Assessment of each identified potentially significant impact and risk

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Roads and transport	Geology	No alteration of geological conditions linked to roads/transport.	*N/A*	*N/A*	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to roads/transport.	*N/A*	*N/A*	*N/A*	*N/A*
	Topography	No impact to topography is expected from roads/transport.	*N/A*	*N/A*	*N/A*	*N/A*
	Soil	Compaction is expected to occur where roads are constructed and on other areas experiencing regular vehicular movements.	Construction Operational	Low	Ripping of roads, stripping of topsoil and concurrent rehabilitation.	Very low
	Land use / capability	Loss of land capability/land use with improper planning of road infrastructure and/or ineffective road rehabilitation; proliferation of alien vegetation after disturbances.	Construction Operational Closure	Medium - High	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Low
	Fauna	Construction of new roads will disturb fauna and alter/destroy natural faunal habitats. Accidental road kills are possible during vehicular movement.	Construction Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	Construction of new roads will disturb/destroy natural vegetation and potentially also flora of conservation concern.	Construction Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Ground water	No impact to groundwater is expected from roads/transport.	*N/A*	*N/A*	*N/A*	*N/A*
	Surface water	Alteration of watercourse characteristics during construction of haul roads in the pans or stream; sedimentation/contamination during runoff.	Operational	High	Limit operational footprint in watercourses; accurate planning; effective rehabilitation; control contamination; storm water management.	Medium
	Air quality	Nuisance dust from hauling material and/or speeding on gravel roads.	Operational	Low	Dust control; adherence to speed limit; air-quality monitoring.	Very low
	Noise	Noise/vibration created during vehicular movement.	Operational	Low	Regular maintenance of vehicles and equipment; operate during day times; ensure adherence to the speed limit.	Very low
	Visual	Haulage roads will be visible to landowner and farm residents.	Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	Transporting staff / material includes potential safety risks to public road users and degradation of public road infrastructure.	Operational	Low - Medium	Implement measures that ensure adherence to traffic rules and road legislation.	Low
	Heritage resources	The potential destruction of heritage resources during uncontrolled vehicular movement or when creating new roads.	Construction Operational	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Excavations	Geology	Alteration of geological conditions during excavations.	Operational	Very low	Employ effective rehabilitation strategies.	Very Low
	Minerals	No sterilisation of mineral resources linked to excavations.	*N/A*	*N/A*	*N/A*	*N/A*
	Topography	Excavations will unearth the natural topography/create voids.	Operational	Medium - high	Effective rehabilitation strategies to restore surface topography of the site by concurrent backfilling and general surface rehabilitation.	Low
	Soil	Excavations will remove fertile soil layers/seed bank and disturb the natural soil structure; runoff erosion on slopes.	Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Very low
	Land use / capability	Loss of land capability/land use caused due to impacts to soils, ineffective rehabilitation of voids and/or proliferation of alien vegetation after disturbances.	Operational Closure	Medium - High	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Low - Medium
	Fauna	Excavations will disturb fauna and alter/destroy natural faunal habitats. Accidental kills are possible during excavations.	Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	Excavations will disturb/destroy natural vegetation and potentially also flora of conservation concern.	Operational	Medium - High	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low - Medium
	Ground water	Alteration of groundwater resource characteristics and deterioration of groundwater quality and quantity through excavation of karst aquifer.	Operational	Medium - High	Effective contamination control; effective management and control measures; abide by legal requirements.	Low - Medium
	Surface water	Alteration of watercourse characteristics during excavations in the pans and stream. Contamination of watercourses from machinery and hazardous materials.	Operational	High	Limit operational footprint within the watercourses; accurate planning; effective rehabilitation strategies to restore resource characteristics; storm water management.	Medium
	Air quality	The potential of nuisance dust being created during excavation activities.	Operational	Low	Dust control; air-quality monitoring.	Very low
	Noise	Potential noise/vibrations created during excavation activities.	Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	Excavation activities will be visible from the public gravel road and to landowner and farm residents.	Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impact to traffic/road safety is expected from excavations.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during excavation activities.	Operational	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Temporary dumping / storage areas	Geology	No impact to geological conditions linked to dumping/storage.	*N/A*	*N/A*	*N/A*	*N/A*
	Minerals	No impact to mineral resources linked to dumping/storage.	*N/A*	*N/A*	*N/A*	*N/A*
	Topography	Temporary waste dumps/stockpile areas will change the natural topography by adding features/slopes to the landscape.	Operational	Medium - High	Restore surface topography by removing all dumps/storage facilities and material; conduct general surface rehabilitation.	Low
	Soil	Soil compaction is expected to take place where temporary dumps are located; potential increased runoff and erosion during storm events; The potential contamination of soil from temporarily stored material that leak hazardous fluids.	Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Very low
	Land use / capability	Temporary loss of land capability/land use where dumps are located; permanent loss in terms of impacts to soils/ineffective rehabilitation.	Operational Closure	Low - Medium	Careful planning; effective rehabilitation strategies; soil management.	Low
	Fauna	Dumping activities will disturb fauna and alter/disturb their natural habitats; temporary storage of waste material (e.g. scrap) potentially poses a direct safety risk to fauna.	Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	The destruction of natural vegetation and the potential loss in flora of conservation concern through placement of temporary dumps/storage areas.	Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Ground water	The potential contamination of ground water resources from temporarily stored material that leak hazardous fluids.	Operational	Low	Contamination control; abide by legal requirements.	Very low
	Surface water	Indirect sedimentation/contamination during runoff episodes.	Operational	Low	Contamination control measures and storm water management.	Very low
	Air quality	Nuisance dust from material that are dumped/stockpiled.	Operational	Low	Dust control; air-quality monitoring.	Very low
	Noise	Noise/vibration created during dumping activities.	Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	These temporary dumps/storage areas will be visible to the immediate surroundings.	Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impacts to traffic/road safety expected from dumping/ storage activities.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during dumping or constructing of temporary storage facilities.	Operational	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Residue disposal dam	Geology	Alteration of geological conditions during excavation of dams.	Construction	Very low	Employ effective rehabilitation strategies.	Very Low
	Minerals	Sterilisation of mineral resources due to poor placement of non-transient slimes dams.	Construction	Very low	Apply modern technologies and methodologies; accurate planning.	Very Low
	Topography	Slimes dams will change the natural topography by adding features/slopes to the landscape.	Construction Operational Closure	Medium - High	Employ effective rehabilitation strategies to restore surface topography by reclamation or by stabilising slopes of slimes dams	Low - Medium
	Soil	Soil compaction is expected to take place where slimes dam walls are constructed; excavation of dams will remove fertile soil layers/seed bank and disturb the natural soil structure; potential increased runoff and erosion during storm events.	Construction Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Very low
	Land use / capability	Loss of land capability/land use where slimes dams are located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Medium - High	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Low - Medium
	Fauna	Construction of slimes dams will disturb fauna and alter/disturb their natural habitats; sludge potentially poses a direct safety risk to fauna.	Construction Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern through placement of slimes dams.	Construction	Medium - High	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Ground water	No impact to groundwater is expected from slimes dams.	*N/A*	*N/A*	*N/A*	*N/A*
	Surface water	Indirect sedimentation during runoff episodes.	Operational	Low	Contamination control measures and storm water management.	Very low
	Air quality	Nuisance dust from material that constitutes the slimes dam walls.	Operational	Low	Dust control; air-quality monitoring.	Very low
	Noise	Noise/vibration created during construction of slimes dams and slight potential noise created by dewatering/desanding machinery.	Construction Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	The slimes dams will be visible to the immediate surroundings.	Construction Operational Closure	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impacts to traffic/road safety expected from slimes dams.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of slimes dams.	Construction	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Plant & processing areas (plant sites)	Geology	No impact to geological conditions linked to plant sites.	N/A	*N/A*	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to plant sites.	N/A	*N/A*	*N/A*	*N/A*
	Topography	Temporary ramps and other related structures will add features to the landscape.	Construction Operational	Medium	Restore surface topography by removing all machinery/infrastructure and rehabilitate the surface.	Very low
	Soil	Soil compaction is expected to take place where plant sites are constructed; activities will disturb fertile soil layers/seed bank and alter the natural soil structure; potential increased runoff and erosion during storm events; contamination from spillages.	Construction Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Very low
	Land use / capability	Loss of land capability/land use where plant sites are located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Low - Medium	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Low
	Fauna	Construction of plant sites will disturb fauna and alter/disturb their natural habitats; site activities will deter fauna; plant site machinery potentially poses a direct safety risk to fauna.	Construction Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern during construction of- and activities at the plant sites.	Construction	Medium - High	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Ground water	Direct overutilization/wastage of water extracted from boreholes for the use in processing operations; the potential contamination of ground water resources from spillages/leakages of hazardous fluids.	Operational	Low	Contamination control; abide by legal requirements.	Very low
	Surface water	Indirect contamination during runoff episodes.	Operational	Medium - High	Contamination control measures and storm water management; controlled water use.	Low
	Air quality	Nuisance dust from material that are processed at the plant sites.	Operational	Low	Dust control; air-quality monitoring.	Very low
	Noise	Noise/vibration created during construction of plant sites and as well as by the plant and processing machinery during the operation.	Construction Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	The plant sites are visible to the immediate surroundings.	Construction Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impacts to traffic/road safety expected from plant sites.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of plant sites; uncontrolled site activities.	Construction Operational	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	SIGNIFICANCE PRE MITIGATION	MITIGATION TYPE	SIGNIFICANCE POST MITIGATION
Associated infrastructure	Geology	Alteration of geological conditions during the excavation for any potential foundations of associated infrastructure.	Construction	Very low	Employ effective rehabilitation strategies.	Very Low
	Minerals	Sterilisation of mineral resources due to poor placement of permanent infrastructure.	Construction	Very low	Apply modern technologies and methodologies; accurate planning.	Very Low
	Topography	Associated infrastructure will alter the natural topography by adding features to the landscape.	Construction Operational Closure	Low	Restore surface topography by removing all temporary infrastructures and conducting general surface rehabilitation.	Low
	Soil	Compaction where infrastructure is located; destruction/ disturbances to fertile soil layers/seed bank and alteration of the natural soil structure; potential increased runoff/erosion during storm events; contamination from spillages/leakages.	Construction Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Very low
	Land use / capability	Loss of land capability/land use where associated infrastructure is located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Low - Medium	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Low
	Fauna	Construction of infrastructure will disturb fauna and alter/ disturb their natural habitats; activities will deter fauna; some infrastructure will pose safety risks to fauna (e.g. power lines).	Construction Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern during construction of- associated infrastructure.	Construction	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Ground water	The potential contamination of ground water resources from spillages/leakages of hazardous fluids.	Operational	Low	Contamination control; abide by legal requirements.	Very low
	Surface water	Indirect contamination during runoff episodes.	Operational	Low	Contamination control measures and storm water management.	Very low
	Air quality	No impact to air quality linked to associated infrastructure.	*N/A*	*N/A*	*N/A*	*N/A*
	Noise	Noise and vibration created during construction of infrastructure and limited noise created by associated infrastructure (e.g. generators) during the operation.	Construction Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	Associated infrastructure is visible to the immediate surroundings.	Construction Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impacts to traffic/road safety expected from associated infrastructure.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of associated infrastructure.	Construction	Low - Medium	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Low
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Low	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	Very low

j) Summary of specialist reports.

LIST OF SPECIALIST STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	RECOMMENDATIONS INCLUDED IN THIS REPORT?	REFERENCE TO APPLICABLE SECTION OF THIS REPORT
Terrestrial ecology A terrestrial ecological assessment report was completed by Dr Betsie Milne in October 2016. Attached as Appendix 3.	• A permit application regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation. • A licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries if any of the *Boscia albitrunca* or *Vachellia erioloba* individuals are to be affected; prior to any disturbances to these protected trees. • It is also recommended that all plant species of conservation are identified and marked prior to any impact. • Mitigation measures to reduce the potential impact of the prospecting activities are important to ensure a low ecological impact. • Habitats associated with watercourses are expected to be adversely affected. Authorisation should not be granted unless the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Surface water study A Surface Water Study Report was completed by MojaTerre in November 2016. Attached as Appendix 4.	• Appropriate mitigation measures should be put into place and careful monitoring is required to ensure potential impacts are mitigated. • Detailed delineation of cryptic wetlands is unlikely to be achievable with any useful degree of confidence based on a dry season assessment only and thus a follow up study is suggested during the wet season.	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Groundwater study A Groundwater Study Report was completed by MojaTerre in November 2016. Attached as Appendix 5.	• If groundwater is to be sourced for water supply to the prospecting project, this should be undertaken with cognisance of existing groundwater use and should be undertaken in a manner that will not detrimentally impact on regional groundwater use patterns. • This can only be confirmed through on-going groundwater monitoring during prospecting. • Surface sources of contamination should be managed by implementing good housekeeping and safety measures. • Dolomitic outcrops to be avoided.	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)

LIST OF SPECIALIST STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	RECOMMENDATIONS INCLUDED IN THIS REPORT?	REFERENCE TO APPLICABLE SECTION OF THIS REPORT
Heritage resources A Phase 1 Heritage Impact Assessment Report was completed by Dr Edward Matenga. Attached as Appendix 6.	• Protect all of the graves. • Protect part of the old pioneer mine. • Should archaeological or other heritage relics be found during the construction phase, heritage authorities will be advised immediately and a heritage specialist will be called to attend.	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Palaeontological resources Palaeontological information was obtained from a report compiled by Dr Nonhlanhla Vilakazi. Attached as Appendix 6.	• Once construction has begun, and if good fossil exposures are found/uncovered, these should be safeguarded preferably in situ and reported as soon as possible to the relevant heritage management authority (South African Heritage Resources Agency).	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Please Note: No other specialist assessments have been conducted on the property.			

k) Environmental impact statement

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

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. The most profound impacts will be in the form of large-scale clearance of indigenous terrestrial habitats with slight potential loss in species of conservation concern; as well as possible alterations of watercourse characteristics in the ephemeral pans and stream. This will lead to the degradation of ecological corridors/stepping stones and subsequently cause loss of connectivity and ecological function. Soil erosion, loss of future land use and proliferation of alien invasive species are likely to be important impacts if appropriate management/rehabilitation strategies are not practised.

Impacts on the groundwater resources are also considered to be significant in terms of the cumulative effect of groundwater abstraction. This will mainly impact other water users of the area. The excavations in the alluvial gravels also pose a risk to the surrounding auifer recharge rates and therefore monitoring is vital during the implementation of the EMPr.

The heritage resources (graves and pioneer complex) is expected to be protected with the implementation of the EMPr. The fossil rich geological features do not fall within the earmarked area and are expected to remain intact.

Positive impacts include the demarcation and subsequent protection of heritage resources and the eradication of alien invasive species. Positive social impacts include community development, job creation, local procurement and numerous economic benefits.

To conclude, it must be accepted that prospecting activities will have both physical and social impacts. Therefore, the destruction of the natural environmental features 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

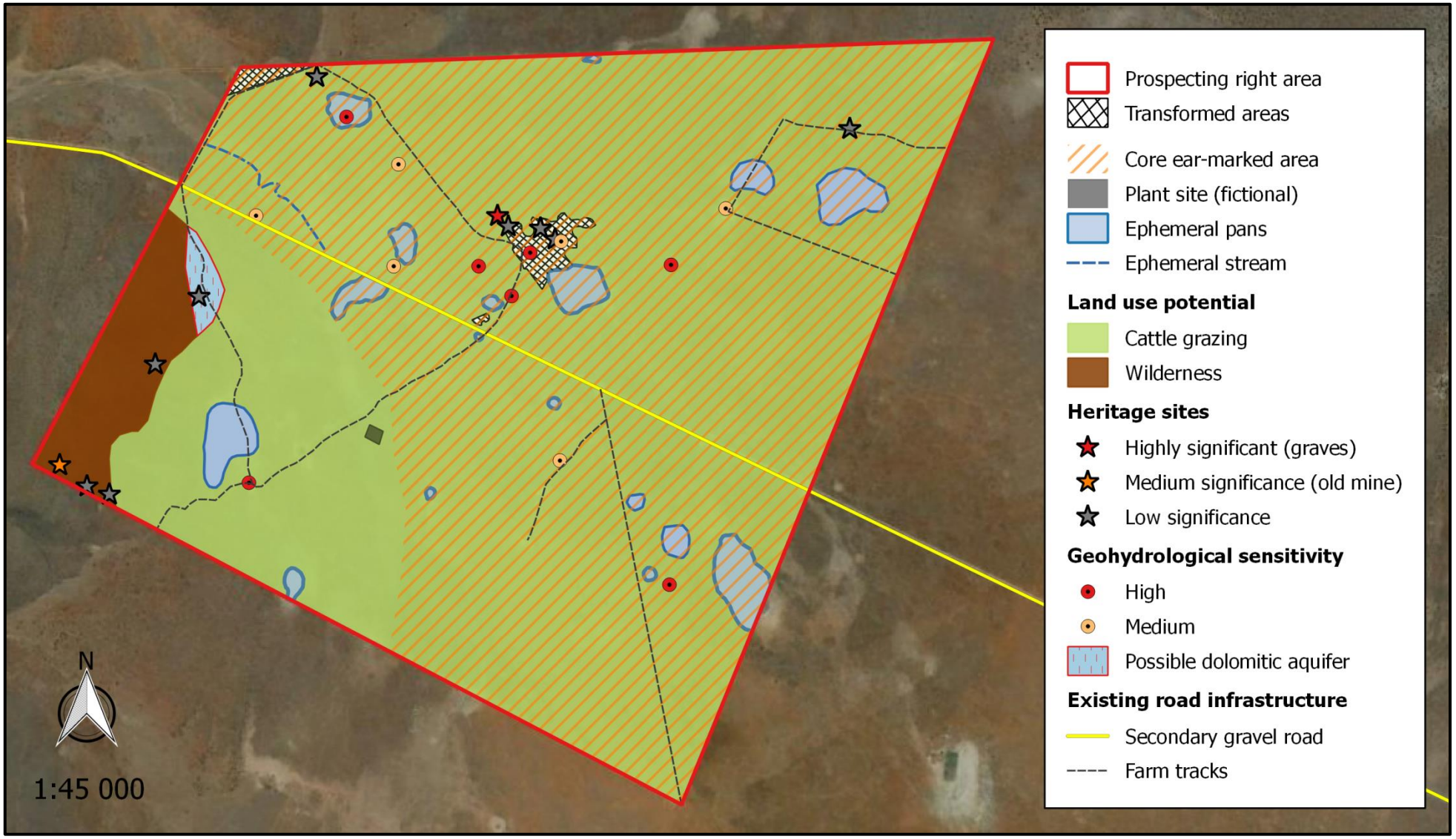
The final site map below indicates the prospecting right application area in which related activities will take place. Existing road infrastructure is also depicted. The associated infrastructure relating to the prospecting site will be placed in the areas marked as “site infrastructure”. However, for the purpose of this map, this locality is only fictional as it is impossible to predict the site location at this stage, as mentioned in the section where alternatives are discussed. The most sensitive areas include the watercourses, Dolomitic outcrop, specified boreholes, graves and pioneer mine complex.

Buffers (no-go zones) that must be implemented include the following:

- The 100 m buffer zones around identified watercourses in terms of the NWA. These buffers may only be annulled with the relevant authorisation from DWS and DENC and this annulation should be strictly limited to earmarked areas.

- The 10 m buffers around the graves and pioneer mine complex.

- The 5 m buffer within the road reserve from the public gravel road, according to the Roads Ordinance.


Prospecting right area
Transformed areas
Core ear-marked area
Plant site (fictional)
Ephemeral pans
Ephemeral stream
Land use potential
Cattle grazing
Wilderness
Heritage sites
Highly significant (graves)
Medium significance (old mine)
Low significance
Geohydrological sensitivity
High
Medium
Possible dolomitic aquifer
Existing road infrastructure
Secondary gravel road
Farm tracks
N
1:45 000

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

As mentioned before, the specific occurrence of alluvial diamond deposits in the area dictates the selection of the specific prospecting site. There are therefore no alternatives in terms of project location. In terms of the prospecting operation itself, the following implications are predicted:

Negative implications

- The deterioration of watercourse characteristics and associated habitats caused by excavations in the beds and banks of the ephemeral pans and stream.
- Impact on groundwater recharge rate through excavation of alluvial gravels.
- Other environmental implications will be in the form of any infrastructure or disturbances that might affect the pristine vegetation in terms of large-scale clearance of indigenous vegetation and the potential removal of protected species.
- The most significant impacts linked to erosion are restricted to the slopes of stockpiles, slimes dams and open pits. These will increase surface flow on the sites and could intercept any hazardous fluid spillages.
- Loss of future land use and land capability is expected if soil and natural vegetation are not effectively restored/rehabilitated.
- The current extent of alien invasiveness on site is moderately low, but can increase if not eradicated and controlled.

The majority of the negative implications are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered to. The risks of significant negative environmental impacts are therefore largely related to improper management and the lack of governance.

Positive implications

- The demarcation and subsequent protection of heritage resources.
- The eradication of alien invasive/encroaching species.
- Social impacts, including job creation, social upliftment, training, community development and numerous economic benefits.

The benefits derived from these positive implications rely solely on the efficiency of governance and project management as well as the implementation of ethical project procedures and procurements. Therefore, the risks of not benefitting from these positive outcomes are largely related to illegal and unethical conduct, improper management and the lack of governance.

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

The impact management objective and outcomes for the Werda prospecting operation should include:

OBJECTIVE 1: To ensure safe and efficient extraction of the diamond resource

Outcome 1 (a): Proven zero injury or deaths.
Outcome 1 (b): Proven zero/minimal loss of mineral resources.
Outcome 1 (c): Maintained high profit margin.

OBJECTIVE 2: To limit the alteration of the surrounding topography

Outcome 2 (a): Natural topography restored.
Outcome 2 (b): Slopes downgraded and low runoff potential established.

OBJECTIVE 3: To manage and preserved sensitive soil types

Outcome 3 (a): Topsoil removed and preserved.
Outcome 3 (b): Topsoil with viable seedbed re-established.

OBJECTIVE 4: To ensure the continuation of economically viable land use

Outcome 4 (a): Topsoil removed and preserved.
Outcome 4 (b): All unwanted infrastructure demolished.
Outcome 4 (c): Topsoil with viable seedbed re-established.
Outcome 4 (d): Post-closure monitoring results show re-establishment of natural vegetation.

OBJECTIVE 5: To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of the regional ecology or nearby human communities.

Outcome 5 (a): Operational and post-closure monitoring results show no adverse effects to surface water quality.

Outcome 5 (b): Post-closure monitoring results show re-establishment of watercourse characteristics and associated vegetation after closure.

OBJECTIVE 6: 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.

Outcome 6 (a): Operational and post-closure monitoring results show no adverse effects to ground water resources.

Outcome 6 (b): A complete register of water use records kept on file.

Outcome 6 (c): Hazardous fluids are contained in demarcated containers and/ or concrete bund walls.

OBJECTIVE 7: To contain soils and materials within demarcated areas and prevent contamination of storm water runoff

Outcome 7 (a): Hazardous fluids are contained in demarcated containers and/ or concrete bund walls.

Outcome 7 (b): Topsoil removed and preserved.

Outcome 7 (c): Slopes downgraded and low runoff potential established.

Outcome 7 (d): Operational and post-closure monitoring results show no adverse effects to ground water / surface water resources.

OBJECTIVE 8: To minimise the loss of natural vegetation and protected plant species.

Outcome 8 (a): Topsoil removed and preserved.

Outcome 8 (b): Topsoil with viable seedbed re-established.

Outcome 8 (c): Relevant permits and licences obtained.

Outcome 8 (d): Confirmed zero illegal harvesting of protected plants.

Outcome 8 (d): Post-closure monitoring results show re-establishment of natural vegetation after closure.

OBJECTIVE 9: To prevent the proliferation of alien invasive plants species

Outcome 9 (a): Topsoil removed and preserved.

Outcome 9 (b): Topsoil with viable seedbed re-established.

Outcome 9 (c): Alien invasive plant species on site eradicated.

Outcome 9 (d): Post-closure monitoring results show no proliferation after closure.

OBJECTIVE 10: To protect the wildlife and bird species

Outcome 10 (a): Environmental awareness conducted.

Outcome 10 (b): Monitoring results indicate no injuries or death of birds due to collision or electrocution caused by power lines.

Outcome 10 (c): Confirmed zero animals killed or injured during activities.

OBJECTIVE 11: To protect the natural habitat of wildlife and bird species

Outcome 11 (a): Topsoil removed and preserved.

Outcome 11 (b): Topsoil with viable seedbed re-established.

Outcome 11 (c): Alien invasive plant species on site eradicated.

Outcome 11 (d): Post-closure monitoring results show re-establishment of natural vegetation.

OBJECTIVE 12: To minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors

Outcome 12 (a): Topsoil removed and preserved.

Outcome 12 (b): Topsoil with viable seedbed re-established.

Outcome 12 (c): Post-closure monitoring results show re-establishment of natural vegetation.

Outcome 12 (d): Monitoring results indicate adequate levels of dust particles within mine vicinity.

OBJECTIVE 13: To reduce the impact on visual integrity due to intrusive infrastructure, activities and facilities

Outcome 13 (a): Alien invasive plant species on site eradicated.

Outcome 13 (b): No domestic waste intercepted by wind or found in surrounding areas.

Outcome 13 (c): All visually intrusive infrastructures removed.

Outcome 13 (d): All intrusive slopes downgraded and do not break the skyline.

Outcome 13 (e): Post-closure monitoring results show re-establishment of natural vegetation after closure.

OBJECTIVE 14: To minimise noise and vibration to a level that disturbances felt by the communities are limited

Outcome 14 (a): Monitoring results indicate adequate levels of noise and vibration levels within project vicinity.

OBJECTIVE 15: To ensure that all traffic generated by the operation does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.

Outcome 15 (a): Proven implementation and adherence to traffic legislation.

Outcome 15 (b): Zero accidents on public roads.

Outcome 15 (c): No damage to public road networks or infrastructure related to the mining activities.

OBJECTIVE 16: To preserve the historical and cultural resources located on site in compliance with the South African Heritage Resources Act (No. 25 of 1999)

Outcome 16 (a): Heritage Impact Assessment Report received, reviewed and kept on site.

Outcome 16 (b): Graves and other identified heritage resources fenced off and buffered with no-go zones.

OBJECTIVE 17: To ensure that the current socio-economic status quo is improved

Outcome 17 (a): Audited financial statements and proven adherence to ethical business conduct.

OBJECTIVE 18: To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties

Outcome 18 (a): IAP complaints register compiled, updated regularly, and kept on site.

Outcome 18 (b): Proven good-standing relationships with IAPs.

Outcome 18 (c): Word-of-mouth social and environmental reputation is high.

m) Final proposed alternatives

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

The property on which the prospecting operations (i.e. excavations) are being undertaken is determined by the geological location of the mineral resource (as discussed in section f). This also applies to the minerals associated to the watercourses. 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 type of activity, technology and operational aspects

The current prospecting activities, as discussed in section d) ii), include the excavation of open pits and trenches, with continued backfilling. 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 extraction of alluvial diamonds. Further alternatives in terms of operational aspects include the slimes dams and water use. These are discussed below.

The design or layout of the activity

The **site infrastructure** will be strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the prospecting right application process. Thus, the site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for initial pitting and trenching after the non-invasive phase is completed, as well as limited additional impact on the environmental and heritage resources. The benefit of typical alluvial diamond prospecting sites is that they are generally transient in nature and therefore renders the consideration of further alternative layouts unnecessary.

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. Mobile tanks are viable option for infield screening activities, but 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 were determined based on proximity to site operations.

In terms of **water use** alternatives; the absence of any perennial surface water resource renders ground water the best water source for the operation. Alternatives include sourcing from service providers, but these are not currently available or feasible. The hydrocensus revealed that numerous boreholes occur on site, but that only a few have high reported yields. These high yielding boreholes will most likely be the best alternative water source to fulfil operational needs, but their use depend on negotiations with the landowner and site locality.

Mobile pumps and **pipelines** are considered to be the best long term option for transferring water from the borehole, due to the temporary nature of these pumps and plastic pipes; which causes minimum environmental disturbances. Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment and to avoid the disturbance of heritage resources. This is however dependent on the preferred borehole and site locations.

A residue deposit (slimes dams) will be established, with its selected locality being based on the following considerations:

- Historic anthropogenic activities and existing infrastructure on the property;
- Proximity to the processing plant;
- No underlying ore bodies.

The slimes dams typically used for alluvial diamond mining are believed to be the most viable option for the operation. These slimes dams are in line with ECSA registered engineering designs and take all of the relevant standards and legislation into account. Therefore no alternatives were considered.

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

Potential land use includes grazing and mining. The majority of the area is classified to have low to moderate potential for grazing land and no suitability for crop yield. Apart from the diamond deposits, there are also potential for limestone, manganese and iron ore mining on the property. Therefore, mining activities are believed to be the most economically beneficial option for the area. Whether the proposed diamond prospecting operation continues or not, the other prospecting operations will most likely persist. The farming of livestock will only be able to continue in areas not affected by prospecting operations. The most significant impacts associated with grazing activities include the provision of water. These are not expected to have a serious impact on the existing groundwater features. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that agriculture might have.

The HC van Wyk prospecting project aims to **uplift** the local community. If the operation does not continue it would hold back any potential employment for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a stagnant effect on the economy of South Africa and the diamond industry as a whole. Substantial tax benefits to the State and Local Government will also be inhibited.

The implementation of the operation is believed to have a significant impact on the **biodiversity** through the removal of indigenous vegetation, destruction of habitats and disturbances of ephemeral pans. If activities were not to continue, the status quo would apply and no damage would accrue to the environment. This means that the ecological integrity and functionality on site will be preserved and potential natural corridors available to species in the surrounding areas will continue to exist.

In the event that the prospecting operation does not proceed, the **heritage resources** will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the operation continues, any potential heritage resources will have to be protected through the demarcation of no-go zones.

n) Aspects for inclusion as conditions of Authorisation

There are no other aspects which have not formed part of the EIAR or EMPR that must be made conditions of the Environmental Authorisation.

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

This EIAR and EMPr were prepared in such a way that it complies with the requirements of NEMA and the EIA Regulations. All the potential activities associated with the operation were listed, discussed and considered in this report, and it is therefore believed that the structure, format and content of this report sufficiently cover all related impacts and mitigations.

The report was compiled by incorporating information provided by the applicant and the various specialists and no warranty or guarantee, whether expressed or implied, is made by the EAP with respect to the completeness, accuracy or truth or any aspect of this document with reference to the instructions, information and data supplied by the aforementioned parties.

The impact assessment was conducted based on the EAPs knowledge and experience. The probability, intensity/severity and significance pertaining to the criteria used to assess the significance of the impacts were based on rule-of-thumb and experience.

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

The proposed prospecting area falls in a rural and pristine setting. The pristine indigenous terrestrial and watercourse habitats are expected to be adversely affected. 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 long-term consequences.

Therefore, authorisation should not be granted unless the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures. Furthermore, the competent authority should take all the necessary steps to ensure that the prospecting operation complies with the conditions set out in the EMPR.

ii) Conditions that must be included in the authorisation

Specific conditions

- The necessary permits and licences should be obtained for restricted activities and should be kept on site; which include the following:
  - Water use licence;
  - Flora harvesting permit;
  - Protected trees licence (if necessary);
  - Heritage resource permit (if necessary);
- The financial provision following the latest re-calculation for rehabilitation and closure be paid;
- All recommendations and mitigation measures as set out in the EMPR should be adhered to.
- All recommendations set out in specialists reports must be adhered to.

Rehabilitation requirements

Infrastructure Areas

On completion of the prospecting operation, the various surfaces, including the access road, the office areas, storage areas, processing plant sites, and all other buildings should be rehabilitated as follows:

- All infrastructures, equipment, machinery, processing plant, pipelines and other items used during the operation should be demolished or removed from the site, except where the future land users want them to remain; and in that case obtain written approval from the Director: Mineral Development of the Department of Mineral Resources;

- All remaining material on the surface should be removed to the original topsoil level. This material should then be backfilled into any depressions. Any compacted area should be ripped to a depth of 300 mm, where possible, the topsoil or growth medium returned and landscaped.

- On completion of operations, all buildings, structures or objects on the site should be dealt with in accordance with Regulation 44 of the Mineral and Petroleum Resources Development Act, 2002.

Roads

After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and seeded, except if the future land users want them to remain; in which case written approval should be obtained from the Director: Mineral Development of the Department of Mineral Resources.

Waste 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 unless a waste licence for such activities is obtained.

Slimes dams

The slimes dams should be removed and used as backfill material or landscaped and stabilised and any residual dumps should be kept below the natural skyline.

On-going seepage and control of rain water

It is important that the topography should be returned to its natural state and all hazardous fluids should be removed from site. Monitoring of ground water should take place during closure in order to understand the effect that the operation might have had on the aquifer, but no other long-term contamination related impact is expected from the Werda activities.

Long-term stability and safety

It should be the objective of site management to ensure the long term stability of all rehabilitated areas including all backfilled depressions and the altered characteristic of the watercourses. 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.

Submission of Information

Reports on rehabilitation and monitoring should be submitted annually to the Northern Cape Department of Mineral Resources (Kimberley), as described in Regulation 55.

Maintenance (aftercare)

Maintenance after closure should include regular inspections and monitoring of the slimes dams to ensure slope stability and safety. Monitoring should also include the affirmation of natural vegetation re-establishment and efficient eradication of alien invasive species. The aim is for rehabilitation to be stable/self-sufficient so that the least possible aftercare is required and to create an acceptable post-operational environment and land-use. Groundwater monitoring should ensure quality and quantity is not affected by operation.

After-effects following closure:

- The hydrological and ecological risks associated with the watercourse characteristics remain after closure;
- The safety risk associated with the slimes dams will remain after closure;
- No potential for bad quality leachate or acid mine drainage development is associated with the Werda closure.
- No after effect on the groundwater yield or quality is expected after closure.

q) Period for which the Environmental Authorisation is required.

The prospecting operation is planned for 5 years.

r) Undertaking

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 Report.

s) Financial Provision

The current, preliminary mine closure and rehabilitation costs is estimated at **R 1 900 367.83** which is to be submitted to the DMR upon approval of the EIAr and EMPr.

i) Explain how the aforesaid amount was derived.

The quantum of the financial provision contemplated in Regulation 54 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) was revised, using a cost estimation model in line with the DMR's "Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision Provided by a Mine" (here on referred to as DMR Guideline Document).

The cost estimation model considered various closure components related to Werda, such as: dismantling and demolition of infrastructure, rehabilitation of roads, rehabilitating open pits, general surface rehabilitation, etc. The closure costing also adhered to the latest amended NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining, or production operations.

The calculations were based on a rule of thumb expectation that is typically associated with an operation of this nature. However, a more accurate assessment of the environmental liability of HC van Wyk should be conducted by a professional Mine surveyor within one year after invasive activities have started. The outstanding rehabilitation was calculated as per the agreed rate in the DMR Guideline and following the prescribed procedural steps outlined in Table B.2 of the DMR Guideline Document.

The following steps were followed during the calculations:

Step 1: Determine mineral mined and saleable by-products

Diamonds (according to Table B.12 in the DMR guideline)

Step 2: Determine primary risk class

Class C; i.e. a small mine, mine waste, plant and plant waste (according to Table B.12 in the DMR guidelines)

Step 3: Determine environmental sensitivity

Area sensitivity is regarded as being High – Although the Social and Economic sensitivity is regarded as being Low; the Biophysical sensitivity is regarded as being high: the area is largely natural and numerous watercourses on site forms part of an overall ecological regime of conservation concern within the province and is protected in terms of the NWA. Therefore, causing the total sensitivity of the area to be High (by accepting the most sensitive of the three individual assessments according to Step 3 and Table B.4 of the DMR guideline).

Step 4/5: Determine closure components, weighting and multiplication factors

Closure components (listed in the table below) are in line with open-cast mine types (according to Table B.5 of the DMR guideline) and based on those components relevant to the operation.

Rehabilitation component	DMR guideline terms, assumptions and recommendations	Werda context
Dismantling of processing plant and related structures (including overland conveyors and power lines)	All plant infrastructure should be broken down to natural ground level and buried adjacent to the plant site: • Foundations, structures and conveyors should be broken down to natural ground level, • The areas are to be top-soiled with 300 mm of topsoil and vegetation established, or as noted in the relevant EMP, • The monitoring and maintenance of these areas has been costed under the appropriate areas, • Top soiling and vegetation for the areas are included under general surface rehabilitation, and • No credits are allowed for scrap steel and equipment that can be re-used or sold.	A total of ± 120 m^3: (± 400 m^2 of plant infrastructure) These are all surface infrastructure therefore provision for compacted areas to be ripped to a depth of 300 mm, is made.
Demolition of steel buildings and structures	All structures should be demolished to 1 m below ground level: • The rubble is to be buried adjacent to the sites, provided this adheres to the National Waste Management Strategy, • The areas should be shaped, top soiled with 300 mm of topsoil and vegetated, • Monitoring and maintenance is costed in the relevant areas.	± 500 m^2 of steel structures
Demolition of reinforced concrete buildings and structures		± 250 m^2 in total
Rehabilitation of access roads	No specific terms/recommendations provided.	± 4 000 m^2 of roads
Opencast rehabilitation including final voids and ramps	Some form of beneficial land use is desirable after mining. Hence, in-filling of opencast pits is advocated. However, in cases where notably less material remains on site for pit in-filling, final voids should be made safe. Costing includes sloping perimeter walls, shaping and grassing and also includes surveying and geotechnical fees.	A total of ± 5 ha: (concurrent rehabilitation considered)
Rehabilitation of overburden and spoils	No residual dumps expected.	A total of 0.5 ha (concurrent rehabilitation considered)

Rehabilitation component	DMR guideline terms, assumptions and recommendations	Werda context
Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	These features have a low pollution potential and hence only need to be shaped to create a stable landform. Costing includes shaping and grassing or vegetation of the overburden and spoils. Furthermore, the costing for waste deposits also includes the establishment of a dedicated cover on the reshaped surface of the dump. This cover has to fulfil the following primary functions: • Protection of the integrity/ stability of the modified outer slope. • Limiting the ingress of air and water into residue material that has the potential to contaminate local groundwater by means of contaminated seepage arising from the footprint area of the deposit. • Separation of the deposited residue from uncontaminated surface runoff arising from the outer slopes of the residue deposit. • Contribution to the aesthetic appeal of the rehabilitated residue deposits. Covers fulfilling the above functions could be of varying nature, comprising of natural and/or synthetic material. If natural materials are to be used, current practice allows for an evaporative cover, varying in thickness between 750 and 1 000 mm, with an outer cover layer of 300 mm thickness of armouring or topsoil with vegetation. The Master Rate allows for an evaporative cover of sandy/loam material. It has been assumed that material of this nature is available within free haul distance from the residue deposit to be rehabilitated or has been stockpiled in close proximity of the residue deposit. It has also been assumed that the armouring material can be obtained within a reasonable haul distance.	± 3 ha
General surface rehabilitation, including grassing of all denuded areas	Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use and should ensure that the surface topography is restored, runoff risk ameliorated and structures removed in order to encourage revegetation. The unit cost for general rehabilitation allows for shaping and landscaping of disturbed areas.	An estimated area of 0.5 ha will be in need of general surface rehabilitation after disturbances has ceased and include the following: - Removal of safety berms, pipelines, water tanks, etc. - General surface rehabilitation of the parking areas and plant area.
2 to 3 years of maintenance and aftercare	Maintenance and aftercare is planned for 2 to 3 years after production ceases, and covers: • Annual fertilising of rehabilitated areas, • Monitoring of surface and subsurface water quality, • Control of alien plants, and • General maintenance, including rehabilitation of cracks and subsidence.	It is estimated that a total area of 3 ha will be in need of maintenance and aftercare.
Specialist studies	Identify closure costs from site-specific specialist studies. According to Table B.9 a screening level risk assessment for a Class C mine is needed.	It is estimated that ± R 50 000 is needed for a closure risk assessments.

Weighing Factor 1 depends on the nature of the terrain where the mine is located. The terrain is regarded as flat and therefore Weighting Factor 1 = 1.00 (according to Table B.7 of the DMR guideline).

Weighting Factor 1:	Flat	Undulating	Rugged
Nature of the terrain/ accessibility	1.00	1.10	1.20

This factor is applicable as it is more difficult (and hence more costly) to undertake work related to mine closure in areas that are undulating or rugged. Weighting Factor 1 is applied to each of the closure components.

Weighing Factor 2 depends on the proximity of the mine to an urban centre. The mine is regarded to be situated in a Peri-urban area, because it is less than 150 km from a developed urban area. Therefore, Weighting Factor 2 = 1.05 (according to Table B.7 of the DMR guideline).

Weighting Factor 2:	Urban	Peri-urban	Remote
Proximity to urban area where goods and services are to be supplied	1.00	1.05	1.10

This factor is applicable as there will be increased costs to transport machinery, goods and personnel to more remote mine sites. Weighing Factor 2 is applied to the Preliminary and General items only.

Multiplication factor for opencast rehabilitation is 0.52 and is based on a Risk Class C mine where environmental sensitivity is Medium (according to Table B.6 of the DMR guideline).

Step 6: Calculation of quantum

ii) Confirm that this amount can be provided for from operating expenditure

The current, preliminary mine closure and rehabilitation costs amounts to **R 1 900 367.83**. The EAP can however not confirm on behalf of HC van Wyk if this amount can be provided from the 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.

The scoping report was compiled in order to provide a brief scope of activities and possible impacts related to the Werda operation, whereas the Impact Assessment Report provides a comprehensive account of activities and assesses all potential impacts fully. Therefore, this report did not deviate from the scoping report per se, but merely provides a more thorough impact assessment.

ii) Motivation for the deviation.

Not applicable. No deviations mere made.

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:

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

The land owner is Mr JJ Oosthuizen, who uses the land for grazing of livestock and wildlife. Impacts include deterioration of land due to mining activities as well as the cumulative effect of groundwater extraction for operational use. Other impacts include the safety and living conditions of the farm workers who reside on the farm.

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

Eight graves and one pioneer mine complex were considered significant. Applicable mitigation measures have been provided.

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

As mentioned before, the specific occurrence of alluvial diamond deposits in the area dictates the selection of the specific prospecting site. The Werda associated infrastructure will be established after the prospecting right has been granted and the necessary non-invasive assessments have been conducted. All of the associated methodologies are believed to be the most efficient and modern techniques to alleviate health and environmental risks. There are therefore no alternatives to consider apart from not implementing the activities. This will however have undesirable economic impacts.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

a) Details of the EAP

I hereby confirm that the requirement for the provision of the details and expertise of the EAP is already included in Part A, section 1 (a) as required.

Confirmed	**X**

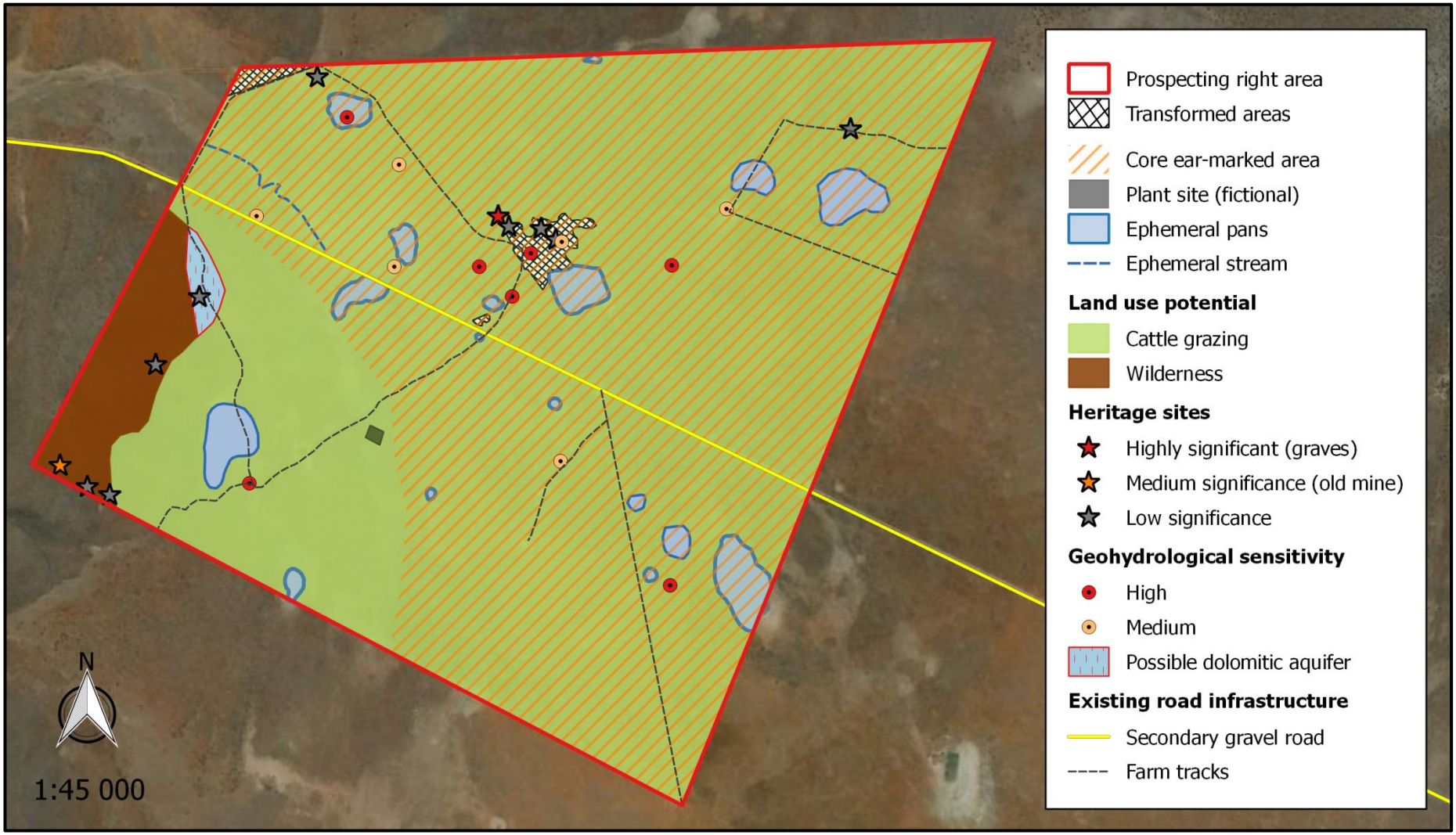
b) Description of the Aspects of the Activity

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

Confirmed	**X**

c) Composite Map

The final site map below indicates the prospecting right application area in which related activities will take place. Existing road infrastructure is also depicted. The associated infrastructure relating to the prospecting site will be placed in the areas marked as “site infrastructure”. However, for the purpose of this map, this locality is only fictional as it is impossible to predict the site location at this stage, as mentioned in the section where alternatives are discussed. The most sensitive areas include the watercourses, Dolomitic outcrop, specified boreholes, graves and pioneer mine complex.


Prospecting right area
Transformed areas
Core ear-marked area
Plant site (fictional)
Ephemeral pans
Ephemeral stream
Land use potential
Cattle grazing
Wilderness
Heritage sites
Highly significant (graves)
Medium significance (old mine)
Low significance
Geohydrological sensitivity
High
Medium
Possible dolomitic aquifer
Existing road infrastructure
Secondary gravel road
Farm tracks
N
1:45 000

d) Description of Impact management objectives including management statements

i) Determination of closure objectives

The key aim of decommissioning and closure is to ensure that all the significant impacts to the environment are ameliorated. This is where baseline information is crucial, as it provides a platform of comparison between the impacted area after-, and the original state before prospecting activities took place. The following were considered for guidance in determining the closure objectives:

- The company's institutional objectives, policies and practice;
- Closure objectives from specialist reports;
- The various relevant national and provincial Acts and Regulation;
- General objectives of integrated environmental management laid down in the NEMA, ensuring that environmental considerations are fully integrated;
- The sustainable development objectives of the MPRDA;
- South African National Standards;
- Industry best practice guidelines
- Resource Water Quality Objectives;
- Applicable environmental quality objectives;

Closure objectives include to following:

- To prevent the sterilization of any ore reserves;
- To rehabilitate the site to its natural or predetermined state, or to a land use that conforms to the generally accepted principle of sustainable development;
- To establish a stable and self-sustainable vegetation cover;
- To limit and rehabilitate any erosion features and prevent any permanent impacts to the soil capability of the site;
- To limit and manage the visual impacts of the site.
- To ensure that environmental damages are minimised to such an extent that all the affected parties are satisfied;
- To ensure that site closure is achieved efficiently, cost effectively and in compliance with the law;
- To safeguard the safety and health of humans and animals on the site.
- To manage the social impacts resulting from the site closure, to such an extent that it facilitates a socially stable community, in line with the principles of sustainable development.

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

The following impact management objectives and statements relate to managing any environmental damage, pollution or ecological degradation as a result of the Werda prospecting activities:

OBJECTIVE 1: To ensure safe and efficient extraction of the diamond resource

Management statements:

- Proven zero injury or deaths.
- Proven zero/minimal loss of mineral resources.
- Maintained high profit margin.

OBJECTIVE 2: To limit the alteration of the surrounding topography

Management statements:

- Natural topography restored.
- Slopes downgraded and low runoff potential established.

OBJECTIVE 3: To manage and preserved sensitive soil types

Management statements:

- Topsoil removed and preserved.
- Topsoil with viable seedbed re-established.

OBJECTIVE 4: To ensure the continuation of economically viable land use

Management statements:

- Topsoil removed and preserved.
- All unwanted infrastructure demolished.
- Topsoil with viable seedbed re-established.
- Post-closure monitoring results show re-establishment of natural vegetation.

OBJECTIVE 5: To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of the regional ecology or nearby human communities.

Management statements:

- Operational and post-closure monitoring results show no adverse effects to surface water quality.
- Post-closure monitoring results show re-establishment of watercourse characteristics and associated habitats after closure.
- Watercourse beds and banks rehabilitated.

OBJECTIVE 6: 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.

Management statements:

- Operational and post-closure monitoring results show no adverse effects to ground water resources.
- A complete register of water use records kept on file.
- Hazardous fluids are contained in demarcated containers and/ or concrete bund walls.

OBJECTIVE 7: To contain soils and materials within demarcated areas and prevent contamination of storm water runoff

Management statements:

- Hazardous fluids are contained in demarcated containers and/ or concrete bund walls.
- Topsoil removed and preserved.
- Slopes downgraded and low runoff potential established.
- Operational and post-closure monitoring results show no adverse effects to ground water / surface water resources.

OBJECTIVE 8: To minimise the loss of natural vegetation and protected plant species.

Management statements:

- Topsoil removed and preserved.
- Topsoil with viable seedbed re-established.
- Relevant permits and licences obtained.
- Confirmed zero illegal harvesting of protected plants.
- Post-closure monitoring results show re-establishment of natural vegetation after closure.

OBJECTIVE 9: To prevent the proliferation of alien invasive plants species

Management statements:

- Topsoil removed and preserved.
- Topsoil with viable seedbed re-established.
- Alien invasive plant species on site eradicated.
- Post-closure monitoring results show no proliferation after closure.

OBJECTIVE 10: To protect the wildlife and bird species

Management statements:

- Environmental awareness conducted.
- Monitoring results indicate no injuries or death of birds due to collision or electrocution caused by power lines.
- Confirmed zero animals killed or injured during activities.

OBJECTIVE 11: To protect the natural habitat of wildlife and bird species

Management statements:

- Topsoil removed and preserved.
- Topsoil with viable seedbed re-established.
- Alien invasive plant species on site eradicated.
- Post-closure monitoring results show re-establishment of natural vegetation.

OBJECTIVE 12: To minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors

Management statements:

- Topsoil removed and preserved.
- Topsoil with viable seedbed re-established.
- Post-closure monitoring results show re-establishment of natural vegetation.
- Monitoring results indicate adequate levels of dust particles within mine vicinity.

OBJECTIVE 13: To reduce the impact on visual integrity due to intrusive infrastructure, activities and facilities

Management statements:

- Alien invasive plant species on site eradicated.
- No domestic waste intercepted by wind or found in surrounding areas.
- All visually intrusive infrastructures removed.
- All intrusive slopes downgraded and do not break the skyline.
- Post-closure monitoring results show re-establishment of natural vegetation after closure.

OBJECTIVE 14: To minimise noise and vibration to a level that disturbances felt by the communities are limited

Management statements:

- Monitoring results indicate adequate levels of noise and vibration levels within project vicinity.

OBJECTIVE 15: To ensure that all traffic generated by the operation does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.

Management statements:

- Proven implementation and adherence to traffic legislation.
- Zero accidents on public roads.
- No damage to public road networks or infrastructure related to the mining activities.

OBJECTIVE 16: To preserve the historical and cultural resources located on site in compliance with the South African Heritage Resources Act (No. 25 of 1999)

Management statements:

- Heritage Impact Assessment Report received, reviewed and kept on site.
- Graves and other identified heritage resources fenced off and buffered with no-go zones.

OBJECTIVE 17: To ensure that the current socio-economic status quo is improved

Management statements:

- Audited financial statements and proven adherence to ethical business conduct.

OBJECTIVE 18: To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties

Management statements:

- IAP complaints register compiled, updated regularly, and kept on site.
- Proven good-standing relationships with IAPs.
- Word-of-mouth social and environmental reputation is high.

iii) Potential risk of Acid Mine Drainage

Prospecting activities at Werda cannot result in acid mine drainage and therefore there are no potential risk of Acid Mine Drainage.

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

Not applicable. Prospecting activities at Werda cannot result in acid mine drainage.

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

Not applicable. Prospecting activities at Werda cannot result in 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

Not applicable. Prospecting activities at Werda cannot result in acid mine drainage.

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

Process water will most likely be obtained from a suitable borehole, as there is no surface water available nearby. Water will be pumped and transported via a number of pipelines to the processing area. Although it is not possible to confirm at this stage how much water will be used, it is estimated that a total volume of 18 000 L/hr and 40 000 m^3 per annum will be needed for the operation.

viii) Has a water use licence has been applied for?

A water use licence application is currently being compiled. This EIAr & EMPr is a requirement thereof and is to be included in the WULA application documentation package. Therefore the WULA will be lodged with Department of Water and Sanitation (Kimberley) as soon as this EIAr & EMPr has been completed and submitted at the DMR. Proof of the WULA submission will be submitted to the DMR's offices as soon as it has been lodged.

ix) Impacts to be mitigated in their respective phases

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
The clearing of vegetation for: • Access roads and haul roads • Surface infrastructure • Bulk sampling	Construction Operational	In total: ± 40 000 m^2 ± 400 m^2 ± 150 ha	- Minimise the impact on flora species; - Implementation of soil conservation management plan and erosion control; - Limit footprint and avoid the unnecessary removal of vegetation; - Biodiversity controls and management plan; - Control invasive and declared weeds and bush encroachers; - Appropriate design and development of stormwater controls; - Dust control and monitoring; - Noise control and monitoring; - Visual controls; - Avoidance of heritage resources. - Implementation of an emergency response procedure.	**NEMA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **NCNCA** restricts the large-scale harvesting of indigenous flora. **NFA** restricts activities regarding nationally protected trees. **NHRA** restricts activities regarding Heritage Resources. **NWA** (Reg 704) restricts activities in terms of proximity to watercourses. **CARA** regulates activities in terms of alien/invasive weeds and encroaching species.	Safety and control procedures always during any future construction, during bulk sampling activities and other planned vegetation clearance events.
The stripping and stockpiling of topsoil	Operational	In total: ± 500 m^2	- Stormwater management; - Erosion control; - Topsoil stockpiling management; - Cultural heritage management.	**NEMA** Integrated Environmental Management Principles**.**	Control procedures always during stripping and dumping activities; Monitoring of erosion after rainfall events; Regular monitoring and control of alien invasive plant species.

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
Open pit sampling	Operational	In total: ± 250 000 m^3 diamondiferous gravel	- Proper planning of excavations; - Promote use of PPE such as dust masks; - Access control; - Dust and noise control monitoring; - Cultural heritage management. - Stormwater management; - Erosion control; and - Emergency response procedure.	**NWA** protects water resources **NWA** (Reg 704) restricts activities in terms of proximity to watercourses. **NEMA** Integrated Environmental Management Principles. **NHRA** restricts activities regarding Heritage Resources.	Safety and control procedures always during excavation activities; Regular monitoring of noise and vibration; Regular monitoring of groundwater quality and yield.
The processing of a mineral resources • Processing plants	Operational	In total: ± 400 m^2	- Proper planning; - Promote use of PPE; - Access control; - Maintenance; - Dust and noise control monitoring; - Cultural heritage management. - Pollution and erosion control; - Storm water management; - Emergency response procedure.	**NEMA** Integrated Environmental Management Principles. **NHRA** restricts activities regarding Heritage Resources. **MHSA** provide for protection of health and safety of employees **OHSA** provide for protection of health and safety of people at work in connection with the use of plant and machinery.	Safety and control procedures always during processing and related activities; Regular monitoring of air quality and noise.
The development of temporary stockpiles: • Overburden • Product • ROM	Operational	Continuous; at a time: ± 5 000 m^2	- Placement planning to avoid resource sterilisation; - Access control; - Implementation of soil conservation management plan; - Waste management plan; - Biodiversity controls, management plan and monitoring; - Appropriate design and development of stormwater controls; - Dust control and monitoring; - Visual controls, concurrent rehabilitation; - Control alien/ invasive/ encroaching species; - Avoidance of heritage resources.	**NEMWA** regulates stockpiles created by prospecting/mining activities. **NEMBA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **NFA** restricts activities regarding nationally protected trees. **NHRA** restricts activities regarding Heritage Resources. **NWA** (Reg 704) restricts activities in terms of proximity to watercourses. **CARA** regulates activities in terms of alien/invasive weeds and encroaching species.	Safety and control procedures always during dumping activities; Monitoring of erosion after rainfall events; Regular monitoring and control of alien invasive plant species;

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
The backfilling of open pits	Operational, Rehabilitation	In total: ± 250 000 m^3	- Sound planning of rehabilitation according to post sampling topographical plan; - Access control; - Dust control and monitoring; and - Visual controls and concurrent rehabilitation.	**NEMA** Integrated Environmental Management Principles**.** **CARA** regulates activities in terms of alien/invasive weeds and encroaching species.	Safety and control procedures implemented regularly during life of operation; Monitoring of erosion after rainfall events; Regular monitoring and control of alien invasive plant species; Post-closure monitoring of rehabilitation success.
The construction of a slimes dam	Operational, Closure, Post-closure	In total (current): To be confirmed	- Proper design and planning; - Placement planning to avoid resource sterilisation; - Access control; - Implementation of soil conservation management plan; - Waste management plan; - Biodiversity controls, management plan and monitoring; - Appropriate design and development of stormwater controls; - Dust control and monitoring; - Visual controls and concurrent rehabilitation; - Avoidance of heritage resources; and - Emergency response procedure.	**NEMWA** regulates residue stockpiles created by prospecting/mining activities. **NEMBA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **NFA** restricts activities regarding nationally protected trees. **NHRA** restricts activities regarding Heritage Resources. **NWA** restricts activities in terms of proximity to watercourses and in terms of water uses**.**	Safety and control procedures implemented regularly during life of operation; Monitoring of erosion after rainfall events; Regular monitoring and control of alien invasive plant species; Post-mining monitoring of visual impact, slope stability and revegetation success.

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
Loading, hauling and transporting of ROM, product and material	Operational, Rehabilitation	Continuous; at a time: ± 2 km	- Proper activity planning; - Waste management plan; - Dust control and monitoring; - Allocate and adhere to speed limits; - Restrict traffic to demarcated areas; - Erect safety signage; and - Ensure that all drivers employed are certified with appropriate training levels for the required vehicle.	**NEMWA** regulates residue stockpiles created by prospecting/mining activities. **MHSA** provide for protection of health and safety of employees. **National traffic regulations** regulates general road safety rules	Active implementation of control and safety procedures during all transporting activities.
Water holding facilities, pipeline and storm water control • Water storage facility • Pipeline for transporting water	Operational	In total: To be confirmed To be confirmed	- Placement planning; - Access control; - Implement soil conservation; - Erosion management plan; - Biodiversity controls; - Appropriate design and development of stormwater controls; - Appropriate design and development of groundwater controls and monitoring; - Monitoring leaks in water storage and pipes; - Avoidance of heritage resources; and - Emergency response procedure.	**NEMBA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **NFA** restricts activities regarding nationally protected trees. **NHRA** restricts activities regarding Heritage Resources. **MHSA** provide for protection of health and safety of employees. **NWA** restricts activities in terms of water use.	Safety and control procedures actively implemented during life of operation; Regular monitoring and control of leakages.
Water abstractions • Groundwater abstraction from boreholes	Operational	Total annual rate: ± 40 000 m^3	- Monitor and control water use and perform regular monitoring on pumps for leakages/spillage. - Daily operational tasks water care works; - Continually monitor the effect of groundwater withdrawal on the groundwater aquifers.	**NWA** restricts activities in terms of water use. **NEMA** Integrated Environmental Management Principles**.**	Control procedures implemented regularly during life of operation; Annual monitoring of groundwater quantity; Post-mining monitoring of groundwater quantity.

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
Fuel storage and refuelling bays • Diesel tanks • Concrete bund walls and diesel depots	Operational	In total: 80 m^3 250 m^2	- Soil remediation measures; - Emergency response procedure; - Appropriate design and development of stormwater controls; and - Surface water and groundwater monitoring;	**MHSA** provide for protection of health and safety of employees. **NEMA** Integrated Environmental Management Principles**.**	Safety and control procedures actively implemented during life of operation; Regular monitoring and control of leakages and contamination.
Waste facilities • Industrial waste and salvage yards	Operational	In total: ± 3 000 m^2	- Proper design and planning; - Access control; - Implementation of soil conservation management plan; - Waste management plan; - Biodiversity controls, plans and monitoring; - Appropriate design and development of stormwater controls; - Wind control and monitoring; - Visual controls and proper rehabilitation; - Avoidance of heritage resources; - Emergency response procedure.	**NEMWA** regulates waste facilities. **NEMA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **NFA** restricts activities regarding nationally protected trees. **NHRA** restricts activities regarding Heritage Resources. **NWA** protects water resources**.**	Safety and control procedures actively implemented during life of operation; Regular monitoring and control of possible soil contamination. Regular monitoring and control of visual impacts and wind dispersed waste.
Supporting infrastructure: • Office complexes • Workshops • Ablution facilities • Pipelines transporting slimes • Pipeline transporting return water	Operational	In total: ± 200 m^2 ± 300 m^2 ± 30 m^2 To be confirmed To be confirmed	- Infrastructure design and placement planning; - Access control; - Soil conservation management plan; - Waste management plan; - Biodiversity controls; - Storm water controls; - Visual controls; - Rehabilitation; - Avoidance of heritage resources; - Emergency response procedures.	**NEMBA** restricts activities regarding nationally threatened or protected species. **NCNCA** restricts activities regarding provincially threatened or protected species. **MHSA** provide for protection of health and safety of employees. **NEMA** Integrated Environmental Management Principles**.**	Safety and control measures actively implemented during life of operation;

e) Impact Management Outcomes

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Roads and transport	Geology	No alteration of geological conditions linked to roads/transport.	*N/A*	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to roads/transport.	*N/A*	*N/A*	*N/A*
	Topography	No impact to topography is expected from roads/transport.	*N/A*	*N/A*	*N/A*
	Soil	Compaction is expected to occur where roads are constructed and on other areas experiencing regular vehicular movements.	Construction Operational	Ripping of roads, stripping of topsoil and concurrent rehabilitation.	Topsoil removed and preserved; topsoil with viable seedbed re-established.
	Land use / capability	Loss of land capability/land use with improper planning of road infrastructure and/or ineffective road rehabilitation; proliferation of alien vegetation after disturbances.	Construction Operational Closure	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Topsoil with viable seedbed re-established; alien invasive plant species eradicated; post-closure monitoring results prove re-established natural vegetation.
	Fauna	Construction of new roads will disturb fauna and alter/destroy natural faunal habitats. Accidental road kills are possible during vehicular movement.	Construction Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Topsoil removed and preserved; viable seedbed re-established; alien invasive plant species eradicated; relevant permits and licences obtained; affirmed zero illegal harvesting of plants and faunal killings; post-closure monitoring results indicate re-establishment of natural vegetation.
	Flora	Construction of new roads will disturb/destroy natural vegetation and potentially also flora of conservation concern.	Construction Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	No impact to groundwater is expected from roads/transport.	*N/A*	*N/A*	*N/A*
	Surface water	Alteration of watercourse characteristics during construction of haul roads in watercourses; sedimentation/contamination during runoff.	Operational	Limit operational footprint in river; accurate planning; effective rehabilitation; control contamination; storm water management.	Operational and post-closure monitoring results show no adverse effects to surface water quality.
	Air quality	Nuisance dust from hauling material and/or speeding on gravel roads.	Operational	Dust control; adherence to speed limit; air-quality monitoring.	Implementation of speed limit; results from monitoring show adequate dust levels.
	Noise	Noise/vibration created during vehicular movement.	Operational	Regular maintenance of vehicles and equipment; operate during day times; ensure adherence to the speed limit.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	Some haulage roads will be visible from the public gravel road.	Operational	Effective operational control measures and rehabilitation strategies.	Alien invasive plant species eradicated; post-closure monitoring results show re-establishment of natural vegetation.
	Traffic and road safety	Transporting staff and material includes potential safety risks to public road users and degradation of public road infrastructure.	Operational	Implement measures that ensure adherence to traffic rules and road legislation.	Implementation of traffic legislation; zero accident tolerance; no damage to public road networks and infrastructure.
	Heritage resources	The potential destruction of heritage resources during uncontrolled vehicular movement or when creating new roads.	Construction Operational	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Excavations	Geology	Alteration of geological conditions during excavations.	Operational	Employ effective rehabilitation strategies.	Pits backfilled with source material.
	Minerals	No sterilisation of mineral resources linked to excavations.	*N/A*	*N/A*	*N/A*
	Topography	Excavations will unearth the natural topography/create voids.	Operational	Effective rehabilitation strategies to restore surface topography.	Natural topography restored.
	Soil	Excavations will remove fertile soil layers/seed bank and disturb the natural soil structure; runoff erosion on slopes.	Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Topsoil removed and preserved; topsoil with viable seedbed re-established.
	Land use / capability	Loss of land capability/land use caused due to impacts to soils, ineffective rehabilitation of voids and/or proliferation of alien vegetation after disturbances.	Operational Closure	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Topsoil with viable seedbed re-established; alien invasive plant species eradicated; post-closure monitoring results prove re-established natural vegetation.
	Fauna	Excavations will disturb fauna and alter/destroy natural faunal habitats. Accidental kills are possible during excavations.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Topsoil removed, preserved and viable seedbed re-established; alien invasive plant species eradicated; relevant permits and licences obtained; zero illegal harvesting of plants / zero faunal killings; post-closure monitoring results indicate re-establishment of natural vegetation.
	Flora	Excavations will disturb/destroy natural vegetation and potentially also flora of conservation concern.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	Alteration of groundwater resource characteristics and limitations of groundwater recharge due to excavations.	Operational	Effective contamination control; effective management and control measures; abide by legal requirements.	Operational and post-closure monitoring results show no adverse effects to ground water resources.
	Surface water	Alteration of watercourse characteristics during excavations in the pans and stream. Contamination of surface water from machinery.	Operational	Limit operational footprint within the watercourses; accurate planning; effective rehabilitation strategies to restore resource characteristics; storm water management.	Relevant licence obtained; operational and post-closure monitoring results show no adverse effects to watercourse characteristics; watercourses rehabilitated.
	Air quality	The potential of nuisance dust being created during excavation activities.	Operational	Dust control; air-quality monitoring.	Monitoring results indicate adequate levels of dust particles within site vicinity.
	Noise	Potential noise/vibrations created during excavation activities.	Operational	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	Excavation activities will be visible from the public gravel road and farmworkers/residents.	Operational	Effective operational control measures and rehabilitation strategies.	Depressions backfilled; alien invasive plant species eradicated; natural vegetation re-established after closure.
	Traffic and road safety	No impact to traffic/road safety is expected from excavations.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during excavation activities.	Operational	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legislation.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Temporary dumping / storage areas	Geology	No impact to geological conditions linked to dumping/storage.	*N/A*	*N/A*	*N/A*
	Minerals	No impact to mineral resources linked to dumping/storage.	*N/A*	*N/A*	*N/A*
	Topography	Temporary waste dumps/stockpile areas will change the natural topography by adding features/slopes to the landscape.	Operational	Restore surface topography by removing all dumps/storage facilities and material; conduct general surface rehabilitation.	Natural topography restored.
	Soil	Soil compaction where temporary dumps are located; potential increased runoff and erosion during storm events; potential contamination of soil from leaking hazardous fluids.	Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Hazardous fluids contained in demarcated containers; topsoil with viable seedbed re-established.
	Land use / capability	Temporary loss of land capability/land use where dumps are located; permanent loss in terms of impacts to soils/ineffective rehabilitation.	Operational Closure	Careful planning; effective rehabilitation strategies; soil management.	Dumps/storage areas cleared; alien invasive species eradicated; post-closure re-establishment of natural vegetation.
	Fauna	Dumping activities will disturb fauna and alter/disturb their natural habitats; temporary storage of waste material (e.g. scrap) potentially poses a direct safety risk to fauna.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Hazardous fluids contained in demarcated containers; environmental awareness policies; topsoil preservation and seedbed re-establishment; alien invasive species eradicated; relevant permits and licences obtained; zero illegal harvesting of plants / zero faunal killings; post-closure monitoring results indicate re-establishment of natural vegetation.
	Flora	The destruction of natural vegetation and the potential loss in flora of conservation concern through placement of temporary dumps/storage areas.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	The potential contamination of ground water resources from temporarily stored material that leak hazardous fluids.	Operational	Contamination control; abide by legal requirements.	Hazardous fluids contained; operational and post-closure monitoring results show no adverse effects to groundwater.
	Surface water	Indirect sedimentation/contamination during runoff episodes.	Operational	Contamination control measures and storm water management.	Monitoring results show no adverse effects to surface water quality.
	Air quality	Nuisance dust from material that are dumped / stockpiled.	Operational	Dust control; air-quality monitoring.	Monitoring results indicate adequate levels of dust particles within site vicinity.
	Noise	Noise/vibration created during dumping activities.	Operational	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	These temporary dumps/storage areas will be visible to the immediate surroundings.	Operational	Effective operational control measures and rehabilitation strategies.	Dumps/storage areas cleared; alien invasive species eradicated; post-closure re-establishment of natural vegetation.
	Traffic and road safety	No impacts to traffic/road safety expected from dumping/ storage activities.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during dumping or constructing of temporary storage facilities.	Operational	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Residue disposal dam	Geology	Alteration of geological conditions during excavation of dams.	Construction	Employ effective rehabilitation strategies.	Backfill with source material.
	Minerals	Sterilisation of mineral resources due to poor placement of non-transient slimes dams.	Construction	Apply modern technologies and methodologies; accurate planning.	Dams constructed on already mined areas/where no mineral potential occurs.
	Topography	Slimes dams will change the natural topography by adding features/slopes to the landscape.	Construction Operational Closure	Employ effective rehabilitation strategies to restore surface topography by reclamation or by stabilising slopes of slimes dams	Natural topography restored; slopes downgraded and low runoff potential established.
	Soil	Soil compaction is expected to take place where slimes dam walls are constructed; excavation of dams will remove fertile soil layers/seed bank and disturb the natural soil structure; potential increased runoff and erosion during storm events.	Construction Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Topsoil removed and preserved; topsoil with viable seedbed re-established.
	Land use / capability	Loss of land capability/land use where slimes dams are located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Alien invasive plant species eradicated; post-closure monitoring results indicate re-establishment of natural vegetation.
	Fauna	Construction of slimes dams will disturb fauna and alter/disturb their natural habitats; sludge potentially poses a direct safety risk to fauna.	Construction Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Topsoil removal, preservation and viable seedbed re-establishment; alien invasive species eradicated; relevant permits and licences obtained; zero illegal harvesting of plants/zero faunal killings; post-closure re-established natural vegetation.
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern through placement of slimes dams.	Construction	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	No impact to groundwater is expected from slimes dams.	*N/A*	*N/A*	*N/A*
	Surface water	Indirect sedimentation during runoff episodes.	Operational	Contamination control measures and storm water management.	Relevant licences obtained; monitoring results show no adverse effects to surface water quality.
	Air quality	Nuisance dust from material that constitutes the slimes dam walls.	Operational	Dust control; air-quality monitoring.	Monitoring results indicate adequate levels of dust particles within site vicinity.
	Noise	Noise/vibration created during construction of slimes dams and slight potential noise created by dewatering/desanding machinery.	Construction Operational	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	The slimes dams will be visible to the immediate surroundings.	Construction Operational Closure	Effective operational control measures and rehabilitation strategies.	No visual intrusion of skyline; alien invasive species eradicated; post-closure re-establishment of natural vegetation.
	Traffic and road safety	No impacts to traffic/road safety expected from slimes dams.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of slimes dams.	Construction	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Plant & processing areas (plant sites)	Geology	No impact to geological conditions linked to plant sites.	N/A	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to plant sites.	N/A	*N/A*	*N/A*
	Topography	Temporary ramps and other related structures will add features to the landscape.	Construction Operational	Restore surface topography by removing all machinery/infrastructure and rehabilitate the surface.	Natural topography restored.
	Soil	Soil compaction is expected to take place where plant sites are constructed; activities will disturb fertile soil layers/seed bank and alter the natural soil structure; potential increased runoff and erosion during storm events; contamination from spillages.	Construction Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Records of contamination control kept; hazardous fluids are contained in demarcated containers; topsoil removed and preserved; topsoil with viable seedbed re-established.
	Land use / capability	Loss of land capability/land use where plant sites are located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Topsoil with viable seedbed re-established; alien invasive plants eradicated; post-closure re-establishment of natural vegetation.
	Fauna	Construction of plant sites will disturb fauna and alter/disturb their natural habitats; site activities will deter fauna; plant site machinery potentially poses a direct safety risk to fauna.	Construction Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Hazards contained; topsoil removed, preserved and viable seedbed re-established; alien invasive plants eradicated; permits and licences obtained; zero illegal harvesting of plants / zero faunal killings; post-closure re-establishment of natural vegetation.
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern during construction of- and activities at the plant sites.	Construction	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	Direct overutilization/wastage of water extracted from boreholes. The potential contamination of ground water resources from spillages/leakages of hazardous fluids.	Operational	Contamination control; abide by legal requirements.	Relevant licences obtained; hazardous fluid containment; monitoring results show no adverse effects to ground/ surface water resources; records of water use kept on site.
	Surface water	Indirect contamination during runoff episodes.	Operational	Contamination control measures and storm water management; controlled water use.	
	Air quality	Nuisance dust from material that are processed at the plant sites.	Operational	Dust control; air-quality monitoring.	Monitoring results indicate adequate levels of dust particles within site vicinity.
	Noise	Noise/vibration created during construction of plant sites and as well as by the plant and processing machinery during the operation.	Construction Operational	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	The plant sites will be visible to the immediate surroundings and possibly from the public gravel road.	Construction Operational	Effective operational control measures and rehabilitation strategies.	Infrastructure removed; alien invasive plants eradicated; post-closure re-establishment of natural vegetation.
	Traffic and road safety	No impacts to traffic/road safety expected from plant sites.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of plant sites; uncontrolled site activities.	Construction Operational	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
Associated infrastructure	Geology	Alteration of geological conditions during the excavation for any potential foundations of associated infrastructure.	Construction	Employ effective rehabilitation strategies.	Backfill depressions with source material.
	Minerals	Sterilisation of mineral resources due to poor placement of permanent infrastructure.	Construction	Apply modern technologies and methodologies; accurate planning.	Construction on already mined areas/where no mineral potential occurs.
	Topography	Associated infrastructure will alter the natural topography by adding features to the landscape.	Construction Operational Closure	Restore surface topography by removing all temporary infrastructures and conducting general surface rehabilitation.	Natural topography restored; slopes downgraded and low runoff potential established.
	Soil	Compaction where infrastructure is located; destruction/ disturbances to fertile soil layers/seed bank and alteration of the natural soil structure; potential increased runoff/erosion during storm events; contamination from spillages/leakages.	Construction Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil resources/fertility.	Records of contamination control kept; hazardous fluids are contained in demarcated containers; topsoil removed and preserved; topsoil with viable seedbed re-established.
	Land use / capability	Loss of land capability/land use where associated infrastructure is located; loss in terms of impacts to soils/ineffective rehabilitation; proliferation of invasive species.	Construction Operational Closure	Careful planning; effective rehabilitation strategies; soil management; eradicate/ control alien invasive/encroaching species.	Topsoil with viable seedbed re-established; alien invasive plants eradicated; post-closure re-establishment of natural vegetation.
	Fauna	Construction of infrastructure will disturb fauna and alter/ disturb their natural habitats; activities will deter fauna; some infrastructure will pose safety risks to fauna (e.g. power lines).	Construction Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Hazards contained; topsoil removed, preserved and viable seedbed re-established; alien invasive plants eradicated; permits and licences obtained; zero illegal harvesting of plants / zero faunal killings; post-closure re-establishment of natural vegetation.
	Flora	The disturbance/destruction of natural vegetation and potential loss in flora of conservation concern during construction of-associated infrastructure.	Construction	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	The potential contamination of ground water resources from spillages/leakages of hazardous fluids.	Operational	Contamination control; abide by legal requirements.	Hazardous fluid containment; monitoring results show no adverse effects to ground/ surface water resources.
	Surface water	Indirect contamination during runoff episodes.	Operational	Contamination control measures and storm water management.	
	Air quality	No impact to air quality linked to associated infrastructure.	*N/A*	*N/A*	*N/A*
	Noise	Noise and vibration created during construction of infrastructure and limited noise created by associated infrastructure (e.g. generators) during the operation.	Construction Operational	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Monitoring results indicate adequate levels of noise and vibration levels within site vicinity.
	Visual	Associated infrastructure is visible to the immediate surroundings.	Construction Operational	Effective operational control measures and rehabilitation strategies.	Temporary infrastructure removed; alien invasive plants eradicated; post-closure re-establishment of natural vegetation.
	Traffic and road safety	No impacts to traffic/road safety expected from associated infrastructure.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources during construction of associated infrastructure.	Construction	Preservation/protection of heritage/cultural resources; reporting structure for uncovered resources; adherence to legal requirements.	Identified heritage resources fenced off and buffered with no-go zones; Heritage register kept on site.
	IAPs	Potential legal risks/forfeited credibility when the relevant legislation/agreements are not adhered to or when unethical operations/activities/actions are conducted.	Construction Operational Closure	Ensure continuous and transparent communication with IAPs; employ ethical operational policies; adhere to legislation.	IAP complaints register up to date and kept on site; word-of-mouth social and environmental reputation is high.

f) Impact Management Actions

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
These have collectively been described in the above tables of section 1 d) ix) and section 1 e) of this EMPR.				

g) 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.

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated and that the environment is returned to its original state, based on the baseline information, as far as is practically possible. Therefore, all rehabilitated areas should be left in a stable, self-sustainable state and proof of this should be submitted at closure.

The baseline environmental information is usually determined by reviewing all applicable information available for the site and the overall region. This information is gathered through a combination of on-site observations, spatial information and specialist baseline studies. Information regarding current land uses and existing biophysical environment gathered from interested and affected parties during the public consultation process are also taken into consideration when describing the baseline environment.

General closure objectives include the following:

- Adhere to all statutory and other legal requirements;
- Identify potential post-closure land uses in consultation with the future landowner, surrounding land owners and land users; well in advance, before closure and preferably during the operational phase of the mine;
- Remove, decommission and dispose all infrastructure, and ensure that these processed comply with all conditions contained in the MPRDA
- Rehabilitate disturbed land to a state suitable for its post-closure uses, and which are stable, sustainable and aesthetically acceptable on closure;
- Rehabilitate disturbed land and mine residue deposits to a state that facilitates compliance with applicable environmental quality objectives;
- Physically stabilise remaining structures to minimise residual risks;
- Ensure the health and safety of all stakeholders during closure and post closure and that future land users are not exposed to unacceptable risks;
- To alleviate the negative socio-economic impacts that will result from closure;
- Promote biodiversity and ecological sustainability as far as practically possible;
- Keep relevant authorities informed of the progress of the decommissioning phase;
- 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, for two years after closure, or for long as deemed necessary at the time and to submit such monitoring data to the relevant authorities;
- Maintain required facilities and rehabilitated land until closure.

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

The closure objectives have been consulted with the landowner during the consultation process and these discussions will be on-going.

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

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

Final rehabilitation of the site is expected to be within 5 years after the right has been granted. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.

<u>Dismantling of processing plant and related structures</u>

- The processing plant in total is expected to cover an area of ± 400 m^2, of which all should be dismantled and removed. This includes related infrastructures, equipment, machinery, screening plant, and other items used during the processing activities, such as conveyor belts, pipelines and powerlines.

- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of steel buildings and structures

- All steel buildings and structures are expected to amount to 500 m^2. These include mobile stores, workshops, offices, ablutions, water tanks, etc. Those in disuse and which cannot be sold, donated, or used for future purposes should be dismantled and removed or demolished.

- Any associated foundations associated with dismantled steel buildings and structures should also be demolished to 1 m below ground level;

- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of reinforced concrete buildings and structures

- All brick buildings and concrete structures are expected to amount to ± 250 m^2. These include French drains, wash bays, refuelling depots and concrete floors. Those in disuse and which cannot be donated or used for future purposes should be demolished.

- The foundations of these buildings should also be demolished and to a depth of 1 m below ground level;

- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Rehabilitation of access roads

- Mine roads in total, is expected to cover an area of 4 000 m^2. After general site rehabilitation has been completed, all redundant roads should be ripped or ploughed.

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition and rehabilitation of electrified railway lines

There are no electrified railway lines associated with the Werda Prospecting activities.

Demolition and rehabilitation of non-electrified railway lines

There are no non-electrified railway lines associated with the Werda Prospecting activities.

Demolition of housing and/or administration facilities

There are no other housing or administration facilities associated with the Werda Prospecting activities, other than those in the form of mobile containers. These were however included in the section for demolition of steel buildings and structures.

Opencast rehabilitation including final voids and ramps

- Opencasts and ramps associated with the Werda Prospecting activities are expected to cover 5 ha.

- In-filling of the pits should take place concurrently and by obtaining material from the closest adjacent excess material heaps;

- The topography should then be shaped to the natural contours;

- The prepared surfaces should finally be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Sealing of shafts, adits and inclines

There are no shafts associated with the Werda Prospecting activities.

Rehabilitation of overburden and spoils

- The total final overburden and spoils are estimated to amount to 0.5 ha and includes waste dumps as well as earth walls. Pre-planning should be conducted in order decide the fate of these features. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.

- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Rehabilitation of processing waste deposits and evaporation ponds with pollution potential

No processing waste deposits and evaporation ponds with pollution potential are associated with the Werda Prospecting activities.

Rehabilitation of processing waste deposits and evaporation ponds with no pollution potential

- The processing waste deposits on the Werda Prospecting area is estimated to cover an area of ± 3 ha. Pre-planning should be conducted in order decide the fate of this feature. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.

- The toe trenches should be backfilled by obtaining material from the closest adjacent heaps deemed appropriate for such purpose;

- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- For backfilled trenches the topography should be shaped to be in line with the natural contours, but where compaction occurred, the areas should be ripped to a depth no deeper than 300 mm;

- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Storm water management

Storm water runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed to (1) prevent uncontrolled runoff from the residue deposit, which in turn creates surface erosion and resultant damage to the cover material and could also expose deposited material; (2) route the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure; and (3) allow for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

Current practice allows for two broad approaches to handle runoff arising from the rehabilitated residue deposit:

- Collection of the runoff arising from the benches in chutes to route this water to the toe of the residue deposit. Chutes must be constructed from concrete or other suitable material to cater for the high flow velocities that could be encountered.

- Collection of runoff arising from the modified outer slopes on the benches itself and allowing this water to evaporate on the benches. Under these circumstances bench width could be wider than the normal 5 m width, with parapet walls provided on the outer edges of the benches. These walls must be designed for at least the 1:200 year rainfall events. The residue deposit material must also be suitable for this type of storm water contaminant and must not be susceptible to slumping under saturated conditions.

Rehabilitation of subsided areas

The EAP is not currently aware of any areas of subsidence on site. However, any potential for such occurrences should be actively investigated and should be included in the rehabilitation plan, if and when such areas are identified.

General surface rehabilitation

- Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. General surface rehabilitation encompasses the reinstatement of natural topography, the top soiling and the re-vegetation of all those areas where infrastructure have been dismantled and removed or demolished. It also includes any industrial waste or scrap material that need to be removed from site. The total area that will need general surface rehabilitation at the time mine closure is estimated to be ± 0.5 ha.

River diversions

No river diversions are planned.

Fencing

It is not known at this stage if any fencing is planned.

Water management

No treatment of water will be necessary for the Werda Prospecting activities.

Maintenance and aftercare

Maintenance and aftercare should be planned for two to three years after mine production have ceased and should include the following:

- Annual fertilising of rehabilitated areas.
- Monitoring of surface and subsurface water quality,
- Control of alien plants, and
- General maintenance, including rehabilitation of cracks and subsidence.
- Erosion control and monitoring of the slopes of the slimes dams;

Specialist study

- A screening level risk assessment should be completed by a specialist environmental practitioner during mine closure in order to ensure that all of the rehabilitation objectives have been met and that all of the potential risks have been eliminated and/or are controlled. This assessment should specifically emphasis on those risks relating to river disturbances, groundwater quality and slope stabilities, but should not neglect progress made in natural vegetation restoration or success in alien invasive eradications. The current average specialist fees are estimated at R 50 000.

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

The rehabilitation plan was primarily designed with the closure objectives in mind and therefore it relates to all the various objectives as set out above in Section 1) g) 1) a) of this EMPR. In general, the main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the prospecting area to a condition acceptable for obtaining a closure certificate. Each and every element in the rehabilitation plan was designed in order to meet these closure objectives.

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

The current, preliminary mine closure and rehabilitation costs amounts to

R 1 900 367.83

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

It is hereby confirmed that the financial provision, as determined, should be provided to the DMR by HC van Wyk Diamonds.

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount
1	Dismantling of processing plant and related structures (including overland conveyors and pow erlines)	m3	120.00	12.21	1	1	R1 465.20
2 (A)	Demolition of steel buildings and structures	m2	500.00	170.13	1	1	R85 065.00
2(B)	Demolition of reinforced concrete buildings and structures	m2	250.00	250.72	1	1	R62 680.00
3	Rehabilitation of access roads	m2	4 000.00	30.44	1	1	R121 760.00
4 (A)	Demolition and rehabilitation of electrified railw ay lines	m	0.00	295.49	1	1	R0.00
4 (A)	Demolition and rehabilitation of non-electrified railw ay lines	m	0.00	161.18	1	1	R0.00
5	Demolition of housing and/or administration facilities	m2	0.00	340.26	1	1	R0.00
6	Opencast rehabilitation including final voids and ramps	ha	5.00	173 174.97	0.52	1	R450 254.92
7	Sealing of shafts adits and inclines	m3	0.00	91.33	1	1	R0.00
8 (A)	Rehabilitation of overburden and spoils	ha	0.50	118 912.29	1	1	R59 456.15
8 (B)	Rehabilitation of processing w aste deposits and evaporation ponds (non-polluting potential)	ha	3.00	148 103.10	1	1	R444 309.30
8 (C)	Rehabilitation of processing w aste deposits and evaporation ponds (polluting potential)	ha	0.00	430 161.62	1	1	0.00
9	Rehabilitation of subsided areas	ha	0.00	99 571.13	1	1	R0.00
10	General surface rehabilitation	ha	0.50	94 198.59	1	1	R47 099.30
11	River diversions	ha	0.00	94 198.59	1	1	R0.00
12	Fencing	m	0.00	107.45	1	1	R0.00
13	Water management	ha	0.00	35 816.95	1	1	R0.00
14	2 to 3 years of maintenance and aftercare	ha	3.00	12 535.93	1	1	R37 607.79
15 (A)	Specialist study	Sum	50 000.00	1.00	1	1	R50 000.00
15 (B)	Specialist study	Sum				1	R0.00
					Sub Total 1		R1 359 697.65

1	Preliminary and General	163 163.72	**weighting factor 2** 1.05	R171 321.90
2	Contingencies	135 969.77		R135 969.77
			Subtotal 2	R1 666 989.32
			VAT (14%)	R233 378.50
			Grand Total	**R 1 900 367.83**

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

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Excavations; dumping and storage area; slimes dams; plant sites and processing areas; other infrastructure areas.	Alteration of the natural topography.	- Monitoring of topography shaping by conducting specialised surveying; - Monitoring of re-vegetation success by visual inspection, plant surveys and fixed-point photography; - Monitoring of erosion caused by rainfall, flooding or water leakages by visual on-point inspections and fixed-point photography.	Qualified surveyor should monitor the topography shaping; an ECO or independent EAP should conduct general monitoring, while the site manager or foreman should ensure that these activities take place.	**Monitoring**: Visual inspections of re-vegetation progress monthly and post-closure, monitoring of erosion after rainfall/flooding; surveying after completion of topography shaping and/or during closure. Active visual inspections of leaking pipes and water features. **Reporting**: After every monitoring or surveying procedure has been completed. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations; dumps and storage area; slimes dams; plant sites and processing areas; other infrastructure areas.	Loss of topsoil, sterilisation, compaction and contamination of soil, erosion.	- Monitoring of topsoil storage by visual on-point inspection; - Monitoring of re-vegetation success by visual inspection, plant surveys and fixed-point photography; - Monitoring of groundwater quality by conducting specialised tests; - Monitoring of spillages or leakages by visual on-point inspections and by taking photographs; - Monitoring of contaminant containment by visual on-point inspections; - Monitoring of erosion caused by rainfall/flooding or water leakages by visual on-point inspections and fixed-point photography.	ECO, SHE officer, independent EAP or SHE consultant should conduct general monitoring, a groundwater specialist should conduct groundwater monitoring, while the site manager or foreman should ensure these activities take place.	**Monitoring**: Groundwater monitoring annually and post-closure, visual inspections of topsoil storage procedures and areas concurrently, monitoring of contaminant containment weekly, monitoring of erosion after rainfall/flooding events, active monitoring of spills and leakages as well as active visual inspections of leaking pipes and water features. **Reporting**: After every incident and after every monitoring procedure has been completed. **Impact Management Action**: Immediately after significant incidents.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Roads and transport; excavations; dumps and storage area; slimes dams; plant sites and processing areas; other infrastructure areas.	Pristine habitat destruction, loss of plant species of conservation concern, illegal harvesting of bulbs, proliferation of alien invasive species, loss of land capability/use.	- Monitoring of revegetation success by visual inspections, plant surveys and by fixed-point photography; - Monitoring of alien invasive species eradication success by visual inspections and fixed-point photography and by taking GPS points; - Monitoring illegal harvesting incidents by visual inspections by foot or by word-of-mouth and by taking photographs and GPS points; - Monitoring of environmental awareness programmes by auditing the attendance registers and agendas/programmes;	ECO or independent EAP should conduct monitoring, while the site manager or foreman should ensure monitoring and management actions take place.	**Monitoring:** Visual inspections of re-vegetation progress and alien invasive proliferation monthly and post-closure, auditing of Environmental Awareness programme registers quarterly, active monitoring of illegal harvesting. **Reporting:** After every incident, after every monitoring procedure has been completed, and also after every awareness training programme has been presented. **Impact Management Action:** Immediately after significant incidents.
Roads and transport; excavations; dumps and storage area; slimes dams; plant sites and processing areas; other infrastructure areas.	Disturbances to fauna, faunal habitat fragmentation and destruction, accidental deaths or intentional killing of faunal species	- Monitoring of birds along powerlines for collision or electrocution by foot and by taking photographs and GPS points; - Monitoring of environmental awareness programmes by auditing the attendance registers and agendas/programmes; - Monitoring of faunal deaths and injury on site by word-of-mouth or by visual inspections on foot and by taking photographs and GPS points.	ECO, independent EAP or ecological consultant should conduct monitoring and environmental awareness training, while the site manager or foreman should ensure these activities and management actions take place.	**Monitoring**: Visual inspections of powerlines weekly, auditing of Environmental Awareness programme registers quarterly, active monitoring of faunal deaths or injuries. **Reporting**: After every incident and also after every awareness training programme has been presented. **Impact Management Action**: Immediately after significant incidents.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Excavations; storage areas; plant sites and processing areas; other infrastructure areas.	Depletion of aquifers, contamination of groundwater resource, wastage/ overutilization of water.	- Monitoring of groundwater use; - Monitoring of groundwater quality and aquifer yield by conducting specialised tests; - Monitoring of spillages or leakages by visual on-point inspections and by taking photographs; - Monitoring of contaminant containment by visual on-point inspections;	ECO, SHE officer, independent EAP or SHE consultant should conduct general monitoring, a groundwater specialist should conduct groundwater monitoring, while the site manager or foreman should ensure these activities take place.	**Monitoring**: Groundwater monitoring annually and post-closure, visual inspections of contaminant containment weekly, active monitoring of spills and leakages. **Reporting**: After every incident and after every monitoring procedure has been completed. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations; dumps and storage areas; slimes dams; plant sites and processing areas; other infrastructure areas.	Alterations of watercourse characteristics, contamination/sedimentation of surface water resources.	- Monitoring of surface water quality by conducting specialised tests; - Monitoring of spillages or leakages by visual on-point inspections and by taking photographs; - Monitoring of contaminant containment by visual on-point inspections; - Monitoring of erosion caused by rainfall/flooding of diversions by visual on-point inspections and fixed-point photography.	ECO, SHE officer, independent EAP or SHE consultant should conduct general monitoring, a surface water specialist should conduct water quality monitoring, while the site manager or foreman should ensure these activities take place.	**Monitoring**: Surface water monitoring annually and post-closure, visual inspections of contaminant containment weekly, active monitoring of spills and leakages, monitoring of erosion after rainfall/flooding. **Reporting**: After every incident and after every monitoring procedure has been completed. **Impact Management Action**: Immediately after significant incidents.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Roads and transport; excavations; dumps and storage areas; slimes dams; plant sites and processing areas.	Nuisance dust affecting air quality.	- Dust monitoring along roads, topsoil storage area, waste dumps, stockpiles, slimes dams and processing plant by conducting specialised tests; - Monitor speed and traffic incidents with speed monitoring devices installed in vehicles.	SHE officer, or appointed SHE consultant should conduct monitoring, while the site manager or foreman should ensure monitoring and management actions takes place.	**Monitoring**: Visual inspections daily, dust monitoring tests quarterly, active speed monitoring. **Reporting**: After every incident and quarterly after monitoring results have been released. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations; dumps and storage areas; slimes dams; plant sites and processing areas, other infrastructure areas.	Noise and vibration from construction/operational activities, vehicular movement.	- Monitoring of ambient noise and vibration by conducting specialised tests. - Monitor speed and traffic incidents with speed monitoring devices installed in vehicles.	SHE officer or independent EAP or SHE consultant should conduct monitoring, while the site manager or foreman should ensure that monitoring takes place.	**Monitoring**: Noise and vibration monitoring tests quarterly, active speed monitoring. **Reporting**: After every incident and quarterly after monitoring results have been released. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations;, dumps and storage areas; slimes dams; plant sites and processing areas, other infrastructure areas.	Visual intrusions by features and infrastructure, and aesthetic nuisances caused by dispersed waste and proliferation of alien vegetation.	- Monitoring the skyline from surrounding areas by fixed-point photography; - Monitoring of re-vegetation success by visual inspection, plant surveys and fixed-point photography; - Monitoring of wind dispersed waste by visual inspection on foot.	ECO, SHE officer or any other appointed person should conduct monitoring, while the site manager or foreman should ensure that monitoring takes place.	**Monitoring**: Visual inspections of skyline baseline and post-closure, active visual inspections of wind dispersed waste. **Reporting**: Reporting on skyline intrusions post-closure and weekly reporting on wind dispersed waste. **Impact Management Action**: Immediately after significant incidents.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Roads and transport	Safety risks to public road users and degradation of public road infrastructure.	- Monitor speed and traffic incidents with speed monitoring devices installed in vehicles. - Monitoring the condition of the road.	SHE officer or any other appointed person should conduct monitoring, while the site manager or foreman should ensure that monitoring takes place.	**Monitoring**: Active speed and road condition monitoring. **Reporting**: After every monitoring procedure has been completed and after every incident. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations, dumps and storage areas; slimes dams; plant sites and processing areas, other infrastructure areas.	Disturbances and destruction of heritage resources.	- Monitoring the condition of significant heritage sites by visual inspection and fixed-point photography.	ECO, SHE officer or any other appointed person should conduct monitoring, while the site manager or foreman should ensure that monitoring takes place.	**Monitoring**: Visual inspections of all identified heritage sites bi-monthly. **Reporting**: After every monitoring procedure has been completed. **Impact Management Action**: Immediately after significant incidents.
Roads and transport; excavations; dumps and storage areas; slimes dams; plant sites and processing areas, other infrastructure areas.	Legal risks/forfeited credibility associated with legal/ethical contraventions.	- Monitoring of the complaints management system.	Any appointed person should conduct monitoring, while the site manager or foreman should ensure that monitoring takes place.	**Monitoring**: Active updates to complaints register, monthly inspections of the complaints register. **Reporting**: After every monitoring procedure has been completed. **Impact Management Action**: Immediately after significant incidents.

i) Indicate the frequency of the submission of the performance assessment report.

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

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

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

j) 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 following:
    - 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; and

- 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.

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

It is the responsibility of management to ensure that all employees, contractors and visitors are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible. Environmental awareness should be part of the existing training and development plan. Key personnel with environmental responsibilities should be identified and the following principles should be applied:

- Procedures should be developed to facilitate training of employees, on-site service providers and contractors;

- Environmental awareness should focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;

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

- There should be an ongoing system of identifying training needs.

- An environmental, health and safety induction programme should be provided to all employees, contractors and visitors prior to commencing work or entering the site, and they should sign acknowledgement of the induction. An attendance register and agenda/programme should be filed for each induction.

- A daily “toolbox talk” should be held prior to commencing work, which will include discussions on health, safety and environmental considerations. The toolbox talks should be led by the site manager or the appointed supervisor/s.

- Refresher training should also be given to permanent employees and long-term contractors on an annual basis, to ensure that all are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

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

- General environmental awareness, which incorporates environmental, ecological and heritage elements;

- The mine policies and vision concerning environmental management;

- Legal requirements;

- Mine activities and their potential impacts;

- Different management measures to manage identified impacts;

- Mine personnel’s role in implementing environmental management objectives and targets.

- Environmental awareness topics to be covered in training should include:
  - Natural resource management and conservation;
  - Biodiversity awareness and conservation principles;
  - Heritage resource awareness and preservation principles;
  - Hazardous substance use and storage;
  - Waste management; and
  - Incident and emergency actions and reporting;

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

Environmental incident reporting will be a vital part of communication in order to deal with risks and ultimately avoid pollution or the degradation of the environment. Such communication should take place through the management, administrative and worker sectors of the operation, as well as contractors and visitors. Employees should be required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigation actions can be implemented timeously. In the event of an environmental incident, the reporting procedure as indicated in the table below should be followed.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTIONS REQUIRED
Person causing or observing the incident	The first person causing or observing the incident shall report the incident to an immediate supervisor where the environmental incident is observed.
Line management in the relevant area of responsibility where the incident occurred	Line management in the relevant area of responsibility where the incident occurred shall: ▪ Investigate the incident and record the following information: - How the incident happened; - The reasons the incident happened; - How rehabilitation or clean up needs to take place; - The nature of the impact that occurred; - The type of work, process or equipment involved; - Recommendations to avoid future such incidents and/or occurrences; ▪ Inform the environmental manager/ECO and the Operations Manager on a daily basis of all incidents that were reported on site; ▪ Consult with the relevant department/person for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups). ▪ Assist the Environmental Manager and/or Operations Manager with applicable data in order to accurately capture the incident into the reporting database; ▪ Ensure that remediation measures are implemented as soon as possible.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTIONS REQUIRED
Site managers	The site managers shall: ▪ Forward a copy of the incident form to other line managers; ▪ Forward a copy of the incident form to the Environmental manager/ECO; ▪ Inform the relevant department/person on a weekly basis of the incident by e-mail or by submitting a copy of the incident report. Once a High Risk Incident (any incident which results from a significant aspect and has the potential to cause a significant impact on the environment) occurred it must be reported immediately to the Environmental Manager and the Operations Manager by telephone or email to ensure immediate response/action. ▪ Forward a copy of the completed Incident Reporting Form (and where applicable a copy of the incident investigation) to the relevant department/person.
Environmental manager/ECO	The appointed environmental manager or ECO shall: ▪ Complete an incident assessment form to assess what level of incident occurred; ▪ Make recommendations for clean-up and/or appropriate alternate actions; ▪ Enter actions necessary to remediate environmental impacts into the database in conjunction with the responsible line manager; ▪ Enter the incident onto the database in order to monitor the root causes of incidents; ▪ Include the reported incidents in an appropriate monthly/quarterly report; ▪ Highlight all incidents for discussion at HSEC meetings.

k) Specific information required by the Competent Authority

According to Section 41(3) of the MPRDA the holder of a prospecting right must annually assess (and revise, if necessary) the total quantum of environmental liability for the operation and ensure that financial provision are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-operation liability.

An Annual Rehabilitation Plan should be developed to match the various requirements set out in the NEMA regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the site at that time.

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

2) UNDERTAKING

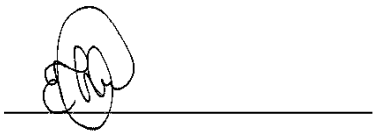
The EAP herewith confirms:

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

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

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

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



Dr Elizabeth (Betsie) Milne

- END -