November 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: WEDBERG COMMUNAL PROPERTY ASSOCIATION

TEL NO: 053 551 0089
FAX NO: 086 609 8740
POSTAL ADDRESS: PO BOX 82, WINDSORTON, 8510
PHYSICAL ADDRESS: 448 FRERE STREET, WINDSORTON, 8510
EXISTING RIGHT REFERENCE NUMBER: NC 01/2012 PPR
FILE REFERENCE NUMBER SAMRAD: NC-00047-PR/102

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)

  (Please find resume and certificates attached as **Appendix 1**)

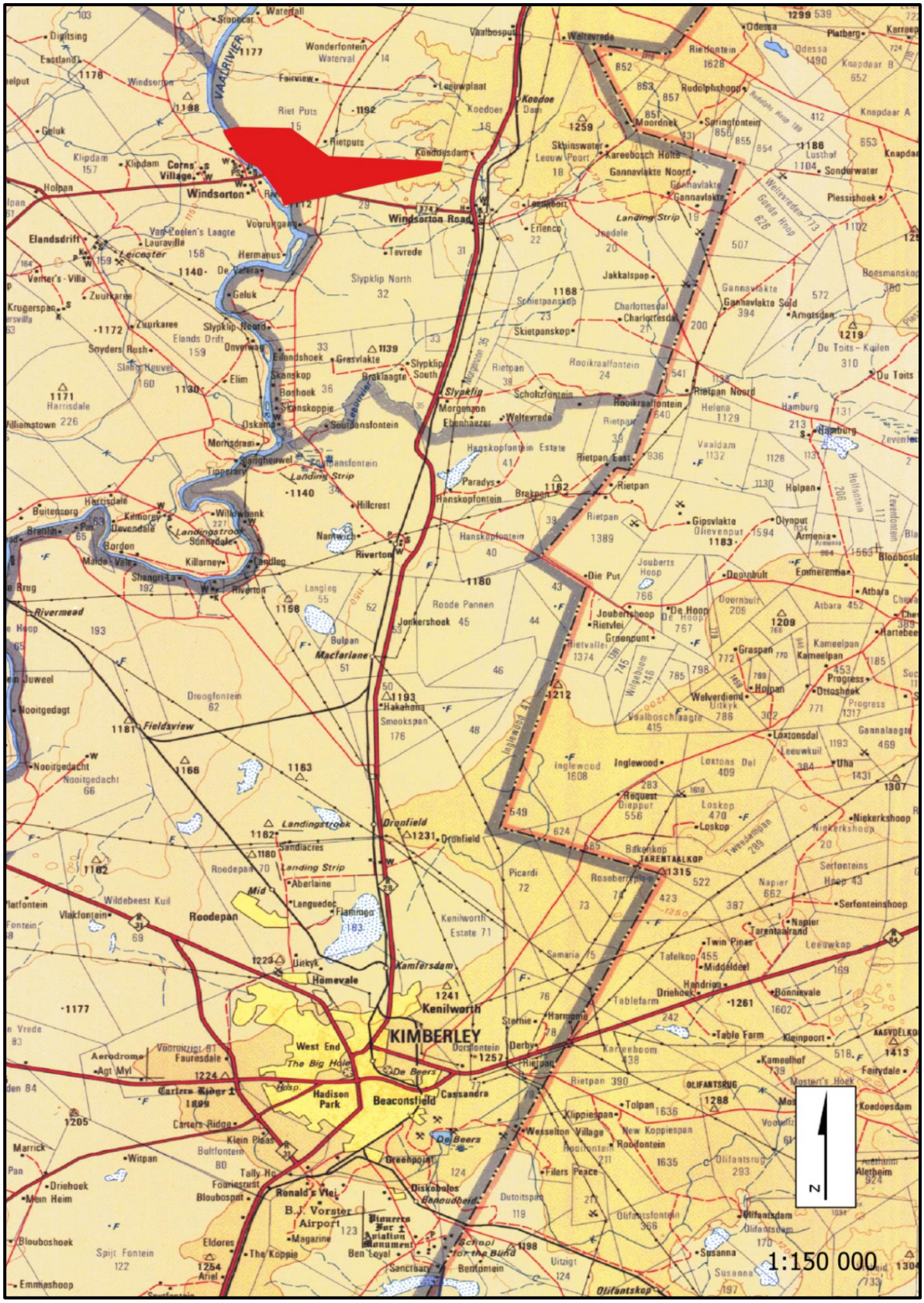
- **Summary of the EAP's past experience**

  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.

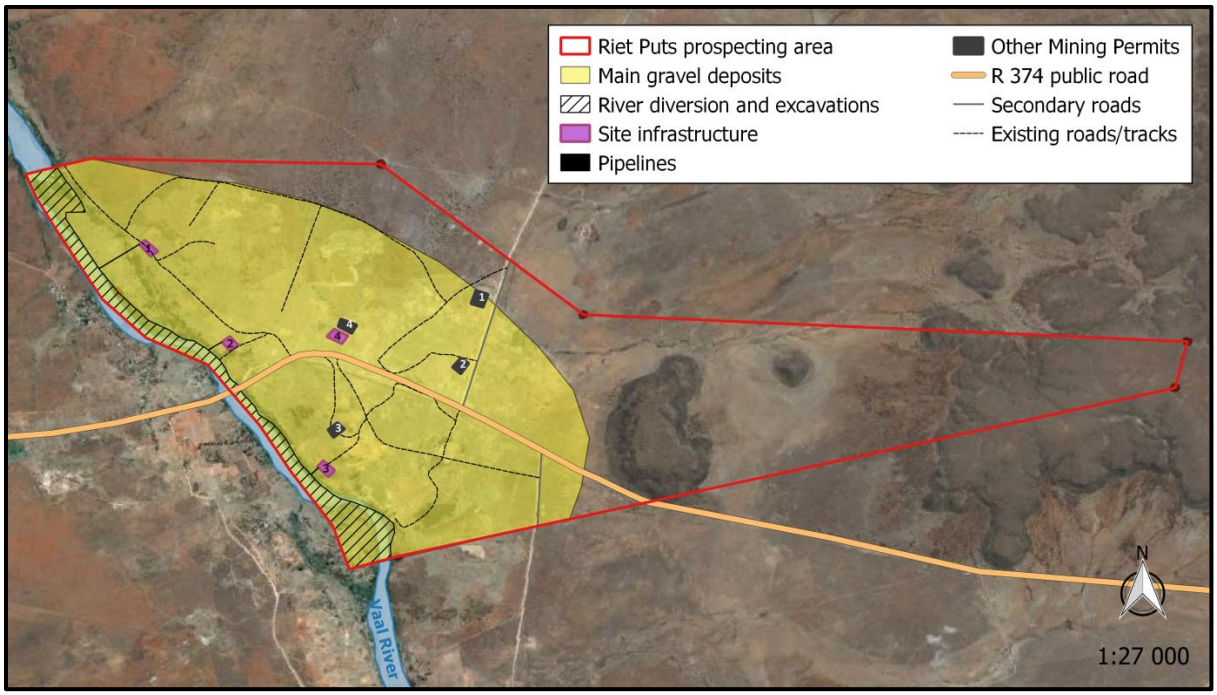
b) Description of the property

Farm Name:	**Farm No.:**	15
	Portions:	Re of Po 3, Po 4, Re of Po 5, Po 9
	Farm Name:	Riet Puts
	Magisterial District:	Kimberley
	Province:	Northern Cape
	Title Deed No's.:	T82/2013 (Wedberg CPA)
	Including a portion of Stateland.	
Application area:	± 1 669 ha	
Magisterial district:	Kimberley	
Distance and direction from nearest town:	The prospecting right area is located within the Kimberley District Municipality of the Northern Cape Province and lies approximately 55 km north of Kimberley and 6 km east of Windsorton on the R374. The site is accessed via gravel roads that turn off from the R374.	
21 digit Surveyor General Code for each farm portion:	Remainder of Portion 3	C03700000000001500003
	Portion 4	C03700000000001500004
	Remainder of Portion 5	C03700000000001500005
	Portion 9	C03700000000001500009

c) Locality map



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



LISTED ACTIVITIES ON ABOVE MAP DESCRIBED	
MAP LEGEND	**ASSOCIATED ACTIVITIES**
Riet Puts proposed prospecting area	- The operation directly relates to prospecting of a mineral resource (diamonds, sand, clay) and requires a prospecting right. - The operation directly relates to prospecting of a mineral resource (diamonds, sand, clay) and requires permission in terms of Section 20 (MPRDA), for the removal and disposal of bulk samples of any minerals.
Core gravel deposits	- The clearance of an area of more than 20 ha of indigenous vegetation. - The development of haul roads 18 m wide with no reserve. - The continuous lengthening (and rehabilitation) of haul roads 18 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.
River diversion and excavations	- The development of a temporary berm wall (diversion) within the Vaal River. - The excavation of soil, sand, shells, shell grit, pebbles or rock from the Vaal River.
Site infrastructure	- The operation 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 60 m^3. - The establishment of slimes dams resulting from activities which require a prospecting right. - Pipelines for the bulk transportation of slimes. - Pipelines for the bulk transportation of return water. - General site infrastructure, including office complexes, workshop facilities, storage facilities, concrete bund walls and diesel depots, ablution facilities and plastic water storage tanks.
Pipelines	- Pipelines for the bulk transportation of water.

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 12(v)(a): The development of temporary berm walls (diversion) exceeding 100 m^2 in size within the Vaal River.	± 60 ha	**X**	NEMA: LN1 (GNR983)	
Activity 19: The excavation of soil, sand, shells, shell grit, pebbles or rock of more than 5 m^3 from the Vaal River.	< 90 ha	**X**	NEMA: LN1 (GNR983)	
Activity 20: The Riet Puts operation directly relates to prospecting of a mineral resource (diamonds, sand, clay) and requires a prospecting right.	± 1 669 ha	**X**	NEMA: LN1 (GNR983)	
Activity 24(iii): The development of haul roads 18 m wide with no reserve.	± 21 000 m^2	**X**	NEMA: LN1 (GNR983)	
Activity 56(ii): The continuous lengthening (and rehabilitation) of haul roads 18 m wide with no reserve.	± 21 000 m^2	**X**	NEMA: LN1 (GNR983)	
Activity 15: The clearance of an area of more than 20 ha of indigenous vegetation.	± 1 000 ha	**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**
Activity 19: The Riet Puts operation directly relates to prospecting of a mineral resource (diamonds, sand, clay) and requires permission in terms of Section 20 (MPRDA), for the removal and disposal of bulk samples of any minerals.	± 1 669 ha	**X**	NEMA: LN2 (GNR 984)	
Activity 21: The Riet Puts operation directly relates to activities associated with the primary processing of a mineral resource.	± 1 400 m^2	**X**	NEMA: LN2 (GNR 984)	
Activity 4: The development of access roads 6 m in width with no reserve.	± 8 000 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 30 - 80 m^3.	± 85 m^2	**X**	NEMA: LN3 (GNR985)	
Activity 15: The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a prospecting right.	± 6 000 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.	± 43 000 m^2	**X**	NEMWA: Category A (GNR 633)	**X**

ACTIVITIES TO BE AUTHORISED (cont.)				
NAME OF ACTIVITY	**AERIAL EXTENT OF THE ACTIVITY**	**LISTED ACTIVITY**	**APPLICABLE LISTING NOTICE**	**WASTE MANAGEMENT AUTHORISATION**
Linear Activities (associated infrastructures not considered to be listed activities):				
Pipelines for the bulk transportation of water with a diameter of 0.11 m and a peak throughput of 29.1 L /s.	2 400 m			
Pipelines for the bulk transportation of slimes with a diameter of 0.11 m and a peak throughput of 29.1 L/s.	400 m			
Pipelines for the bulk transportation of return water with a diameter of 0.11 m and a peak throughput of 29.1 L/s.	800 m			
Other activities (associated infrastructure not considered to be listed activities):				
Office complexes	± 800 m^2			
Workshop facilities	± 1 000 m^2			
Storage facilities	± 10 000 m^2			
Concrete bund walls and diesel depots	± 900 m^2			
Ablution facilities	± 100 m^2			
Water storage tanks	± 20 m^2			

ii) Description of the activities to be undertaken

Prospecting

The prospecting operation is based on diamondiferous alluvial gravels which will be extracted by means of opencast pitting and trenching methodology using heavy earthmoving machinery. Overburden is stripped where required and the underlying gravels are excavated in the form of shallow open pits, by means of hydraulic shovels and excavators.

The prospecting right area is currently utilised by four contractors and therefore four different prospecting sites have been established (from here on referred to as the "sites"). These sites each involve their respective operational activities. It is foreseen that the operation will remove a volume of approximately 600 000 m^3 during bulk sampling.

An excavated pit, indicating diamondiferous gravels

River diversions and disturbances of water courses

River diversions are planned in order to access gravels that occur in the beds of the Vaal River. The beds and banks of the Vaal River will be subject to pitting and trenching. A technical assessment was conducted by MVD Kalahari Consulting and Structural Engineers for the diversions and results are discussed below. River diversions will occur at two separate locations along the Vaal River and is depicted in the below figure. The river diversion report and designs are attached as **Appendix 2**.

River diversion No 1

This diversion will be developed in the northern section of the study area and is estimated to divert 2.2 km of the Vaal River. The proposed method statement for the diversion is as follows:

- Excavate proposed diversion as indicated on the above figure starting from Point B and work toward Point A.

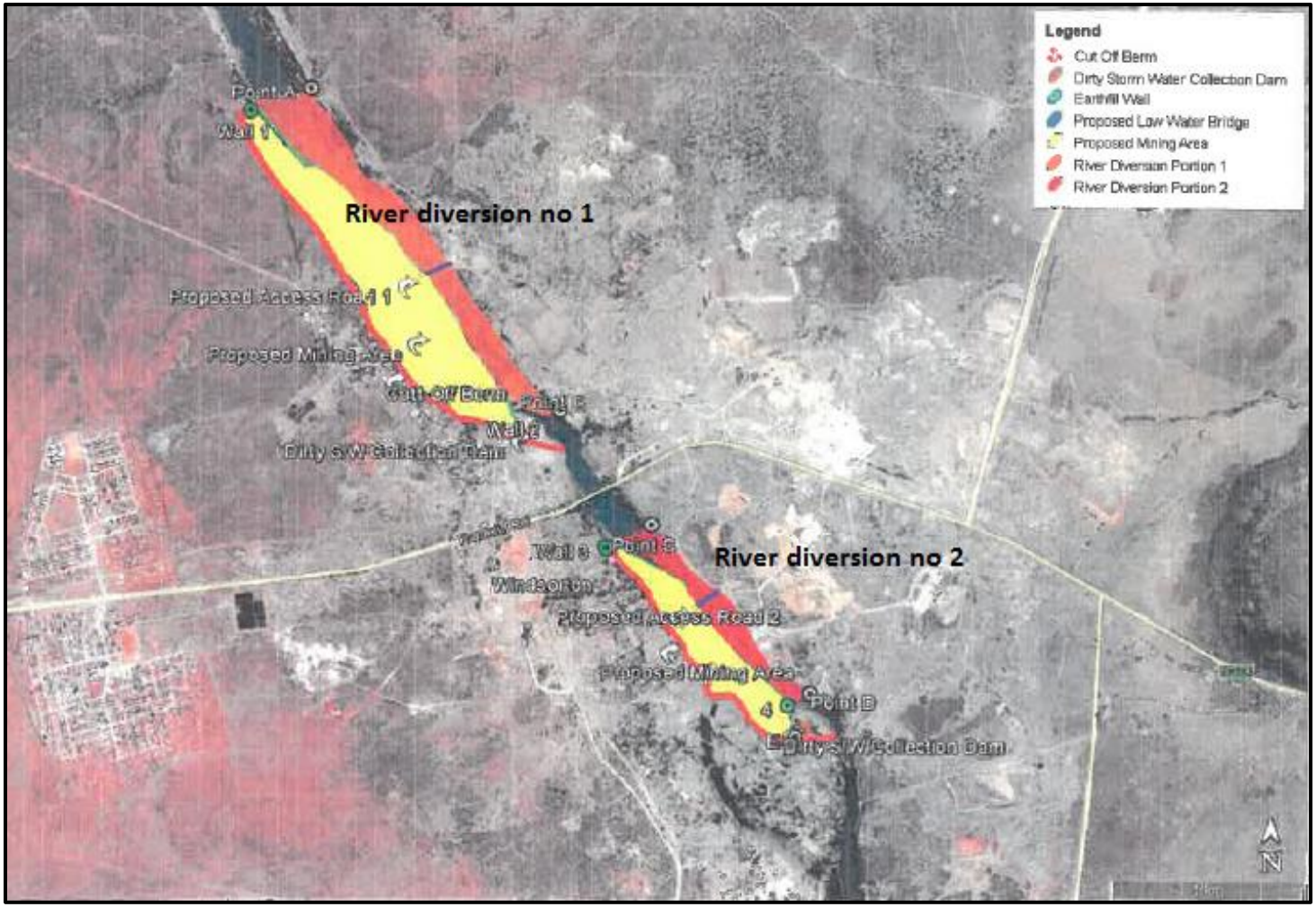
- Place excavated material on the eastern bank of the proposed diversion. This stockpiled material will be used to construct the cut-off Wall 1 at the start of the diversion. The remaining stockpiled material to be used for future rehabilitation at completion of prospecting activity.

- Proposed river crossing (Access Road 1) to be constructed prior to completion of river diversion.

- Embankment Wall 1 is to be constructed from stockpiled material mentioned above.

- All slopes to be protected from scour action by the placing of sandbags.

- Construct cut-off Wall 2.


Legend
Cut Off Berm
Dirty Storm Water Collection Dam
Earthfill Wall
Proposed Low Water Bridge
Proposed Mining Area
River Diversion Portion 1
River Diversion Portion 2
River diversion no 1
River diversion no 2
Point A
Wall 1
Proposed Access Road 1
Proposed Mining Area
Cut-Off Berm
Point C
Wall 2
Dirty s/w Collection Dam
Wall 3
Point C
Windsorton
Proposed Access Road 2
Proposed Mining Area
Point D
Dirty s/w Collection Dam
N

River diversion No 2

This diversion will be developed in the southern section of the study area and is estimated to divert 1.2 km of the Vaal River. The proposed method statement for the diversion is as follows:

- Excavate proposed diversion starting in the middle halfway between Points D and C and work towards Point D. This should be done using excavating material to construct cut-off Wall 4 including the excavation of a channel at Point E for directing the water flow during construction of this cut-off wall.

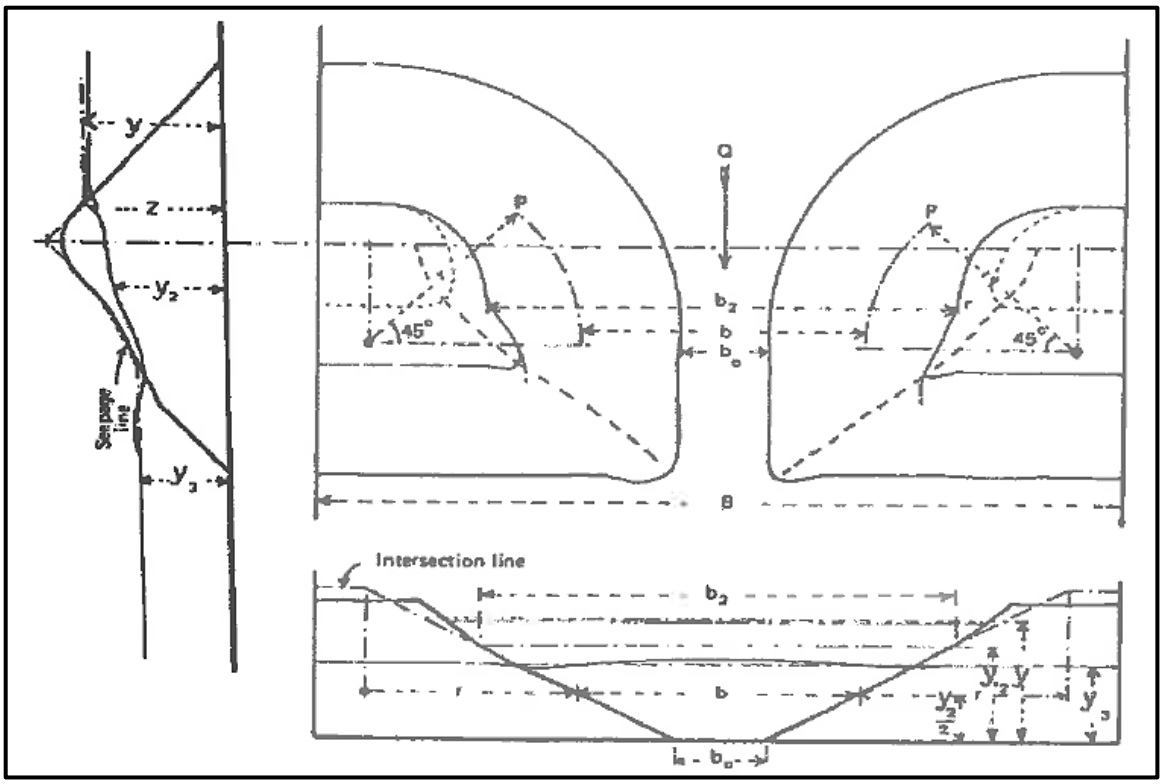
- The method of end tipping should be used due to the presence of flowing water. The channel should be closed up after completion of the diversion. Embankment slopes of the cut-off wall should be protected from scour action by placing of sandbags on the slopes. Excavation of the river diversion towards Point D can now be completed.

- Construct the portion of Access Road 2 from the left bank towards cut-off Wall 4. Construct as per detail on drawings. The section of access road from the cut-off wall towards the right bank to be constructed when river diversion is complete.

- Construct cut-off Wall 3 using excavated material from the river diversion excavations. Protect embankment slopes by the placing of sandbags as per detail on drawing. Cut-off Wall 3 is to be constructed by end tipping due to the presence of flowing water. End tipping is to take place towards the right bank of the Vaal River. An embankment as indicated is to be protected by sand bags to prevent scour action and therefore contamination of the flowing water.

End tipping method

This method is frequently used for the closure of rivers. Rocks are tipped into the river starting from the banks. The crest level of the resulting rock-tip embankment is kept above water level. Rock is end-tipped towards the centre of the river from either or both banks, gradually closing the gap (see below figure). As the trapezoidal shaped gap is narrowed, the flow velocity through it increases.

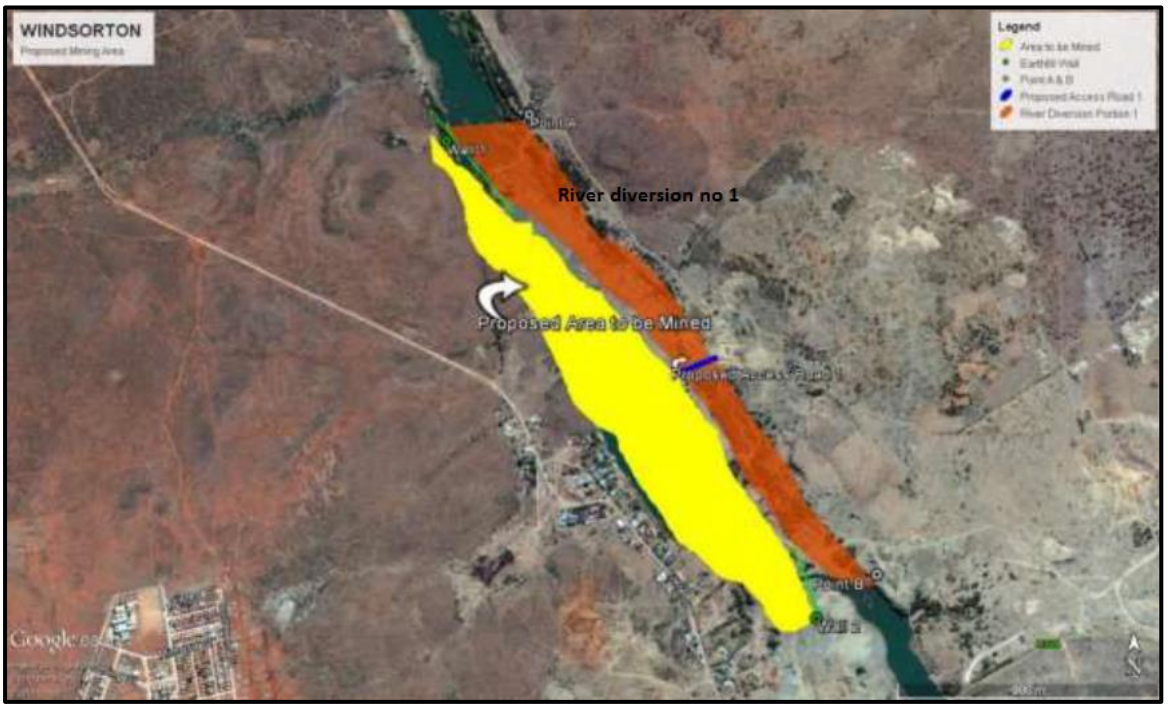


Eventually, the stage may be reached where the velocity is sufficient to erode the rock-tip and equilibrium is reached. Further rock tip is washed with the stream to be deposited in a fan downstream. Gradually, the flow may be reduced due to storage or diversion of the river and consequently the gap may be further narrowed. In general, it is found that a larger stone is required to prevent scour of the end-tipped bank during the closure stage than for the submerged embankment.

Mining along the river diversion

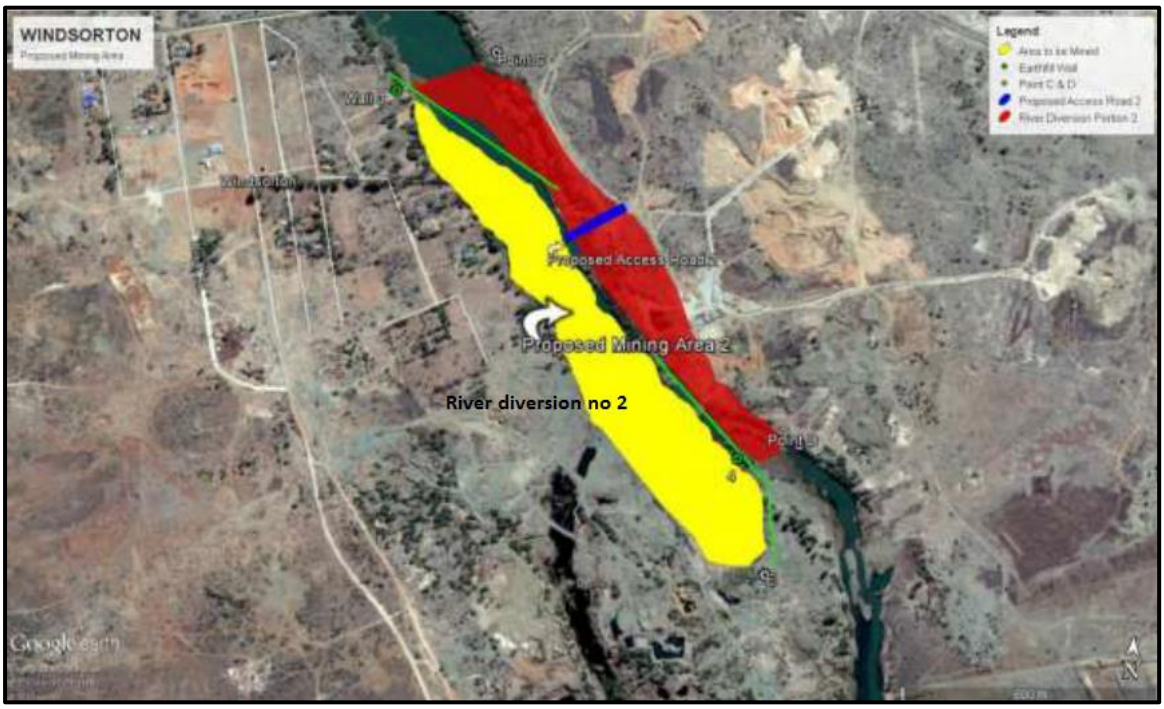
Cut-off drains to be constructed around the proposed prospecting area to prevent clean water runoff to enter into the prospecting area. Storm water generated within the prospecting area will be known as dirty storm water runoff and this dirty water system will be separated from the clean water system.

These cut-off drains will divert clean storm water runoff during a rainstorm around the proposed prospecting area following the natural contours into the Vaal River downstream:

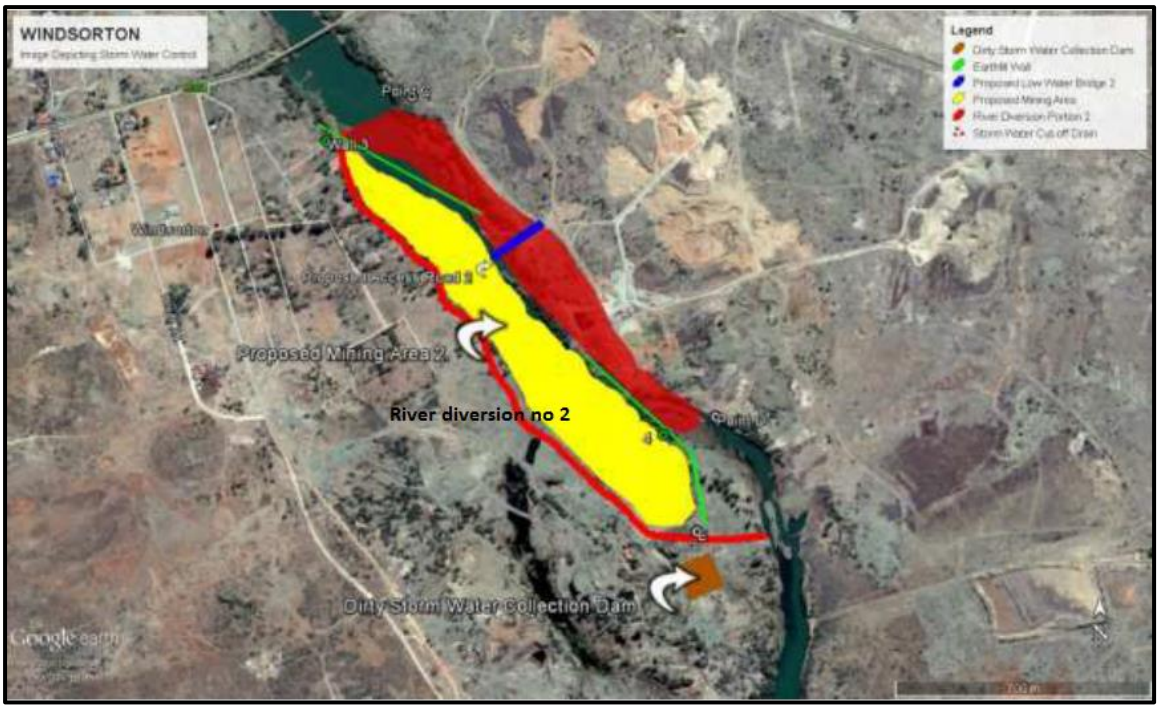


Proposed mining area at river diversion no 1

Proposed cut-off berm at river diversion no 1



Proposed mining area at river diversion no 2



Proposed cut-off berm at river diversion no 2

The storm water runoff generated in the prospecting area will be contaminated with silt and will therefore have to be pumped to a storm water collection dam situated on the right flank downstream of the prospecting area. This dam will be constructed above ground level to prevent any clean storm water runoff to enter the dam. This storm water collection dam will be known as the dirty storm water collection dam. The storm water collection dam will have to be constructed outside the 1:100 year flood line or outside a horizontal distance of 100 m away from the watercourse.

Excess storm water run-off generated within the prospecting area will have to be pumped into the dirty storm water collection dam. The proposed earthfill wall of the collection dam will consist of granular material to allow seepage through the dam wall. This dam will have the same function as a slimes dam typically used at alluvial diamond mining sites. The earthfill wall will trap the silt particles that are in suspension and only clean water will permeate through the wall to enter into the natural watercourse. See Annexure A of the river diversion report for typical design details of the dirty storm water collection dam.

This dam will also have an earth storm water channel installed along the perimeter of the dam wall to prevent erosion of the wall and to collect the seepage through the wall. An outlet is to be made at the lowest point of the channel that will allow the clean water (seepage water) to drain towards the river following the natural contours.

This collection dam will have to be constructed to the following requirements to prevent being registered at DWS: Dam Safety Office and are as follows:

- Wall height not to exceed 5m,
- Storage capacity not to exceed 50 000 m^3.

The operational requirement from DWS for this type of dam is that the dam will always be operated with a minimum freeboard of 800 mm.

Mineral processing

Excavated gravels are screened at the central screening facilities located at each site. Here, oversized material (> 150 mm) is separated, loaded onto dump trucks and returned to the pit for backfilling. The screened gravel is then fed to 16 ft rotating pans, where after the diamondiferous concentrate is loaded into bins and transported off-site for final recovery. Each site currently runs one 16 ft pan, but they each aim to potentially add one more pan; i.e. maximum of eight pans in total for the prospecting area.

Excavated material is screened (top)
Thereafter < 150 mm material is fed into 16 ft rotary pans (bottom)

Plant residue disposal

Residue from the pan plants are processed through de-watering screens where the sand is removed for beneficiation at some sites. The remaining slimes (sludge) are then pumped from the plant onto slimes dams and gravitated to the walls, providing time for settlement to take place and cleaner water to drain towards the walls. Each site has at least one active slimes dam, i.e. four slimes dams in use on the prospecting area.

Typical slimes dams found in the prospecting right area.

A technical assessment was conducted by MVD Kalahari Consulting and Structural Engineers for the slimes dams on Riet Puts. The assessment revealed that the dam walls consisted of light grey clayey soil with pebbles and that the embankment materials are not dispersive. According to the report (attached as **Appendix 3**), the current slimes dams are almost at full capacity, which means that additional slimes dams will be needed.

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.

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.

- The indicated fill heights and excavation depths of each layout has been determined according to the requirements of the operation, with the majority of the dams being 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.

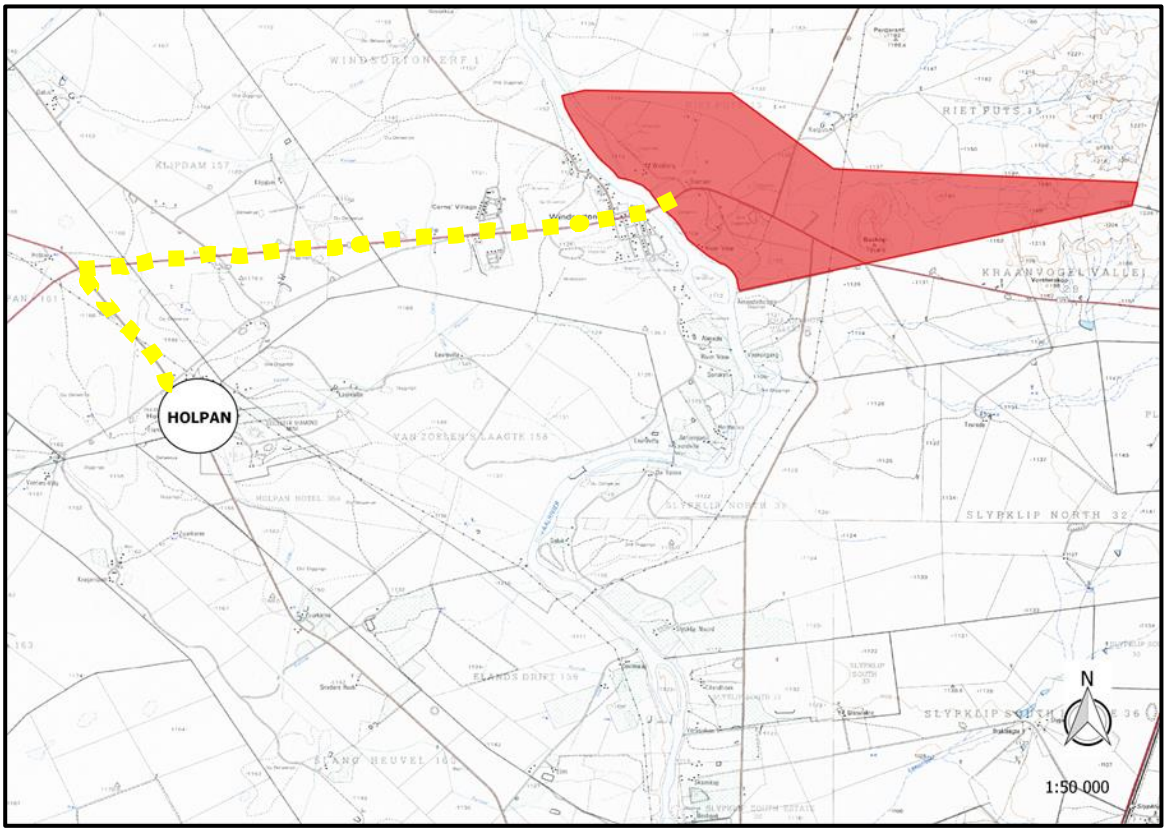
- A storm water channel will be constructed around the perimeter of each dam to ensure safe surface runoff towards the embankment, therefore protecting the embankment from erosion. The storm water channel will also serve a detection mechanism to detect any possible leakage through the embankment. See drawings in **Appendix 3** for the proposed position, including a typical cross-section through the storm water channel.

- All slimes dams will have to be fenced off to comply with the Health and Safety regulations, including the necessary signage (see the drawings in **Appendix 3**).

Material transport

Dump trucks are used to transport raw material from the excavations to the processing plants and to return waste rock to the excavations for backfilling. Access is gained by low angle ramps to open pits and trenches, and by haul roads to the processing areas.

Transporting trucks carry concentrate bins off-site to the final recovery situated on Holpan, approximately 17 km south-west of the prospecting area. This transportation route entails utilising an estimated 12 km stretch of the public R374 road, before turning south towards Holpan.



The diamondiferous concentrate is transported from the prospecting area (in red) to Holpan in the south-west as indicated by the yellow line.

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. The river diversions will be removed in order to restore hydrologic regime in the Vaal River. A more detailed rehabilitation plan is provided in the EMP report.

Waste management facilities

All domestic waste is stored in garbage bins at the different sites and then transported regularly to the registered waste disposal facility in Windsorton.

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

Industrial waste disposal facilities are located on the sites. Designated concrete wash bays are used to clean vehicles, while fenced scrapyards have been erected to contain scrap material. Temporary workshop and storage facilities are used for general repair and maintenance and to store tools and hazardous substances, e.g. oil and grease.

One diesel tank is situated at each site. These tanks vary in capacity, but an estimated total combined capacity of between 70 and 80 m^3 is provided for diesel storage on the prospecting area. All fuel storage tanks are contained within a retaining wall in order to contain diesel spillage.

No permanent waste rock dumps are being created as waste rock is continuously being used as backfill material for the trenches that have already been excavated.

Examples of a fuel storage facility and basic wash bay (top), a designated scrap yard (middle) and a temporary workshop and storage facility (bottom) that have been established on site.

Water use and management

Drinking water is obtained from Windsorton and is brought onto the site in containers by the respective contractors.

Process water for most of the sites is directly obtained from the Vaal River, but one of the sites will be utilising ground water that is struck during excavations. The latter will be pumped directly from the pits to the site. Surface water is pumped from the banks of the Vaal and transported via a pipeline to each of the other three sites. It is expected that not more than 200 000 m^3 of surface water and 105 000 m^3 of cipher water will be used yearly for the operation. A WULA for Section 21 (a), (c) & (i), (g) and (j) has been compiled and will be submitted as soon as this EIAr has been finalised. Some water is stored in tanks, but no water use licence is required in terms of Section 21 (b).

No pollution control dams have been established at Riet Puts, because the processing and treatment are a chemical free process. There are no facilities for the treatment of polluted water, other than the slimes dams, which act as settling dams.

A detailed water balance is provided in **Appendix 4**.

Housing, recreation and other employee facilities

No temporary or permanent staff housing facilities have been erected on any of the sites. All workers live off-site. Security guards patrol the sites on a rotational shift basis, but do not reside on site. Kitchens are present on at least two of the sites with their associated cooking, recreational and dining facilities, where food is prepared for staff of these sites. Other sites do not have kitchen facilities and food is brought on site.

Staff transport

Transportation is provided for the staff from their homes to the mining sites and back. Each site contractor is responsible for transportation of their staff members, who access the prospecting area mainly with private light vehicles.

Site access

Access to Riet Puts is gained via a security gate. The property is easily accessed via a network of regional tarred roads and gravel service roads on the prospecting property. The prospecting site is located in the vicinity of the following main roads:

Road N12: This national road traverses in a north-south direction in the vicinity of the site. The road links the towns of Kimberley in the south with Warrenton in the north.

Road R374: This road is used to access the site. It is an arterial road that traverses in an east-west direction in the vicinity of the site. The road links the N12 in the east with Windsorton in the west, before it traverses southwards; to link Windsorton in the north-east with Barkly West in the south-west.

Service road #77217: This secondary gravel road traverses in a north-south direction; where it links the R374 in the south with the N12 towards Warrenton in the north.

Service road #75972: This secondary gravel road also traverses in a north-south direction and links the R374 in the north with the town of Riverton in the south.

Activities associated with the Riet Puts prospecting operation 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 diamondiferous ore concentrate.

These transport operations will make use of passenger vehicles, light delivery vehicles, transportation trucks and security/armoured vehicles.

Riet Puts is accessed via a security gate that is located on the R374.

Associated infrastructure

The prospecting operation makes use of existing access roads to gain access to the prospecting right area, while smaller temporary roads have been constructed to gain access to trenches. There are no railway lines on the property, but Eskom power lines are present. Currently, the prospecting operations make use of generators and ESKOM electricity as sources of power supply.

Machinery

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

- Hydraulic excavators
- Articulated dump trucks
- Front End Loaders
- Bulldozers
- Graders
- Transportation trucks
- Water truck

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 mine rests solely on their implementation of the EMPR, which is evaluated with a 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 initial financial provision calculated to R 137 652.00, which was submitted with bank guarantees to the DMR. The revised quantum amounts to R 12 014 869.92. Therefore the outstanding financial provision of **R 11 877 217.92** 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.	A permit application regarding protected plant species was lodged with DENC (Tracking No: #1866/2016). 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.	An aquatic assessment and wetland delineation report was compiled by Dr Betsie Milne in order to evaluate the state of water sources in the prospecting right area. Baseline data for water resource quality was obtained from data collected by Adriaan Du Toit in 2003. Results of the assessments are presented in Part A, section g, subsection iv (A). A technical specialists report was compiled by MVD Kalahari in order to assess the planned river diversion and slimes dams. Results of the assessment are presented in Part A, section d, subsection ii.	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 was performed by Paleo Field Services in order to identify any potential cultural and heritage 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 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.	It is not foreseen that the operation will impact any protected trees that occur on Riet Puts. Nevertheless, a permit application regarding protected tree species need to be lodged with DAFF if the footprint of the operation expands to those areas where these trees occur. 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 has been lodged with DENC (Tracking No: #1866/2016). 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.

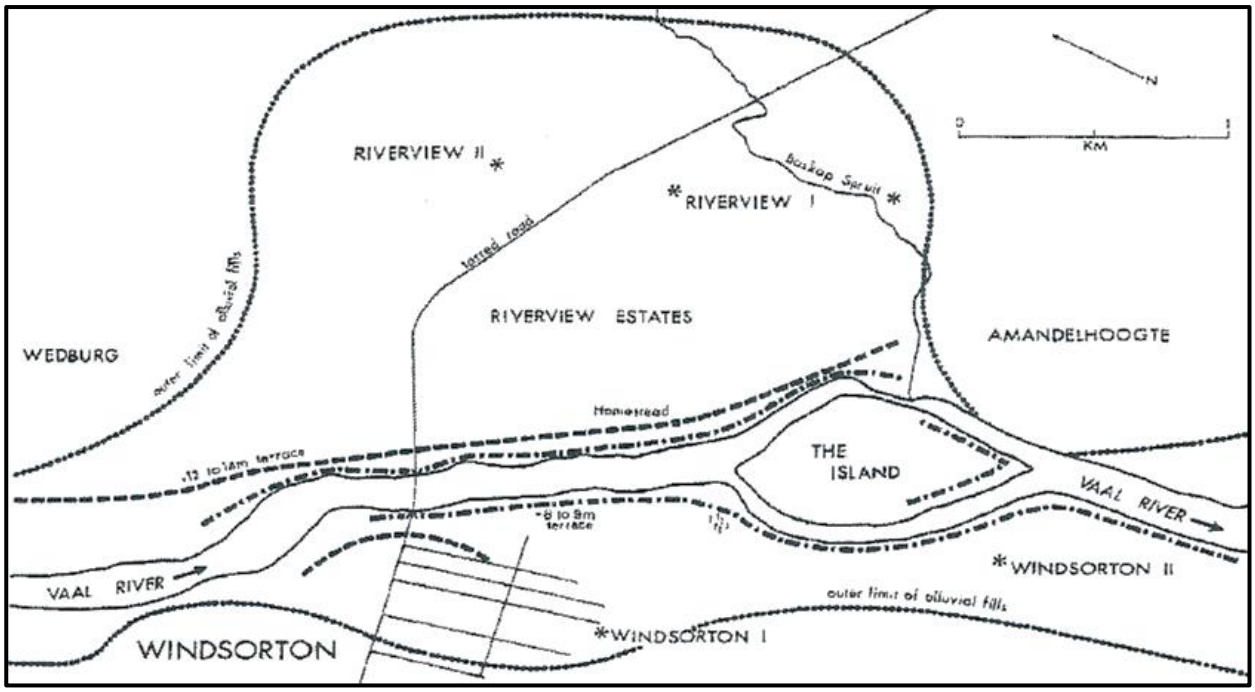
APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS OPERATION COMPLY/RESPOND TO POLICY AND LEGISLATIVE CONTEXT
Section 17 of the Fencing Act (Act No. 31 of 1963) states that any person erecting a boundary fence may clean any bush along the line of the 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.	Baseline data for noise was obtained from data collected by Adriaan Du Toit in 2003. 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.	Baseline data for air quality was obtained from data collected by Adriaan Du Toit in 2003. 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 The Riet Puts Formation occupying the east side of the Vaal River at Windsorton. The classic occurrence of Younger Gravels is at Windsorton, where the Riet Puts Formation and earlier Riverton Formation is part of one ± 12 to 14 meter flooplain terrace. Although the surface has been reached by historic floods, there is only thin veneer of recent sediments.

A lower, + 8 to 9 m terrace also occur along the sides of the modern channel at Windsorton. This terrace is composed of greyish-brown sandy silts pertaining to member IV of the Riverton Formation. Also present at this level are minor erosion shoulders cut into the higher terrace. Remnants of greyish-brown, sandy silts of member V of the Riverton Formation are found at this level, but construction of coffer dams in the modern river by diggers and mining on the channel fringes has nearly obliterated the 19th century channel morphology.



An indication of diamondiferous gravels near Windsorton

The gravels near Windsorton have been strongly emphasised in earlier reports due to their artefact and diamond content. However, a nearly equal volume of arenaceous sediments is also present. Thick gravel deposits occur east of the Vaal to the north and east of Riverview Estates farm buildings and at the lower level on Wedberg and west of the Vaal below Windsorton's main street.

Thinner gravel fills are found in the Vaal channel and beneath a thick layer of Riverton Formation sediments, both on the southern part of the Windsorton town lands and on the peripheries of the thick gravels on Riverview Estates. A small dolerite sill and a kimberlite fissure also occur on Riverview Estates.

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 Riet Puts. The proposed project has the potential to uplift the previous disadvantage communities (Wedberg) and to redress the results of the past racial and gender discrimination. It 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 5** and the location of the individual activities on Riet Puts, alternatives were considered with respect to the following:

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 found in the beds of the Vaal River. 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, river diversions and water use. These are discussed below.

The design or layout of the activity

The **site infrastructure** has already been established. It was strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the prospecting right application process. Thus, the site layout is primarily based on proximity to the access roads, proximity to the areas earmarked for pitting and trenching as well as limited additional impact on the environmental and heritage resources. This 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 proximity of the operation to the perennial Vaal River renders it the best water source for the operation, especially for those sites that are situated near (< 500 m) the river. On the other hand, alternatives for Site 4 (> 500 m from river) include the utilization of groundwater struck during excavations. For the latter, groundwater is struck when excavations for diamond extraction reaches a depth of ± 15 m. The pits need to be dewatered in order for operations to continue safely and therefore the most sensible option for Site 4 is to utilise this water for processing.

Mobile pumps and pipelines were considered to be the best long term option for **transferring water** from the river and pits, due to proximity and the temporary nature of these pumps and plastic pipes; which causes minimum environmental disturbances. Therefore, a pipeline route was designed based on the principle of minimum impacts to the environment and to avoid the disturbance of graves.

The **river diversions** were assessed by ECSA registered engineering consultants (MVD Kalahari). The designs proposed by them are believed to be the most viable option for the operation and take all of the relevant standards and legislation into account. Therefore no alternatives were considered.

The **residue deposits** (slimes dams) have already been established, with their selected localities being based on the following considerations:

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

These existing residue deposits were assessed by MVD Kalahari in order to evaluate the dam materials, capacity and risks. The slimes dam designs proposed by them are believed to be the most viable option for the operation 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>

The earmarked area was mined in the past, but other potential **land use** includes grazing and maize crops. The pristine areas are classified to have moderate potential for grazing land and marginal suitability for maize yield. Therefore, mining activities are believed to be the most economically beneficial option for the area. If the prospecting operation does not continue, the farming of livestock can persist and possible irrigation of maize crops.

The most significant impacts associated with these activities include the provision of water and the introduction of chemicals like fertilisers and pesticides. These could have a potentially serious impact on the existing surface water features. Cumulative impacts associated to grazing and crop irrigation include pollution of water resources, overgrazing and destruction of natural vegetation.

The Riet Puts prospecting project aims to **uplift** the previously disadvantaged Wedberg community. If the prospecting operation does not continue, this community will be deprived of economic empowerment. Furthermore, if this operation does not continue it would impact negatively on the employment rate for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a negative 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 lost.

The implementation of the Riet Puts operation will have a potential impact on the **biodiversity** through removal of indigenous vegetation, destruction of habitats and disturbances of water courses. If activities were not to continue, the status quo would apply and no damage would accrue to the environment.

In the event that the prospecting operation does not proceed, the **heritage resources** will remain as is. Many of the resources have already been destroyed by previous mining activities. The protection and preservation of these resources are not guaranteed. However, if the operation continues, the heritage resources will be protected through the demarcation of no-go zones and fencing off of graves, as is required by law.

ii) Details of the Public Participation Process Followed

The initial public participation process was completed during the prospecting right application process. However, a new public participation process was launched as part of the current application for Environmental Authorisation, which was triggered by a section 102 amendment application. The WULA process is also integrated in the current public participation process.

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. The holder of the prospecting right (Wedberg CPA) is also the landowner, who received the property after a successful land claim was processed in 2012.

All proof of consultation is attached as **Appendix 6**. The following procedures were followed:

- **Notice boards**

  A site notice was placed at the entrance gate along the R347 road on 21 April 2016. On the same day, the same notice was also placed at JJ Oppihoek, a local convenient store in Windsorton and at The N12 Outspan Ranch, a local motel which is situated on the corner of the N12 and the R347 roads. With these notices, a legal background and project description were provided 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; before 31 May 2016.

- **Published notice**

  An advert was published in the Diamond Fields Advertiser on 20 April 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; before 31 May 2016.

- **Notice letters to authorities**

  All of the relevant authorities located in Kimberley were notified through notice letters that were hand-delivered. Notice letters were also sent with registered post to the local municipalities of Warrenton (Magareng Local Municipality) and Barkly West (Dikgatlong Local Municipality), while a notice letter was emailed to Department of Agriculture, Forestry and Fisheries in Upington. With these letters, a legal background and project description were provided and all known activities requiring authorisation were listed. Authorities were requested to submit any written comments, to request additional information or to register as IAPs by contacting the designated consultant; before 31 May 2016.

- **Project registration on SAHRIS**

  A heritage case 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.

  A general notice, similar to the notice boards was added to the heritage case profile. With this notice, a legal background and project description were provided and SAHRIS users were requested to submit any written comments, to request additional information or to register as IAPs by contacting the designated consultant; before 31 May 2016.

- **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, late payments received by clients, etc.), which led to the fact that this report has not yet been fully reviewed by all of the IAPs and therefore not all comments have yet been incorporated into this report. However, if any comments arise, 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					
Not applicable					
Lawful occupier/s of the land					
Not applicable					
Landowners or lawful occupiers on adjacent properties					
Not applicable					
Municipality					
Frances Baard District Municipality 51 Drakensberg Avenue Carters Glen Kimberley Attention: Esmé van Niekerk	X	No comments/objections received			
Magareng Local Municipality P O Box 10 Warrenton 8530	X	No comments/objections received			
Dikgatlong Local Municipality Private Bag X5 Barkly West 8375	X	No comments/objections received			
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA					
ESKOM: Land Development 4 George Street Kimberley 8301 Attention: Ronaaz Rutter	X	No comments/objections received			
Department of Water and Sanitation 28 Central Road Beaconsfield Kimberley Attention: Kutjo Sekwaila Attention: Esther Makungo	X	1 Feb 2016 (Kutjo)	Water use not registered; need to lodge a WULA	Will apply for WULA once all documentation is in place (including EIAr)	WULA document preparation In process
Department of Roads and Public Works 9-11 Stokroos Street Squarehill Park Kimberley Crystal Robertson	X	15 June (letter sent per email)	No objections subject to compliance with roads legislation.	Relevant roads legislation will be promulgated in the EIAr and EMPr.	Roads legislation is promulgated in the EIAr and EMPr.
Communities					
Not applicable					

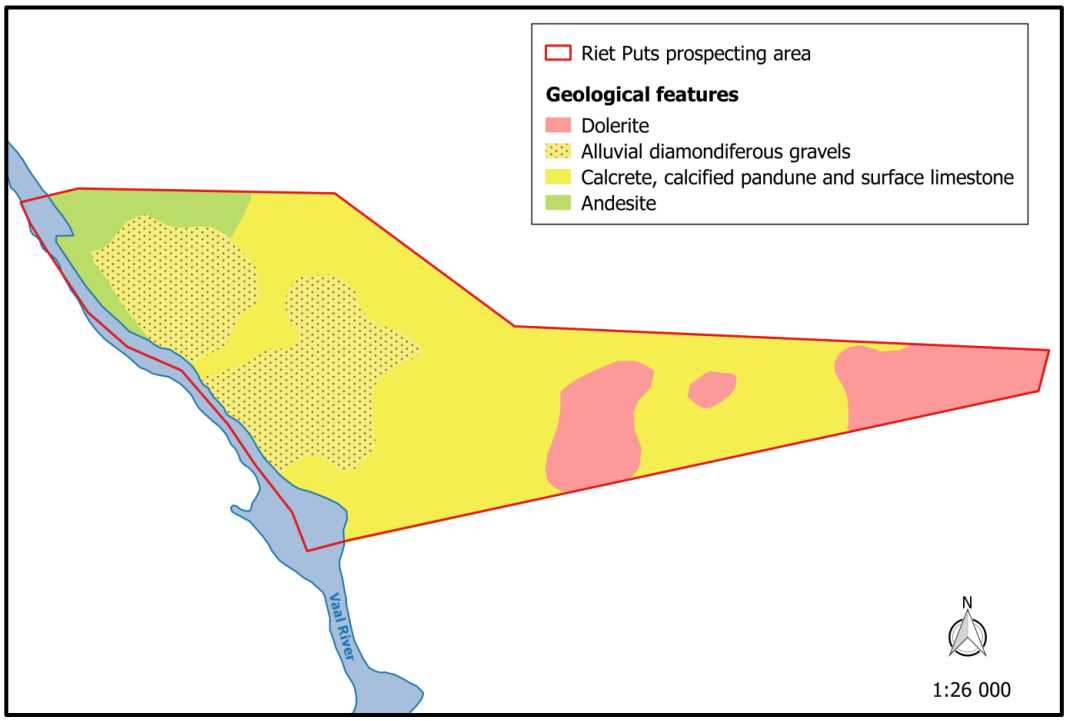
A list of all Interested and Affected Parties. X indicates that IAPs were consulted with		Date comments received	Issues raised	Consultant's response to issues as mandated by the applicant	Consultation status
AFFECTED PARTIES (cont.)					
Dept. Land Affairs					
Department of Agriculture, Land Reform and Rural Development 162 George Street Kimberlite Building Kimberley Attention: Bernadette Julius	X	No comments/objections received			
Traditional Leaders					
Not applicable					
Dept. Environmental Affairs					
Northern Cape Department of Environment and Nature Conservation Sasko Building 90 Long Street Kimberley Attention: Thulani Mthombeni	X	No comments/objections received			
Other Competent Authorities affected					
Department of Agriculture, Forestry and Fisheries Attention: Jacoline Mans e-mail: JacolineMa@daff.gov.za	X	5 May 2016 (letter sent per email)	Concerned about impacts on protected flora; requested that impacts on protected trees be assessed; requested that applications for relevant permits be lodged; requested a copy of EIAr; requested general info on project	10 May 2016 (Letter sent per email) Provided the requested info; undertook to perform an ecological assessment, to forward a copy of EIAr and to apply for permits if necessary	Ecological assessment was performed in May; no protected trees licence required, but a flora permit was lodged with DENC on 15 June 2016. EIAr was forwarded on 25 Nov 2016
South African Heritage Resource Agency	X	No comments/objections received			
Department of Sports, Arts and Culture 22 Abattoir Road Ashburnham Kimberley	X	22 Apr 2016 (Per phone call)	Concerned about graves on site. Requested a copy of the HIA report	22 Apr 2016 (Telephonically) Undertook to forward a copy as soon as the HIA has been completed	A copy of the HIA was submitted on the SAHRIS database
OTHER AFFECTED PARTIES					
None registered					
INTERESTED PARTIES					
None registered					

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

(A) Type of environment affected by the proposed activity

GEOLOGY

The Riet Puts prospecting right area is interwoven by various geologies. Here, the hills towards the east are associated with a network of dolerite sills, sheets and dykes, mainly intrusive into the Karoo Supergroup. The central parts comprise of calcrete, calcified pandune and surface limestone, while the sections along the river consist of alluvial diamondiferous gravels. A small section in the north-western corner of the study area comprise of andesitic Ventersdorp lava which could be up to 3 800 m thick.



An indication of geological features in the study area

The classic occurrence of younger diamondiferous gravels is at Windsorton, where the Riet Puts Formation and earlier Riverton Formation is part of one ± 12 to 14 meter flooplain terrace. A lower, + 8 to 9 m terrace also occur along the sides of the modern channel at Windsorton. This terrace is composed of greyish-brown sandy silts pertaining to member IV of the Riverton Formation.

Also present at this level are minor erosion shoulders cut into the higher terrace. Remnants of greyish-brown, sandy silts of member V of the Riverton Formation are found at this level, but construction of coffer dams in the modern river by diggers and mining on the channel fringes has nearly obliterated the 19th century channel morphology.

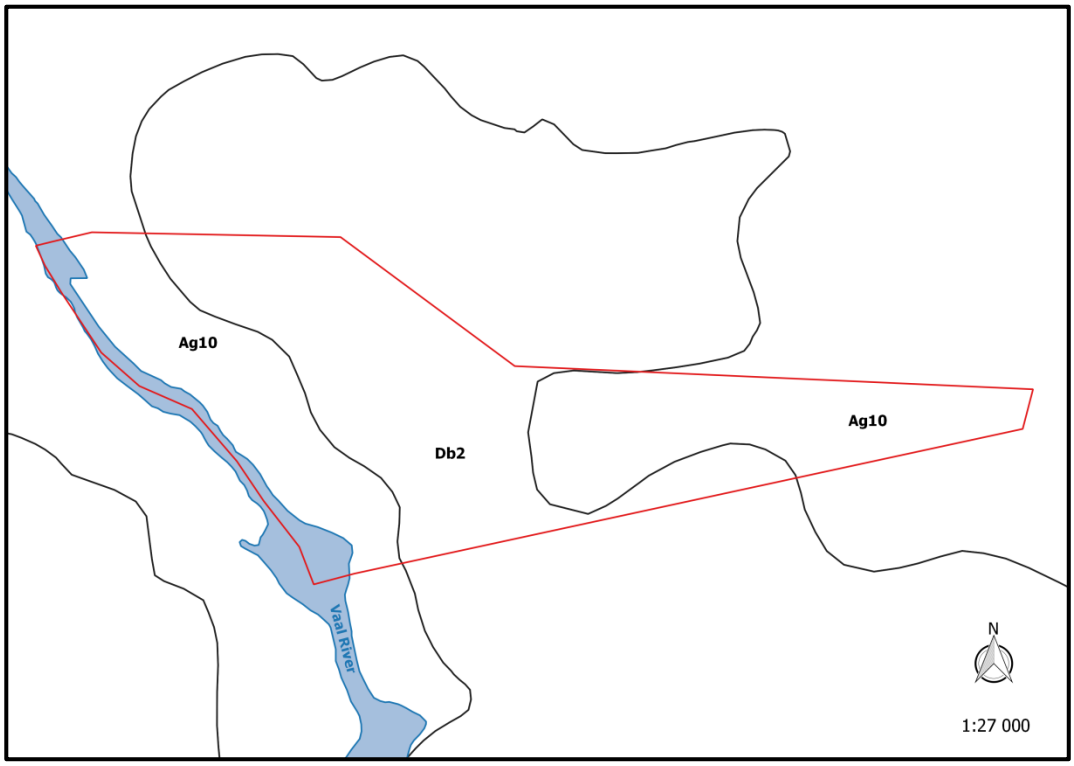
Thick gravel deposits occur east of the Vaal to the north and east of Riverview Estates farm buildings and at the lower level on Wedberg and west of the Vaal below Windsorton's main street. Thinner gravel fills are found in the Vaal channel and beneath a thick layer of Riverton Formation sediments, both on the southern part of the Windsorton town lands and on the peripheries of the thick gravels on Riverview Estates. A small dolerite sill and a kimberlite fissure also occur on Riverview Estates. The surface contains reddish brown soil and silty sand. The calcrete, which is moderately cemented, occur in the depth of 1 – 2.5 m.

There are no dykes or fissures found or known to occur on the prospecting area, but several are found in a radius of 5 km around the site. The structural geology of the area is dominated by the Ventersdorp lavas and its base erosion surface. The scale and impact of the regional joint and fracture system is presented by the numerous sharp turns of the Vaal River as it turns over and along the different fracture and fault zones.

TOPOGRAPHY AND SOILS

The area is generally flat, characterised by slightly irregular plains with low relief. The Vaal River cuts through the landscape in the west at 1 109 m above sea level and hills protrude in the east, with a maximum altitude of 1 232 m above sea level. The terrain is indicated by a gentle slope of 8 % from the plains in the east towards the river in the west, while steeper slopes (20 %) are associated with the hills.

In the east and west, the terrain is closely associated with the Ag10 land type. Here, shallow (< 300 mm) red-yellow apedal, freely drained, red soils, with a high base status are found. The central area represents the Db2 land type, where prismacutanic and/or pedocutanic diagnostic horizons are dominant and the B horizons are mainly not red.



Land types associated with the study area

According to the Southern African Agricultural Geo-referenced Information System, the soils associated with the Ag10 land type have a low to moderate erodibility, while those associated with Db2 may have low to high erodibility. Main soil types include the dominant stratified alluvial Dundee form and the Coega form (hardpan carbonate horizon that outcrop).

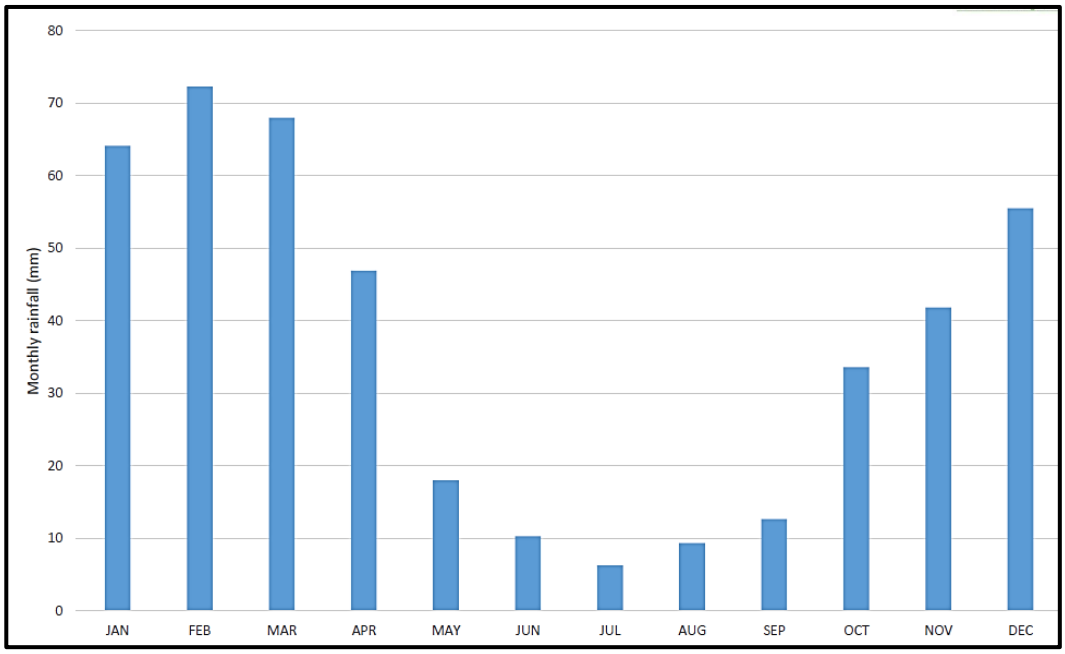
CLIMATE

Regional Climate

The prospecting right area is located in a semi-arid region, receiving on average about 250 mm of rain in the west to 500 mm on its eastern boundary. The rainfall is largely due to showers and thunderstorms falling in the summer months October to March. The peak of the rainy season is normally March or February. The summers are very hot with cool winters. The nearest weather station to the project area with complete records is Kimberley.

Rainfall

Average monthly rainfall for Kimberley is presented in the table below:



Source: South African Weather Bureau – Kimberley 1940 – 2015

The maximum rainfall intensities are presented in the table below:

MONTH	60 MINUTES	24 HOURS	24 HOURS IN 50 YEARS	24 HOURS IN 100 YEARS
January	35.8	57	65.1	73.8
February	70.1	82	58.9	66.5
March	63.7	67.8	72.1	81.4
April	25.7	51.6	65.9	75.2
May	14.6	54.6	36.8	42.4
June	19.1	67.5	26	30.4
July	12	26.7	26.6	31
August	17	58.2	23.4	27.3
September	16.3	26.7	24.1	28
October	37.6	59.2	53.8	61.8
November	25.2	60.1	41.2	46.7
December	59.9	64.5	70.7	80.9

Source: South Africa (WB42) – Station 0290468:- Kimberley 1961 – 1990

Temperatures

The average monthly maximum and minimum temperatures are presented in the table below:

MONTH	DAILY MAXIMUM °C	DAILY MINIMUM °C
January	32.8	17.9
February	31	17.3
March	28.8	15.2
April	24.8	10.9
May	21.4	6.5
June	18.2	3.2
July	18.8	2.8
August	21.3	4.9
September	25.5	8.9
October	27.8	11.9
November	30.2	14.6
December	32.1	16.6
Yearly average	**26.1**	**10.9**

Source: Directorate: Climatology South African Weather Bureau © 2000 – Station 0290468:- Kimberley 1960 – 2000

Wind

The prevailing wind direction for the area is north to north-north-west for the months of January to September and changing from north to sometimes westerly winds during October to December averaging 3.5 m/s (Kimberley 01/01/1990 – 31/08/2000, Station 0290468).

Humidity and evaporation

The average monthly humidity is presented in the table below:

MONTH	AVERAGE (%)	MAXIMUM (%)	MINIMUM (%)
January	47	91	8
February	54	94	12
March	57	96	15
April	60	96	16
May	56	96	16
June	54	97	15
July	49	97	13
August	42	94	10
September	36	91	8
October	39	89	8
November	42	92	8
December	43	90	7
Yearly average	**48**	**94**	**11**

Source: Directorate: Climatology South African Weather Bureau © – Station 0290468:- Kimberley 1960 – 2000

The average monthly evaporation is presented in the table below:

MONTH	EVAPORATION IN mm
January	365.6
February	279.1
March	235.8
April	169.1
May	135.1
June	108.6
July	130.1
August	181.2
September	252.6
October	314.8
November	345.5
December	378.6
Yearly average	**2896**

Source: South African Weather Bureau – Station 0290468:- Kimberley 1957 – 1987

Incidents of Extreme Weather Conditions

- **Hail**

  Hail is sometimes associated with thunderstorms and mainly occurs in early to late summer (November to February). It occurs on average three times a year and although these storms may sometimes be severe and cause much damage, they usually 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 -8ºC 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.

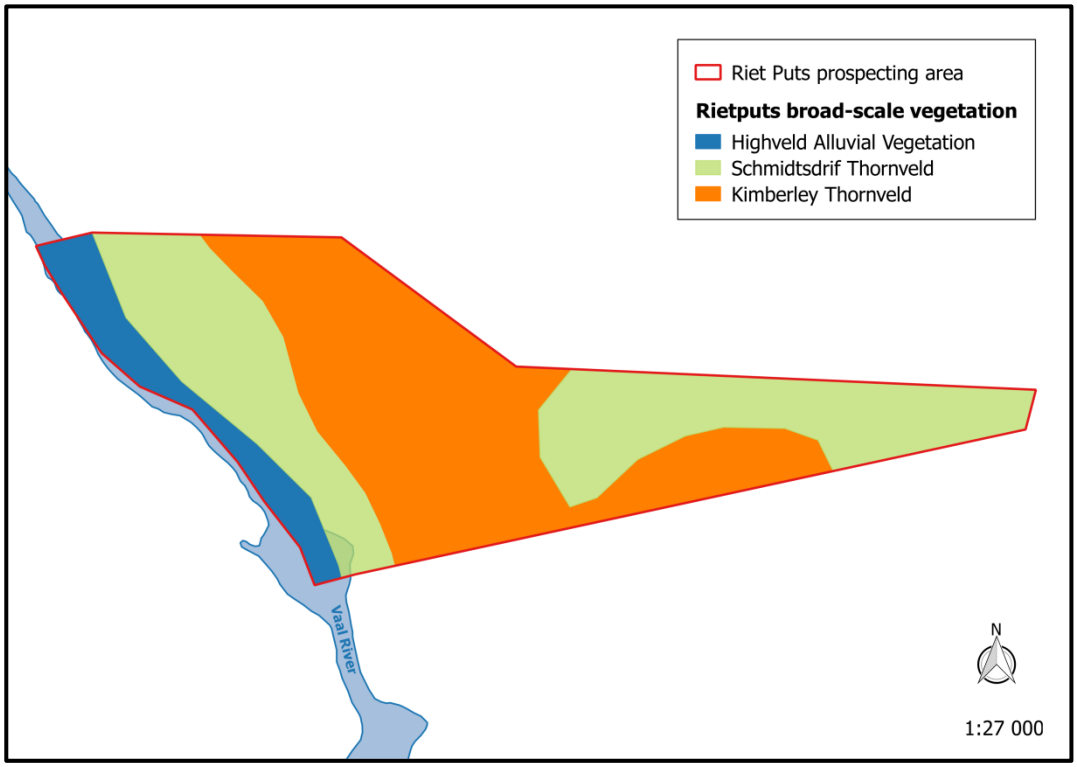
- **Wind**

  High winds are unusual but when the do occur can uproot trees and take off roofs.

NATURAL VEGETATION

Broad-scale vegetation patterns

The majority of the study area falls within the Savanna Biome, while the Vaal River falls within Inland Azonal Vegetation (Mucina and Rutherford 2006). According to the vegetation map of Mucina et al. (2005) three broad-scale vegetation units are present on site, i.e. Highveld Alluvial Vegetation, Schmidtsdrif Thornveld and Kimberley Thornveld.



Broad-scale vegetation units found in the Riet Puts prospecting area.

Highveld Alluvial Vegetation falls within the Azonal Vegetation Biome and is mainly distributed in the Free State, North-West, Mpumalanga and Gauteng Provinces, but is also found in alluvial drainage lines and floodplains along marginal (eastern) units of the Savanna Biome in Northern Cape. Altitute ranges between 1 000 and 1 500 m.

The unit is typically presented with flat topography supporting riparian thickets, mostly dominated by *Vachellia karroo*. It is accompanied by seasonally flooded grasslands and disturbed herblands often dominated by alien plants. The geology comprise of deep sandy to clayey (but mostly coarse sand) alluvial soils that developed over Quaternary alluvial sediments. Oakleaf, Dundee, Shortlands, Glenrosa and Mispah soil forms were identified in the Vaal River floodplain. Rivers are perennial and often flood in summer. Erosion of the banks and deposition of new fine soil on alluvium can be of considerable extent. Some smaller anastomosing channels of major rivers can dry out in winter. The unit is classified as being least threatened, with 10% being conserved within formal conservation areas, e.g. Bloemhof Dam, Christiana, Baberspan, Wolwespruit, Sandvlei, Schoonspruit, Faan Meintjes and Soetdoring Nature Reserves. More than a quarter has been transformed for cultivation and by building of dams. The unit is highly prone to invasion by alien weeds, while the undergrowth suffers from overgrazing. No endemic species are known from this unit.

Schmidtsdrif Thornveld is distributed in the Northern Cape, Free State and North-West Provinces at altitudes between 1 000 and 1 350 m. It stretches from the footslopes and midslopes to the southeast and below the Ghaap Plateau from around Douglas in the southwest via Schmidtsdrif towards Taung in the northeast. A small less typical section is found east of the Ghaap Plateau from Warrenton towards Hertzogville. The unit is typically presented as a closed shrubby thornveld dominated by *Senegalia mellifera* and *Vachellia tortilis*. Apart from grasses, bulbs and annual herbs are also prominent. The vegetation is very disturbed in some areas due to overgrazing by goats and other browsers. Dwyka diamoctites and Ecca shales of the Karoo Supergroup are the most significant geological features in this unit, Shale and dolomite of the Schmidtsdrif Subgroup IGriqualand West Supergroup) are also present. Surface limestone occurs sporadically. The soils are well-drained, stony and shallow (< 0.3 m), with large angular rocks found on the surface. A soil-rock complex with Mispah soil form is typical, while the unit is mainly associated with the Ae and Dc land types. The unit is classified as being least threatened, with 13 % being transformed mainly by cultivation. A very small portion (0.2 %) used to be conserved in the de-proclaimed Vaalbos National Park, but it is not currently known to be statutorily conserved. Erosion is very low to low. No endemic species are known from this unit and *Prosopis* spp. are significant alien invaders.

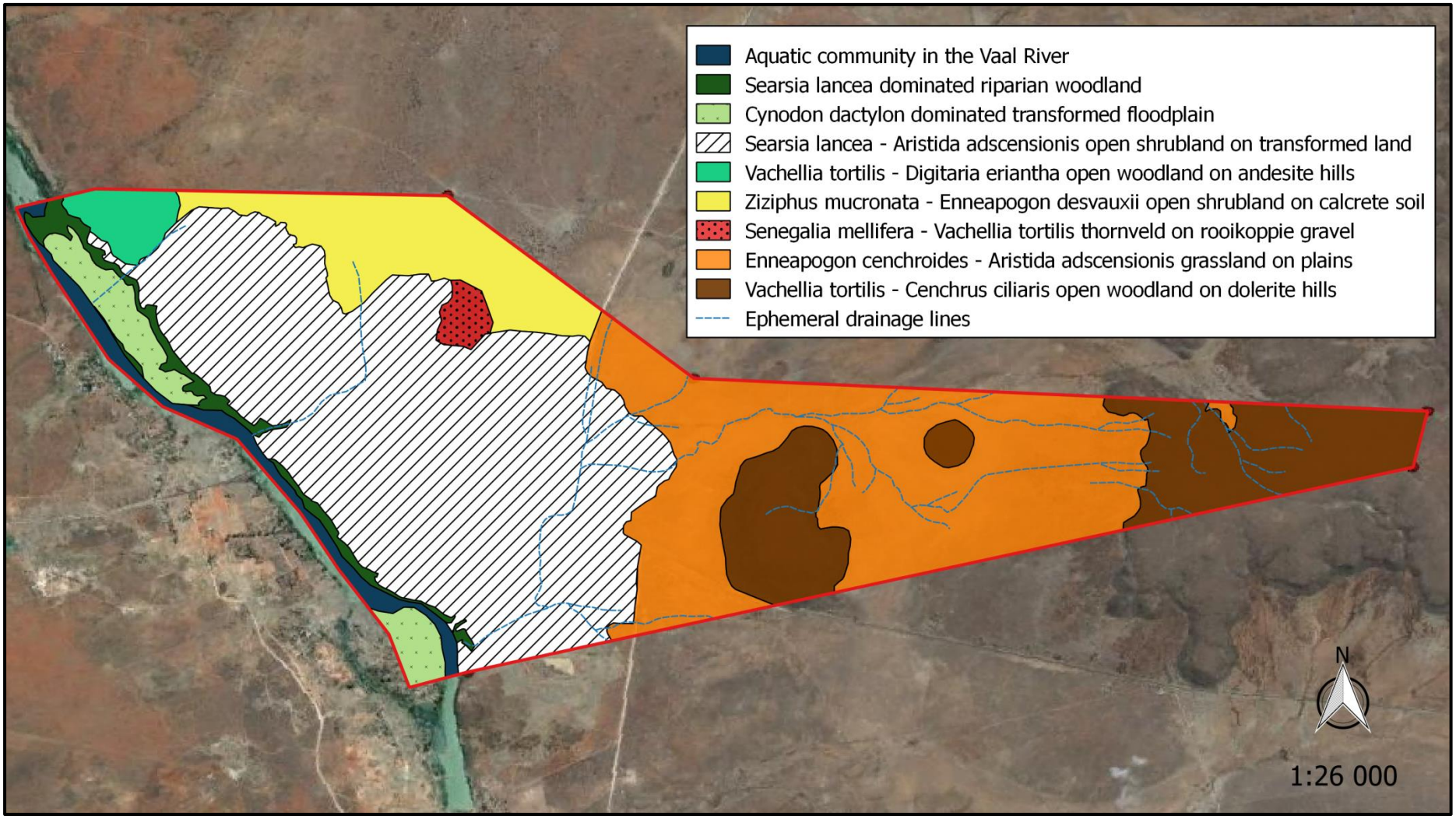
Kimberley Thornveld is distributed in the North-West, Free State and Northern Cape Provinces at altitutes between 1 050 and 1 400 m. It is found in the Kimberley, Hartswater, Bloemhof and Hoopstad Districts, but is also within the Warrenton, Christiana, Taung, Boshof and Barkly West Districts. The unit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

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 will also be identified. The assessment report is attached as **Appendix 7** and results of this assessment is summarised below:

Fine-scale vegetation patterns

Pristine plant communities within the study area are delineated according to plant species correspondences, change in soil structure, topographical changes and disturbance regimes. Areas that have already been cleared for mining or other activities are categorised as transformed habitats.

The vegetation on site can be divided into ten distinct units and are described below. The plant community descriptions include unique characteristics and the dominant species found in each unit. A complete plant species list, including those species likely to occur in the area is presented in Appendix 1 of the Ecological Assessment Report.



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

1. **Aquatic community in the Vaal River**

This community occurs within the aquatic zone of the Vaal River, which lines the study area in the west. The highest vegetation cover is found in the shallow waters along the edge of the river, were *Phragmites australis* is most conspicuous. Other common species include *Juncus exsertus, Pseudoschoenus inanis, Cyperus Eragrostis* (exotic) and other *Cyperus* spp. *Myriophyllum aquaticum* (exotic) and *Potamogeton pectinatus* are common in slightly deeper water.

2. ***Searsia lancea* dominated riparian woodland**

This community occurs along the eastern banks of the Vaal River on alluvial soil and rock. Here, the vegetation is presented as a closed-canopy woodland dominated by tall trees, with a weekly developed understory dominated by weeds.

The riparian woodland occurs on the banks of Vaal River, where tall trees form a closed canopy.

The woody stratum is dominated by *Searsia lancea*, but *Vachellia tortilis* subsp. *heteracantha, V. karroo*, *Diospyros lycioides*, *Salix mucronata* subsp. *mucronata, Gymnosporia buxifolia*, *Ziziphus mucronata* and *Asparagus* spp. are also common. Typical graminoid species include *Setaria verticillata, Cynodon dactylon, Chloris virgata* and *Panicum maximum,* but *Aristida adscensionis*, *A. scabrivalvis* subsp. *scabrivalvis*, *Dactyloctenium aegyptium*, *Enneapogon cenchroides*, *Eragrostis rotifer*, *Melinis repens*, *Paspalum distichum, Tragus racemosus, Juncus exsertus*, *Phragmites australis* and *Pseudoschoenus inanis* are also found.

The forb stratum is dominated by exotics, but common indigenous species include *Arctotis arctotoides, Cleome monophylla, Cullen tomentosum, Mentha longifolia, Nidorella ivifolia* and *Persicaria attenuata* subsp*. africana.*

Exotic species found in the riparian woodland include *Eucalyptus camaldulensis*, *Schinus molle, Sesbania punicea, Argemone ochroleuca* subsp*. ochroleuca, Datura stramonium, Salsola kali, Xanthium spinosum, Conyza bonariensis, Verbena bonariensis, Bidens bipinnata, Atriplex semibaccata* var*. typica, Malvastrum coromandelianum, Flaveria bidentis, Tagetes minuta, Gomphrena celosioides, Oenothera rosea* and *Hibiscus trionum.*

No nationally protected trees (NFA) or specially protected species according to NCNCA occur in this community. However, *Gymnosporia buxifolia* is protected in terms of Schedule 2 of the NCNCA.

3. *Cynodon dactylon* dominated transformed floodplain

This plant community is restricted to the floodplains along the Vaal River and mainly occurs in the north-western section of the study area. A small portion in the south appears to fall within the demarcated border of Riet Puts, but is located on the opposite banks of the current river channel. Both these areas have been mined in the past, which vastly transformed their natural habitats. The grassland vegetation occurs on river gravel, cobbles and boulders which collectively constitute approximately 30 % of the ground cover.

The grassland of the transformed floodplain is found on river gravel, cobbles and boulders which collectivelly consititute 30 % of the ground cover.

The high density of *Cynodon dactylon* creates a monotonous grassland, with *Chloris virgata*, *Dactyloctenium aegyptium* and *Cyperus* spp. occurring sporadically. *Cullen tomentosum* and *Arctotis arctotoides* are fairly common indigenous herbs. The provincially protected *Euphorbia inaequilatera* (Schedule 2) forms dense mats at places and the declining bulb (Red List and NCNCA Schedule 2) *Crinum bulbispermum* was also encountered here. Exotics include *Cyperus eragrostis*, *Flaveria bidentis, Verbena bonariensis, Hibiscus trionum* and *Zinnia peruviana*.

4. S*earsia lancea* – *Aristida adscensionis* open shrubland on transformed land

This community occurs east of the Vaal River, where past mining activities have transformed the natural landscape. The alluvial gravels that were used for rehabilitating the surface during that time forms a gravelly substrate that constitute 10 % of the ground cover. The vegetation typically occurs in the form of and open shrubland where trees and tall shrubs are scattered in a shrubby grassland matrix.

The open shrubland on transformed land is represented by tall shrubs that are scattered in a shrubby grassland matrix.

The tall woody stratum is signified by a combination of exotic and indigenous species. *Searsia lancea* is the most dominant indigenous species, but only slightly more dominant than *Senegalia mellifera, Vachellia tortilis* subsp. *heteracantha*, *V. karroo* and *Ziziphus mucronata*, which are all very common. *Tarchonanthus camphoratus, Ehretia alba* and *Diospyros lycioides* are found in lower densities. *Tamarix ramosissima* is the most conspicuous exotic and form very dense stands in the vicinity of old slimes dams. Other common exotic trees and shrubs include *Schinus molle*, *Prosopis glandulosa*, *Nicotiana glauca* and *Melia azedarach.*

The grass layer is dominated by *Aristida adscensionis,* but *Eragrostis echinochloidea, E.* cf. *porosa* and *Enneapogon cenchroides* are also very common, while *Aristida scabrivalvis* subsp. *scabrivalvis*, *A. congesta* subsp*. barbicollis, Eragrostis lehmanniana, Melinis repens* and *Chloris virgata* are widely distributed. Other grasses encountered here include *Cynodon dactylon, Dichanthium annulatum, Digitaria eriantha, Enneapogon scoparius, Eragrostis rotifer, Fingerhuthia africana, Heteropogon contortus, Hyparrhenia hirta* and *Panicum maximum*. The exotic grass *Cymbopogon pospischilii* also occur in this community.

The herbaceous stratum is dominated by *Laggera decurrens*, but *Salvia disermas, Cullen tomentosum, Gomphocarpus fruticosus* subsp*. fruticosus* and *Sesamum triphyllum* var*. triphyllum* are common. Indigenous low shrubs include *Chrysocoma ciliata*, *Felicia filifolia* subsp. *filifolia*, *Melolobium candicans*, *Osteospermum muricatum* subsp. *muricatum*, *Salsola calluna* and *Sericocoma avolans*.

Other exotics found here include *Atriplex semibaccata* var. *typical, Flaveria bidentis, Argemone ochroleuca* subsp*. ochroleuca, Bidens bipinnata, Datura stramonium, Salsola kali* and *Tagetes minuta.*

No nationally protected trees (NFA) or specially protected species according to NCNCA occur in this community. However, *Gomphocarpus fruticosus* subsp. *fruticosus* is protected in terms of Schedule 2 of the NCNCA.

5. *Vachellia tortilis – Digitaria eriantha* open woodland on andesite hills

This community is restricted to a small section in the north-eastern corner of the study area, where red andesitic rock constitutes approximately 25 % of the ground cover. The vegetation is typically presented as trees and shrubs scattered among well-developed grass and forb strata. The community is regarded as being pristine with a variety of bulbs and very few exotic species present.

Vachellia tortilis subsp. *heteracantha* dominates the tall woody strata, with *Ehretia alba, Senegalia mellifera, Grewia flava, Gymnosporia buxifolia, Searsia lancea, Tarchonanthus camphoratus* and *Ziziphus mucronata* also being common. Lower shrubs include *Searsia ciliata, Hermannia affinis, Leonotis pentadentata, Sericocoma avolans, Phyllanthus maderaspatensis, P. parvulus, Eriocephalus* sp. 2 and *Asparagus* spp.

The open woodland on andesite hills have well-developed grass and forb strata, with red andesitic rocks constituting approximately 25 % of the ground cover.

Although the grass layer is dominated by *Digitaria eriantha,* other graminoids like *Aristida congesta* subsp. *congesta, A. scabrivalvis* subsp*. scabrivalvis, Enneapogon cenchroides, Eragrostis lehmanniana, Heteropogon contortus, Melinis repens, Schmidtia pappophoroides, Sporobolus fimbriatus* and *Themeda triandra* are also common. *Elionurus muticus, Eragrostis superba* and the exotic grass *Cymbopogon pospischilii* were also encountered here.

The forb component includes *Dicoma capensis*, *Geigeria* sp., *Heliotropium* sp., *Hibiscus marlothianus*, *Monsonia angustifolia*, *Osteospermum scariosum* var. *scariosum, Rhynchosia* sp., *Talinum caffrum* and the exotic herb *Flaveria bidentis*. Geophytes are widespread in this community and include *Freesia andersoniae, Massonia depressa, Ornithoglossum vulgare, Raphionacme hirsuta, Ledebouria* sp. and *Oxalis* sp.

No nationally protected trees (NFA) or specially protected species according to NCNCA occur in this community. However, *Gymnosporia buxifolia, Freesia andersoniae* and *Oxalis* sp. are protected in terms of Schedule 2 of the NCNCA.

6. *Ziziphus mucronata – Enneapogon desvauxii* open shrubland on calcrete soil

This community is located in the north of the study area. Trees and tall shrubs are scattered in a grassy matrix where shallow calcrete soil and surface limestone constitute between 15 and 20 % of the ground cover. No signs of substantial anthropogenic transformation are present, apart from a few roads that cross the unit.

The open shrubland on calcrete soil is presented as trees and tall shrubs scattered in a grassy matrix where shallow calcrete soil and surface limestone constitute between 15 and 20 % of the ground cover.

The tree stratum is signified by tall *Ziziphus mucronata* and *Searsia lancea* individuals that occasionally form bushclumps, where *Asparagus* spp. are prominent. Other shrubs like *Diospyros lycioides*, *Grewia flava*, *Senegalia mellifera* and *Vachellia tortilis* subsp. *heteracantha* are also scattered across the unit.

The grass layer is conspiquously dominated by *Enneapogon desvauxii*, while other grasses like *Aristida adscensionis, A. scabrivalvis* subsp*. scabrivalvis, Digitaria eriantha, Enneapogon cenchroides, Eragrostis lehmanniana, E. obtusa, Heteropogon contortus* and *Schmidtia pappophoroides* are also present.

Low shrubs predominantly found in the matrix include *Aptosimum marlothii, Leonotis pentadentata, Felicia* cf*. fascicularis, Pentzia calcarea, Sericocoma avolans* and *Eriocephalus* sp*.* Common forbs include *Aerva leucura, Corchorus* sp., *Geigeria* sp., *Hibiscus marlothianus, Kalanchoe rotundifolia, Limeum aethiopicum, Monechma divaricatum, Peliostomum lineare, Salvia disermas* and *Tribulus terrestris*.

Exotic species include *Cymbopogon pospischilii*, *Achyranthes aspera* and *Opuntia ficus-indica*. No nationally protected trees (NFA) or specially protected species according to NCNCA occur in this community. However, *Kalanchoe rotundifolia* is protected in terms of Schedule 2 of the NCNCA.

7. *Senegalia mellifera – Vachellia tortilis* thornveld on rooikoppie gravel

This community covers a very small section in the north-western section of the study area, where it represents a remnant patch of intact alluvial diamondiferous gravel. Rooikoppie constitutes 30 % of the ground cover and it appears to have been subjected to overutilision in the past. This assumption is based on the dense thorny shrub cover that becomes impenetrable in some places, while the grass layer is weekly developed.

The thornveld on rooikoppie gravel contains a dense cover of shrubs that become impenetrable at some places, while the grass layer is weekly developed.

Vachellia tortilis subsp. *heteracantha* is most dominant and form a dense canopy cover along with *Senegalia mellifera*, which is almost equally common. Other shrubs like *Diospyros lycioides*, *Grewia flava* and *Searsia lancea* are less common, but occur widespread. The understory shrubs include *Lycium cinereum, Eriocephalus* sp., *Lantana rugosa*, *Pentzia calcarea* and *Sericocoma avolans*.

The grass layer is dominated by *Enneapogon scoparius*, but *Aristida scabrivalvis* subsp. *scabrivalvis*, *Digitaria eriantha*, *E. cenchroides* and *Fingerhuthia africana* are also very common. *Kalanchoe rotundifolia*, *Aloe grandidentata, Pupalia lappacea* var. *lappacea* and *Heliotropium* sp. are the most common forbs and *Opuntia ficus-indica* is the only exotic species encountered here.

No nationally protected trees (NFA) or specially protected species according to NCNCA were found. However, *Kalanchoe rotundifolia* and *Aloe grandidentata* are protected in terms of Schedule 2 of the NCNCA.

8. *Enneapogon cenchroides – Aristida adscensionis* grassland on plains

The plains comprise the eastern half of the study area and are signified by well-developed grassland with trees and shrubs being sparsely distributed across the landscape. This unit can be regarded as pristine, with very little evidence of past disturbances. It is in good condition and has great landuse potential in terms of grazing. Red, sandy soil constitutes 10 % of the ground cover.

The grassland on plains is has a well-developed grass stratum, with trees and shrubs being scattered across the landscape.

Enneapogon cenchroides and *Aristida adscensionis* are dominant across the unit, but *A. congesta* subsp. *barbicollis*, *E. desvauxii*, *Eragrostis porosa*, *E. lehmanniana*, *E. echinochloidea*, *E. obtusa*, *Fingerhuthia africana*, *Chloris virgata, Digitaria eriantha, Cenchrus ciliaris* and *Sporobolus fimbriatus* are also very common. Other graminoids found here include *Tragus racemosus, Schmidtia pappophoroides, Enneapogon scaber, Eragrostis rotifer, E. superba* and *Cyperus longus* var*. tenuiflorus*.

Vachellia tortilis subsp. *heteracantha* is conspicuously scattered across the landscape, while *Rhigozum trichotomum* and *Senegalia mellifera* form occasional dense stands. Other shrubs found here include *Grewia flava, Asparagus* sp., *Monechma incanum, Salsola calluna, Lycium cinereum, Penzia incana, Felicia filifolia* subsp. *filifolia* and *Sericocoma avolans*.

Forbs include *Heliotropium* sp., *Hypertelis salsoloides* var. *salsoloides, Limeum africanum* subsp. *africanum, Peliostomum leucorrhizum*, *Lotononis* sp., *Cucumis myriocarpus* and *Tribulus terrestris*. *Moraea polystycha* and *Oxalis* sp. are very common geophytes and widespread across the unit. They are also both protected in terms of Schedule 2 of the NCNCA. No specially protected species under this Act were encountered in this unit, but a few individuals of the nationally protected tree *Vachellia erioloba* occurs along the public gravel road thatn turns south from the R374 towards Riverton. Exotics include *Prosopis glandulosa*, *Opuntia ficus-indica* and *Flaveria bidentis.*

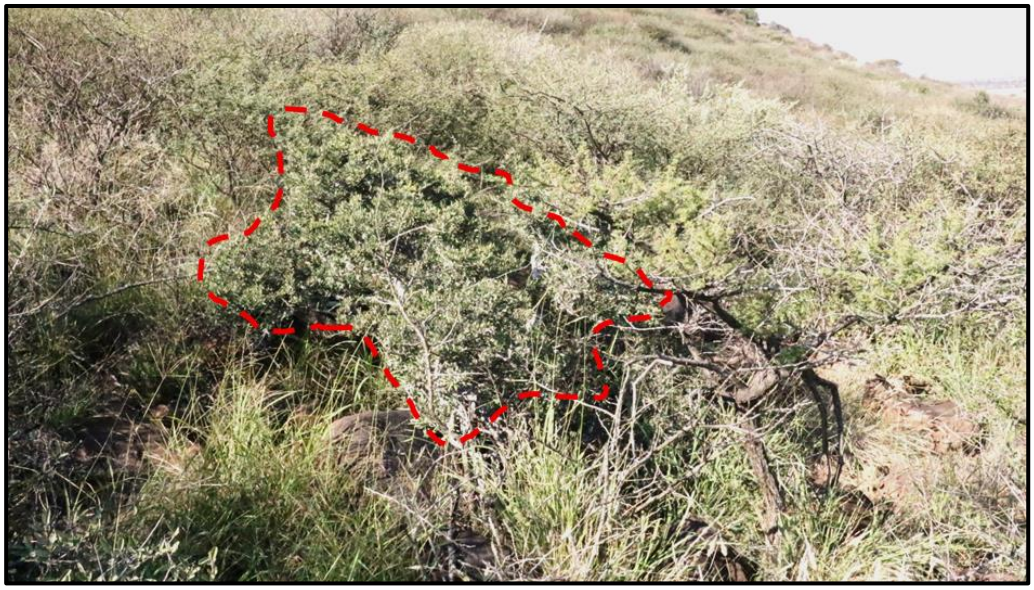
9. *Vachellia tortilis – Cenchrus ciliaris* open woodland on dolerite hills

The dolerite hills of the study area are located in the eastern half of Riet Puts. Here, the vegetation is signified by tall trees that are scattered in a dense grassland matrix. The community is located on steep slopes where dolerite boulders constitute 10% of the ground cover. Little evidence of past disturbances exists and therefore the dolerite hills are regarded to be pristine.

The community composition transitions along the hillslopes. Here, *Senegalia mellifera* forms dense stands at the footslopes, but then gradually becomes sporadic upwards; where *Vachellia tortilis* subsp. *heteracantha* dominates the slopes and crests. Similarly, *Digitaria eriantha* is more conspicuous along the mid slopes, while *Cenchrus ciliaris* becomes much more prominent towards the crests.

Other tall shrubs include *Ehretia alba, Grewia flava, Rhigozum obovatum, Ziziphus mucronata* and *Tarchonanthus camphoratus*. Low shrubs comprise *Asparagus* sp.*, Lycium cinereum, Lantana rugosa, Monechma incanum, Solanum* sp.*, Viscum rotundifolium, Barleria rigida, Cadaba aphylla* and *Felicia filifolia* subsp*. filifolia.* The nationally (NFA) and provincially (Schedule 2: NCNCA) protected *Boscia albitrunca* is found widespread across the community as low-growing shrubs and is especially prominent in the drainage lines.

The woodland of the hills in the east is signified by tall trees that are scattered in a dense grassland matrix. Dolerite boulders constitute 10 % of the ground cover.



The nationally and provincially protected tree Boscia albitrunca (outlined in red) occurs widespread across the dolerite hills in the form of low-growing shrubs.

Apart from the aforementioned dominant grasses, other graminoids also include *Aristida congesta* subsp. *barbicollis, Chrysopogon serrulatus, Enneapogon cenchroides, E. scaber, E. scoparius, Eragrostis porosa, Panicum maximum* and *Sporobolus fimbriatus.* Forbs like *Cheilanthes eckloniana, Heliotropium* sp., *Hermannia* cf. *scabra* and *Pupalia lappacea* var. *lappacea* are common.

The exotic *Opuntia ficus-indica* is widespread and conspicuous on the slopes. Apart from *B. albitrunca*, no other protected species occur on the dolerite hills.

10. Ephemeral drainage lines

A number of emphemeral drainage lines originally occurred in the study area, of which all meandered westerly to drain into the Vaal River. However, a number of these have been destroyed during past mining activities. Only those in the the pristine eastern section of the study area remain, but there are no clear evidence of re-established drainage to the Vaal.

The drainage lines found in the plains are characterised by a dense stand of riparian shrubs and trees, with a typically bare channel.

Of the remaining drainage lines, only those meandering through the plains show distinct floristics, while those associated with the hills are similar to the surrounding vegetation. Plains drainage lines are characterised by a dense stand of riparian shrubs and trees with a weak understory, but occasional dense grass patches are also found. The drainage channel is typically bare and comprises dark clayey soil, but annuals and weeds grow opportunistically in some places.

Vachellia karroo and *Lycium oxycarpum* are equally conspicuous, while *Prosopis glandulosa* (exotic)*, Ziziphus mucronata, Diospyros lycioides, Grewia flava, Lycium hirsutum, Searsia lancea, Senegalia mellifera* and *Asparagus* spp. are also common. The grass stratum is represented by *Cynodon dactylon, Sporobolus fimbriatus, Cenchrus ciliaris* and *Panicum maximum*, while exotic forbs like *Tagetes minuta* and *Bidens bipinnata* have infested the majority of the understory. No species of conservation concern were encountered here.

Population of sensitive, threatened and protected plant species

The SANBI Red List provides information on the national conservation status of South Africa's indigenous plants, while the National Forests Act (No. 84 of 1998) (NFA) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) restricts activities regarding sensitive plant species. Section 15 of the NFA prevents any person to cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. Section 49 (1) and 50 (1) of the NCNCA states that no person may, without a permit pick, transport, possess, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) plants. Furthermore, Section 51(2) states that no person may, without a permit, pick an indigenous plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

Most of the species recorded for the area are classified as least concern; a category which include widespread and abundant taxa. Two listed species are however known from the study area, of which one was encountered during the survey, i.e. *Crinum bulbispermum* (Declining). This species is restricted to the transformed floodplain, where it occurs at very low densities.

Although *Lithops lesliei* subsp. *lesliei* (Near-Threatened) was not encountered during the survey, it is highly likely that they occur on site. The plant is typically sunken in the soil and therefore not easily detected. They prefer arid grasslands, usually in rocky places, where they grow under the protection of forbs and grasses.

Species found on Riet Puts that are protected in terms of the National Forests (NFA) Act No 84 of 1998 includes *Vachellia erioloba* and *Boscia albitrunca*. The latter species occurs widespread across the dolerite hills at low densities, while only a few *V. erioloba* species are found along a public gravel road toward Riverton within the grassland on plains. It is not foreseen that any individuals of these protected tree species will be affected by the Riet Puts 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.

No specially protected species (Schedule 1 of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009) are known from the region and none were encountered. Those protected according to Schedule 2 are listed in the table below.

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
AMARYLLIDACEAE	*Crinum bulbispermum**	**Decl.**		S2
APIACEAE	*Heteromorpha arborescens* var. *arborescens*			S2
APOCYNACEAE	*Gomphocarpus fruticosus* subsp. *fruticosus**			S2
ASPHODELACEAE	*Aloe grandidentata**			S2
CAPPARACEAE	*Boscia albitrunca**		**X**	S2
CELASTRACEAE	*Gymnosporia buxifolia**			S2
CRASSULACEAE	*Cotyledon orbiculata* var. *dactylopsis*			S2
	Crassula lanceolata subsp. *lanceolata*			S2
	*Kalanchoe rotundifolia**			S2
EUPHORBIACEAE	*Euphorbia inaequilatera**			S2
FABACEAE	*Vachellia erioloba**		**X**	
IRIDACEAE	*Freesia andersoniae**			S2
	Moraea pallida			S2
	*Moraea polystachya**			S2
	Moraea simulans			S2
MESEMBRYANTHEMACEAE	*Lithops lesliei* subsp. *Lesliei*	**NT**		S2
OXALIDACEAE	*Oxalis* sp. *			S2
SCROPHULARIACEAE	*Jamesbrittenia aurantiaca*			S2

Of these, *Crinum bulbispermum, Gomphocarpus fruticosus* subsp. *fruticosus, Aloe grandidentata, Gymnosporia buxifolia, Kalanchoe rotundifolia* and *Euphorbia inaequilatera* were encountered in the areas that are most likely to be affected by the prospecting operation. A projection for species of conservation concern is presented in the table below and a photographic guide to those species encountered during the survey is attached as Appendix 3 of the Ecological Assessment Report.

Additionally, according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for the large-scale clearance of indigenous (Schedule 3) vegetation, before prospecting activities commences.

Critical biodiversity areas and broad-scale processes

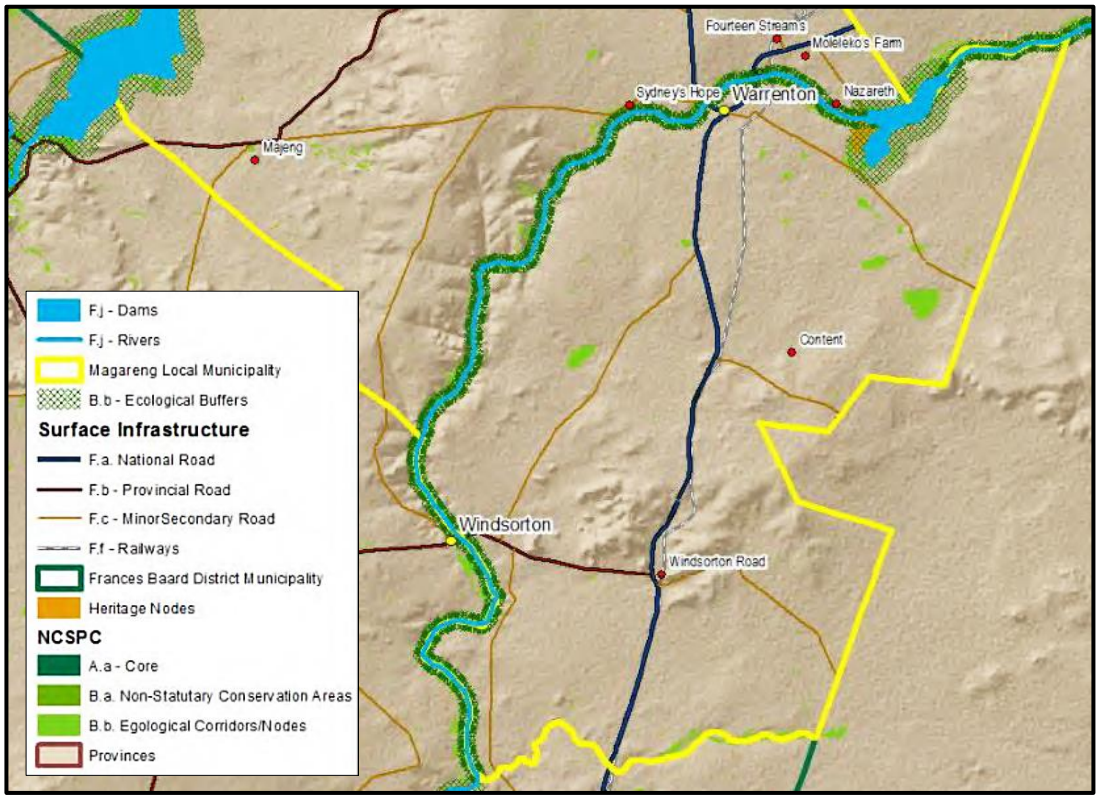
The vegetation units found within the study area are classified as least threatened. No fine-scale conservation planning has been conducted for the area and it is not known to host exceptional biodiversity. Furthermore, the study area does not fall within a National Protected Areas Expansion Strategy Focus Area.

Areas that have been identified for long-term maintenance of broad-scale ecological processes include the riparian zones along the Vaal River. The Magareng Spatial Development Framework proposed these to be maintained as ecological corridors in order to create an open space system throughout the municipal areas that promotes ecological ecosystems within the region.

The Wedberg operation itself is expected to cause habitat transformation through the excavation of open pits, and will thereby contribute to cumulative habitat loss and the disruption of the broad-scale landscape connectivity in the region. The study area falls within a zone where one of South Africa's largest economically most important alluvial deposits of diamonds are found. The primary secondary source of alluvial diamond deposits in the Northern Cape extends along the Orange and Vaal Rivers, while the most significant crop irrigation in the province also stretches along these rivers. The transformation of those broad-scale vegetation units that fall within the study area are mainly due to cultivation. The cumulative impacts in the vicinity of the study area are therefore considered to be high.

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
Aquatic community in the Vaal River	± 44 ha	± 22 ha	None encountered	N/A	N/A
Searsia lancea dominated riparian woodland	± 35 ha	± 20 ha	*Gymnosporia buxifolia*	± 7	± 140
Cynodon dactylon dominated transformed floodplain	± 56 ha	56 ha	*Euphorbia inaequilatera* *Crinum bulbispermum*	< 1	< 50
Searsia lancea – Aristida adscensionis open shrubland on transformed land	± 698 ha	± 600 ha	*Gomphocarpus fruticosus* subsp. *fruticosus*	< 1	< 500
Vachellia tortilis – Digitaria eriantha open woodland on andesite hills	± 32 ha	0 ha	*Gymnosporia buxifolia* *Freesia andersoniae* *Oxalis* sp.	< 1 12 17	None predicted None predicted None predicted
Ziziphus mucronata – Enneapogon desvauxii open shrubland on calcrete soil	± 142 ha	0 ha	*Kalanchoe rotundifolia*	< 1	None predicted
Senegalia mellifera – Vachellia tortilis thornveld on rooikoppie gravel	± 15 ha	15 ha	*Kalanchoe rotundifolia* *Aloe grandidentata*	± 5 < 1	± 75 < 15
Enneapogon cenchroides – Aristida adscensionis grassland on plains	± 456 ha	0 ha	*Moraea polystycha* *Vachellia erioloba* *Oxalis* sp.	3 <1 6	None predicted
Vachellia tortilis – Cenchrus ciliaris open woodland on dolerite hills	± 237 ha	0 ha	*Boscia albitrunca*	3	None predicted
Ephemeral drainage lines (natural remnants on plains)	± 15 km	0 km	None encountered	N/A	N/A



Proposed buffers within the Magareng Local Municipality that are to be maintained as ecological corridors in order to create an open space system throughout the municipality.

The extent of habitat transformation by mining activities and crop irrigation along the Vaal River, in the vicinity of the study area.

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
Achyranthes aspera	Burweed	1	-	S6
Flaveria bidentis	Smelter's bush	-	1b	-
Xanthium spinosum	Spiny cocklebur	1	1b	S6
Opuntia ficus-indica	Sweet prickly pear	1	1b	S6
Salsola kali	Tumbleweed	-	1b	-
Prosopis glandulosa var. *glandulosa*	Honey mesquite	2	3	S6
Sesbania punicea	Red sesbania	1	1b	S6
Myriophyllum aquaticum	Parrot's feather	1	1b	S6
Malvastrum coromandelianum	Prickly malvastrum	-	1b	-
Melia azedarach	Syringa	3	1b	S6
Eucalyptus camaldulensis	Red river gum	2	1b	S6
Argemone ochroleuca subsp. *ochroleuca*	White-flowered Mexican poppy	1	1b	S6
Datura stramonium	Common thorn apple	1	1b	S6
Nicotiana glauca	Wild tobacco	1	1b	S6
Tamarix ramosissima	Pink tamarisk	1	1b	S6
Verbena bonariensis	Purple top	-	1b	-

Indicators of bush encroachment

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

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

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

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

Mammals

A number of habitats are found in the study area and therefore the proposed prospecting site is likely to host a rather diverse mammal community. As many as 59 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2 of the Ecological Assessment Report), of which Rock Hyrax, Vervet Monkey and Steenbok were encountered during the site visit.

Eleven listed terrestrial mammal- and four listed bat species potentially occur in the area:

A list of mammal species found in the study area, which are of conservation concern in terms of the international (IUCN) Red List and the South African Red Data Book (SA RDB). Their respective NCNCA schedule numbers are indicated in superscript.

Scientific name	Common name	IUCN Status	SA RDB Status
[2]*Eidolon helvum*	African Straw-coloured Fruit-bat	NT	*Not listed*
[2]*Rhinolophus denti*	Dent's Horseshoe Bat	LC	NT
[2]*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	LC	NT
[2]*Rhinolophus darlingi*	Darling's Horseshoe Bat	LC	NT
[2]*Chlorotalpa sclateri*	Sclater's Golden Mole	LC	DD
[2]*Gerbilliscus leucogaster*	Bushveld Gerbil	LC	DD
[1]*Smutsia temminckii*	Ground Pangolin	VU	VU
[2]*Suncus varilla*	Lesser Dwarf Shrew	LC	DD
[1]*Atelerix frontalis*	South African Hedgehog	LC	NT
[1]*Felis nigripes*	Black-footed cat	VU	LC
[2]*Aonyx capensis*	Cape Clawless Otter	NT	LC
[1]*Hydrictis maculicollis*	Spotted-necked Otter	NT	NT
[1]*Hyaena brunnea*	Brown Hyena	NT	NT
[1]*Poecilogale albinucha*	African Striped Weasel	LC	DD
[1]*Mellivora capensis*	Honey Badger	LC	NT

The African Straw-coloured Fruit-bat, Geoffroy's Horseshoe Bat, African Striped Weasel and Honey Badger have a high chance of occurring across the site, given their wide habitat tolerances. The Dent's Horseshoe Bat, Darling's Horseshoe Bat, Black-footed cat, Ground Pangolin, Bushveld Gerbil and Lesser Dwarf Shrew all have a high potential of occurring in the pristine habitat in the east due to their preference for either savana, grassland or rocky hill habitats. The Cape Clawless Otter and Spotted-necked Otter both have a high potential to occur in the vicinity of the Vaal River due to their preference for aquatic habitats.

On the other hand, the Sclater's Golden Mole has a moderate to low potential of occuring on the higher altitude hills in the east, while the South African Hedgehog 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 occur in the pristine areas, but has a low potential to be found on site mainly based on the fact that farm fences are restricting their occurences across their natural distribution range.

Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2 of the Ecological Assessment Report). Those that are specially protected include Spotted-necked Otter, Honey Badger, Striped Polecat, Bat-eared Fox, Brown hyena, Cape Fox, Black-footed cat, African Wild Cat, Aardwolf, African Striped Weasel, South African Hedgehog, Ground Pangolin and Aardvark. Problem animals (Schedule 4) include Black-backed Jackal, Vervet Monkey, Chacma Baboon and Caracal.

The core prospecting activities are associated with the Vaal River as well as those alluvial terraces, east of the river that has been mined in the past. 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 associated with the aquatic, wetland and riparian habitats. It is not foreseen that any listed mammal species will be impacted in the historically mined alluvial terraces in terms of habitat loss, but if these species occur on site they could accidentally be disturbed or killed during prospecting activities.

Reptiles

The Riet Puts prospecting area lies within the distribution range of at least 55 reptile species (see Appendix 2 of the Ecological Assessment Report), of which none are of international or national conservation concern. Three species are endemic to South Africa, i.e. *Homopus femoralis* (Greater Padloper), *Pachydactylus mariquensis* (Common Banded Gecko) and *Agama aculeata distanti* (Eastern Ground Agama) and most area are protected either according to Schedule 1, 2 or 3 of NCNCA, except for agamas, geckos and skinks (see Appendix 2 of the Assessment Report). Specially protected species include *Karusasaurus polyzonus* (Southern Karusa Lizard) and *Chamaeleo dilepis dilepis* (Namaqua Chamaeleon).

The habitat diversity for reptiles in the study area is high and includes the aquatic and riparian zones, rocky hills, calcrete plains, sandy plains and ephemeral drainage lines. The rocky hills are considered to be the most important habitat for reptiles at the site, but it is 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. In general, impacts by the proposed mining operations on reptiles are likely to be low.

Amphibians

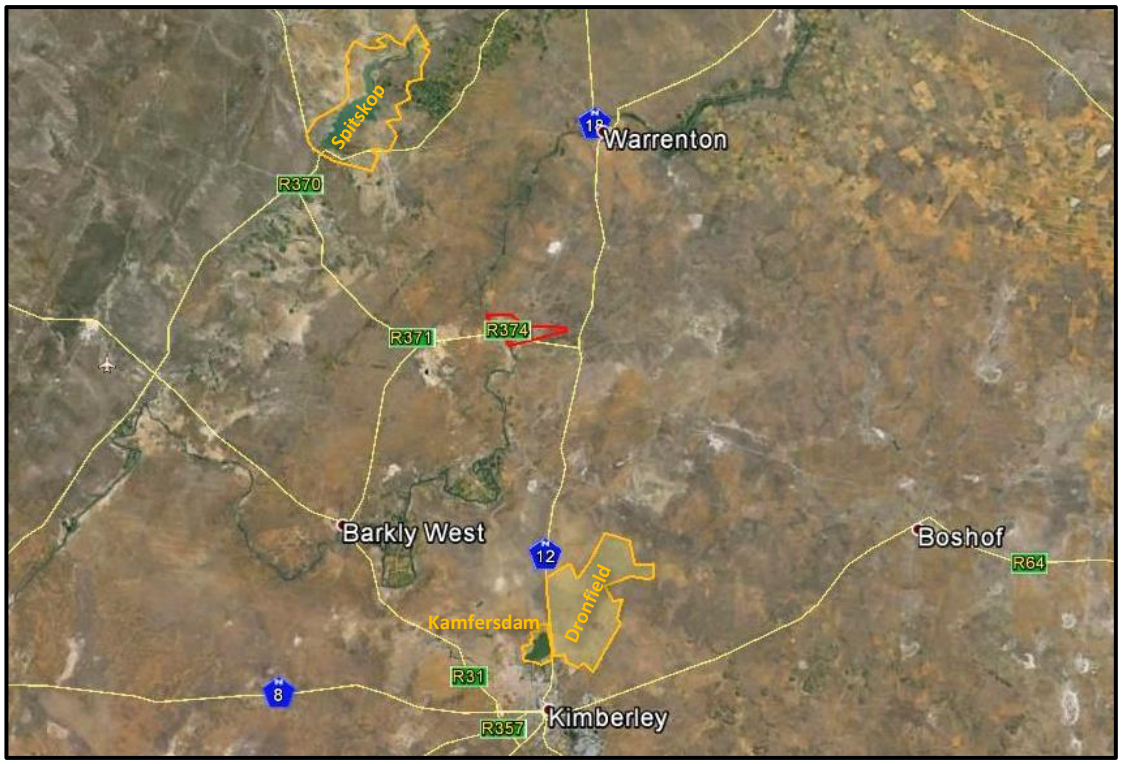
Fifteen amphibian species are known from the region (Appendix 2 of the Ecological Assessment Report). Low amphibian diversity is normal for an arid area, but is likely to increase within the aquatic and wetland ecosystem of the Vaal River. As a result, a higher amphibian diversity is most likely to be found in the latter, while only those species which are relatively independent of water are likely to be common in the area further east of the river.

Pyxicephalus adspersus (Giant Bull Frog) is the amphibian species of conservation concern that potentially occur in the study area. It is listed as Near Threatened in terms of the Red Data Book of Frogs and is protected according to Schedule 1 of the NCNCA. All other amphibians of the study area are protected according to Schedule 2 of NCNCA (see Appendix 2 of assessment report). Impacts on amphibians are likely to be high in the aquatic, wetland and riparian habitats.

Avifauna

The study site does not fall within any of the Important Bird Areas (IBA) defined by Birdlife South Africa, but lies near (< 50 km) three IBAs; i.e. Spitskop Dam (23 km), Dronfield (24 km) and Kamfers Dam (33 km).

Spitskop Dam is one of the largest wetlands in the Northern Cape region and holds water permanently, providing a vital habitat when many temporary wetlands have dried up. It is an important habitat for the Greater- and Lesser Flamingo, Chestnut-banded Plover, Caspian Tern, Pink-backed Pelican and Yellow-billed Stork. One of the most important threats is the poor water quality of the dam fed by the Hart River. The water quality of the latter deteriorates due to irrigation return flows with increasing concentrations of sodium, magnesium, chloride, sulphate and nutrients. Releases from Spitskop Dam could also impact on the quality of the Vaal River. Other important threats to Spitskop Dam include the hunting or poaching of waterbirds, fishing activities and livestock grazing and trampling. The dam edges are threatened by the common reed, the dominance of which reduces the foraging area for flamingos and waders that prefer open shoreline.



Riet Puts (indicated in red) lies in the vicinity of three Important Bird Areas, i.e. Spitskop Dam, Kamfers Dam and the Dronfield Nature Reserve (indicated in yellow).

Dronfield supports large numbers of breeding White-backed Vulture, which comprises 41 % of the breeding pairs in the Kimberley region. These birds forage over wide areas and a pair was encountered soaring over the study area during the site visit. The use of poisons in farming areas to combat mammalian predators still poses a threat to scavenging raptors, and hundreds of vultures can be killed in a single poisoning incident. Collisions with transmission power lines and electrocutions on reticulation and distribution power lines also pose an ongoing threat to vultures and other trigger species.

Kamfersdam is an endorheic pan that has been transformed into a permanent wetland over the past decade due to an increase in sewage effluent inflow. Hence, it has become an important habitat for birds, especially the Greater- and Lesser Flamingos. The dam supports the largest permanent population of Lesser Flamingos in southern Africa. The most significant threats to Kamfersdam are poor water quality, flooding and expansion of urban development, while threats to the bird population include illegal hunting of water birds and the collisions and mortality of flamingos and other water birds caused by power lines and the electrical transmission lines along the railway.

A total number of 295 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 (Appendix 2 of the Ecological Assessment Report). Twenty-four listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened or Endangered:

Bird species found in the study area that are of conservation concern.

Scientific name	Common name	Status
Aquila rapax	Tawny Eagle	EN
Circus ranivorus	African Marsh-Harrier	EN
Gyps africanus	White-backed Vulture	EN
Gyps coprotheres	Cape Vulture	EN
Mycteria ibis	Yellow-billed Stork	EN
Polemaetus bellicosus	Martial Eagle	EN
Torgos tracheliotus	Lappet-faced Vulture	EN
Anthropoides paradisea	Blue Crane	NT
Ardeotis kori	Kori Bustard	NT
Charadrius pallidus	Chestnut-banded Plover	NT
Ciconia abdimii	Abdim's Stork	NT
Eupodotis caerulescens	Blue Korhaan	NT
Glareola nordmanni	Black-winged Pratincole	NT
Leptoptilos crumeniferus	Marabou Stork	NT
Limosa limosa	Black-tailed Godwit	NT
Numenius arquata	Eurasian Curlew	NT
Oxyura maccoa	Maccoa Duck	NT
Phoenicopterus minor	Lesser Flamingo	NT
Phoenicopterus ruber	Greater Flamingo	NT
Aquila verreauxii	Verreaux's Eagle	VU
Circus maurus	Black Harrier	VU
Falco biarmicus	Lanner Falcon	VU
Rostratula benghalensis	Greater Painted-snipe	VU
Sagittarius serpentarius	Secretarybird	VU

The Verreaux's Eagle (Vulnerable) is confirmed to occur on site, as it was seen hunting in the pristine plains during the site visit. It is however not clear if they reside on site. The remaining listed species are expected to occur on site either by occasionally passing over the area or by frequently foraging in the various habitats.

In general, bird species of the study area are likely to experience some disturbances as a result of the Riet Puts prospecting activities. The most significant impacts are however expected to be in the form of riparian habitat destruction and the subsequent loss of ecological corridors and connectivity. This will especially impact the wetland and aquatic birds that rely on the riparian habitats for breeding, nesting and foraging.

Terrestrial birds are not likely to experience any major direct disturbances in the habitats east of the River. Here, disturbances will be very local and confined to the core sites and will be in the form of noise and movement. It is not expected that any additional habitat loss will occur here, due to the extent of past disturbances; unless mining activities expand into pristine vegetation. Birds are however highly mobile and are expected to move to similar adjacent habitats, if necessary. Therefore, the Riet Puts activities would not constitute a significant loss that would compromise the available habitat for any of the terrestrial resident bird species.

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 power lines, but flamingos, bustards and storks are highly vulnerable to collisions, while many of the raptors, including vultures, are susceptible to electrocution and collision. Monitoring during the prospecting operation would be vital in order to ensure no or low impact.

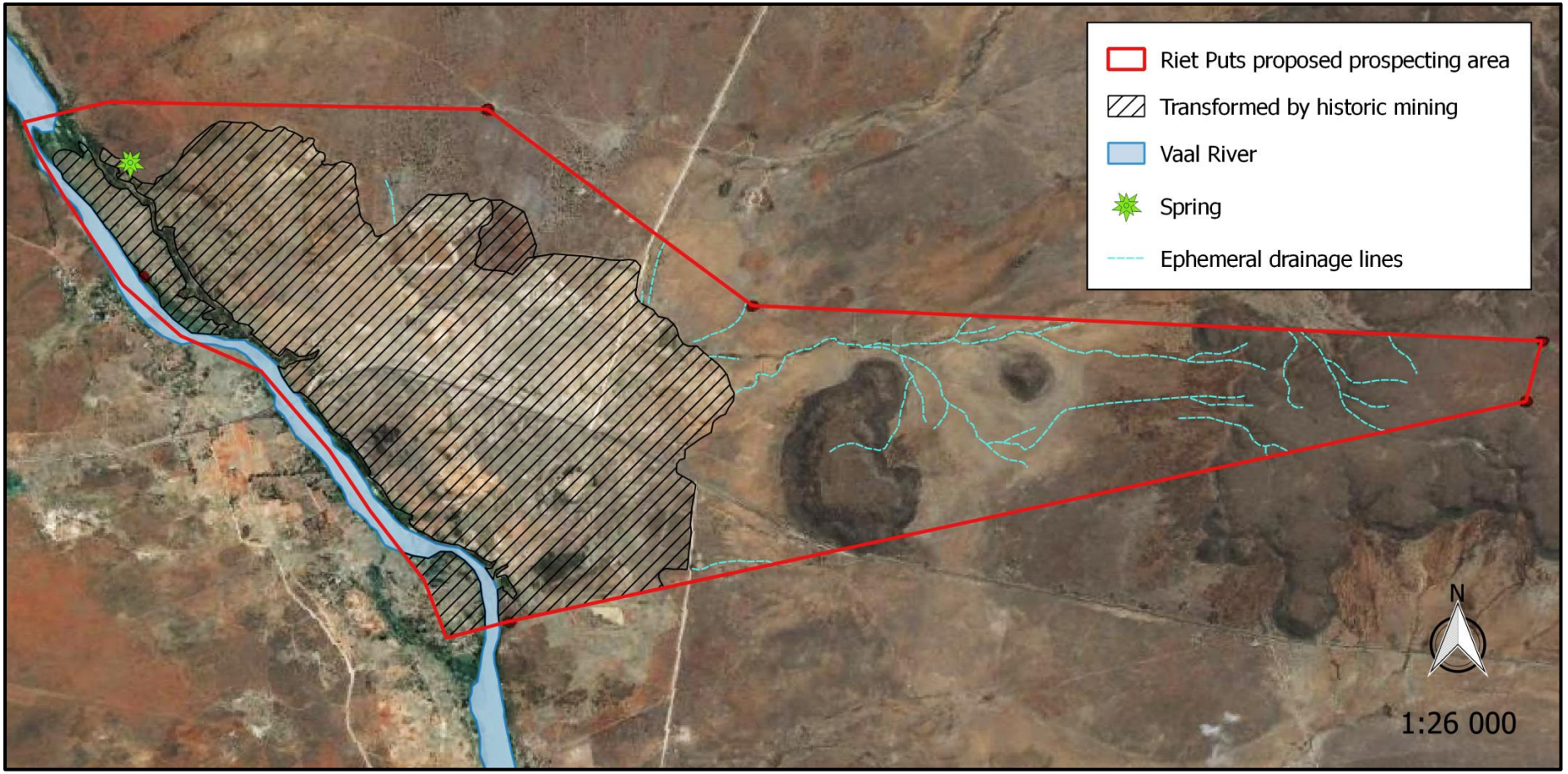
SURFACE WATER RESOURCES

The Riet Puts prospecting operation is situated within the Vaal D/S Bloemhof quaternary catchment (C91D) of the Lower Vaal Water Management Area. The quaternary catchment has been allocated a Present Ecological State (PES) of 'largely modified' (D) during the Water Resources Situation Assessment Study that was conducted by DWS in 2002.

Information regarding mean annual rainfall, evaporation potential and runoff for the quaternary catchment is provided in the table below.

Mean Annual Rainfall (mm)	Mean Annual Evaporation (mm)	Mean incremental Annual Runoff (million m^3)
397	2 050	4.22

The identified surface water features on Riet Puts include the Vaal River, numerous ephemeral drainage lines and a spring, as seen in the figure below. The past mining activities have impacted the drainage channels on the historic mine footprint and therefore only those in the east remain.



Identified surface water features on Riet Puts.

Surface water related information for Riet Puts was obtained from three reports: a Mine Closure Environmental Management Application Report compiled by Adriaan du Toit in 2004 was consulted to obtain baseline information on surface water quantity and quality, the river diversion report compiled by MVD Kalahari was consulted for information on hydrology, while an aquatic assessment and wetland delineation report (**Appendix 8**) compiled by Dr Betsie Milne was used to attain information watercourses in terms of PES, EIS and functionality. The results of these assessments are provided below.

Drainage, yield, runoff and flooding

One spring is located in the north-west corner of the prospecting right area, which yield approximately 150 l/hr.

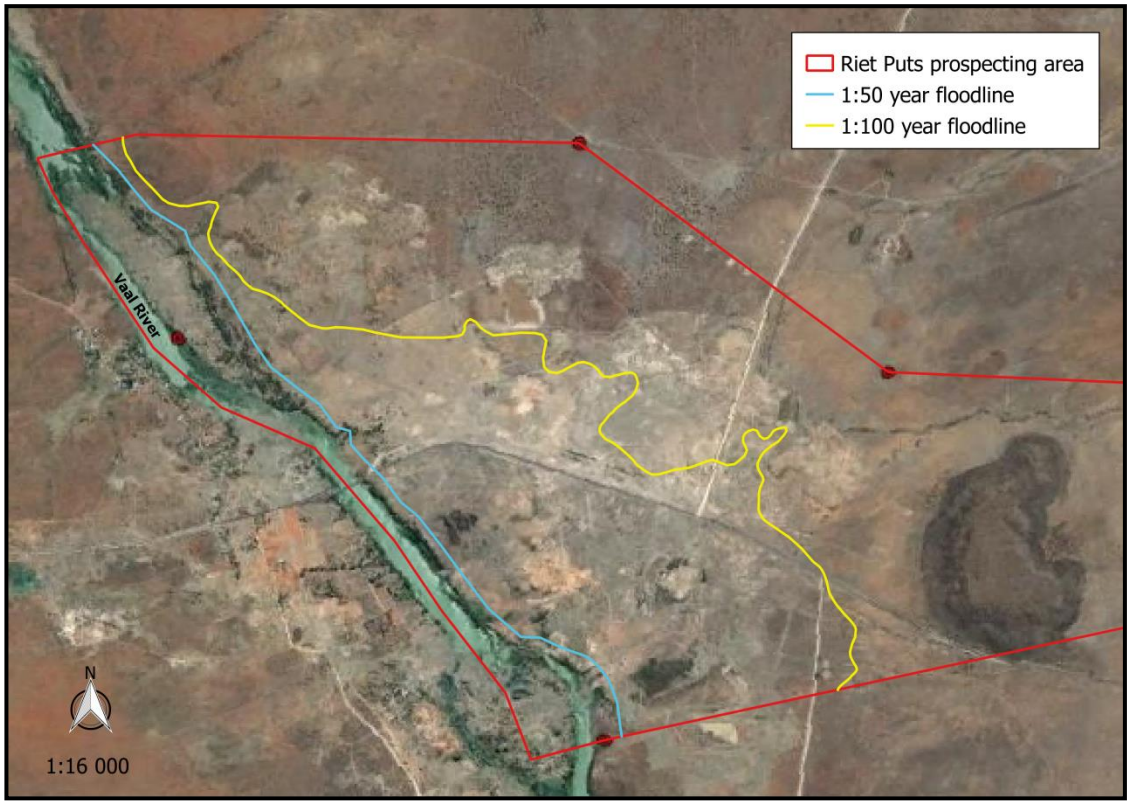
No perennial rivers drain from the prospecting right area into the Vaal River and those ephemeral drainage lines that remain, are no longer connected to the river. Nevertheless, surface flow is directed south-westerly and all runoff that reaches the Vaal River flows in a southern direction through Riverton, Barkly West, Delportshoop, Schmidtsdrif and Douglas over a distance of ± 250 km, before it meets the Orange River to become the greater Orange River.

Surface runoff only reaches the Vaal during storm events and the Dundee soil forms have a high permeability due to their low clay content and deep profiles. If 10 mm rainfall occurs at an average of 13 days per year it will result in 130 mm/year and will lead to 10 % runoff. Therefore, the sub-catchment area (4 736 ha) in which Riet Put falls has an annual runoff of 615 680 m^3.

River flow data from a gauging structure (C9H009) in the Vaal River some 10km upstream of the proposed mining area is available. The structure is a sharp crested flow gauging structure. This flow data was captured from 1969 to date. The data can be used to give an indication of the size of flows that can be expected throughout a yearly cycle and can be used for the proposed prospecting site due to the close proximity of the location of the gauging structure. The maximum monthly flood size throughout the lifespan of the measuring point were determined as from 1969 from where the average maximum monthly flood size for each month were calculated.

The maximum monthly flood sizes were during the months of January, February and March which were 290.05 m^3/s, 431.94 m^3/s and 370.33 m^3/s respectfully. The 431.94 m^3/s had a water level of 2.43 m above the low crest level at the gauging structure. The flow of 431.94 m^3/s was 27 times exceeded since 1969 and the flow of 812,125 m^3/s (h = 3.8 m above low crest level) was only exceeded 20 times.

The normal dry weather flow in the Vaal River is as low as 52.71 million m^3 during the month of August, to as high as 674.1 million m^3 during February. During a 1 in 50 year flood event, the Vaal River is expected to rise by an average of 5 m, while during a 1 in 100 year flood event the river height will rise as much as 10 to 12 m. Based on these assumptions, flood lines were derived using elevation data (see map below). It is however important to note that the Vaal River has been significantly altered by anthropogenic activities and that past mining activities on Riet Puts have transformed the natural topography. No fine-scale survey data (contour survey) is available for the proposed prospecting areas. Therefore these flood lines only provide a relative impression and cannot be regarded as accurate.



A relative indication of the flood lines on Riet Puts.

Surface water quality

Regional surface water quality data was obtained from two routine DWS monitoring points located up- and downstream of Riet Puts (see table below), while local baseline water samples were taken by Adriaan du Toit in 2003 at an unknown point in the Vaal River and at the spring in the north-west of the property. Follow-up samples were taken by Dr Milne in May 2016.

The water quality results are presented in the next section and indicate that water in the Vaal is recent with low salinity, moving towards a stagnant character due to the high sulphate content. The latter is a concern and potentially reflects the high salt load the Vaal is receiving. The character of the spring water differs from the other surface water features because it originates from an aquifer. The spring will therefore be discussed in the groundwater section below.

The location of monitoring points selected to assess water quality for the Vaal River

POINT ID	DESCRIPTION	LOCATION	
		Latitude	Longitude
RP1	Vaal River: Upstream point of the Riet Puts prospecting operation. Data collected by Dr. Milne in May 2016.	-28.31156	24.70344
RP2	Vaal River: Downstream of the Riet Puts prospecting operation. Data collected by Dr. Milne in May 2016.	-28.33898	24.73147
C9H008Q01	Vaalharts barrage on Vaal River: downstream weir (further upstream of Riet Puts). DWS monitoring point.	-28.114167	24.915278
C9H009Q01	Vaal River at de hoop (further downstream of Riet Puts). DWS monitoring point.	-28.515833	24.601111
Vaal River (general)	Baseline water quality monitoring point. Data collection done by Adriaan Du Toit in 2004.	*Not specified*	
Spring	A freshwater spring located on Riet Puts. Data collection done by Adriaan du Toit in 2004 and Dr. Milne in May 2016.	-28.31337	24.70859

Most of the water from the Vaal River is used for urban, agricultural and mining purposes. The numerous alluvial diamond mining operations, Windsorton municipality and farmers for crop irrigation schemes are making substantial use of surface water from the Vaal around Windsorton. Total water abstraction volume from the Vaal River in the region is estimated to be between 130 000 m^3 and 200 000 m^3 per month. Apart from abstraction, these activities also contribute to the downstream water quality deterioration, which include impacts such as waste water discharge (sewage), sedimentation (diamond diggings) and saline irrigation return flows and nutrient loads (agriculture).

Watercourse delineation, classification and descriptions

Two wetlands, one river, one ephemeral stream, a spring and numerous drainage lines were identified on site (see figure below). The wetlands have a total area of ± 78 ha of which ± 56 ha falls within the study site. The Vaal River flows in a north-south direction, of which a total stretch of ± 5.2 km runs through the site. Much of the riparian vegetation has been destroyed, but the remaining intact riparian zone lines the river for ± 2 km. The spring is located in the north-west corner of the prospecting right area.

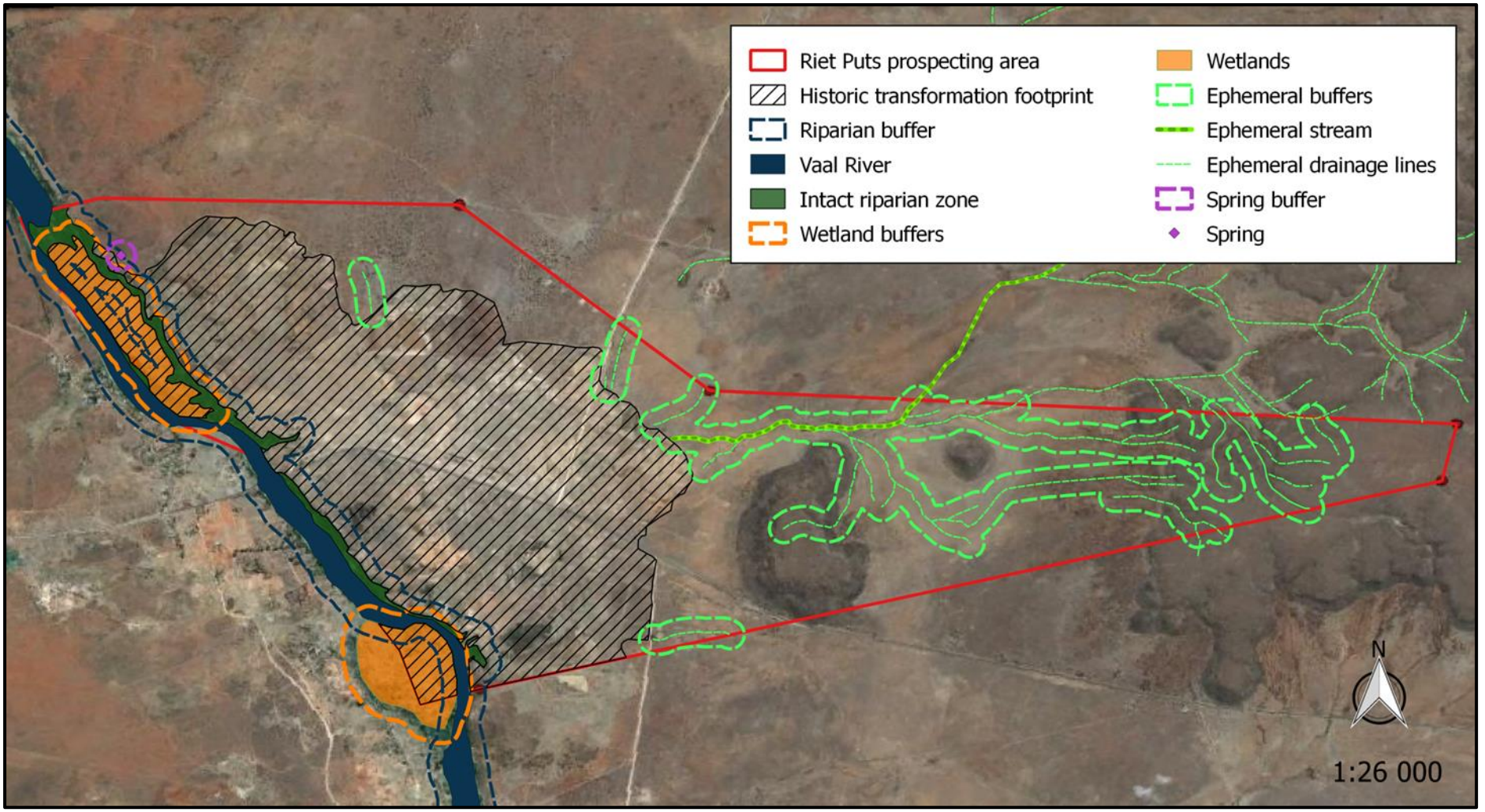
The ephemeral stream runs from east to west, with a total length of ± 3.66 km of which ± 1.8 km falls within the study site. The drainage lines run from the hills towards the plains, mainly in an east to west direction, of which a total combined length of ± 14.5 km occur within the study site.

The 100 m buffer zones of identified watercourses are also indicated in the figure below. Most of these buffers, required by the NWA, can however not be effectively assigned due to the following reasons:

- most of the area has been transformed by past mining activities;
- the infrastructure on site has already been established; and
- the proposed prospecting activities are planned within the river channel.

However, the buffers around the spring and those ephemeral watercourses that remain in the east should be implemented.

The wetlands, riverine habitat, ephemeral stream and some drainage lines are found on valley bottom terrain, while the spring is found on the footslope of a hill in the north western corner of the study site. Most of the drainage lines near Baskop in the centre, and further east are associated with the midslopes, footslopes and the scarps of the dolerite hills in the eastern half of the site. The identified Hydrogeomorphic Units (HGMU) are described below, but the ephemeral drainage lines will not be further defined.



Watercourses in the vicinity of Riet Puts, along with the buffer zones of those that occur on site.

HGMU1: PERENNIAL LOWLAND RIVER

The Vaal River is classified as a natural perennial lowland river, with a distinct alluvial sand-bed channel, which meanders from Warrenton in the north-east, towards Riverton in the south.

The meandering channel of the Vaal River, flowing from Warrenton in the north-east towards Riverton in the south. The Riet Puts prospecting area is indicated in red.

The classification of the river is shown in the table below:

Summary of the results for the application of Levels 1 to 5 of the Classification System (Ollis et al. 2013), to the Vaal River. The confidence rating of classification at each level is given in brackets. The location of monitoring points selected to assess water quality for the Vaal River

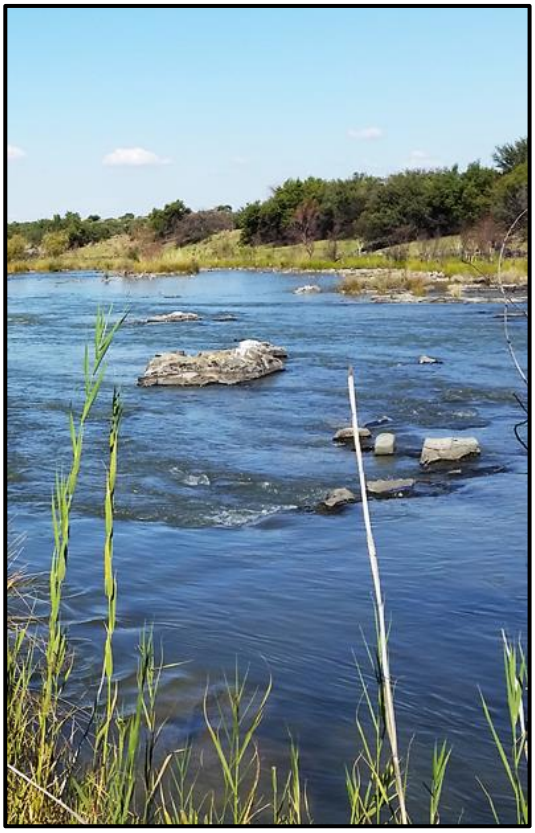
Level 1	Level 2		Level 3	Level 4: HGM Unit			Level 5	
System type	DWA Ecoregion	NFEPA Wet Veg Group	Landscape Unit	4A	4B	4C	5A	5B
INLAND	Southern Kalahari	Eastern Kalahari Bushveld Group 3	Valley floor (high)	River (high)	Lowland river (high)	Active Channel + Riparian Zone (high)	Perennial (high)	n/a

The water found in the active channel is considered to be fresh and alkaline:

Water quality data obtained from various monitoring points along the Vaal River. The resource water quality objective (RWQO) depicts acceptable management targets

Elements	DWS C9H008Q01	DWS C9H009Q01	Riet Puts Vaal River	RP1	RP2	RWQO
pH	8.1	8.2	8.1	8.56	8.56	
Nitrate (mg/l)	0.59	0.55	< 2.9			**3**
Ammonia (mg/l)	0.09	0.08				**0.1**
Electrical Conductivity (mS/m)	92	113	79	52	54	**120**
Dissolved oxygen (mg/L) (%)				9.64 (90.9)	10.39 (99.3)	
Temperature (°C)				12.7	13.2	
Sodium (mg/l)	80.6	59.6	70			
Magnesium (mg/l)	32.6	28.7	33			
Chloride (mg/l)	87	118	62			**100**
Fluoride (mg/l)	0.43	0.35				
Phosphate (mg/l)	0.07	0.07				**0.04**
Sulphate (mg/l)	202	250	198			**250**
TDS	626	701				**840**

The substrate is a typical alluvial sand-bed with cobbles, but bedrock protrudes the surface at places:



The substrate of the Vaal River mainly consist of alluvial sand-bed with cobbles (left), but bedrock protrudes the surface at places (right).

The active channel is predominantly unvegetated and covered with open water, but vegetation occurs sparsely towards the shallow edges of the channel. The reed *Phragmites australis* is most conspicuous, but other common herbaceous species include *Juncus exsertus, Pseudoschoenus inanus, Cyperus eragrostis* (exotic) and other *Cyperus* spp. *Myriophyllum aquaticum* (exotic) and *Potamogeton pectinatus* are common aquatic plants, but algal mats are also present. The status of the vegetation in the active channel of the Vaal River can mainly be regarded as indigenous, with a few exotics present.

Vegetation associated with the active channel of the Vaal River.

Results for the vegetation classification of the active zone are shown in the table below:

Summarised results for the classification of vegetation in the active channel and the riparian zone of the Vaal River.

LEVEL 6A:	Proportional rating (0-6)	
Vegetation cover	**Active channel**	**Riparian zone**
Vegetated	2	5
Unvegetated	5	2

LEVEL 6B:	Proportional rating (0-6)	
Vegetation form (primary)	**Active channel**	**Riparian zone**
Aquatic	2	0
Herbaceous	4	1
Shrubs/Thicket	0	2
Forest	0	5

LEVEL 6C:	Proportional rating (0-6)	
Vegetation form (detailed)	**Active channel**	**Riparian zone**
AQUATICS		
Floating	1	0
Submerged	5	0
Algal Mat	1	0
HERBACEOUS		
Geophytes	0	0
Grasses	0	1
Herbs/Forbs	0	5
Sedges/Rushes	2	1
Reeds	5	0
Restios	0	0
Palmiet	0	0
FORESTS		
Riparian Forest	0	6
Forested Wetland	0	0

LEVEL 6E:	Proportional rating (0-6)	
Vegetation status	**Active channel**	**Riparian zone**
Indigenous	5	4
Alien	2	3
Crop	0	0

The **riparian zone** occurs along the banks of the Vaal River on alluvial soil and cobbles:

The riparian zone is found on the banks of the Vaal River, where tall trees form a closed canopy (top) on alluvial soil with cobbles (bottom)

The vegetation is classified as forest, with closed canopy dominated by tall trees. The understory is weekly developed and is dominated by forbs, but grasses and shrubs are also present. Some areas have been transformed by mining activities and are unvegetated, covered with bare soil. The status of the vegetation can mainly be regarded as indigenous, but aliens are very common, especially in the understory.

The woody stratum is dominated by *Searsia lancea*, but *Vachellia tortilis*, *V. karroo, Diospyros lycioides, Salix mucronata, Gymnosporia buxifolia, Ziziphus mucronata* and *Asparagus* spp. are also common. Typical graminoid species include *Setaria verticillata, Cynodon dactylon, Chloris virgata* and *Panicum maximum,* but *Aristida adscensionis, A. scabrivalvis* subsp. *scabrivalvis, Dactyloctenium aegyptium, Enneapogon cenchroides, Eragrostis rotifer, Melinis repens, Paspalum distichum, Tragus racemosus, Juncus exsertus, Phragmites australis* and *Pseudoschoenus inanus* are also found. The forb stratum is dominated by exotics, but common indigenous species include *Arctotis arctotoides, Cleome monophylla, Cullen tomentosum, Mentha longifolia, Nidorella ivifolia* and *Persicaria attenuata* subsp. *africana*.

Exotic species found in the riparian woodland include *Eucalyptus camaldulensis, Schinus molle, Sesbania punicea, Argemone ochroleuca* subsp. *ochroleuca, Datura stramonium, Salsola kali, Xanthium spinosum, Conyza bonariensis, Verbena bonariensis, Bidens bipinnata, Atriplex semibaccata* var. *typica, Malvastrum coromandelianum, Flaveria bidentis, Tagetes minuta, Gomphrena celosioides, Oenothera rosea* and *Hibiscus trionum*. Species of conservation concern found in the riparian zone includes *Gymnosporia buxifolia*, which is protected in terms of Schedule 2 of the NCNCA.

Fish species expected to occur in the active channel of the Vaal River are listed in the below table, along with their IUCN status and sensitivity to physico-chemical and no-flow conditions:

Fish species expected to occur in the active channel of the Vaal River, along with their IUCN status and sensitivity to physico-chemical and no-flow conditions.

Scientific Name	Common name	IUCN	Phys-Chem sensitivity	No-Flow sensitivity
Austroglanis sclateri	Rock Catfish	LC	Moderate	High
Labeobarbus aeneus	Vaal-orange Smallmouth Yellowfish	LC	Moderate	High
Clarias gariepinus	African Catfish	LC	Low	Low
Labeo capensis	Orange River Mudfish	LC	Moderate	High
Labeo umbratus	Moggel	LC	Low	Moderate
Pseudocrenilabrus philander	Southern Mouthbrooder	-	Low	Low
Tilapia sparrmanii	Banded Tilapia	LC	Low	Low

HGMU2: INTERMITTENT NON-PERENNIAL LOWER FOOTHILLS RIVER

The ephemeral stream is classified as a natural intermittent non-perennial lower foothills river, with a distinct alluvial channel that drains rainwater from the hills in the east, via the footslopes and valley towards the Vaal River. It has however been cut off from the Vaal during transformation of the landscape by historic mining activities. The stream is associated with quaternary deposits of calcrete, calcified pandune and surface limestone. The classification of the stream is shown below:

Summary of the results for the application of Levels 1 to 5 of the Classification System (Ollis et al. 2013), to ephemeral stream. The confidence rating of classification at each level is given in brackets.

Level 1	Level 2		Level 3	Level 4: HGM Unit			Level 5	
System type	DWA Ecoregion	NFEPA WetVeg Group	Landscape Unit	4A	4B	4C	5A	5B
INLAND	Southern Kalahari	Eastern Kalahari Bushveld Group 3	Valley floor (high)	River (high)	Lower foothills (high)	Active Channel + Riparian Zone (high)	Non-perennial (high)	Intermittent (high)

The stream was dry during the field survey and no water sampling records could be found to indicate the character of the water associated with it. The **active channel** is narrow, but distinct and the substrate consists of dark to red loamy soil. The channel is predominantly unvegetated and covered with bare soil, but annual forbs and grasses grow opportunistically in some places. The **riparian zone** is densely vegetated and occurs on red loamy soil. It predominantly represents thicket vegetation, but herbaceous strata, typically consisting of grasses and forbs are also common, especially in the understory.

Vachellia karroo and *Lycium oxycarpum* are equally conspicuous, while *Prosopis glandulosa* (exotic)*, Ziziphus mucronata, Diospyros lycioides, Grewia flava, Lycium hirsutum, Searsia lancea, Senegalia mellifera* and *Asparagus* spp. are also common. The grass stratum is represented by *Cynodon dactylon, Sporobolus fimbriatus, Cenchrus ciliaris* and *Panicum maximum*, while exotic forbs like *Tagetes minuta* and *Bidens bipinnata* have infested the majority of the understory. No species of conservation concern were encountered here. The vegetation status of the active channel and the riparian zone is regarded as predominantly natural, with exotics being sparse.

The ephemeral stream on Riet Puts drains from the hills in the east, via the footslopes and valley, towards the Vaal River (blue line), but has been cut off by the transformation of the landscape by historic mining activities.

The narrow, but distinct channel of the ephemeral stream (indicated in yellow) is predominantly unvegetated, while the riparian zone is represented by thicket vegetation. The stream is associated with red loamy soils (insert).

Summarised results for the classification of vegetation in the active channel and the riparian zone of the ephemeral stream

LEVEL 6A:	Proportional rating (0-6)	
Vegetation cover	**Active channel**	**Riparian zone**
Vegetated	1	6
Unvegetated	5	0

LEVEL 6B:	Proportional rating (0-6)	
Vegetation form (primary)	**Active channel**	**Riparian zone**
Aquatic	0	0
Herbaceous	6	2
Shrubs/Thicket	0	5
Forest	0	0

LEVEL 6C:	Proportional rating (0-6)	
Vegetation form (detailed)	**Active channel**	**Riparian zone**
HERBACEOUS		
Geophytes	0	0
Grasses	3	2
Herbs/Forbs	3	5
Sedges/rushes	0	0
Reeds	0	0
Restios	0	0
Palmiet	0	0

LEVEL 6E:	Proportional rating (0-6)	
Vegetation status	**Active channel**	**Riparian zone**
Indigenous	5	5
Alien	2	2
Crop	0	0

HGMU3: CHANNELLED VALLEY-BOTTOM WETLANDS

The wetlands are classified as natural channelled valley-bottom wetlands, due to their location on a valley floor, the absence of characteristic floodplain features and their location along the channel of the Vaal River. However, due to the vast transformation and disturbances of these areas it is difficult to discern their original form and if these wetlands are in fact wetlands, or just transformed mid-channel bars or side bars of the Vaal River. Therefore they have been classified with low confidence. Nevertheless, these wetlands are subject to water input from periodic overtopping of the Vaal's channel banks. The wetlands are therefore intermittently inundated, but saturation periodicity is not known. The classification of the channelled valley-bottom wetlands is shown below:

Summary of the results for the application of Levels 1 to 5 of the Classification System (Ollis et al. 2013), to the wetlands. The confidence rating of classification at each level is given in brackets.

Level 1	Level 2		Level 3	Level 4: HGM Unit			Level 5		
System type	DWA Ecoregion	NFEPA WetVeg Group	Landscape Unit	4A	4B	4C	5A	5B	5C
INLAND	Southern Kalahari	Eastern Kalahari Bushveld Group 3	Valley floor (high)	Channelled valley-bottom wetland (low)	n/a	n/a	Intermittently inundated (high)	Unknown	n/a

The geology of the wetlands comprise of coarse sandy alluvial soils that developed over Quaternary alluvial sediments. The substrate is a mix of boulders and cobbles, which produces sparsely scattered unvegetated spots. The vegetation is almost entirely herbaceous, predominantly occupied by grasses, but geophytes, forbs, sedges, rushes and reeds also occur. Trees and shrubs from the riparian zone of the Vaal River have opportunistically established on areas that have been disturbed, but are rare.

The wetlands are typically presented by herbaceous vegetation (top) that grow on a rocky substrate dominated by a mix of cobbles and boulders (middle). The declining bulb *Crinum bulbispermum* was encountered here.

Results for the vegetation classification of the wetlands are shown below:

Summarised results for the classification of vegetation in the wetlands.

LEVEL 6A:	Proportional rating (0-6)
Vegetation cover	
Vegetated	5
Unvegetated	2

LEVEL 6B:	Proportional rating (0-6)
Vegetation form (primary)	
Aquatic	0
Herbaceous	6
Shrubs/Thicket	1
Forest	1

LEVEL 6C:	Proportional rating (0-6)
Vegetation form (detailed)	
HERBACEOUS	
Geophytes	1
Grasses	5
Herbs/Forbs	3
Sedges/rushes	2
Reeds	1
Restios	0
Palmiet	0
FORESTS	
Riparian Forest	6
Forested Wetland	0

LEVEL 6E:	Proportional rating (0-6)
Vegetation status	
Indigenous	5
Alien	2
Crop	0

Cynodon dactylon occurs in high densities, with *Chloris virgata*, *Dactyloctenium aegyptium* and *Cyperus* spp. occurring sporadically. *Cullen tomentosum* and *Arctotis arctotoides* are fairly common indigenous herbs. Exotics include *Cyperus eragrostis, Flaveria bidentis, Verbena bonariensis, Hibiscus trionum* and *Zinnia peruviana*. The provincially protected *Euphorbia inaequilatera* (Schedule 2) forms dense mats at places and the declining bulb (Red List and NCNCA Schedule 2) *Crinum bulbispermum* was also encountered here.

HGMU4: SEEP WITHOUT CHANNELLED OUTFLOW

The spring is classified as an artificial seep, situated on the footslopes of the hills in the north-western corner of the property, where andesitic Ventersdorp lava is found (Bosch and Visser 1993). Here, it is fed by an aquifer situated in the fractured zone of the basement rock at a depth of more than 50 m and does not consist of a channelized outlet. The seep is considered to be artificial due the casing associated with it, from which water oozes. It is assumed that the underground water is routed to the surface by means of a borehole. The classification of the spring is shown below:

Summary of the results for the application of Levels 1 to 4 of the Classification System (Ollis et al. 2013), to the spring. The confidence rating of classification at each level is given in brackets.

Level 1	Level 2		Level 3	Level 4: HGM Unit			Level 5		
System type	DWA Ecoregion	NFEPA WetVeg Group	Landscape Unit	4A	4B	4C	5A	5B	5C
INLAND (high)	Southern Kalahari (high)	Eastern Kalahari Bushveld Group 3 (high)	Slope (high)	Seep (high)	Without channelled outflow (high)	n/a	Permanently inundated (high)	n/a	Littoral (high)

The water associated with the seep is considered as fresh and alkaline:

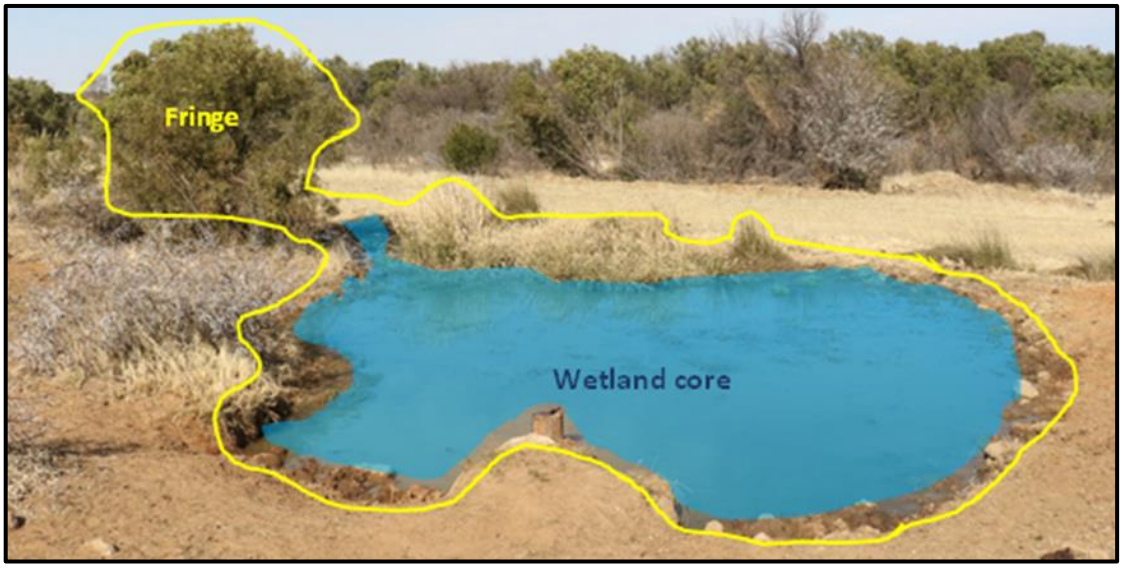
Water quality data obtained from the spring. The resource water quality objective (RWQO) depicts acceptable management targets.

Elements	2004	2016	RWQO
pH	8.6	9.38	
Nitrate (mg/l)	< 2.9		**3**
Electrical Conductivity (mS/m)	150	124	**120**
Sodium (mg/l)	302		
Magnesium (mg/l)	1.1		
Chloride (mg/l)	317		**100**
Sulphate (mg/l)	4.5		**250**

The spring is contained by a steel pipe casing, from which water oozes continuously to the surface to form a very small wetland habitat. The substrate consists of saturated clayey-loamy soil:

The spring is contained by a steel pipe casing, from which water oozes continuously to form a very small wetland habitat (left). The substrate consists of saturated clayey-loamy soil (right).

The seep is presented as a permanently inundated shallow aquatic habitat (wetland core), surrounded by a fringe of herbaceous vegetation and shrubs:



The seep is presented as a permanently inundated shallow aquatic habitat (wetland core), surrounded by a fringe of herbaceous vegetation and shrubs.

The wetland core and the fringe are both partially vegetated. Open water covers approximately 60 % of the core's surface, while disturbances along the fringe have left 50 % of the surface bare. The core mainly constitutes aquatic vegetation dominated by submerged plants, but algal mats are also present. The fringe is dominated by herbaceous plants like *Cynodon dactylon* and *Cyperus* sp. but shrubs like *Searsia lancea, Vachellia tortilis* and *Asparagus* sp. are also present. The vegetation associated with the seep can be regarded as indigenous. No macro-fauna were observed in the seep waters during the site visit.

Summarised results for the classification of vegetation at the spring

LEVEL 6A:	Proportional rating (0-6)	
Vegetation cover	**Wetland core**	**Fringe**
Vegetated	2	3
Unvegetated	4	3

LEVEL 6B:	Proportional rating (0-6)	
Vegetation form (primary)	**Wetland core**	**Fringe**
Aquatic	6	0
Herbaceous	0	5
Shrubs/Thicket	0	1
Forest	0	0

LEVEL 6C:	Proportional rating (0-6)	
Vegetation form (detailed)	**Wetland core**	**Fringe**
AQUATICS		
Floating	0	0
Submerged	5	0
Algal Mat	1	0
HERBACEOUS		
Geophytes	0	0
Grasses	0	5
Herbs/Forbs	0	0
Sedges/Rushes	0	2
Reeds	0	0
Restios	0	0
Palmiet	0	0

LEVEL 6E:	Proportional rating (0-6)	
Vegetation status	**Wetland core**	**Fringe**
Indigenous	6	6
Alien	0	0
Crop	0	0

Watercourse assessments

Health Assessments (PES)

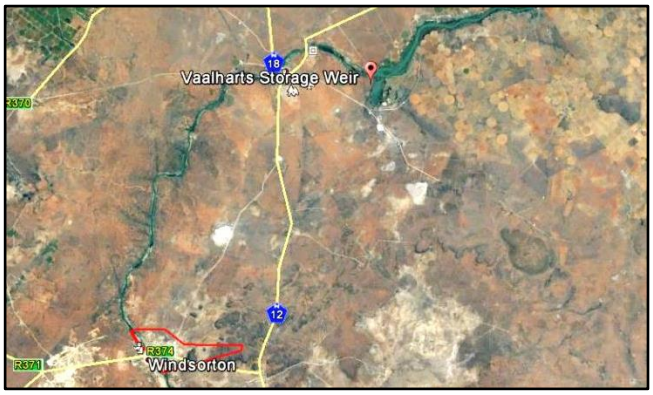
The study area falls within a zone where one of South Africa's largest economically most important alluvial deposits of diamonds are found. The primary secondary source of alluvial diamond deposits in the Northern Cape extends along the Orange and Vaal Rivers (Gresse 2003), while the most significant crop irrigation in the Northern Cape also stretches along these rivers (Durand 2006). The town of Windsorton is also situated on the opposite banks of the Vaal from the study site.

These have all led to numerous impacts on the riverine and wetland habitats on site, resulting in all of them being modified to some extent. Key impacts identified are shown in the table below. The results of the PES assessments are illustrated in the next figure.

Abstraction for irrigation and mining, the Vaalharts Weir, runoff from Windsorton and irrigation return flows are impacts associated with the Vaal River that affects the natural base flow. System variables were in acceptable range and although no toxicity tests were performed, it is expected that urban and agricultural discharges have an effect on the chemical character of the water. No significant eutrophication was observed, but some extent of benthic growth occurred. Moderate sedimentation was also observed, which affected the clarity of the water. Large-scale instream bank modifications occur along the Vaal, along with the destruction of riparian vegetation and the increase in alien vegetation. These were mainly caused by mining activities, but the combined effect of urbanisation and road construction along the banks of the river have also lead to loss of instream and riparian connectivity. The Vaal River has therefore been considered to be largely modified (PES = D).

The ephemeral stream has not experienced as many impacts, as in the case of the Vaal River, however past mining activities has completely transformed the western reach of the stream to such an extent that instream and longitudinal riparian connectivity have completely been lost. This also affects the drainage to the Vaal. The ephemeral stream is considered to be moderately modified (PES = C).

Key impacts affecting the health of watercourses on Riet Puts.

HGMU1: PERENNIAL LOWLAND RIVER	
	**Hydrological modifications** - Abstraction for irrigation and mining - Vaalharts Weir - Runoff from Windsorton - Irrigation return flows
	**Physico-Chemical changes** - Urban and agricultural discharges modifies the chemical characteristics - Decreased clarity caused by land use practises and mining.
 	**Bed modifications** - Sedimentation - Benthic growth
	**Bank modifications** - Marginal and non-marginal bank modifications - Destruction of riparian vegetation - Abundance of alien species

HGMU1: PERENNIAL LOWLAND RIVER (cont.)	
 	**Connectivity modifications** - Instream connectivity modifications through roads and river diversions - Lateral riparian connectivity losses - Longitudinal riparian connectivity losses

HGMU2: INTERMITTENT NON-PERENNIAL LOWER FOOTHILLS RIVER	
	**Connectivity modifications** - Complete loss of instream connectivity and longitudinal riparian connectivity in the west due to vegetation removal and mining.

HGMU3: CHANNELLED VALLEY-BOTTOM WETLANDS	
 	**Identified impacts:** - Hydrological impacts associated with the Vaal River - Modification of the river channel - Flow-impeding surfaces produced by mine pits and dumps - Excavations of the wetlands

Hydrological impacts associated with the Vaal River also directly impacts the wetlands. This includes the abstraction for irrigation and mining, the Vaalharts Weir, runoff from Windsorton and the irrigation return flows. Modifications to the river channel have also impacted the wetlands. Direct mining of the wetlands have however produced the most critical impacts through excavations, while moderate impacts are produced through flow-impeding surfaces produced by mine pits and dumps. Overall, the wetlands are considered to be largely modified (PES = D). The spring was not subjected to a PES assessment due to the assumption that the associated seep is artificial.

Ecological Importance and Sensitivity (EIS)

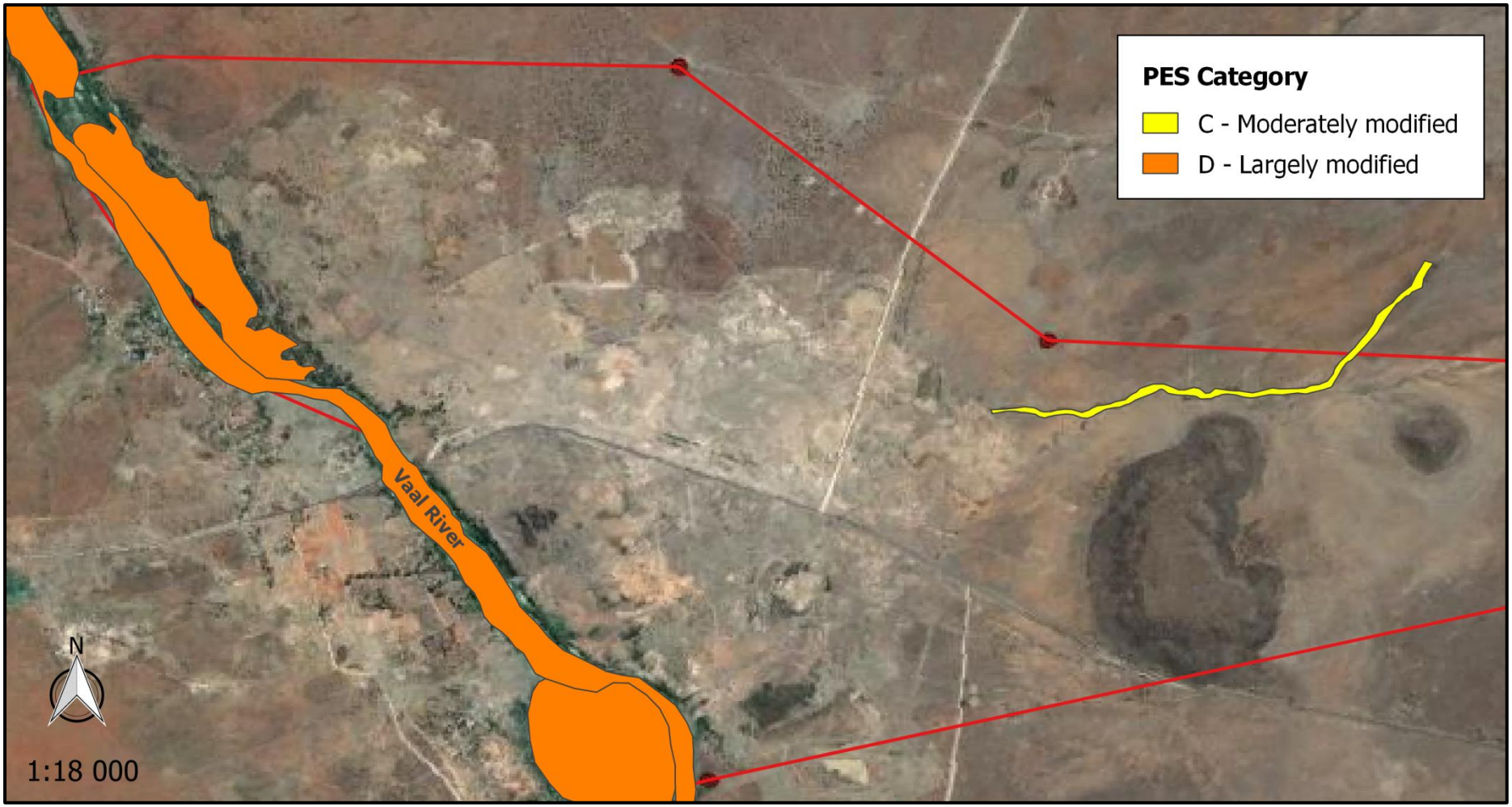
The EIS ratings for watercourses on Riet Puts are shown in the table below. The Vaal River is considered being ecologically important and sensitive (EIS = High). The biodiversity of the Vaal may be sensitive to flow and habitat modifications and it plays a role in moderating the quantity and quality of water of the catchment. The high EIS rating for the Vaal is attributed to the high abundance of taxa of conservation concern associated with it, i.e. red listed bird species and Otter species. The river is also considered to be an important breeding and feeding link in terms of connectivity for the survival of riverine species in the subcontinent.

The ephemeral stream and wetlands are considered to be important and sensitive on a provincial or local scale (EIS = Moderate). The biodiversity of these watercourses is not usually sensitive to flow and habitat modifications, but should nonetheless be conserved.

Wetland functionality

The different ecosystem services provided by watercourses on Riet Puts are shown in the spider diagrams below.

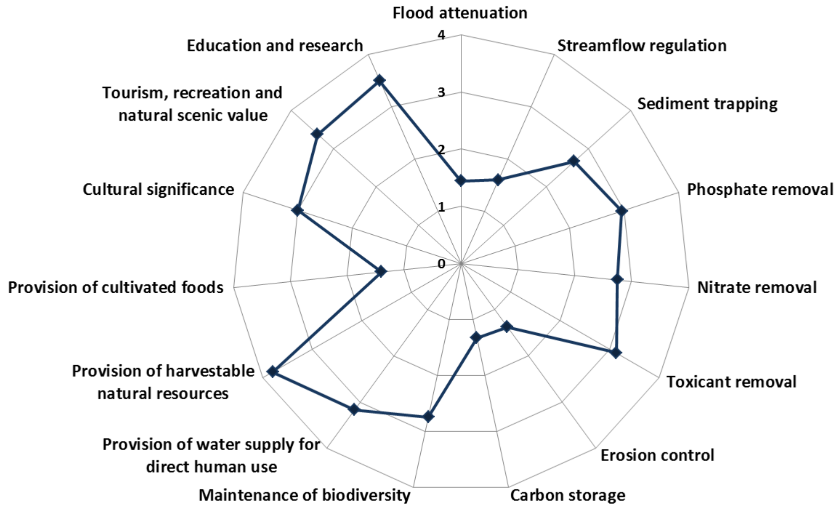
The most significant benefits provided by the Vaal River are related to human needs, i.e. provision of harvestable natural resources, education, tourism and cultural significance, but it is also beneficial in terms of phosphate, nitrate and toxicant removal. The ecosystem services of the Vaal River are increased by its perennial nature and connectivity, but it is decreased due to the impacts associated with mining, agriculture and urbanisation.

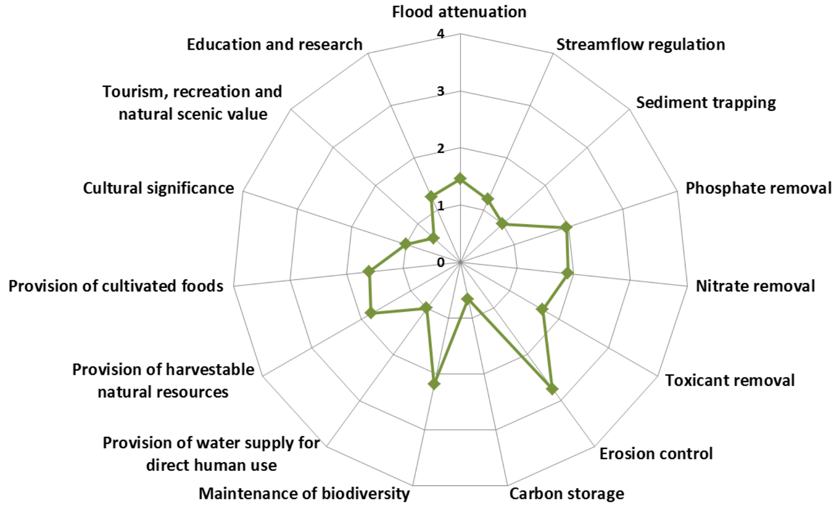


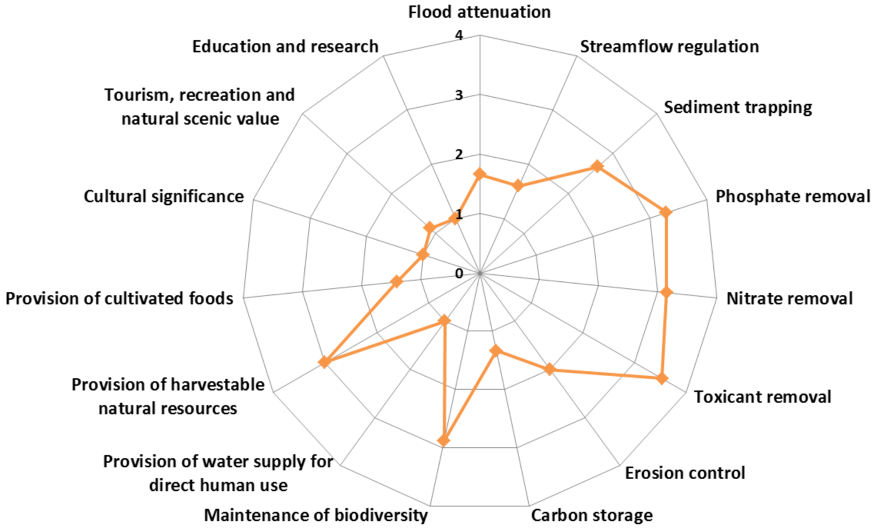
The results of the PES assessments performed on riverine habitats and wetlands on Riet Puts.

Summary of the results for the application of an EIS assessment (Duthie 1999) to the natural watercourses on Riet Puts.

DETERMINANT	SCORE			CONFIDENCE
	HGMU1 Vaal River	HGMU2 Ephemeral stream	HGMU3 Wetlands	
PRIMARY DETERMINANTS				
1. Rare & Endangered Species	4	1	4	4
2. Populations of Unique Species	2	0	0	2
3. Species/taxon Richness	2	1	1	4
4. Diversity of Habitat Types or Features	2	2	1	4
5 Migration route/breeding and feeding site for wetland species	3	1	1	3
6. Sensitivity to Changes in the Natural Hydrological Regime	2	1	2	4
7. Sensitivity to Water Quality Changes	2	1	2	4
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	3	2	2	3
MODIFYING DETERMINANTS				
9. Protected Status	3	1	1	3
10. Ecological Integrity	1	1	1	3
TOTAL	**24**	**11**	**15**	
AVERAGE	**2.4**	**1.1**	**1.5**	
OVERALL ECOLOGICAL SENSITIVITY AND IMPORTANCE	**High**	**Moderate**	**Moderate**	







Ecosystem services provided by the Vaal River (top), ephemeral stream (middle) and wetlands (bottom) of Riet Puts. Services are scored form 0 (no importance) to 4 (very important).

Although all watercourses are important for ecosystem function as a whole, the ephemeral stream does not provide significant ecosystem services, mainly due to its ephemerality. Furthermore, the potential benefits produced by the stream are limited due to past mining disturbances, which destroyed the western portion and disconnected it from the Vaal River. Erosion control is the most important service provided and is attributable to the negligible extent of active erosion and the moderately high vegetation cover.

The wetlands offer significant benefits regarding phosphate, nitrate and toxicant removal and these benefits are derived from their association with the Vaal River, the expected diffuse low flows and moderately high vegetation cover. The wetlands are also important for the provision of natural resources primarily based on the alluvial diamond deposits found here. Furthermore, their moderately high importance in maintaining biodiversity is attributed to the listed *Crinum bulbispermum* and the suitable habitat for Red Data species like the Giant Bull Frog. Furthermore, the wetlands along the Vaal are experiencing cumulative loss due to agriculture and mining activities, which increases their value. However, just like all the other watercourses on Riet Puts, ecosystem services are limited by impacts associated with past mining disturbances as well as current mining and agricultural activities.

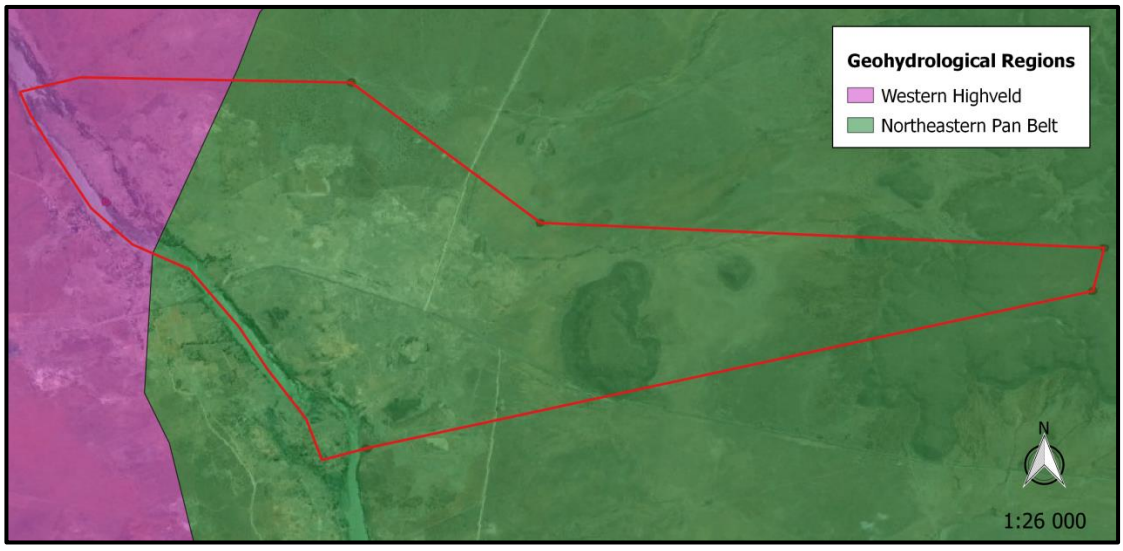
GROUND WATER

Due to the substantial mining history on Riet Puts, a desktop study was conducted to obtain information on groundwater characteristics. Adequate baseline data for the site is available from a Mine Closure Environmental Management Application Report compiled by Adriaan du Toit in 2004 and this report was used as the main reference.

Underlying aquifers

The catchment region has a moderately-yielding aquifer system with a net base flow of -23.85 million m^3 per annum and a usable groundwater component from the base flow of 16.69 million m^3 per annum. Little is known regarding true riverbed sand aquifers in the WMA. Groundwater-surface water interaction has also not been studied sufficiently in the region. Under natural conditions there is seldom groundwater contributing to base flow in rivers.

The hydrogeological terrain beneath the Riet Puts operation comprises two water bearing units (see map below). In the north-west of Riet Puts, the Western Highveld geohydrological region is characterised by an assemblage of compact sedimentary and extrusive rocks, e.g. andesite. The remaining majority of Riet Puts is underlain by the North-eastern Pan Belt region, which consists of compact, dominantly argillaceous strata of the Ecca Group.



The two geohydrological regions found in the study area

Three distinct groundwater layers are known from the study area (see figure below):

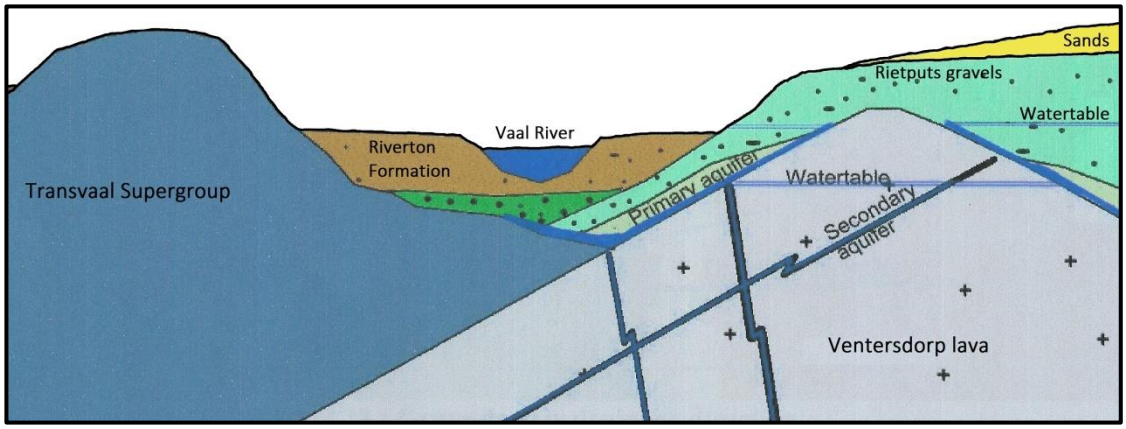
Shallow primary aquifer: This layer is found in the gravel beds on contact with basement rock. It is young groundwater receiving regular recharge, but the solution of old river sediment salts and pyrite minerals could cause a stagnant sulphate character in the water.

Shallow secondary aquifer: This layer occurs in the shallow (< 50 m) fracture zones associated with the numerous joint systems in the Ventersdorp lavas. It should have the same chemical character as the water in the primary aquifer. No boreholes on Riet Puts are known to intersect this aquifer.

Deep secondary aquifer: This layer, also in the fracture zones of the basement rock, occurs at deeper levels (> 50 m). It does not receive recharge regularly and has a completely different chemical character from the other aquifers. A spring on Riet Puts derives from this aquifer.

As a combined hydrogeological unit, the underlying aquifers on Riet Puts are considered a minor aquifer with low susceptibility and vulnerability to contamination from surface sources according to the Aquifer map series of South Africa published by Department of Water Affairs.

The water table depth in boreholes on Riet Puts ranges between 5.43 and 8.67 m, but a maximum depth of 15.32 m was found in a borehole near the hills in the east. Groundwater flow is in the direction of the Vaal River following the surface drainage direction from the hills in the east towards the lowlands and floodplains in the west.



A schematic representation of the aquifers in the vicinity of Riet Puts

Boreholes and springs

The National Groundwater Archive managed by the DWS was searched to identify available boreholes on the prospecting right area that are registered in the archive. This search identified only one within the prospecting right area, but numerous boreholes on surrounding farms are registered (see table below). The status of these boreholes are however unknown.

Boreholes registered on the NGA that occur in the vicinity of Riet Puts

GeoSite ID	Latitude	Longitude	Date	Depth (m)
47287	-28.3129	24.7038	2001	90
47288	-28.3438	24.6801	2001	84
47289	-28.3444	24.6778	2001	48
2824BD00016	-28.31287	24.77456	1970	75.89
2824BD00015	-28.31291	24.77452	1962	45.72
2824BD00007	-28.33927	24.78285	1947	16.98
2824BD00008	-28.31287	24.77452	1947	30.78
2824BD00012	-28.31287	24.77454	1947	46.63
2824BD00009	-28.31288	24.77452	1946	13.1
2824BD00010	-28.31287	24.77453	1946	20.91
2824BD00011	-28.31289	24.77452	1946	48.77
2824BD00013	-28.3129	24.77452	1946	57.61
2824BC00028	-28.33373	24.71619	1919	12.65
2824BD00014	-28.31287	24.77455	1970	61.57

Apart from the above-mentioned NGA data, there are at least four boreholes and one spring on the prospecting area and another four boreholes nearby (see map and table below). A hydro census was conducted at these groundwater sources.

Other groundwater sources on and near Riet Puts, not registered on the NGA

ID	Latitude	Longitude	Water table (mabsl)	Effective depth (m)	Equipment (use)	Diameter (mm)
RF01	-28.313083	24.7088333	1117	0	*None*	165
RB01	-28.310167	24.7066667	1115	6.81	*None*	165
RB02	-28.312444	24.7275278	1120	8.38	Windump (livestock)	165
RB03	-28.323167	24.7244722	1117	5.86	Submersible (livestock)	165
RB04	-28.334833	24.727250	1111	5.43	Submersible (domestic)	165
RB05	-28.311611	24.7412778	1124	8.67	*None*	165
RB06	-28.311389	24.7413611	1124	8.55	*None*	165
RB07	-28.310528	24.7395278	1125	*No access*	*None*	165
RB08	-28.342528	24.7781944	1140	15.32	Windpump (livestock)	165

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

Groundwater quality

The Groundwater Resource Directed Measures status for the quaternary catchment C91D is classified as Natural (A). Water quality data for the region is shown in the table below. The water is neutral and has a slightly salty taste, with electrical conductivity ranging between 47 and 180 mS/m and TDS levels ranging from 300 to 750 mg/l.

Water quality data for the C91D quaternary drainage region

pH	NO_3+NO_2-N (mg/l)	NH_4-N (mg/l)	F (mg/l)	PO_4-P (mg/l)	SO_4 (mg/l)	TDS (mg/l)
7.9 - 8.39	0.04 - 0.16	0.02 - 0.11	0.31 - 0.44	0.02 - 0.05	96 - 230	388 - 712

There are a total of approximately 180 monitoring points throughout the Lower Vaal WMA. Water quality data obtained from those NGA monitoring points (boreholes) in the Lower Vaal WMA that were most complete and nearest to Riet Puts are shown in the table below.

Water quality data for boreholes near Riet Puts

Geosite ID	Latitude	Longitude	EC (mS/m)	pH	Temperature (°C)
2724DD00183	-27.88679	24.86428	86	8.6	20.54
2724DD00184	-27.88678	24.86756	180	7.1	23
2824DA00064	-28.53037	24.61813	135	7.7	21.12
2824DA00082	-28.58778	24.50974	71	7.6	25
2824DA00084	-28.74176	24.74071	47	8.3	18
2824DB00151	-28.71814	24.85285	93	7.6	22

Water samples were taken from the production hydrocensus borehole (RB03) and the spring on 30 October 2003. The chemical results for the borehole are shown in the table below, while the chemical analyses diagrams comparing water quality between surface water, the borehole and the spring are presented in the figure below.

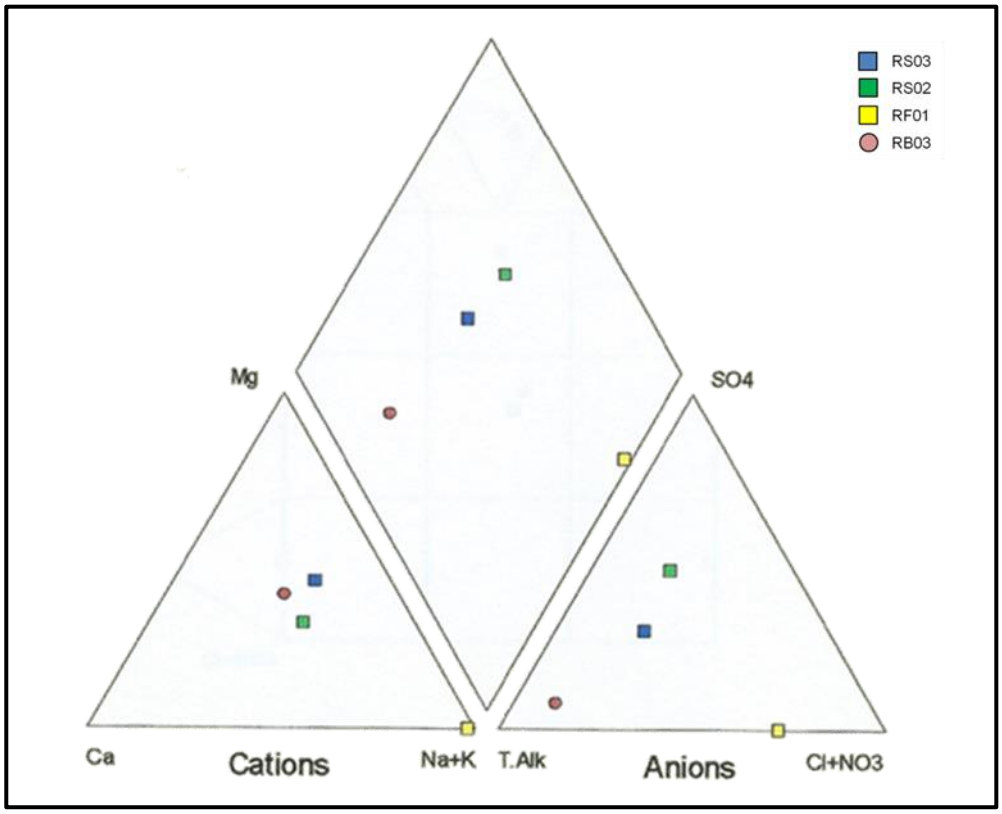
Water quality data from hydrocensus borehole RB03	
Analyte	**Value**
Total Alkalinity	350
Calcium	53
Chloride	32
Conductivity	76
Total hardness	310
Magnesium	43
Nitrate	< 2.9
pH	7.6
Potassium	7.0
Sodium	58
Sulphate	33

In general, the borehole water is very hard, but is of good quality and complies with the DWS target water quality range for domestic use. It can also be used for irrigation purposes. The borehole water represents the water of the primary aquifer and can be classified as fresh recent water. This means that the primary aquifer receives regular recharge from rainfall. It also has a better water quality than the water found in the Vaal River and is dissimilar in character compared to the water from the spring.

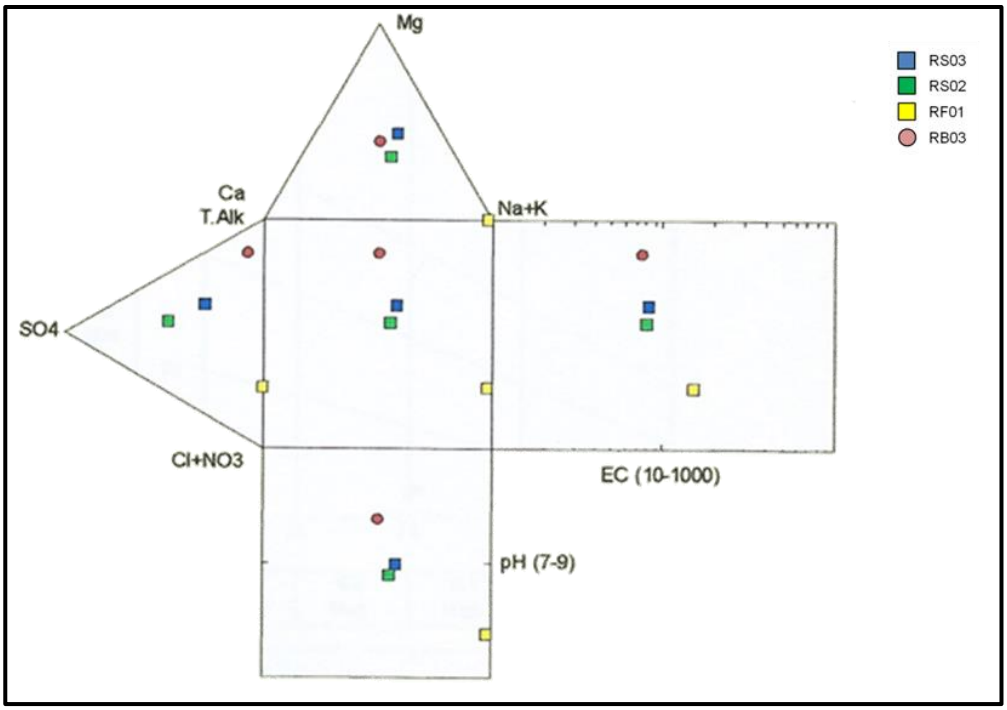
The primary aquifer on Riet Puts contains a high concentration of sulphites, which has a potential pollution impact on the Vaal River and needs to be monitored carefully.

Groundwater use

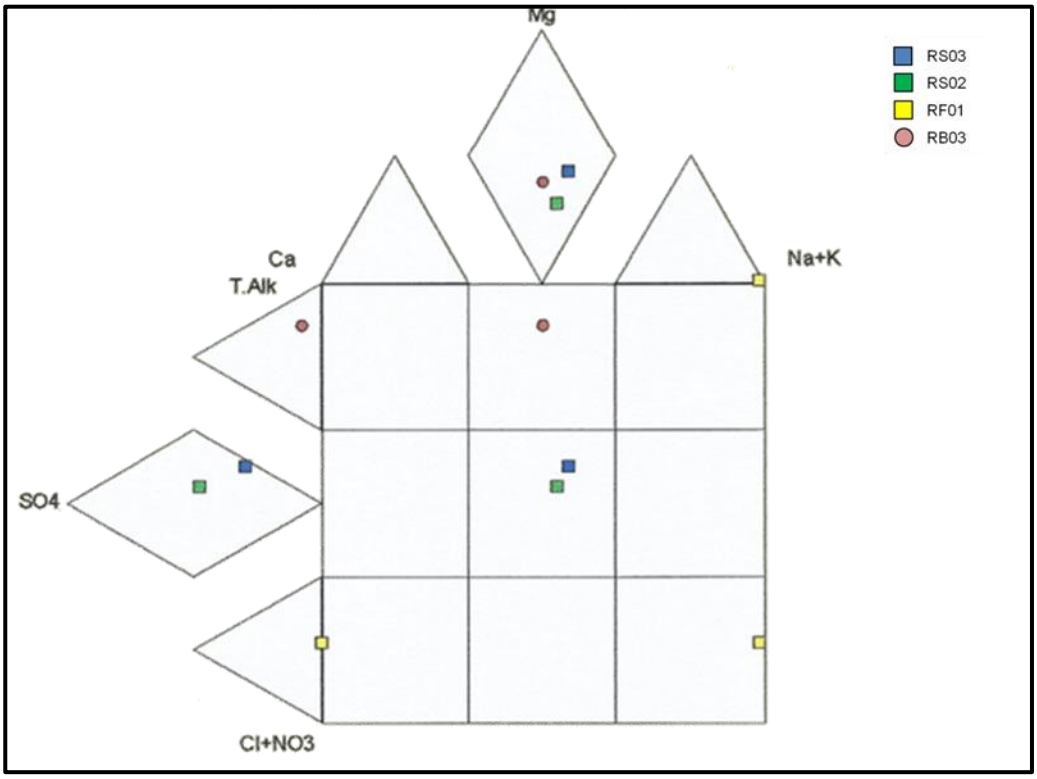
The proximity of Vaal River allows for convenient water abstraction directly from the river. Therefore, groundwater use is limited and it is mainly abstracted for livestock watering points (± 50 000 l/day), while approximately 10 000 l/day is used as potable water for people in the region.



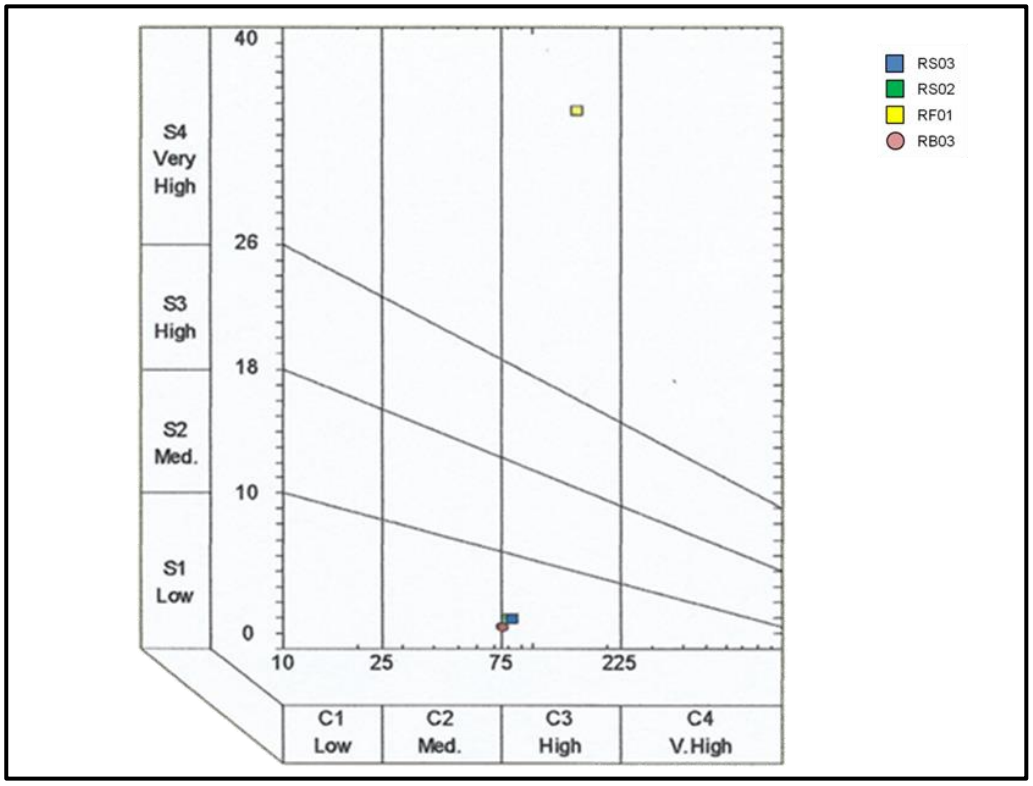
Piper Diagram.



Durov Diagram.



Expanded Durov Diagram.



SAR Diagram.

CULTURAL AND HERITAGE RESOURCES

Specialist information on cultural and heritage resources on Riet Puts was obtained from two reports: a Heritage Impact Assessment performed by Dr David Morris in November 2003 and a Phase 1 Heritage Impact Assessment performed by Dr Lloyd Rossouw in May 2016. The reports are attached as **Appendix 9** and results of these assessments are provided below.

The Vaal River in the vicinity of Windsorton is flanked by a wide, Post-African pediplain that transects rocks of the Ventersdorp Supergroup, Dwyka tillites and shales as well as dolerite inselbergs (koppies) of the Karoo Supergroup. Several levels of terrace development above the modern Vaal River and its tributaries have been recognised and grouped into 'older' and 'younger' gravels.

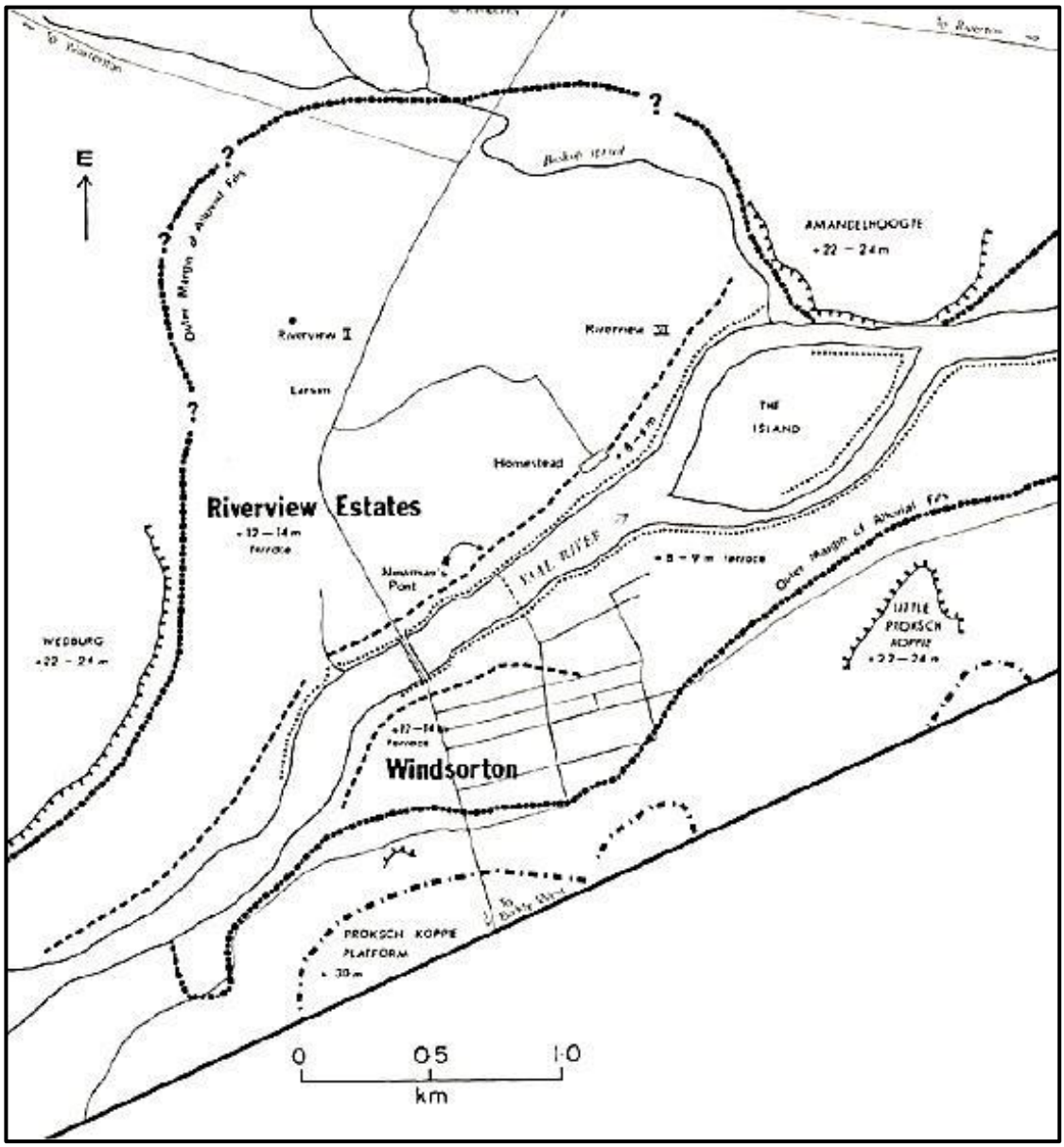
At Windsorton and nearby surrounds the 'older' gravel deposits occur at elevations of 21 to 60 m above river level and are considered to be reworked clasts from pre-existing fluvial deposits, while the 'younger' gravels, which includes the Rietputs Formation, occur at elevations of 12 to 14 m above river level followed by the Riverton Formation at lower elevations.

The Rietputs Formation at Rietputs 15 (type site) is made up of a complex valley fill that includes a lower coarse gravel and sand unit (see figure below), covered by fine alluvium and sporadic palaeosols. The radiometric dates show an age range of 1.57+/-0.22Ma, to ca 1.26+/-0.10Ma for the accumulation of the upward fining course gravel sequence. The gravels reaches a thickness of up to 7 metres thick, with the total deposit reaching depths of up to 19 metres to bedrock.

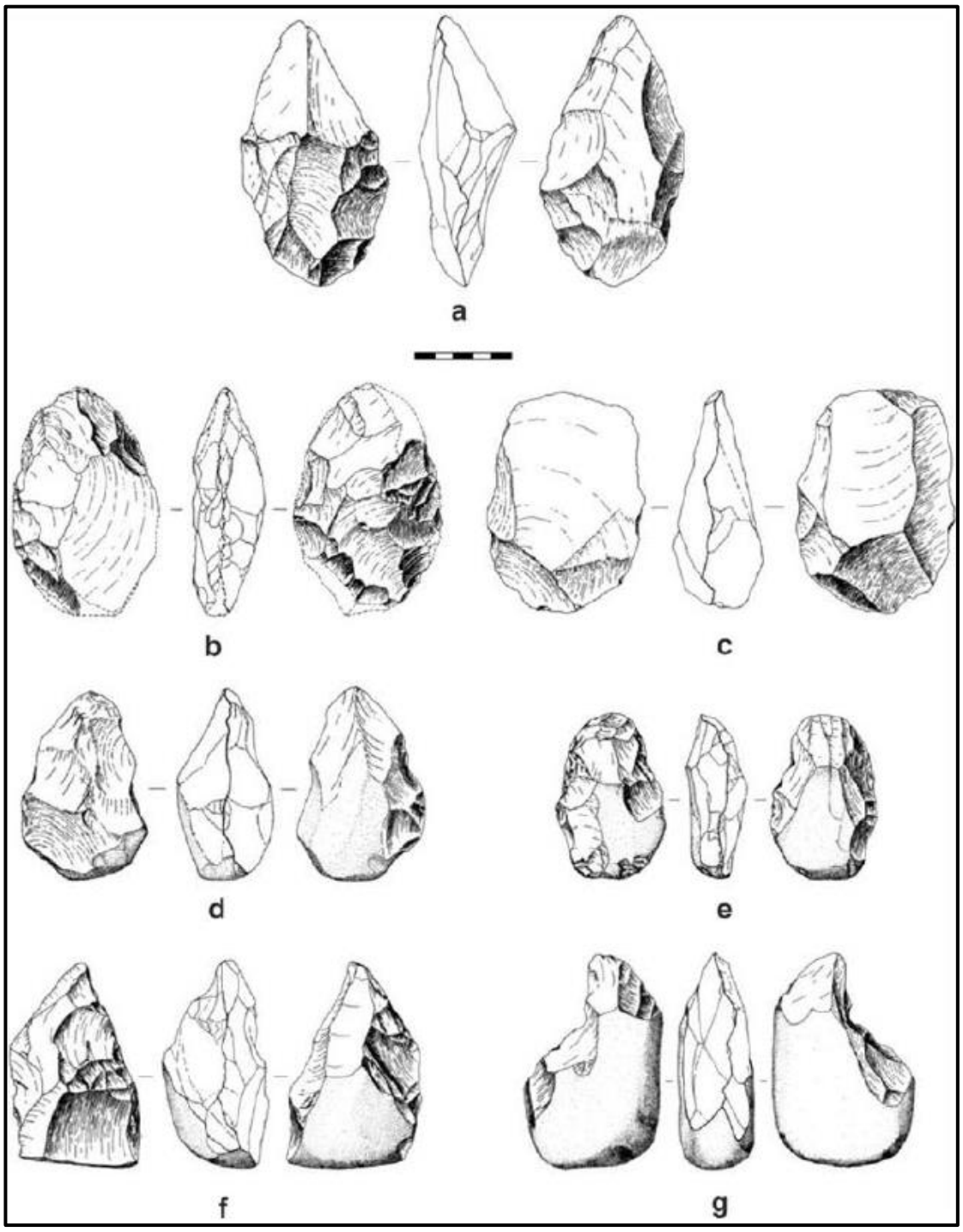
The younger Riverton Formation is primarily composed of fine-grained alluvium (sand and silts) that are represented by several terraces along the modern floodplain directly adjacent to the Vaal River. This formation spans the late Pleistocene and Holocene epochs.

An upward fining sequence of coarse gravel within the Rietputs Formation.

The lower Vaal River basin is generally rich in archaeological heritage, especially in terms of Stone Age human occupation on the landscape. Stone Age archaeological finds are almost exclusively derived from the 'younger' gravels and include an abundance of Acheulean (Early Stone Age) handaxes, cleavers and core-axes, primarily made from quartzite. The Rietputs Formation gravels contain both Acheulean stone tools and vertebrate fossils; although the locations of most of the fossils are poorly documented (see figures below).

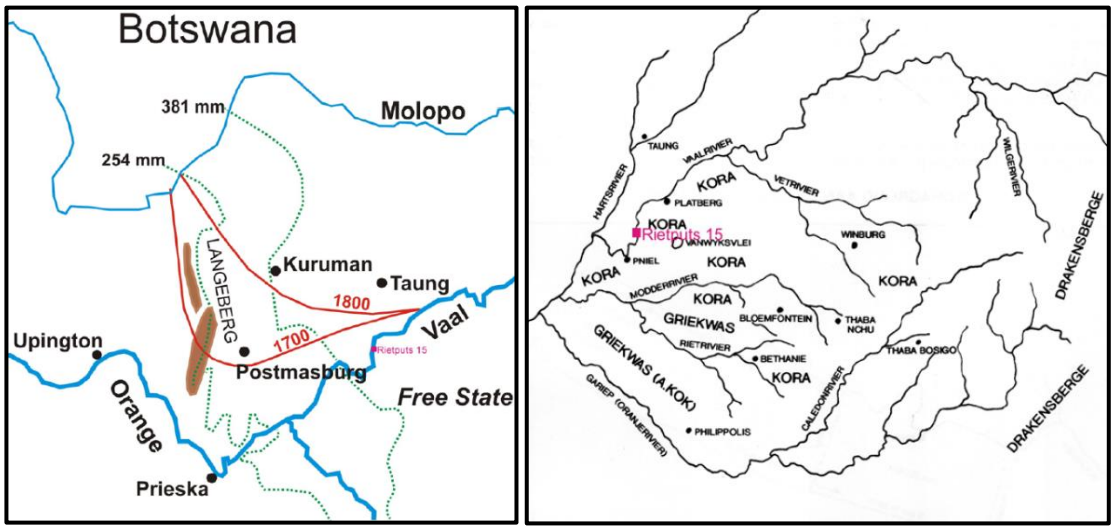


A map of the Acheulen localities.



Early Acheulen tools from the lower coarse alluvium. Riet Puts Formation include hand axes (a and b) and a clever (c) on flakes; hand axes (d and e) and picks (f and g) on cobbles.

The incidence of Later Stone Age artefacts as open-site scatters is also common on the modern landscape along the lower Vaal River valley. There are plentiful rock art engraving sites in the region, including the area around Warrenton to the north of Rietputs 15 where rock engravings have been recorded at Four Streams, Nazareth and Schoolplaats. Late Iron Age and historical stone-walled settlement complexes in the region attest to the presence of BaTswana and Koranna communities occupying the landscape as far back as the 18th and early 19th century (see below).



Southern limits of Iron Age settlement in the Northern Cape at approximately 1700 ad 1800 (left) and a map of the Koranna settlement in the Transgariep ca. 1940 (right).

The study area landscape is largely degraded by previous and ongoing mining activities. One stone-walled settlement complex and three graveyards were recorded within the core operation area, while one potential historical terrain and three rock gongs were recorded within the proposed prospecting area and east of the core operation area (see map below).

These features are described below along with their field rating. Field rating categories as prescribed by SAHRA is explained in the below table.

Map of features recorded during the field assessment. Number 1 - 7 denote historical or archaeological sites, while letters a - e indicate backfilled mining pits that produces ESA lithics and/or vertebrate fossil remains.

Field rating categories as prescribed by SAHRA.

Field Rating	Grade	Significance	Mitigation
National Significance	Grade 1	-	Conservation; national site nomination
Provincial Significance	Grade 2	-	Conservation; provincial site nomination
Local Significance	Grade 3A	High	Conservation; mitigation not advised
Local Significance	Grade 3B	High	Mitigation (part of site should be retained)
Generally Protected A	-	High/medium	Mitigation before destruction
Generally Protected B	-	Medium	Recording before destruction
Generally Protected C	-	Low	Destruction

Stone Age component

Observations were limited since the mining pits exposing the Rietputs Formation gravels, that potentially holds Acheulean artefacts or vertebrate fossils as deep down as 6 to 15 m below the surface, are regularly backfilled. However, Acheuleun handaxes and associated lithic elements that were once preserved within these subsurface gravels are frequently found out of context around spoil heaps and backfilled areas (see images below).

Isolated Later Stone Age surface scatters occur sporadically around Baskop, and further east, but the scatters become less frequent towards the east between the extensively disturbed mining area and the river. The intact sedimentary strata within the core operation area are assigned a field rating of Local Significance Grade 3B.

Acheulen stone tools recorded out of context near spoil heaps and backfilled areas.

Stone-walled complex

A large stone-walled settlement complex covering an approximately 9 ha area, is located on rocky outcrop near the north-western boundary of the study area (see figure below). According to local inhabitants, the site was occupied until the late 1960's. Similar structures were also recorded on the western slopes of Baskop, but the full extent of their distribution could not be established due to impenetrable vegetation (black thorn) that covered large parts of the lower slopes around the mountain. The demarcated area is assigned a field rating of Local Significance, Grade 3A.

Large stone-walled settlement complex with multiple enclosures located near the north-western boundary of the study area

Graveyards

The graveyards are assigned a field rating of Local Significance, Grade 3A. The following graveyards were observed on site:

Historical Graveyard:

A formal graveyard covering approximately 2 200 m^2 is located about 235 m east of the Vaal River (see figure below). The graveyard dates from around the turn of the previous century and consists of a loose arrangement of some heavily overgrown graves, the majority with formal head markers. The site is not marked on the 1:50 000 topographic map of the area.

Informal Graveyard 1:

An unmarked graveyard covering approximately 7 200 m^2 is located about 600 m east of the historical graveyard. The graves are clearly visible, but unmarked and considered to be that of local farm workers. A section of the cemetery was destroyed by earlier mining activities. The report of Dr David Morris also identified this graveyard and noted that it was already in a precarious state. The site is not marked on the 1:50 000 topographic map of the area.

Informal Graveyard 2:

An unmarked graveyard covering approximately 1 800 m^2 is located about 90 m from the riverbank near the south-eastern boundary of the study area (see figure below). The graves are clearly visible but unmarked and considered to be that of local farm workers. The site is not marked on the 1:50 000 topographic map of the area.

Historical graveyard found on Riet Puts.

Informal graveyard 1 (top) and looking south-southeast along a section of the cemetery at Informal Graveyard 1 that was destroyed by earlier mining activities (bottom).

Historical Terrain

Several rectangular stone foundations were recorded within an area of ± 2.5 ha near the northern slope of Baskop (see below). A potential ash heap containing the remains of European ceramics, glassware and ungulate bones is located nearby. The site has the potential for future historical archaeological investigation. The demarcated area is assigned a field rating of Local Significance, Grade 3A.

Informal graveyard 2.

The report of David Morris also noted that an historic building that once occurred on Riet Puts, known as the Halliwell's Store, was destroyed during past mining activities.

Rock Art

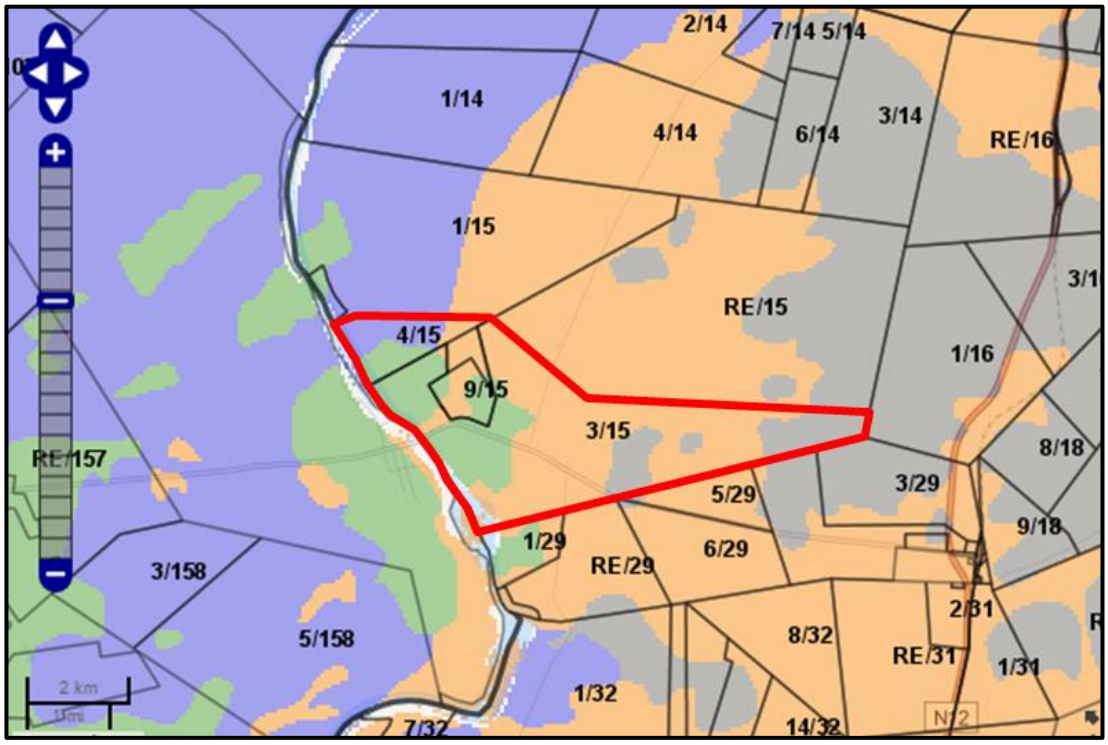
Three rock gongs were mapped along the northern rim of Baskop, but no engravings were recorded during the initial foot survey (see images below). The sites are each assigned a field rating of Local Significance, Grade 3A.

Palaeontology

According to the regional PaleoMap available from the South African Heritage Resources Information System, the majority of the study area is of high palaeontological sensitivity, especially in the central sections (see map below). The remaining areas are of moderate and low sensitivity. The areas on Riet Puts with moderate sensitivity and those western reaches classified to be of high sensitivity have been subjected to past mining activities and are believed to have been destroyed during past excavation activities.

Historical terrain with remains of a possible ash heap (top and middle) and cobble foundation (bottom).

Rock gong localities on Baskop; looking south towards the koppies (top left), and north and down the northwestern rim of the koppies (below left).



Palaeontological sensitivity map of the study area. The Riet Puts prospecting area is indicated in red. Sensitivity is indicated with Orange = HIGH, Green = MODERATE, BLUE = LOW, Grey = INSIGNIFICANT.

AIR QUALITY

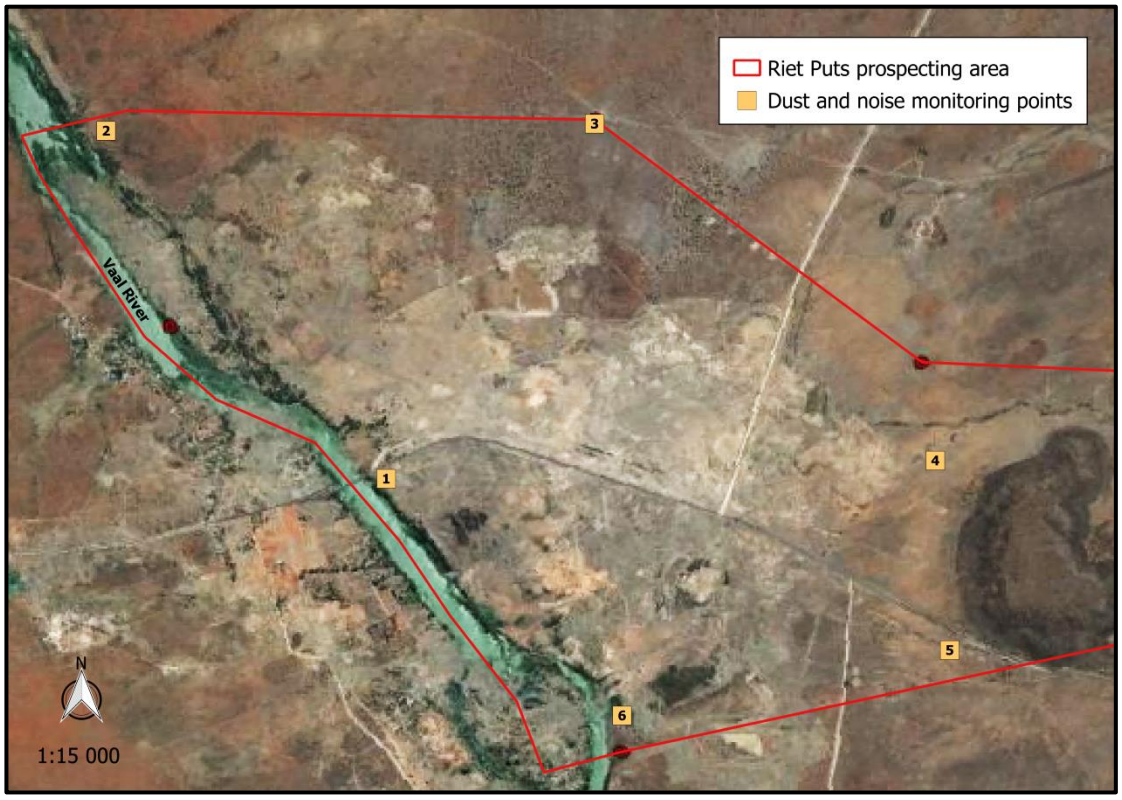
With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed prospecting activity.

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

The potential source of air pollution on Riet Puts 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. Many of the roads are covered with tailings, which act as a natural measure of dust suppression. Gas emissions from machinery will be negligible and within legal limits. Generated dust will be visible from the R374 road and Windsorton. There is however limited potential for fall-out dust to impact on the town of Windsorton.

During a baseline assessment conducted by Adriaan du Toit in 2003 it was clear that the greatest sources of dust pollution on Riet Puts were from old dumps (grey-green silt) and the calcrete gravel roads. The location of the dust monitoring points and results obtained at these points are presented in the table below. The monitoring report is attached as **Appendix 10**.

ID	COORDINATES		FALL OUT DUST			NUISANCE DUST
	Latitude	Longitude	Dust size	(Mg/m^2/day)	Description	(Mg/m^3/day)
1	-28.3306	24.71953	100% < 150 µm	15.8	100% grey-green silt	0.1
2	-28.3093	24.70642	100% < 150 µm	8.6	70% grey-green silt; 30% organic material	0.01
3	-28.3098	24.73222	100% < 150 µm	6.9	40% red sand and calcrete; 60% organic	0.01
4	-28.3318	24.75458	100% < 150 µm	5.32	50% red sand and calcrete; 50% organic	0.03
5	-28.3377	24.75106	100% < 150 µm	4.3	80% calcrete and red sand; 20% organic	0.01
6	-28.3407	24.73258	100% < 150 µm	9.7	100% grey-green silt	0.1



Monitoring points on Riet Puts where baseline data for dust and noise levels were obtained.

NOISE

Baseline monitoring data obtained by Adriaan du Toit on 10 November 2003 indicated that no noise pollution occurred. All readings indicated noise levels to be below 71dBa. The noise monitoring report is attached as **Appendix 10**.

Noise during the prospecting operation 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 residents of Windsorton who reside across the Vaal River from the Riet Puts operation. Operating hours are however restricted to day times and there are also other mining right operations on Riet Puts, on the neighbouring farms, as well as across the Vaal River.

VISUAL ASPECTS

The Riet Puts prospecting activities are visible from the bridge that crosses the Vaal River along the R374 road and from the opposite bank of the Vaal River, where the residential area of Windsorton is situated (see photos below).

Minimal dust that might be generated will be visible to the R374 road users and from across the Vaal River. No significant tourist routes occur in the vicinity of Riet Puts.

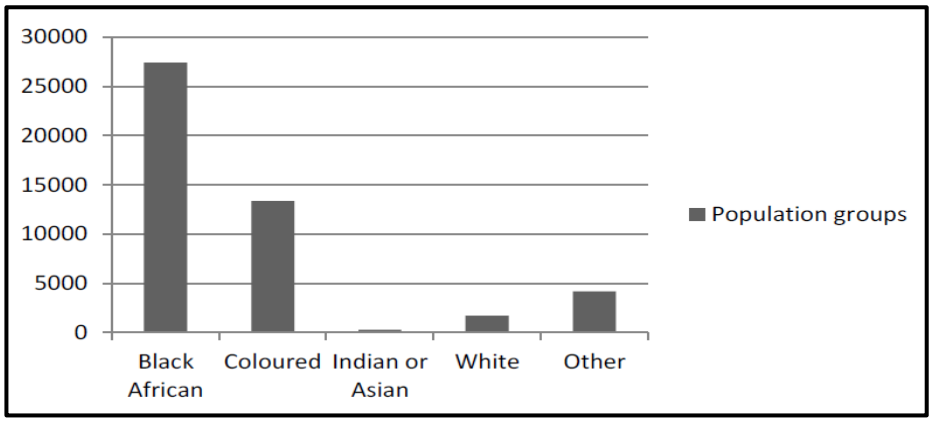
The prospecting operations on Riet Puts are visible from the bridge that cross the Vaal River along the R374 road (top), and the residential area of Windsorton is situated on the opposite bank of the Vaal River (bottom).

SOCIO-ECONOMIC STRUCTURE OF THE REGION

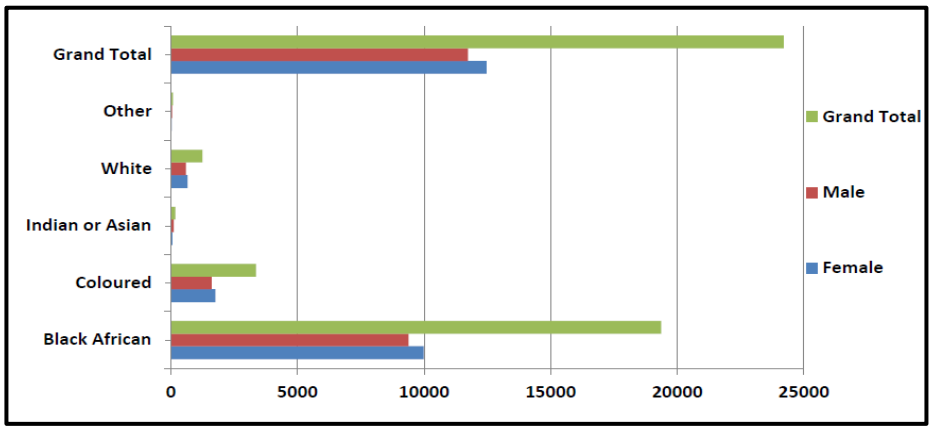
The Riet Puts operation is located within the Magareng Local Municipality and borders the Dikgatlong Local Municipality, where it has a significant effect on the Windsorton community. Therefore, both these municipalities will be discussed here. The municipalities are located in the Northern Cape and form part of Frances Baard District Municipality. Magareng comprises the town of Warrenton and covers an area of 1 542 km^2, while Dikgatlong comprises Barkly West, Delportshoop and Windsorton, and covers an area of 7 315 km^2. The following socio-economic information was obtained from the most recent records in the Local Government Handbook and from the Integrated Development Plans (2014/2015) of the respective local municipalities.

Ethnic profiles

DIKGATLONG LOCAL MUNICIPALITY



MAGARENG LOCAL MUNICIPALITY



Demographic elements

DEMOGRAPHICS	DIKGATLONG	MAGARENG
Population	46 841	24 204
Age Structure		
Population under 15	31.60%	31.40%
Population 15 to 64	63.10%	62.20%
Population over 65	5.30%	6.40%
Dependency Ratio		
Per 100 (15-64)	58.50	60.70
Sex Ratio		
Males per 100 females	97.00	94.10
Population Growth		
Per annum	2.02%	1.08%
Labour Market		
Unemployment rate (official)	39.70%	41.20%
Youth unemployment rate (official) 15-34	49.00%	51.80%
Education (aged 20 +)		
No schooling	17.70%	16.60%
Higher education	2.70%	3.50%
Matric	20.30%	24.00%
Household Dynamics		
Households	11 967	6 120
Average household size	3.70	3.90
Female headed households	35.40%	41.70%
Formal dwellings	78.50%	87.10%
Housing owned	47.10%	58.60%
Household Services		
Flush toilet connected to sewerage	60.00%	81.20%
Weekly refuse removal	49.60%	63.30%
Piped water inside dwelling	30.70%	37.00%
Electricity for lighting	75.90%	85.00%

Economic activities and employment

Around 17.73 % of the economically active population within the region are employed in the formal sector and 3.32 % in the household sector, while the informal economy constitutes 4.29 %. The majority within the formal sector is employed by agriculture as farm workers and by diamond mines (alluvial and kimberlite). A smaller proportion works in the retail and light industry sectors. The household sector encompasses domestic workers, gardeners, drivers and child minders for individual homes.

Service delivery

Service deliver for 2013/2014	DIKGATLONG	MAGARENG
Water		
Number of households and non-domestic provided	10 210	6 907
Number of domestic households/delivery points	10 210	6 771
Inside the yard	9 960	4 985
Less than 200m from yard	0	1 786
More than 200m from yard	250	0
Domestic households with access to free basic service	1 228	2 343
Electricity		
Number of households and non-domestic provided	10 398	4 998
Domestic households with access to free basic service	1 228	2 343
Sewerage and Sanitation		
Number of households and non-domestic provided	10 210	5 201
Number of households using		
Flush toilet - public sewerage	1 932	4 097
Flush toilet - septic tank	8 248	968
Ventilated pit latrine	0	0
Bucket system	30	0
Other	0	0
Domestic households with access to free basic service	1 228	2 343
Solid Waste Services		
Number of households and non-domestic provided	10 210	4 985
Domestic households with access to free basic service	1 228	2 343

(B) Description of the current and historic land uses

The study area had been subject to mining for over 130 years. In the mid-1880s typical historical diggings started and as mining technology advanced over the past century, more large-scale mining occurred. The outcome of the latter is signified by the large-scale disturbance and transformation of the natural vegetation (see below) and numerous unrehabilitated dumps, trenches and pits still remain. Furthermore, the Vaal River had been subject to diversions on both sides as well as mining within the river channel. These past activities make it extremely difficult to determine baseline information related to the natural conditions of the terrestrial and aquatic habitats.

Google earth images indicating the extent of preceding disturbances on Riet Puts. The top image depicts condition of the study area in 2006 after which past mining operations were active, while the bottom image depicts the most recent conditions (2016).

The major land uses in the area are alluvial diamond mining and agriculture. According to the Southern African Agricultural Geo-referenced Information System, the land capability of the area is non-arable with moderate potential grazing land. The grazing capacity is between 14 and 17 ha/AU, with the agricultural region being demarcated for cattle farming. Riet Puts is categorised to have a marginal suitability for maize yield and no suitability for sorghum, soya beans, sugarcane or sunflower. However, no crop production is known to have occurred on the property.

Apart from the current prospecting activities by Wedberg, the farm is also subject to at least four other Mining Permits. Those portions on Riet Puts that are not currently subjected to mining and prospecting activities are utilised as grazing pastures for cattle, while the hills are regarded as wilderness areas.

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

All infrastructure on site is comprehensively discussed in section d) ii) as part of the methodology discussion and a comprehensive description of the environment was presented in section h iv) (A) as part of the baseline report. However, the following key features have been identified within the footprint of the proposed operation:

Vaal River and associated wetlands

The Vaal River and its associated channelled valley-bottom wetlands are natural watercourses protected under the NWA. These habitats have mainly been impacted by past mining disturbances, which have modified them to some extent. The Vaal River and associated wetlands are considered to be largely modified. In terms of Ecological Importance and Sensitivity, the Vaal has scored a High EIS, while the wetlands and ephemeral stream have both scored moderate EIS. The Magareng Spatial Development Framework proposed these to be maintained as ecological corridors in order to create an open space system throughout the municipal areas that promotes ecological ecosystems within the region.

Groundwater struck and extracted during excavations

During excavations, pits intercept seeping groundwater, which will fill the pits and prevent continuation of prospecting activities. This groundwater is from the shallow primary aquifer found in the gravel beds on contact with basement rock. It is young groundwater receiving regular recharge, but the solution of old river sediment salts and pyrite minerals could cause a stagnant sulphate character in the water. The high sulphate concentrations will pollute surface water resources if they mix.

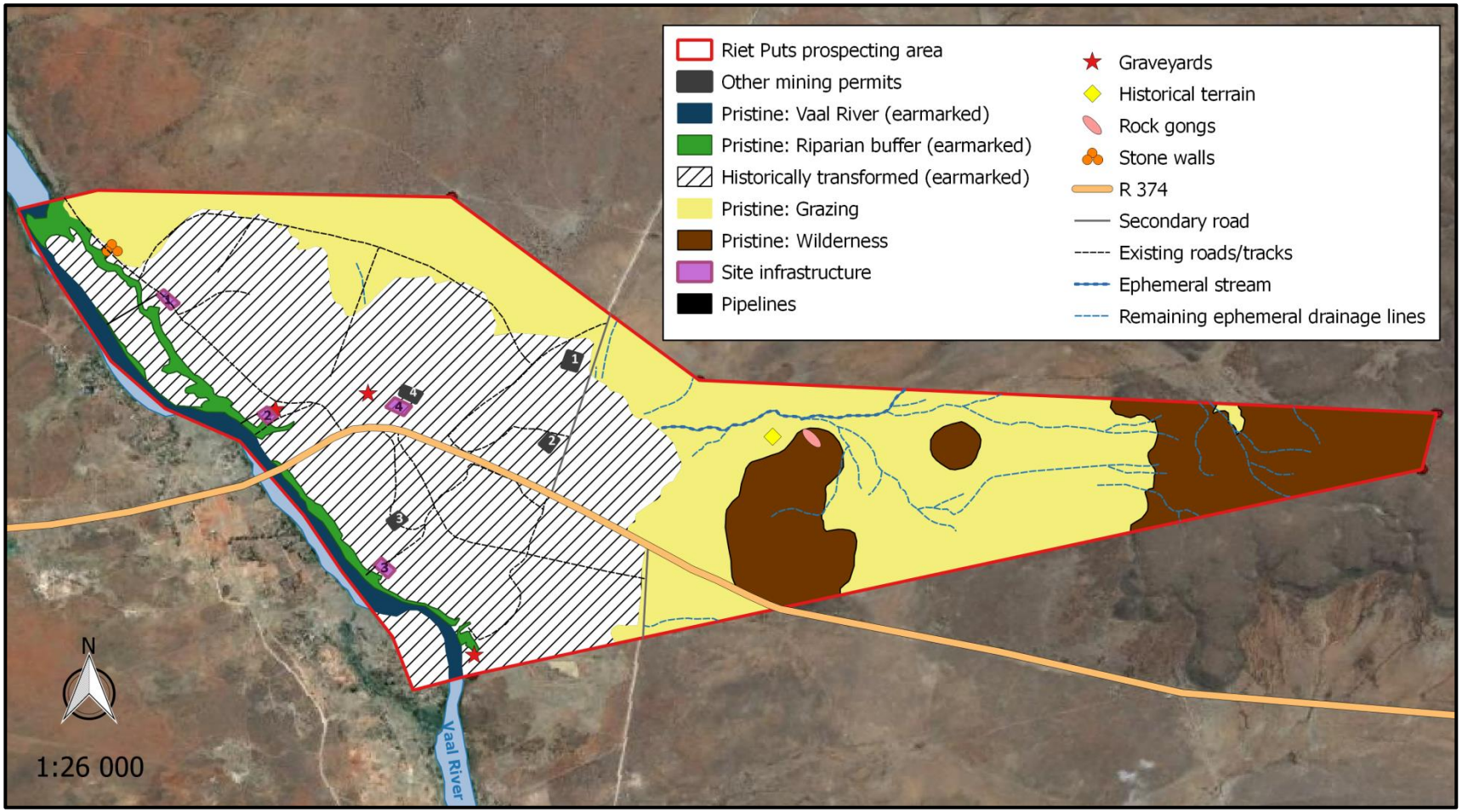
Heritage resources

One stone-walled settlement complex and three graveyards were recorded within the core operation area while one potential historical terrain and three rock gongs were recorded within the proposed prospecting area and east of the core operation area. These sites are all assigned a field rating of Local Significance Grade 3A and should be avoided and conserved. The intact sedimentary strata (Rietputs Formation) within the core operation area are highly significant as it represents an ancient cultural landscape where hand axe - using hominids inhabited southern Africa outside the early hominid sites of the Gauteng Province as early as 1.6 Ma years ago. It is assigned a field rating of Local Significance Grade 3B and higher.

Ore transport on the R374 public road

Transporting trucks carry concentrate bins off-site to the final recovery situated on Holpan, approximately 17 km south-west of the prospecting area. This transportation route entails utilising an estimated 12 km stretch of the public R374 road, before turning south towards Holpan.

(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 deep excavations and possible direct contamination from machinery.	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.
	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 open pits.	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 and diversions in the river.	4	4	4	10	120 (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; controlled water use.
	Deterioration in water quality through spillages and runoff from sites as well as mixing with primary aquifer water.	3	3	4	4	40 (LOW)	Low - Moderate	
	Deterioration in water quantity through abstraction on a cumulative basis.	4	4	2	9	90 (MEDIUM – HIGH)	Moderate - High	
Indigenous flora	The clearance of vegetation; potential loss of ecosystem function.	3	2	4	10	90 (MEDIUM – HIGH)	Moderate	Limit/control operational footprint in pristine areas; 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 (Severity + Spatial Scope + Duration)	*X*	*PROBABILITY* (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 operational footprint falls within the ambit of past mining activities where the geological features have already been altered. 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 deep excavations from which the groundwater will be abstracted once it is struck. Furthermore, if any oil and fuel spillages occur during these open pit activities then groundwater will be contaminated. Similarly, 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 stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the nearby river or streams for this purpose.

Alluvial operations impact on the surface water environment by altering the physical characteristics of the river. These impacts include the alteration of flow patterns, creation of islands due to the modification of the riverbed, ponding of water in excavations along the riverbanks, temporary damming of water and an increase in the concentration of suspended solids and sedimentation due to disturbance of the riverbed and surrounding habitat. Furthermore, during excavations, when pits intercept seeping groundwater from the primary aquifer, the water will fill the pits and prevent continuation of prospecting activities. The groundwater contains high sulphate concentrations that will pollute surface water resources if they mix.

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 riparian 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.

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. Excavations can also have a negative effect on the instream habitat; causing stream bank destabilization, increased erosion, sediment and nutrient inputs, and reduced shading and bank cover leading to increased stream temperatures.

Associated 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. This results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations.

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 surface infrastructure of Riet Puts is situated across the Vaal River from Windsorton, with typically low to moderate levels of noise, dominated by man-influenced sounds such as traffic on the R374, activities in Windsorton, mining and very occasional air traffic. The proposed mine will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining 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 of ore to Holpan. 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 Wedberg 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 the quality of the boreholes located down-gradient of the prospecting site.
- Continually monitor the effect of groundwater withdrawal on the groundwater aquifers.

DIRECT SURFACE WATER IMPACTS

Level of risk: High

Mitigation measures:

- Limit operational footprint within the riverbeds as far as is practically possible.
- Careful management of operations within the aquatic/riparian zones to minimize disturbances and contamination.
- Employ effective rehabilitation strategies to restore river characteristics.
- Adjust operation plans to exclude any potential sensitive wetland areas, if possible.
- Monitor and control water use and perform regular monitoring on pumps for leakages/spillage.
- Adhere to guidelines and recommendations provided by civil engineers.

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.
- No uncontrolled discharges from the sites to any surface water resources shall be permitted.
- 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 pristine 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 those ecological corridors specified in the Municipal Spatial Framework, i.e. riparian zones along the Vaal River.
- 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.

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: High

Mitigation measures:

- Implement measures that ensure the adherence to traffic rules.
- Implement measures that ensure the adherence to the relevant roads legislation.
- No refuse or disused machinery is to be deposited/left within 200 m of the centre line of the R374 public road.
- No structures are to be erected 95 m from the centre line of the R374 public road.

HERITAGE RESOURCES

Level of risk: Moderate to high

Mitigation measures:

- The remaining Rietpus Formation strata within the study area should preferably be conserved. Alternatively, given the understandably negative socio-economic ramifications of this recommendation, it is advised that:
  - In the long–term at least part of the in situ Rietputs Formation located within the Core Gravel Deposits area should be identified, demarcated and conserved for the future.
  - In the short-term the mining authority should engage with local heritage professionals before backfilling disused mining pits, to allow for inspection, recording and sampling of freshly exposed gravels and to allow for sampling of material during sorting.
- The stone-walled complex should be protected with a clearly demarcated no-go area for mining operations with at least a 10m - wide no-go buffer zone against vehicle traffic.
- 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 Historical Terrain site has the potential for future historical archaeological investigation and should be avoided. The site 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.
- The rock gong sites on Baskop will not be impacted by the proposed mining operations. It is likely that the Baskop area may yield more rock art sites. A follow-up survey of the mountain is advised as part of an overall heritage management plan for the study area.
- Should the operation necessitate impact on any heritage resources, the company should apply for a SAHRA destruction permits prior to commencement of such activity.

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 prospecting 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 sites and associated infrastructure is primarily based on past mining infrastructure, proximity to the access roads, proximity to the areas earmarked for excavations and limited additional impact on the environment. The past mining activities left a conspicuous footprint of transformation. It will therefore cause additional impacts if infrastructure is not placed within these areas and render the consideration of alternative sites useless.

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. There is no alternative development location for the site. The location of the sites and associated infrastructure is primarily based on the footprint of transformation left by past mining activities.

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 therefore the initial site locality is considered to be the final site locality. 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 river characteristics during construction of haul roads in the river; sedimentation/contamination during runoff.	Operational	High	Limit operational footprint in river; 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	Some haulage roads will be visible from the opposite banks of the Vaal River and from the R374 bridge that crosses the river.	Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	Transporting ore to Holpan 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 during excavations where groundwater is struck.	Operational	Medium - High	Effective contamination control; effective management and control measures; abide by legal requirements.	Low - Medium
	Surface water	Alteration of river characteristics during excavations in the river beds and banks. Contamination of surface water from machinery as well as from potential mixing of surface water with seeping groundwater high in sulphate.	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 opposite banks of the Vaal River and from the R374 bridge that crosses the river.	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
River diversions	Geology	No alteration of geological conditions linked to diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Topography	The diversions will change the natural topography of the river channel by adding features/slopes to the channel.	Operational	Medium - High	Employ effective rehabilitation strategies to restore surface topography.	Low
	Soil	Soil compaction is expected to take place where diversion structures are constructed; potential erosion during flooding/storm events.	Operational	Low	Employ appropriate management and rehabilitation strategies to preserve/restore soil characteristics.	Very low
	Land use / capability	No impacts to land use/capability *per se* are expected to occur from river diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Fauna	Construction of diversions will alter/disturb aquatic faunal habitats and may have a direct effect on faunal dynamics.	Operational	Low - Medium	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Low
	Flora	Construction of river diversions will disturb/destroy aquatic vegetation.	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 diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Surface water	Alteration of river characteristics during construction of diversions.	Operational	High	Limit operational footprint within the watercourses; accurate planning; effective rehabilitation strategies to restore resource characteristics; storm water management.	Medium
	Air quality	No impact to air quality is expected from diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Noise	Noise/vibration created during construction of diversions.	Operational	Low	Minimise generation of excessive noise/ vibration; regular maintenance of vehicles and equipment; operate during day times.	Very low
	Visual	Diversions will be visible from the opposite banks of the Vaal River and from the R374 bridge that crosses the river.	Operational	Low	Effective operational control measures and rehabilitation strategies.	Very low
	Traffic and road safety	No impact to traffic/road safety is expected from diversions.	*N/A*	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources when constructing the diversions.	Operational	Low	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	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	Direct overutilization/wastage of water extracted from the Vaal River for the use in processing operations; 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 and from across the opposite banks of the Vaal River.	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 May 2016. Attached as Appendix 7.	• 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. • The majority of the site was subjected to previous mining activities which transformed the natural habitat and therefore additional impacts by the Riet Puts operation in these areas are not expected to cause additional habitat loss. On the other hand, those pristine areas that fall within the earmarked area of the Riet Puts operation (aquatic and riparian habitats) 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 and groundwater features An aquatic assessment and wetland delineation report was completed by Dr Betsie Milne in August 2016. Attached as Appendix 8. Baseline surface and groundwater quality sampling were conducted in 2003 by Adriaan du Toit. The results are contained in this EIAr under the ground water section.	• Watercourses are expected to be adversely affected during the operation and the most profound impacts are expected to be in the form of hydrological alterations and the cumulative impacts of habitat destruction. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area. Therefore, 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)

LIST OF SPECIALIST STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	RECOMMENDATIONS INCLUDED IN THIS REPORT?	REFERENCE TO APPLICABLE SECTION OF THIS REPORT
Heritage resources A heritage impact assessment report was completed by Dr Lloyd Rossouw in May 2016. Attached as Appendix 9.	• The remaining Rietpus Formation strata within the study area should preferably be conserved. Alternatively, given the understandably negative socio-economic ramifications of this recommendation, it is advised that: • In the long–term at least part of the in situ Rietputs Formation located within the Core Gravel Deposits area should be identified, demarcated and conserved for the future. • In the short-term the mining authority should engage with local heritage professionals before backfilling disused mining pits, to allow for inspection, recording and sampling of freshly exposed gravels and to allow for sampling of material during the sorting process. • The stone-walled complex should be protected. The site 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. • It is advised that a management plan is submitted for all three graveyard sites to ensure that they are properly maintained and protected from vandalism or damage. It is also advised that each cemetery is enclosed by a wire fence that also includes a 10m - wide no-go buffer zone against vehicle traffic. • The Historical Terrain site has the potential for future historical archaeological investigation and should be avoided. The site 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. • The rock gong sites on Baskop will not be impacted by the proposed mining operations. It is considered likely that the Baskop area may yield more rock art sites. A follow-up survey of the mountain is advised as part of an overall heritage management plan for the study area.	**X**	PART A: Section g) iv) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Air quality and noise (baseline) Baseline dust and noise sampling were conducted in 2003 by Adriaan du Toit. Attached as Appendix 10.	• Hearing protection should be worn		

LIST OF SPECIALIST STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	RECOMMENDATIONS INCLUDED IN THIS REPORT?	REFERENCE TO APPLICABLE SECTION OF THIS REPORT
River diversions A technical assessment report was completed by MVD Kalahari in November 2016. Attached as Appendix 2.	• Adhere to the technical requirements in terms of design and storm water control. • Determine the 1:50 and 1:100 year flood lines for this section of river. • Contour survey of the complete river diversions with river diversion walls. • Calibration of the river diversion sections to establish the flow/height curve per cross-section. • The design of the river diversion walls will have to comply with paragraph 6(e) and 6(f) of GN704 and are as follows: - Minimum freeboard of 800mm; - To guarantee the serviceability for flows up to and including to a flood with an average period of recurrence of once in 50 years.	**X**	PART A: Section d) ii) PART A: Section g) viii PART B: Section 1) d) ix) PART B: Section 1) e)
Slimes dams A technical assessment report was completed by MVD Kalahari in October 2016. Attached as Appendix 3.	• The embankments of the slimes dams should 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. • The dams should be cut-in with a height of 1 m infill to ensure that the threat of storm water is alleviated. The material should be mixed and compacted to 95% Mod. AASHTO density in layers not exceeding 150 mm in thickness. • A storm water channel should be constructed around the perimeter of each dam to ensure safe surface runoff towards the embankment, therefore protecting the embankment from erosion. • All slimes dams will have to be fenced off to comply with the Health and Safety regulations, including the necessary signage.	**X**	PART A: Section d) ii) 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. Due to the fact that past mining activities have already transformed the majority of the ear-marked areas, the most profound impacts here will be in the form of large-scale clearance of re-established indigenous habitats with slight potential loss in species of conservation concern.

In contrast, impacts on the pristine habitats (riparian and aquatic) are likely to be most profound, because the operation will constitute alterations of river characteristics in the Vaal River and the large-scale clearance of indigenous riparian habitats; which will lead to the degradation of ecological corridors and subsequently cause loss of connectivity and ecological function. The risk of deterioration in surface water characteristics is also high. 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.

The heritage resources (graveyards, stonewalls and historical terrain) is expected to be protected with the implementation of the EMPr, but intact sedimentary strata (Rietputs Formation) within the earmarked area that are highly significant have already been destroyed and the proposed activities are also likely to obliterate the remaining resources.

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 sites will be placed in the areas marked as “site infrastructure”. The most sensitive areas include the Vaal River, riparian vegetation, remaining drainage lines, Rietputs Formation, cemeteries and stone wall complex.

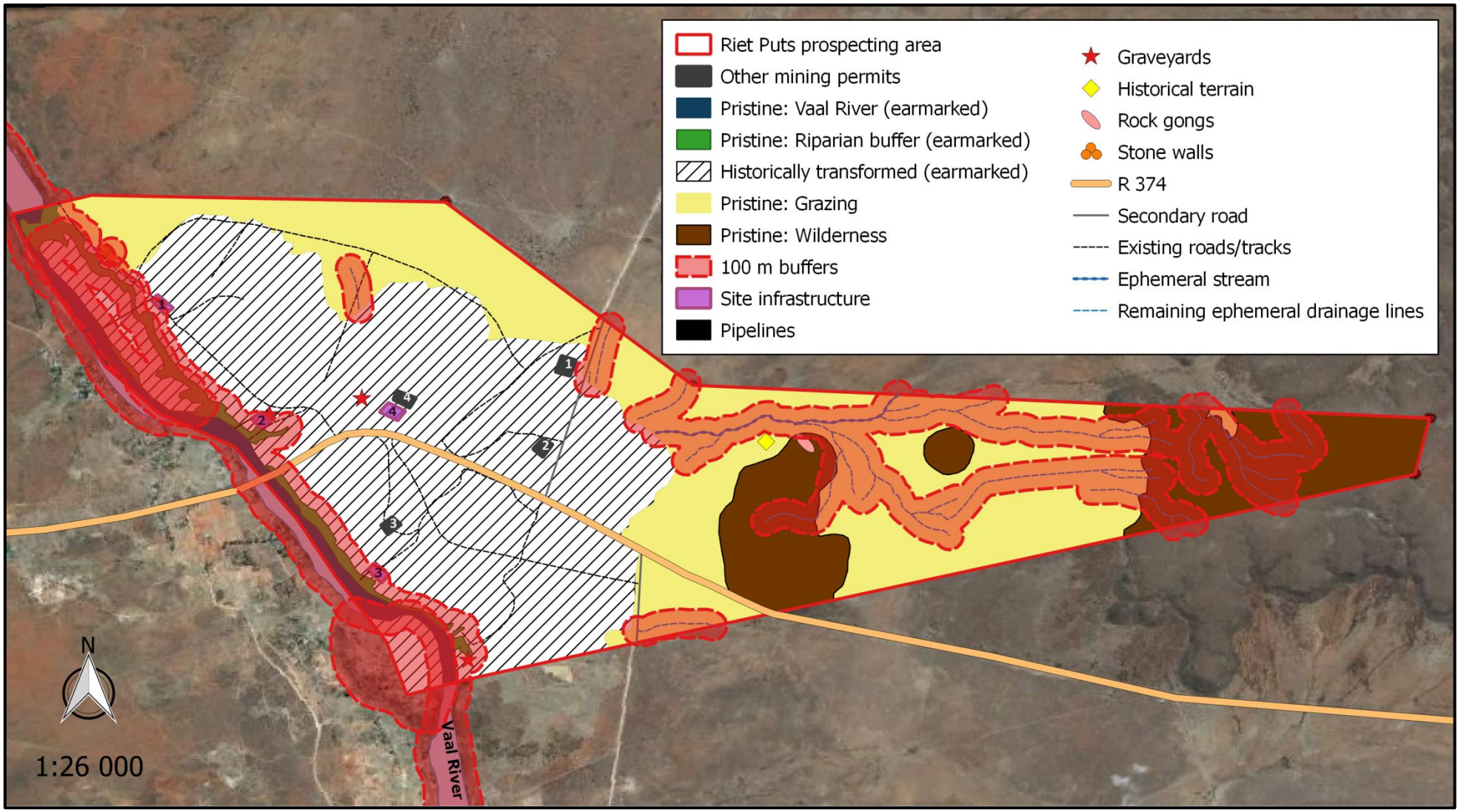
Buffers (no-go zones) that must be implemented include the following:

- 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 stone-wall complex, graveyards and historical terrains.

- The 5 m buffer within the road reserve from the R374 public road, according to the Roads Ordinance.

Please see Final Site Map below. Please note that the 10 m and 5 m buffers cannot be depicted on this map due to their fine scales.


Riet Puts prospecting area
Other mining permits
Pristine: Vaal River (earmarked)
Pristine: Riparian buffer (earmarked)
Historically transformed (earmarked)
Pristine: Grazing
Pristine: Wilderness
100 m buffers
Site infrastructure
Pipelines
Graveyards
Historical terrain
Rock gongs
Stone walls
R 374
Secondary road
Existing roads/tracks
Ephemeral stream
Remaining ephemeral drainage lines
N
1:26 000
Vaal River

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 and the Riet Puts operation is already active. 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 river characteristics and associated habitats caused by river diversions and excavations in the beds and banks of the river.
- 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 intact sedimentary strata (Rietputs Formation) are confined to the earmarked areas, and are likely to be destroyed.
- 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 high and will 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 Riet Puts 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 river characteristics and riparian vegetation after closure.

Outcome 5 (c): River diversions and slimes dams constructed as per requirements of engineer designs and guidelines.

Outcome 5 (c): River diversions removed and rehabilitated.

Outcome 5 (d): Stream beds and banks rehabilitated.

Outcome 5 (e): A complete register of water use records kept on file.

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.

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 found in the beds of the Vaal River. 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, river diversions and water use. These are discussed below.

The design or layout of the activity

The **site infrastructure** has already been established. It was strategically placed by incorporating prospecting project demands and environmental sensitivities identified during the prospecting right application process. Thus, the site layout is primarily based on proximity to the access roads, proximity to the areas earmarked for pitting and trenching as well as limited additional impact on the environmental and heritage resources. This 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 proximity of the operation to the perennial Vaal River renders it the best water source for the operation, especially for those sites that are situated near (< 500 m) the river. On the other hand, alternatives for Site 4 (> 500 m from river) include the utilization of groundwater struck during excavations. For the latter, groundwater is struck when excavations for diamond extraction reaches a depth of ± 15 m. The pits need to be dewatered in order for operations to continue safely and therefore the most sensible option for Site 4 is to utilise this water for processing.

Mobile pumps and pipelines were considered to be the best long term option for **transferring water** from the river and pits, due to proximity and the temporary nature of these pumps and plastic pipes; which causes minimum environmental disturbances. Therefore, a pipeline route was designed based on the principle of minimum impacts to the environment and to avoid the disturbance of graves.

The **river diversions** were assessed by ECSA registered engineering consultants (MVD Kalahari). The designs proposed by them are believed to be the most viable option for the operation and take all of the relevant standards and legislation into account. Therefore no alternatives were considered.

The **residue deposits** have already been established, with their selected localities being based on the following considerations:

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

These existing residue deposits were assessed by MVD Kalahari in order to evaluate the dam materials, capacity and risks. The slimes dam designs proposed by them are believed to be the most viable option for the operation 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>

The earmarked area was mined in the past, but other potential **land use** includes grazing and maize crops. The pristine areas are classified to have moderate potential for grazing land and marginal suitability for maize yield. Therefore, mining activities are believed to be the most economically beneficial option for the area. If the prospecting operation does not continue, the farming of livestock can persist and possible irrigation of maize crops. The most significant impacts associated with these activities include the provision of water and the introduction of chemicals like fertilisers and pesticides.

These could have a potentially serious impact on the existing surface water features. Cumulative impacts associated to grazing and crop irrigation include pollution of water resources, overgrazing and destruction of natural vegetation.

The Riet Puts prospecting project aims to **uplift** the previously disadvantaged Wedberg community. If the prospecting operation does not continue, this community will be deprived of economic empowerment. Furthermore, if this operation does not continue it would impact negatively on the employment rate for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a negative 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 lost.

The implementation of the Riet Puts operation will have a potential impact on the **biodiversity** through removal of indigenous vegetation, destruction of habitats and disturbances of water courses. If activities were not to continue, the status quo would apply and no damage would accrue to the environment.

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, the heritage resources will be protected through the demarcation of no-go zones and fencing off of graves.

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 was prepared in such a way that it complies with the requirements of NEMA and the EIA Regulations. Due to the fact that all of the site infrastructure have already been established, it is difficult to distinguish old and new activities in terms of Listed Activities under NEMA. However, 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 Riet Puts prospecting right has already been granted and the operation is currently active. The majority of the site was subjected to previous mining activities which transformed the natural habitat and therefore additional impacts by the Riet Puts operation in these areas are not expected to cause additional habitat loss. In my opinion the proposed activities can continue in these areas without causing major impacts to environmental features.

On the other hand, those pristine areas that fall within the earmarked area of the Riet Puts operation (aquatic and riparian 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

The Riet Puts prospecting right has already been granted, however any conditions included in the original prospecting right authorisation should be supplemented with the following:

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 outstanding 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, guidelines and designs provided by MVD Kalahari 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 landscaped and stabilised and any residual dumps should be kept below the natural skyline.

River diversions

The diversion structures should be removed and the surface rehabilitated in order to restore the natural flow regime of the Vaal River. Monitoring of river characteristics should take place during closure in order to ensure restoration of natural conditions and/or to understand the effect that the Riet Puts operation has had on the river.

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 Riet Puts 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 beds and banks of the Vaal River. 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 river banks and 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.

After-effects following closure:

- The hydrological and ecological risks associated with the river 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 Riet Puts closure.
- No after effect on the groundwater yield or quality is expected after closure.

q) Period for which the Environmental Authorisation is required.

The expected remaining life span of the prospecting operation is 2 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 bank guarantee submitted to the DMR for site closure and rehabilitation is to the value of R 137 652.00. However, this amount was re-evaluated and the current realistic mine closure and rehabilitation costs amounts to R 12 014 869.92. Therefore the outstanding financial provision of **R 11 877 217.92** 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 Riet Puts, 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 revised calculations were based on a survey assessment of the environmental liability of Wedberg, conducted by professional Mine surveyor, FJ van der Merwe (see **Appendix 11**). The results obtained from this survey were used to calculate the outstanding rehabilitation 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 quantum was determined based on a worst case scenario and takes every possible environmental liability into account.

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 Vaal River forms part of an overall ecological regime of conservation concern within the district municipality and is protected in terms of the NWA. Furthermore, the social sensitivity is also regarded as being high, because the local communities (Town of Windsorton) are in close proximity of the operation (across the Vaal River). 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	Riet Puts 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 ± 839 m^3: (± 761 m^2 of plant infrastructure) (± 2 033 m^2 of powerlines (1 016.35 m in length x ± 2 m in diameter)) 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.	± 763 m^2 of steel structures
Demolition of reinforced concrete buildings and structures		± 657 m^2 in total: (113.42 m^2 brick) (542.75 m^2 concrete)
Rehabilitation of access roads	No specific terms/recommendations provided.	17 706.12 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 ± 7 ha: (60 296.49 m^2 open pits) (9 019.54 m^2 ramps)
Rehabilitation of overburden and spoils	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.	A total of 3.6 ha
Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)		A total of 4.3 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.	A total of 0.6 ha will be in need of general surface rehabilitation after disturbances has ceased and include the following: - Removal of 1 863.91 m^2 safety berms, ± 129 m^2 (1 165.84 m in length x 110 mm in diameter) pipeline and 2.7 m^2 water tank; - General surface rehabilitation of 735.89 m^2 parking area and 2 800 m^2 plant area.

River diversions	Habitats can established within the stream diversion area and therefore considerations should be given whether a stream diversion should be changed at mine closure. Removal of diversions could also result in stream flow over mined areas, which could impact water quality. Nevertheless, if the river diversions are to be removed at closure, the costing is the same as for general surface rehabilitation.	A total river diversion area of ± 60 ha is planned. This is however only an estimate and should be re-evaluated during the next environmental audit, following a survey of the diversion.
Fencing	No specific terms/recommendations provided.	A total of 800 m.
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 17 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

A bank guarantee to the total value of R 137 652.00 has already been submitted to DMR. However, this amount was re-evaluated and the current realistic mine closure and rehabilitation costs amounts to R 12 014 869.92. Therefore an amount of **R 11 877 217.92** is still outstanding. The EAP can however not confirm on behalf of the Wedberg CPA 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 Riet Puts operation, whereas the Impact Assessment Report provides a comprehensive account of activities and assesses all potential impacts fully. scope not compiled by the EAP that compiled the impact assessment report and accompanying EMPR. Therefore it is not possible to provide any information on the methodology used in determining the significance of potential environmental impacts and risks. Therefore, this report did not deviate from the scoping report per se, but merely provides a more thorough impact assessment.

The description of the impact assessment process (methodology) provided in the scoping report was revised in order to provide a more precise assessment methodology. This is evident in Part A: section g) subsection vi) of this report. Severity, Extent and Duration weights were adjusted to provide a more realistic score for these variables. The probability weighting was also adapted in order to include the frequency of impact as well as the frequency of the activity. Subsequently, the consequence values and significance categories were adjusted to reflect an accurate consequence score.

ii) Motivation for the deviation.

The revisions to the impact assessment methodology were made in order to provide a more precise assessment methodology and in order to provide a more accurate reflection of the various scores.

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 Wedberg CPA is the landowner of the prospecting right area following a successful land claim in 2012 and there are no other directly affected persons.

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

The study area is largely degraded by previous and ongoing mining activities. One stone-walled settlement complex and three graveyards were recorded within the earmarked area, while one potential historical terrain and three rock gongs were recorded within the prospecting right area. The intact sedimentary strata (Rietputs Formation) within the earmarked area are highly significant as it represents an ancient cultural landscape where hand axe - using hominids inhabited southern Africa outside the early hominid sites of the Gauteng Province as early as 1.6 Ma years ago. 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 Riet Puts operation and associated infrastructure was established in October 2015 after a Preferent Prospecting Right was granted to the Wedberg CPA and they have been operating since. The operation is therefore already active and hence there are no alternatives to consider apart from ceasing 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

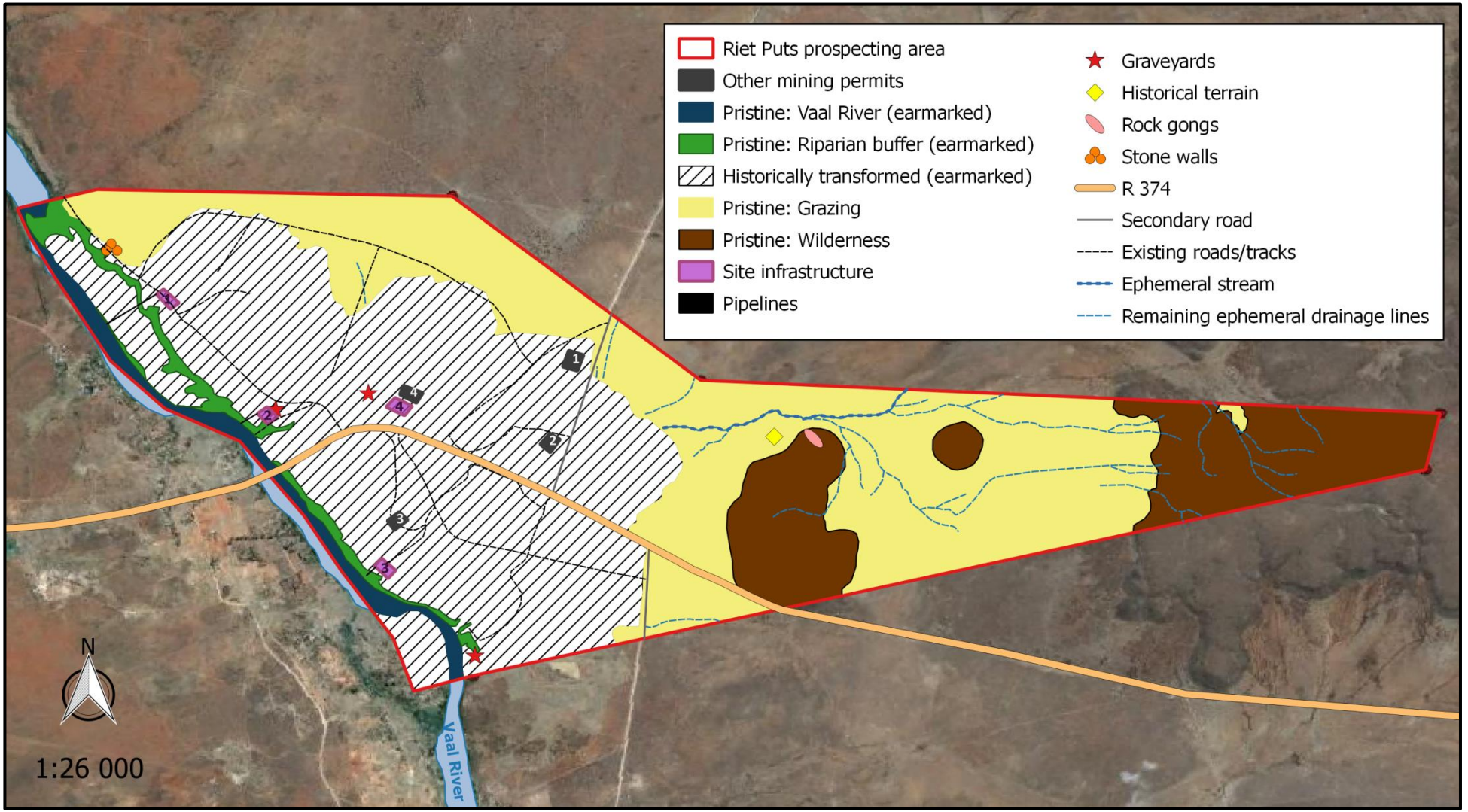
I hereby confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme are already including in PART A, section 1 (h).

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 four contractors will be placed in the areas marked as “site infrastructure”.

The most sensitive areas include the Vaal River, riparian vegetation, remaining drainage lines, Rietputs Formation, cemeteries and stone wall complex.


Riet Puts prospecting area
Other mining permits
Pristine: Vaal River (earmarked)
Pristine: Riparian buffer (earmarked)
Historically transformed (earmarked)
Pristine: Grazing
Pristine: Wilderness
Site infrastructure
Pipelines
Graveyards
Historical terrain
Rock gongs
Stone walls
R 374
Secondary road
Existing roads/tracks
Ephemeral stream
Remaining ephemeral drainage lines
N
1:26 000
Vaal River

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 Riet Puts 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 river characteristics and riparian vegetation after closure.
- River diversions and slimes dams constructed according to civil designs and recommendations.
- River diversions removed and rehabilitated.
- Stream beds and banks rehabilitated.
- A complete register of water use records kept on file.

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.

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 Riet Puts 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 Riet Puts 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 Riet Puts 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 Riet Puts cannot result in acid mine drainage.

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

The operation makes use of water that is pumped from the banks of the Vaal River (surface water) as well as water that is struck during excavations (groundwater). It is expected that not more than 200 000 m^3 of surface water and 105 000 m^3 of cipher water will be used yearly 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	Operational	In total: ± 5 ha ± 13 000 m^2 ± 1 000 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: ± 1 000 ha ± 1 000 000 m^3	- 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: ± 600 000 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: ± 1 400 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: ± 6 000 m^2 ± 18 000 m^3	- 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: ± 600 000 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 development of a temporary berm wall (diversion) within the Vaal River	Operational	± 60 ha	- Proper infrastructure design and planning; - Access control; - Biodiversity controls, management plan and monitoring; - Appropriate design and development of surface water monitoring; - Visual controls; - Control of alien/invasive/encroaching species; and - Emergency response procedure.	**NWA** (Reg 704) restricts activities in terms of proximity to watercourses. **NWA** (Section 21) restricts activities in terms of water uses. **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/flooding; Regular monitoring and control of alien invasive plant species; Post-closure monitoring of rehabilitation success.

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
The construction of slimes dams	Operational, Closure, Post-closure	In total (current): ± 43 000 m^2 ± 56 100 m^3	- 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.
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.

THE MANAGEMENT OF POTENTIAL ENVIRONMENTAL IMPACTS (cont.)					
ACTIVITIES	**PHASE**	**SIZE AND SCALE**	**TYPICAL MITIGATION MEASURES**	**COMPLIANCE WITH STANDARDS**	**TIME TO IMPLEMENT**
Loading and transporting of concentrate bins off-site to Holpan	Operational	Continuous; at a time (return trip): ± 35 km	- 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: 20 m^2 40 m^3 2 400 m	- 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 • Surface water abstraction from Vaal River • Groundwater abstraction from open pits	Operational	Total annual rate: 200 000 m^3 105 000 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: 75 m^3 900 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: ± 2 000 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: ± 800 m^2 ± 1 000 m^2 ± 100 m^2 ± 400 m ± 800 m	- 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 river characteristics during construction of haul roads in the river; 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 opposite banks of the Vaal River and from the R374 bridge that crosses the river.	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 ore to Holpan 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 deterioration of groundwater quality and quantity during excavations where groundwater is struck.	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 river characteristics during excavations in the river beds and banks. Contamination of surface water from machinery as well as from potential mixing of surface water with seeping groundwater high in sulphate.	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 river characteristics; stream beds and banks 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 opposite banks of the Vaal River and from the R374 bridge that crosses the river.	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
River diversions	Geology	No alteration of geological conditions linked to diversions.	*N/A*	*N/A*	*N/A*
	Minerals	No sterilisation of mineral resources linked to diversions.	*N/A*	*N/A*	*N/A*
	Topography	The diversions will change the natural topography of the river channel by adding features/slopes to the channel.	Operational	Employ effective rehabilitation strategies to restore surface topography.	Natural topography restored.
	Soil	Soil compaction is expected to take place where diversion structures are constructed; potential erosion during flooding/storm events.	Operational	Employ appropriate management and rehabilitation strategies to preserve/restore soil characteristics.	Surface characteristics restored.
	Land use / capability	No impacts to land use/capability *per se* are expected to occur from river diversions.	*N/A*	*N/A*	*N/A*
	Fauna	Construction of diversions will alter/disturb aquatic faunal habitats and may have a direct effect on faunal dynamics.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	Diversions removed and rehabilitated; post-closure monitoring results indicate re-establishment of river characteristics and aquatic habitats.
	Flora	Construction of river diversions will disturb/destroy aquatic vegetation.	Operational	Control operational footprint; environmental awareness; effective rehabilitation strategies; adherence to the law.	
	Ground water	No impact to groundwater is expected from diversions.	*N/A*	*N/A*	*N/A*
	Surface water	Alteration of river characteristics during construction of diversions.	Operational	Limit operational footprint within the watercourses; accurate planning; effective rehabilitation strategies to restore resource characteristics; storm water management.	Relevant licence obtained; diversions removed and rehabilitated; post-closure monitoring results show re-establishment of river characteristics and aquatic communities.
	Air quality	No impact to air quality is expected from diversions.	*N/A*	*N/A*	*N/A*
	Noise	Noise/vibration created during construction of diversions.	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	Diversions will be visible from the opposite banks of the Vaal River and from the R374 bridge that crosses the river.	Operational	Effective operational control measures and rehabilitation strategies.	Diversion structures removed; post-closure monitoring results show re-establishment of river characteristics.
	Traffic and road safety	No impact to traffic/road safety is expected from diversions.	*N/A*	*N/A*	*N/A*
	Heritage resources	The potential destruction of heritage resources when constructing the diversions.	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
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	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	Direct overutilization/wastage of water extracted from the Vaal River for the use in processing operations; 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 are visible to the immediate surroundings and from across the opposite banks of the Vaal River.	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.

However, in the case of Riet Puts the proposed footprint has mainly been transformed by past mining activities and not much baseline information is available for these areas. One can only assume that the pristine vegetation and the surrounding land uses mimic that which once was present here. Therefore these will be used as baseline information towards which closure objectives were determined.

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 Wedberg CPA is the landowner and rightful surface right user of the property. The closure objectives were irrelevant to those interested and affected parties which responded during the consultation process.

(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 Riet Puts 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 during September 2018. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. These closure elements were determined by a Professional Mine Surveyor (see report attached as **Appendix 11**).

Dismantling of processing plant and related structures

- The processing plant in total covers an area of ± 839 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 amount to 763 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 amount to ± 657 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, cover an area of 17 706.12 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 Riet Puts Prospecting activities.

Demolition and rehabilitation of non-electrified railway lines

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

Demolition of housing and/or administration facilities

There are no other housing or administration facilities associated with the Riet Puts 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 Riet Puts Prospecting activities cover 7 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 Riet Puts Prospecting activities.

Rehabilitation of overburden and spoils

- The total current overburden and spoils amount to 3.6 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 Riet Puts Prospecting activities.

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

- The processing waste deposits on the Riet Puts Prospecting area include a number of slimes dams from the different subcontracting sites, which collectively cover an area of ± 4.3 ha. 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 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 ± 0.6 ha.

River diversions

Habitats can established within the stream diversion area and therefore considerations should be given whether a stream diversion should be changed at mine closure. Removal of diversions could also result in stream flow over mined areas, which could impact water quality.

- For the removal of river diversions, the material should be used for future rehabilitation at completion of prospecting activity.

Fencing

- Fencing to the total length of 800 m occurs on site. All redundant fences should be dismantled at mine colure and the scrap material should be disposed of at a registered facility.
- The surface area should then be rehabilitated in such a manner as to improve natural vegetation restoration.

Water management

No treatment of water will be necessary for the Riet Puts 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.

A bank guarantee to the total value of R 137 652.00 has already been submitted to DMR. However, this amount was re-evaluated and the current realistic mine closure and rehabilitation costs amounts to R 12 014 869.92. Therefore an amount of **R 11 877 217.92** is still outstanding.

(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 the Wedberg CPA.

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 powerlines)	m3	839.00	12.21	1	1	R10 244.19
2 (A)	Demolition of steel buildings and structures	m2	763.00	170.13	1	1	R129 809.19
2(B)	Demolition of reinforced concrete buildings and structures	m2	657.00	250.72	1	1	R164 723.04
3	Rehabilitation of access roads	m2	17 706.12	30.44	1	1	R538 974.29
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0.00	295.49	1	1	R0.00
4 (A)	Demolition and rehabilitation of non-electrified railway 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	7.00	173 174.97	0.52	1	R630 356.89
7	Sealing of shafts adits and inclines	m3	0.00	91.33	1	1	R0.00
8 (A)	Rehabilitation of overburden and spoils	ha	3.60	118 912.29	1	1	R428 084.24
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	4.30	148 103.10	1	1	R636 843.33
8 (C)	Rehabilitation of processing waste 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	0.60	94 198.59	1	1	R56 519.15
11	River diversions	ha	60.00	94 198.59	1	1	R5 651 915.40
12	Fencing	m	800.00	107.45	1	1	R85 960.00
13	Water management	ha	0.00	35 816.95	1	1	R0.00
14	2 to 3 years of maintenance and aftercare	ha	17.00	12 535.93	1	1	R213 110.81
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		R8 596 540.54

1	Preliminary and General	1 031 584.86	weighting factor 2 1.05	R1 083 164.11
2	Contingencies	859 654.05		R859 654.05
			Subtotal 2	R10 539 358.70
			VAT (14%)	R1 475 510.22
			Grand Total	**R 12 014 868.92**

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; river diversions; 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; river diversions; 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; river diversions; 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; river diversions; 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.	- 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; river diversions; dumps and storage areas; slimes dams; plant sites and processing areas; other infrastructure areas.	Alterations of river characteristics, contamination/sedimentation of surface water resources, wastage/ overutilization of water.	- Monitoring of surface water use; - Monitoring of river 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; river diversions, 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; river diversions, 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; river diversions, 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; river diversions, 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 Riet Puts 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

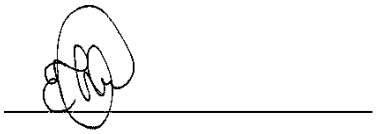
The EAP herewith confirms:

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 -