Reg. Nr BK 2004/077075/23

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR:

The proposed Prospecting Right combined with a Waste Licence application to prospect for Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province.

NAME OF APPLICANT	**Kimswa Mining (Pty) Ltd**
PREPARED BY	**Milnex CC**
TEL NO	(018) 011 1925
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REFERENCE NUMBER:	**NC30/5/1/1/2/13176PR**

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LIST OF APPENDIXES

PROJECT INFORMATION

Project Name:	Environmental Impact Assessment for the Prospecting Right combined with a Waste Licence application to prospect for Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province.
Report Title:	EIR & EMPr
Prepared By:	Milnex CC
Date:	06/03/2023

QUALITY CONTROL:

	Report Author:	**Report Reviewer:**
Name:	Lizanne Esterhuizen Honours Degree in Environmental Science	N/A
Signature:		

DISCLAIMER:

The DFFE screening tool was used in compiling this document

The Public Participation Process (PPP) must follow Regulation 41 of NEMA EIA Regulations; thus, the process needs to be transparent. However, due to the Protection of Personal Information Act (POPI Act) which commenced on 01 July 2021, Stakeholders, Landowners, surrounding landowners and registered I&AP' addresses, contact details and comments will not be included in any draft report to be circulated. All this information will form part of the final report to be submitted to the Competent Authority only.

Should you be identified as a Stakeholder, Landowner, Surrounding landowner and you do not wish to receive any further communique from Milnex CC regarding the application in question, you may request in writing that your details be removed from the Milnex CC database for this application.

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 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.

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

(1) The environmental impact assessment process must be undertaken in line with the approved plan of study for environmental impact assessment.
(2) The environmental impacts, mitigation and closure outcomes as well as the residual risks of the proposed activity must be set out in the environmental impact assessment report.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

2. 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 avoid, manage or mitigate identified impacts; and
(h) identify residual risks that need to be managed and monitored.

SCOPE OF ASSESSMENT AND CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

A. CONTACT PERSON AND CORRESPONDENCE ADDRESS

a) Details of:

i) The EAP who prepared the report

ii) Expertise of the EAP

Name of Practitioner	Qualifications	Contact details
Lizanne Esterhuizen	Honours Degree in Environmental Science (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No. : (053) 963 2009 e-mail address: lizanne@milnex-sa.co.za
Christiaan Baron	Master's Degree in Environmental Management (M.ENV.MAN) (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No.: (053) 963 2009 e-mail address: christiaan@milnex-sa.co.za
Andile Grant Nxumalo	Honours Degree in Environmental Science (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No. : (053) 963 2009 e-mail address: andile.grant@milnex-sa.co.za

Summary of the EAP's past experience. (Attach the EAP's curriculum vitae as **Appendix 2**)

Milnex CC was contracted by **Kimswa Mining (Pty) Ltd** as the independent environmental consultant to undertake the Scoping and EIA process for the Prospecting Right combined with a Waste Licence application to prospect for Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province. The property is located approximately 10km Southwest of Douglas in the Northern Cape Province. Milnex CC does not have any interest in secondary developments that may arise out of the authorisation of the proposed project.

Milnex CC is a specialist environmental consultancy with extensive experience in the mining industry which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Milnex CC benefits from the pooled resources, diverse skills and experience in the environmental and mining field held by its team that has been actively involved in undertaking environmental studies for a wide variety of mining related projects throughout South Africa. The Milnex CC team has considerable experience in environmental impact assessment and environmental management, especially in the mining industry.

Milnex CC have experience consulting in the environmental field. Their key focus is on environmental assessment, advice and management and ensuring compliance to legislation and guidelines. They are currently involved in undertaking EIAs for several projects across the country (refer to **Appendix 2** for CV).

B. DESCRIPTION OF THE PROPERTY

Farm Name:	1) The remaining extent of the farm De Hoek 2 Registration Division: Hopetown Extent: 744.8688 hectares 2) The remaining extent of the farm Marktsdrift 3 Registration Division: Hopetown RD Extent: 1825.3115 hectares 3) Portion 1 of the farm Roode Kop 5 Registration Division: Hopetown RD Extent: 1639.2181 hectares
Application area (Ha)	4209.3984 hectares
Magisterial district:	Pixley Ka Seme District Municipality Thembelihle Local Municipality
Registration division:	Hopetown
Distance and direction from nearest town	This area lies south of the Vaal-Orange Confluence. Douglas is the nearest town to the prospecting site. The capital of the Northern Cape Kimberley is about 100 km to the east in the Northern Cape Province.
21 digit Surveyor General Code for each farm portion	1) C03300000000000200000 2) C03300000000000300000 3) C03300000000000500001
Minerals applied for	Diamonds Alluvial (DA) Diamonds General (D) Diamonds in Kimberlite (DK) Diamonds (DIA)
Locality map	Attach a locality map at a **scale not smaller than 1:250000 and attach as Appendix 2**

iii. Farm co-ordinates

Farms	Longitude	Latitude	Longitude	Latitude
1) The remaining extent of the farm De Hoek 2 Registration Division: Hopetown Extent: 744.8688 hectares 2) The remaining extent of the farm Marktsdrift 3 Registration Division: Hopetown RD Extent: 1825.3115 hectares 3) Portion 1 of the farm Roode Kop 5 Registration Division: Hopetown RD Extent: 1639.2181 hectares	29° 5' 12.905" S	23° 39' 35.745" E	29° 9' 6.365" S	23° 41' 21.121" E
	29° 5' 25.485" S	23° 39' 57.104" E	29° 9' 12.572" S	23° 41' 18.675" E
	29° 5' 45.542" S	23° 40' 35.900" E	29° 9' 17.862" S	23° 41' 19.263" E
	29° 5' 58.851" S	23° 40' 54.635" E	29° 9' 23.864" S	23° 41' 22.082" E
	29° 6' 10.190" S	23° 41' 13.807" E	29° 9' 27.926" S	23° 41' 26.464" E
	29° 6' 17.468" S	23° 41' 28.600" E	29° 9' 37.918" S	23° 41' 30.663" E
	29° 6' 21.014" S	23° 41' 39.004" E	29° 9' 40.314" S	23° 41' 34.345" E
	29° 6' 19.973" S	23° 41' 50.675" E	29° 9' 41.463" S	23° 41' 41.072" E
	29° 6' 19.208" S	23° 42' 0.086" E	29° 9' 42.256" S	23° 41' 46.682" E
	29° 6' 19.724" S	23° 42' 7.955" E	29° 9' 45.017" S	23° 41' 51.856" E
	29° 6' 20.605" S	23° 42' 9.373" E	29° 9' 49.399" S	23° 41' 55.853" E
	29° 6' 23.153" S	23° 42' 13.481" E	29° 9' 57.084" S	23° 42' 0.124" E
	29° 6' 30.126" S	23° 42' 15.519" E	29° 10' 6.253" S	23° 42' 4.505" E
	29° 6' 36.396" S	23° 42' 15.701" E	29° 10' 7.423" S	23° 42' 5.065" E
	29° 6' 41.000" S	23° 42' 15.184" E	29° 10' 19.337" S	23° 42' 10.333" E
	29° 6' 46.548" S	23° 42' 12.761" E	29° 10' 33.448" S	23° 42' 17.559" E
	29° 7' 3.147" S	23° 42' 3.612" E	29° 10' 47.690" S	23° 41' 43.327" E
	29° 7' 8.375" S	23° 42' 1.574" E	29° 12' 13.370" S	23° 38' 17.212" E
	29° 7' 17.316" S	23° 42' 3.175" E	29° 10' 31.116" S	23° 38' 34.289" E
	29° 7' 22.273" S	23° 42' 5.503" E	29° 9' 56.470" S	23° 38' 40.073" E
	29° 7' 26.319" S	23° 42' 7.404" E	29° 9' 53.206" S	23° 38' 40.617" E
	29° 7' 38.384" S	23° 42' 5.155" E	29° 9' 46.629" S	23° 38' 41.716" E
	29° 7' 47.779" S	23° 41' 58.105" E	29° 8' 17.490" S	23° 38' 57.432" E
	29° 8' 1.020" S	23° 41' 46.429" E	29° 8' 12.705" S	23° 39' 0.986" E
	29° 8' 9.043" S	23° 41' 37.168" E	29° 8' 14.012" S	23° 39' 8.487" E
	29° 8' 13.914" S	23° 41' 34.012" E	29° 8' 4.511" S	23° 39' 10.207" E
	29° 8' 19.773" S	23° 41' 30.826" E	29° 7' 12.997" S	23° 39' 17.005" E
	29° 8' 42.722" S	23° 41' 25.234" E	29° 6' 14.824" S	23° 39' 24.508" E

C. LOCALITY MAP

(show nearest town, scale not smaller than 1:250000 attached as **Appendix 3**).

A Locality map is attached in **Appendix 3** and on figure 1 below.

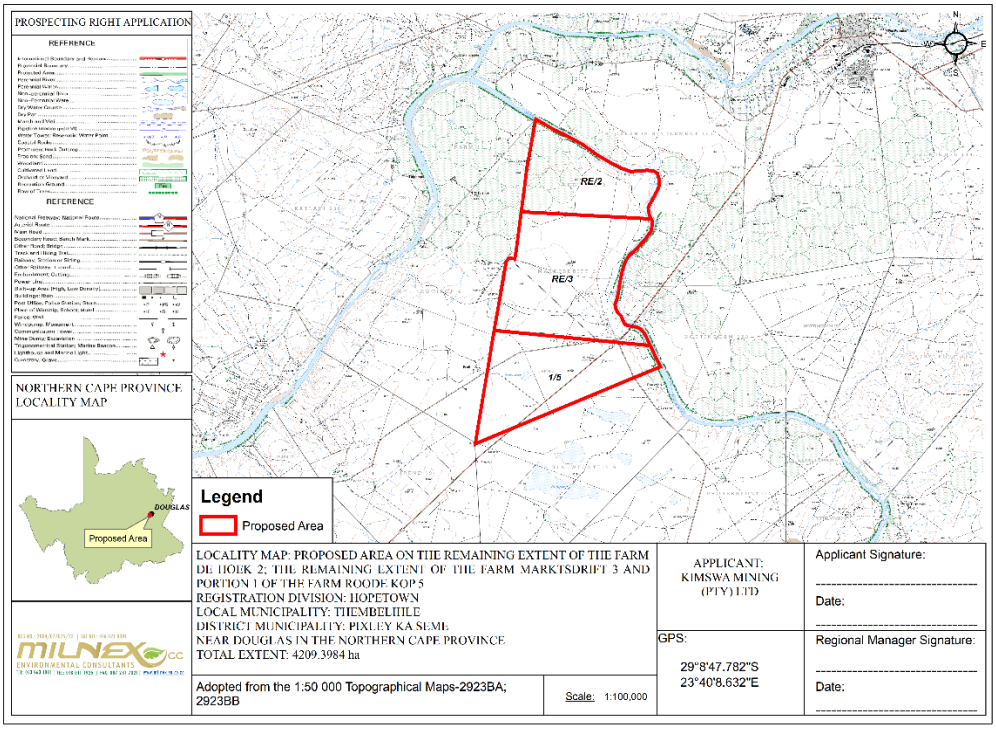


Figure 1: Locality Map

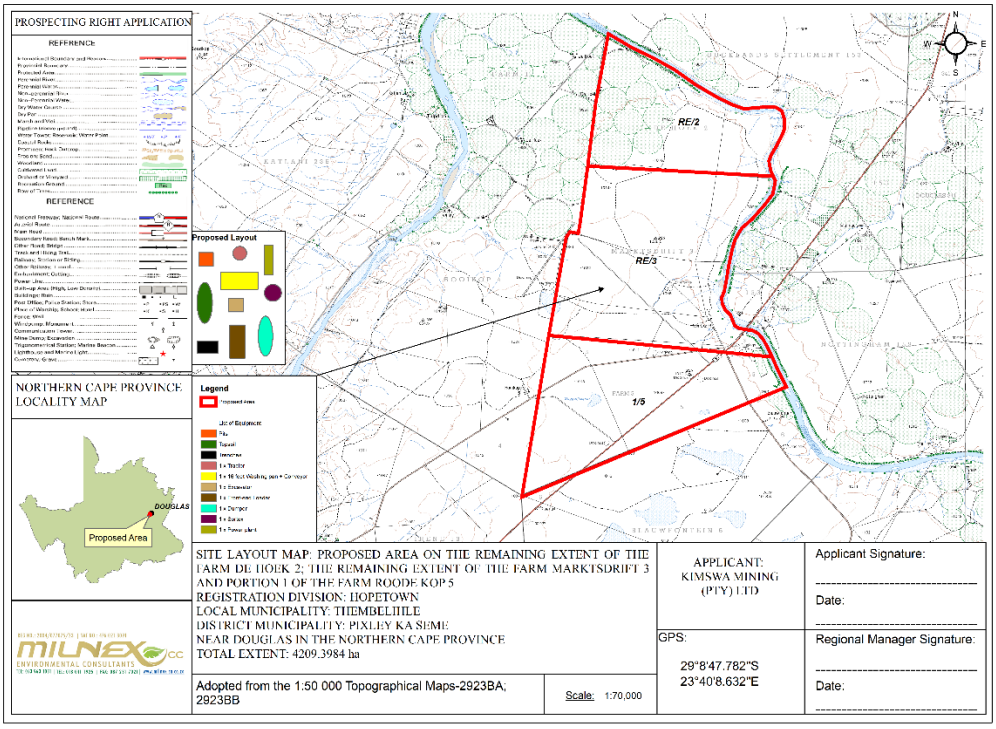


Figure 2: Site Plan

D. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY.

i) LISTED AND SPECIFIED ACTIVITIES

Description of the overall activity. (Indicate Mining Right, Mining Permit, Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)	***1)*** **Listing Notice 1, (GNR 327), Activity 9:** ***"****The development of infrastructure exceeding 1 000 meters in length for the bulk transportation of water or storm water –* *(i) with an internal diameter of 0,36 metres or more: or* *(ii) with a peak throughput of 120 litres per second or more"* ***2)*** ***Listing Notice 1, (GNR 327), Activity 19:*** *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* **3) Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):** *"Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the prospecting right"* ***4)*** **Listing Notice 2 (GNR 325), Activity 15:** *" The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan."* ***5)*** **Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021):** *"The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission.* ***6)*** **Listing Notice 3 (GNR 324), Activity 4:** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***(g)*** *Northern Cape* ***(ii)*** *Outside urban areas;* ***(ee)*** *Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority* **7) Listing Notice 3 (GNR 324), Activity 12:** "*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***(g)*** *Northern Cape* ***(ii)*** *Critical Biodiversity Areas as identified in biodiversity plans ".* Prospecting right with bulk samples for the prospecting of **Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite & Diamonds (DIA)** including associated infrastructure, structure and earthworks.

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **E.g. for mining**,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY** (Mark with an **X** where applicable or affected).	**APPLICABLE LISTING NOTICE** ***(GNR 324, GNR 325 or GNR 326)***	**WASTE MANAGEMENT AUTHORISATION** (Indicate whether an authorisation is required in terms of the Waste Management Act) **(Mark with an X)**
Prospecting: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each. **Listing Notice 1, (GNR 327), Activity 9** ***"****The development of infrastructure exceeding 1 000 meters in length for the bulk transportation of water or storm water –* *(i) with an internal diameter of 0,36 metres or more: or* *(ii) with a peak throughput of 120 litres per second or more"*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 1, (GNR327), Activity 9	**-**
Prospecting: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each ***Listing Notice 1, (GNR327), Activity 19:*** *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 1, (GNR327), Activity 19	**-**

Prospecting Right: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each **Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):** *"Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the prospecting right"*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021)	-
Clearance of indigenous vegetation: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each **Listing Notice 2 (GNR 325), Activity 15:"** *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan."*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 2 (GNR 325), Activity 15	
Prospecting: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each **Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021):** *"The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission."*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021)	-

Possible road **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 _Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each **Listing Notice 3 (GNR 324), Activity 4:** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***(g)*** *Northern Cape* ***(ii)*** *Outside urban areas;* ***(ee)*** *Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 3 (GNR 324), Activity 4 (g)(ii)(ee)	-
Clearance of indigenous vegetation: **<u>BULK SAMPLING: 576 000 tonnes</u>** 4209.3984 _Ha **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each **Listing Notice 3 (GNR 324), Activity 12:** "*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***(g)*** *Northern Cape* ***(ii)*** *Critical Biodiversity Areas as identified in biodiversity plans ".*	Random indigenous vegetation clearance of over a 4209.3984 hectares area. Concurrent backfilling will take place in order to rehabilitate	**X**	Listing Notice 3 (GNR 324), Activity 12 (g)(ii)	

ii) DESCRIPTION OF THE ASSOCIATED STRUCTURES AND INFRASTRUCTURE RELATED TO THE DEVELOPMENT

(Describe Methodology or technology to be employed, and for a linear activity, a description of the route of the activity

Kimswa Mining (Pty) Ltd has embarked on a process for applying for a Prospecting Right combined with a Waste Licence application to prospect for Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province.

These farms/portions are preferred due to the sites expected mineral resources. **Kimswa Mining (Pty) Ltd** requires a prospecting right in terms of NEMA and the Mineral and Petroleum Resources Development Act to mine Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) within the Thembelihle Local Municipality in the Northern Cape province (refer to a locality map attached in **Appendix 3**).

A DESCRIPTION OF HOW THE MINERAL RESOURCE AND MINERAL DISTRIBUTION OF THE PROSPECTING AREA WILL BE DETERMINED

Phase 1 – Site Visits

The applicant will appoint Hunter Kennedy as the project geologist to conduct the site visit. A formal site visit will be done within 90 days after the prospecting right has been executed. It is foreseen that more than one site visit will be conducted on the farms.

The purpose of the site visit is to assist the applicant to be familiar with the environment and with the assessment of the topography and the general geology before invasive prospecting activities. During this process the applicant will also review all documentation.

Phase 2 – Desktop Studies

Desktop studies will be undertaken after a site investigation is done to determine the target areas including the identification of any infrastructure to be build and any potential problems that may need to be addressed.

This phase involves reviewing the literature surveys, interpretation of aerial photographs, satellite images and ground validation of targets. A preliminary analysis of the environment will be obtained which will improve the project's efficiency and cost by providing a clearer understanding of the challenges may be encountered. Compilation of the results of analysis will be done by the geologist after the finalization of the desktop studies.

Phase 3 – Pitting

A trial pit / test pit or inspection pit investigation is a highly effective way of obtaining data on the sub surface soil and rock conditions which underlie a prospecting sight. It allows for the various soils and rock types to be locked, the soil to be sampled and a preliminary assessment to be made.

Pits will be dug, locked, sampled and backfilled. To dig the pits the applicant will make use of the systems of Hunter Kennedy, the appointed project geologist.

The applicant will at the end of the pitting process have locked the pits with the following information:

- A description of the soil and rock types from ground level to the base of the pits;
- Record of rock head depth and refusal depth, a list of where the samples will be taken, a record of where ground water seepage will be recorded;
- A general note of the geology and conditions in the vicinity of the test pits
- Pitting will be done within the period of 24 months once the prospecting right has been granted.

Calculations

It is planned that 250 pits will be dug (it may be less depending on the results) at an extent of 4m (length) x 4m (width) x 5m (depth).

Timeframe: 24 months (month 7 - 30)		
Pits per year	250 pits / 2 years =	125 pits dug per year
Total area to be disturbed per year:	125 pits x (4m x 4m) / 10 000 =	0.2 Ha disturbed per year
Total area disturbed for 24 months	250 pits x (4m x 4m) / 10 000 =	0.4 Ha disturbed

Phase 4 – Trenches

Due to nature of the alluvial diamond deposit, samples are not taken for assay as would be normal practice to evaluate hard rock precious or base-metal prospects. The diamond distribution pattern grade of alluvial diamonds is also of such a nature that there is no repeatability of sample results, even from adjacent samples.

Bulk samples will have to be taken to determine the average sample grade. By taking of the bulk samples, the applicant foresees to determine the grade of the diamond deposits as the number of carats contained in 100 tons (cpht) of gravel and to determine the average diamond sizes.

During these activities the applicant will then find out the size and value distribution of trenches. Diamond distribution patterns of alluvial deposits varies to such a nature that there is no repeatability of sample results even from adjacent samples.

Alluvial diamond deposits can only be sampled through bulk sampling comprising thousands of cubic meters of gravel. Given the extent of the area and the grades

expected to be very low, the applicant will have to process bulk samples of approximately 576 000 tonnes.

The appointed geologist will advise where the samples will be taken. Bulk samples will not be taken along a systematic grid as in the case of drilling.

As the anticipated mining plan for the properties will be based on high volumes (low grades), the bulk samples will have to address average recovery.

As indicated, the bulk sampling exercise has to be conducted to determine the grades (cpht), the diamond size distribution and thereafter to sell the diamonds to determine the diamond values.

The plant/ bulk sampling technique will be that of a typical South African alluvial diamond mining operation. The method is a strip mining process with oversize material and tailings

recovered from the plant will be used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the treatment facility using dump trucks.

The bulk sampling operation will be conducted using a fleet of conventional open pit mining equipment compromising of dump trucks supported by appropriate excavators and front-end- loaders. All equipment is planned to be diesel driven.

Before excavation commences vegetation will be cleared from the proposed bulk sampling block. These will be done as per environmental regulations. Top soil will then be removed and stored separately for later used for rehabilitation.

The bulk samples will be made in the form of box cuts the dimensions of these individual box cuts will on average be 40m long x 50m wide.

It is estimated that the bulk samples will be 5m in depth.

Gravel will be removed by excavators and will be loaded directly into dump trucks. Ore will be hauled to the screening plant. The material will be screened where after the screened material will be moved to the processing plant where the gravel

will be processed. Concentrate will be moved to the sorting plant were the concentrate will be sorted.

It is estimated that pitting and trenching will take approximately 48 months.

<u>Calculations</u>

It is planned that 80 trenches will be dug at an extent of 40m (length) x 50m (width) x 5m (depth).

Timeframe: 24 months (month 31 - 54)		
Trenches per year	80 trenches / 2 years =	40 trenches dug per year
Total area to be disturbed per year:	40 trenches x (40m x 50m) / 10 000 =	8 Ha disturbed per year
Total area disturbed for 24 months	80 trenches x (40m x 50m) / 10 000 =	16 Ha disturbed

Phase 5 – Consolidation and Interpretation of Results Data

The prospecting activities will be conducted to determine an inferred diamond resource and an indicated diamond resource. An inferred diamond resource has a lower level of confidence then that applying to an indicated diamond resource. The inferred resource indication will be where the geological and or grade continuity could not be confidently interpreted. It cannot be assumed that an inferred resource will necessarily be upgraded to an indicated resource. Such a resource is normally also not sufficient to enable an evaluation of economic viability.

To obtain an indicated resource the confidence level of information obtained from the prospecting will have to be sufficient for the information to be applied to mine design, mine planning to enable an evaluation of economic viability.

The project geologist, Hunter Kennedy, will monitor the program and consolidate and process the data and amend the program depending on the results received after each phase of prospecting. The DMR will be updated of any amendments made. This will be a continuous process throughout the prospecting work program.

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

A GIS data base will be constructed capturing all the exploration data. All data will be consolidated and processed to determine the diamond bearing resource on the property.

Prospecting activities and phases

Please find the Prospecting Work Programme attached as **Appendix 9**.

Water uses:

Water uses under section 21 a-k of the NWA may be triggered, thus a Water Use Licence Application (WULA) will needed in cases there will be encroachment. When needed a WULA will be lodged with the department of Water & Sanitation (DWS).

Table 1: Water Use Pan Size specifications for Alluvial Diamond Mining (DWS NC & FS, 2001).

Pan size	Water/hour (m^3)	Water/day(m^3)	Gravel/hour (tons)	Gravel/day (ton)
16	17	170	60	600

Since 1 x 16 feet washing pan will be used, the amount of water for the pans will be 17 000 L/hour from which 30% is re-used.

Dust suppression

Unacceptable levels of dust fallout can be determined by implementing dust management by monitoring compliance with the requirements of the National Dust Control Regulations for an activity, in terms of nuisance or disturbance.

The National Framework for Air Quality Management in the Republic of South Africa (the National Framework), as published under Government Notice No. 1144 of 26 October 2018, underpins NEM:AQA by providing national norms and standards for air quality management to ensure compliance with legislation. The National Framework serves as the country's AQMP.

Section 32 of the NEM:AQA makes provision for the Minister or the MEC to prescribe measures for the control of dust in specific places or areas, or by specified machinery or in specific instances. While dust generally does not pose a health risk, it may be regarded as a nuisance. It is the responsibility of the owner of the dust generating activity to take reasonable measures to limit the nuisance factor.

With respect to this, the Minister has published in the gazette the regulations for the control of dust in 2013 (Notice 827, Government Gazette No. 36974). These regulations provide requirements for measures for the control of dust, which includes the requirements for monitoring, dust management plan development and implementation and reporting.

According to dust levels set out by the National Dust Control Regulations 2013 (GNR. 827). The limits have the following threshold Section 3. Dustfall standard

Table 1. Acceptable dust fall rates

Restriction Areas	***Dustfall rate (D) (mg/m2/day, 30-day average)***	***Permitted frequency of exceeding dust fall rate***
Residential Area	*D < 600*	*Two within a year, not sequential months*
Non-residential Area	*600 < D < 1200*	*Two within a year, not sequential months*

Ablution

Chemical toilets shall be used, no french drains and pits shall be permitted.

Storage of dangerous goods

During the prospecting activities, limited quantities of diesel and fuel, oil and lubricants will be stored on site. These goods should be placed in a bunded area one and a half times the volume of the total amount of goods to be stored.

Road

Access will be obtained from existing gravel roads off the R357.

List of equipment's & infrastructure

List of equipment
1 x 16 feet Washing pan + Conveyor
1 x Excavator
1 x Front-end Loader
1 x Dumper
1 x Sortex
1 x Power plant

E. POLICY AND LEGISLATIVE CONTEXT

(a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;)

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act No. 107 of 1998 as amended.	Department of Environmental Affairs	27 November 1998
Constitution of South Africa Act 108 of 1996	National	18 December 1996
The National Heritage Resources Act (Act No. 25 of 1999)	SAHRA	1999
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	Department of Mineral Resources & Energy (DMRE)	2002
Mineral and Petroleum Resources Development Regulations, 2014.	Department of Mineral Resources & Energy (DMRE)	
National Infrastructure Plan	National	
National Environmental Management: Biodiversity Act No. 10 of 2004	Department of Environmental Affairs	7 June 2004
National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)	National & Provincial	1 July 2009
National Environmental Management: Waste Act, 2008 (Act No. 59 Of 2008). Regulations regarding the Planning & Management of Residue Stockpiles & Residue Deposits from a Prospecting, Mining, Exploration or Production Operation		
EIA regulations under NEMA	Department of Environmental Affairs	14 December 2014
Conservation of Agricultural Resources Act,1983 (Act No. 43 of 1983)	Department of Agriculture Forestry and Fisheries	1 June 1984

National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004).	National and Provincial	11 September 2004
National Water Act, 1998 (Act No. 36 of 1998).	National	20 August 1998
National Forest Act (Act 84 of 1998) (NFA)	National	30 October 1998
National Veld & Forest Fires Act (Act 101 of 1998)	National	27 November 1998
National Environmental Management: Protected Areas Act 57 of 2003		
Hazardous Substances Act (No. 15 of 1979)		
Subdivision of Agricultural Land Act (No. 70 of 1970)		
Occupational Health and Safety Act (No. 85 of 1993)		
Mine Health and Safety Act (No. 29 of 1996)		
Government Notice Regulation 704 of 1999		
Pixley Ka Seme District Municipality Integrated Development Plan (IDP)	Municipal	
Thembelihle Local Municipality Integrated Development Plan (IDP)	Municipal	

Policy and Legislative Context

Title of legislation, policy or guideline:	Reference where applied	How does this development comply with and respond to the legislation and policy context.
Constitution of South Africa Act 108 of 1996	Section 24	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996) states the following: *"Everyone has the right –* *(a) to an environment that is not harmful to their health or well-being; and* *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –* *i) prevent pollution and ecological degradation;* *ii) promote conservation; and* iii) *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."* The Constitution therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the countries environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.
National Environmental Management Act No. 107 of 1998 as amended.	S24(1) of NEMA S28(1) of NEMA	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 326, 327, 325, and 324 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment.
EIA regulations as amended under NEMA	Listing notice 1 Listing notice 2 Listing Notice 3	The National Environmental Management Act107 of 1998 (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment. These activities are detailed in Listing Notice 1 (as amended by GNR 327 of 7 April 2017), Listing Notice 2 (as amended by GNR325 of 7 April 2017) and Listing Notice 3 (as amended by GNR324 of 7 April 2017). Undertaking activities specified in the Listing Notices are only allowed once Environmental Authorisation has been obtained from the competent authority. Such Environmental Authorisation will only be considered once there has been compliance with the EIA Regulations, 2014. The Environmental Authorisation which may be granted subject to conditions.

Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	Section 10, 16, 22, 27 and 48	The Minerals and Petroleum Resources Development Act identifies the state as the official custodian of South Africa's Mineral and Petroleum Resources. Therefore, all activities relating to the reconnaissance, prospecting rights, mining rights, mining permits and retention permits are regulated by the State. One of the objectives of the Act is to give effect to section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development.
Mineral and Petroleum Resources Development Regulations, 2014.	Regulations 3, 5, 10 and 14	MPRDA Regulations prescribe how an application for a permit or right must be lodged.
The National Heritage Resources Act (Act No. 25 of 1999)	Section 35 Section 38	The National Heritage Resources Act (Act No 25 of 1999, Section 35) protects South Africa's unique and non-renewable archaeological and palaeontological heritage sites. These sites may not be disturbed without a permit from the relevant heritage resources authority. Section 38 of the NHRA provides guidelines for Cultural Resources Management and proposed developments:
National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)	Category A Category B Category C	Section 24S of NEMA deals with the management of residue stockpiles and residue deposits and provides that Residue stockpiles and residue deposits must be deposited and managed in accordance with the provisions of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), on any site demarcated for that purpose in the environmental management plan or environmental management programme in question. The management of residue stockpiles and residue deposits must be done in accordance with any conditions set out and any identified measures in the environmental authorisation issued in terms of NEMA, an environmental management programme and a waste management licence issued in terms of NEMA (Regulation 3(2)). The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) regulates waste management in all aspects and created a list of waste management activities that have, or are likely to have, a detrimental effect on the environment, which requires an impact assessment and licensing process. Activities listed in Category A require a Basic Assessment process, activities listed in Category B require a Scoping and EIA process and activities under Category C must comply with the relevant requirements or standards, in order for competent authorities to consider an application in terms of NEM:WA.
National Environmental Management: Biodiversity Act No. 10 of 2004	Chapter 4 Chapter 5	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) is part of a suite of legislation falling under NEMA. The Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant protection; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith (SANBI). Chapter 4 of NEMBA deals with threatened and protected ecosystems and species to ensure the maintenance of their ecological integrity, their survival in the wild, the utilisation of biodiversity is managed in an ecologically sustainable way and to regulate international trade in specimens of endangered species. Chapter 5 of NEMA deals with species and organisms posing potential threats to biodiversity. The purpose of this chapter is to prevent the introduction and spread of alien species and invasive species, also to manage, control and eradicate alien species and invasive species

National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004).	Section 21	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1) (a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
National Water Act, 1998 (Act No. 36 of 1998).	Section 21	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use.
National Forest Act (Act 84 of 1998) (NFA)	Regulation 7	The protection, sustainable management and use of forests and trees within South Africa are provided for under the National Forests Act (Act 84 of 1998). Regulation 7 from the Act states the following: **Prohibition on destruction of trees in natural forests.** (1) No person may - (a) cut, disturb, damage or destroy any indigenous tree in a natural forest; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any tree, or any forest product derived from a tree contemplated in paragraph (a), except in terms of- (i) a licence issued under subsection (4) or section 23; or (ii) an exemption from the provisions of this subsection published by the Minister in the Gazette on the advice of the Council.
National Veld & Forest Fires Act (Act 101 of 1998)	Regulation 13 Chapter 5	The purpose of the Act is to prevent and combat veld, forest and mountain fires throughout the Republic and provides for a variety of institutions, methods and practices for achieving the purpose. Regulations 13 provides the requirement for firebreaks. Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires.

Conservation of Agricultural Resources Act (Act No. 85 of 1983)		The purpose of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants.
National Infrastructure Plan		The National Government adopted a National Infrastructure Plan in 2012. With the plan they aim to transform the South African economic landscape while simultaneously creating significant numbers of new jobs, and strengthening the delivery of basic services. Government will over the three years from 2013/14 invest R827 billion in building and upgrading existing infrastructure. These investments will improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. On the other hand, investments in the construction of ports, roads, railway systems, electricity plants, hospitals, schools and dams will contribute to faster economic growth. This mining activity will indirectly contribute to the growing of the South African economy by supplying SANRAL with material to build and upgrade road infrastructure.
District Municipality Integrated Development Plan (IDP)		The IDP and SDFs of the relevant municipalities was examined and relevant information was included in the EIA report.
Local Municipality Integrated Development Plan (IDP)		The IDP and SDFs of the relevant municipalities was examined and relevant information was included in the EIA report.
National Environmental Management: Protected Areas Act 57 of 2003		This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It also seeks to provide for the sustainable utilization of protected areas and to promote participation of local communities in the management of protected areas.
National Environmental Management: Waste Act, 2008 (Act No. 59 Of 2008) Regulations regarding the Planning & Management of Residue Stockpiles & Residue Deposits from a Prospecting, Mining, Exploration or Production Operation		The purpose of these Regulations is to regulate the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation.
Hazardous Substances Act (No. 15 of 1979)		The object of the Act is inter alia to 'provide for the control of substances which may cause injury or ill health to, or death of, human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances.'

		In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.
Subdivision of Agricultural Land Act (No. 70 of 1970)		This Act regulates the subdivision of agricultural land and its use for purposes other than agriculture. The Directorate of Resource Conservation is responsible for the enforcement thereof. Investigations are done by the Provincial Department in support of the execution of the Act. The Act also deals with aspects associated with rezoning land.
Occupational Health and Safety Act (No. 85 of 1993)		The Occupational Health and Safety Act (No. 85 of 1993) (OHSA) provides a legislative framework for the provision of reasonably healthy and safe conditions in the workplace. It also places extensive legal duties on employees and users of machinery and makes major inroads on employers' and employees' common law rights. The OHSA is applicable and states that any person involved with construction, upgrades or developments for use at work or on any premises shall ensure as far as reasonably practicable that nothing about the manner in which it is installed, erected or constructed makes it unsafe or creates a risk to health when properly used
Mine Health and Safety Act (No. 29 of 1996)		The Mine Health and Safety Act (No. 29 of 1996) (MHSA) aims to protect and promote the health and safety of employees and persons that may be affected by the activities at a mine and outlines both the rights and responsibilities of an employer, as well as the obligations of employees working thereat. The following principles are considered applicable to the Proposed Project and are detailed below: • The primary responsibility for ensuring a health and safe working environment in the mining site is placed on the mine owner. The Act sets out in detail the steps that employers must take to identify, assess records and control health and safety hazards in the mine; • The right of workers to participate in health and safety decisions, the right to receive health and safety information, the right to training and the right to withdraw from the workplace in face of danger; • The Act requires the establishment of institutions to promote a culture of health and safety and develop policy, legislation and regulations; and • The responsibility for enforcing MHSA lies with the Mine Health and Safety Inspectorate. The Inspectorate's powers are recast and include the power to impose administrative fines upon employers who contravene the MHSA. The Act also contains innovative approaches to the investigation of accidents, diseases and other occurrences that threaten health and safety.
Government Notice Regulation 704 of 1999		GNR.704 of 1999 under the NWA provides regulations on the use of water for mining and related activities aimed at the protection of water resources (requirements for clean and dirty water separation). GNR.704 requires inter alia the following: • Separation of clean (unpolluted) water from dirty water; • Collection and confinement of the water arising within any dirty area into a dirty water system; • Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than once in 50 years; • Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8m above full supply level, unless otherwise specified in terms of Chapter 12 of the Act; and • Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years.

		GNR.704 also stipulates that no person in control of a mine or activity may: Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 m from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked; Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; or Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood line of any watercourse or estuary.

F. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES.

(a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred [location] development footprint within the approved site as contemplated in the accepted scoping report;).

Economic activity in modern-day South Africa has been centered on mining activities, their ancillary services and supplies. The country's stock exchange in Johannesburg was established in 1887, a decade after the first diamonds were discovered on the banks of the Orange River, and almost simultaneously with the gold rush on the world-famous Witwatersrand.

In many ways, South Africa's political, social and economic landscape has been dominated by mining, given that, for so many years, the sector has been the mainstay of the South African economy. Although gold, diamonds, platinum and coal are the most well-known among the minerals and metals mined, South Africa also hosts chrome, vanadium, titanium and a number of other lesser minerals.

In 2018 the mining sector contributed R351 billion to the South African gross domestic product (GDP). A total of 456,438 people were employed in the mining sector in 2018. Each person employed in the mining sector has up to nine indirect dependents. The mining sector has, for many years, attracted valuable foreign direct investment to South Africa. (Mineral Council, 2021)

Diamonds, arguably the ultimate luxury mineral, comprise an intricate lattice of carbon atoms, a crystalline structure that makes them harder than any other form in nature. This characteristic makes diamonds not only popular in jewellery, but also desirable in high-tech cutting, grinding and polishing tools (Chamber of Mines, South Africa, 12:2016).

According to the Chamber of Mines the country's diamond sector is far from reaching the end of its life even though diamond mining has been taking place in South Africa for almost a century and a half. The primary sources of all of South Africa's diamonds are kimberlites in ancient, vertically dipping volcanic pipes most of which were located in the vicinity of the city of Kimberley and which were initially amenable to open-cast.

Economic growth - South Africa's total reserves remain some of the world's most valuable, with an estimated worth of R20.3-trillion. Overall, the country is estimated to have the world's fifth-largest mining sector in terms of GDP value.

With South Africa's economy built on gold and diamond mining, the sector is an important foreign exchange earner, with gold accounting for more than one-third of exports. In 2009, the country's diamond industry was the fourth largest in the world.

Mining is a cornerstone of the economy, making a significant contribution to economic activity, job creation and foreign exchange earnings. Mining and its related industries are critical to South Africa's socio-economic development.

G. A MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

(-within the approved site as contemplated in the accepted scoping report;)

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

Location of the site

The location of the site is preferred due to the possibility of shallow diamond. There are various operational alluvial diamond mines adjacent to these properties on which applications for prospecting rights have been lodged. In house information exist which substantiate the reasons for this application.

As discussed in the previous section, based on outcomes of previous studies in the vicinity of the proposed site, the possibility to encounter volumes of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province, was identified.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

If applicable a Water Use License Application will be launched for conducting prospecting operations. All infrastructure will be temporary and/or mobile.

Preferred activity

The prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) is the optimum preferred activity for the site. The shallow diamond deposits make the site ideal for alluvial diamond mining. There are various operational alluvial diamond mines around the proposed area. In house information exist which substantiate the reasons for this application.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

If applicable a Water Use License Application will be launched for conducting prospecting operations. All infrastructure will be temporary and/or mobile.

Technology

In terms of the technologies proposed, these have been chosen based on the long term success of their prospecting history. The prospecting activities proposed in the Prospecting Works Programme (**Appendix 9**) is dependent on the preceding phase as previously discussed, therefore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques.

H. A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT

(-within the approved site as contemplated in the accepted scoping report, including:)

i) Details of the development footprint alternatives considered;

- **Consideration of alternatives**

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, site, activity, and technology alternatives. It is however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer, the EAP and Interested and affected parties, which in some instances culminates in a single preferred project proposal. The following sections explore each type of alternative in relation to the proposed activity.

- **Location alternatives**

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. It is expected that the Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) been deposited on this farm and therefore the applicant would like to commence with their prospecting activities. There are various operational alluvial diamond mines around the proposed area. In house information exist which substantiate the reasons for this application.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

If applicable a Water Use License Application will be launched for conducting prospecting operations. All infrastructure will be temporary and/or mobile.

Land capability

The proposed area falls within Land in Class 7 (vii). (refer to Land capability map on **figure 6** and attached as **Appendix 5**).

According to an article on the Grain SA website by Garry Paterson from ARC-Institute for Soil, Climate and Water on the Grain SA website, agriculture rests on three pillars where natural resources are concerned. These are the soil (comprising the growth medium for the plant), the climate conditions (which supply the plant with sufficient water and heat) and the terrain (enabling the crop to be physically planted, to grow and to be harvested sustainably).

The concept of land capability combines the three natural resource elements or factors listed above (soil, climate and terrain) and uses set parameters to determine a specific class for a given area. The basis of the land capability assessment in South Africa is the well-known Land Type Survey, which is a country-wide inventory of natural resources, i.e. soil pattern, macroclimate and terrain type, carried out between 1972 and 2002 by the ARC-Institute for Soil, Climate and Water.

Each unique land type is allocated to one of eight land capability classes. These classes are based on the original USDA land capability system, whereby Classes I and II comprise areas with little or no limitations to rainfed agriculture, Classes III and IV comprise those areas which are still considered arable, but with moderate to severe restrictions. Classes V to VIII comprise non-arable land with increasingly serious restrictions, either in terms of restricted soil, steep terrain, rockiness and/or an unfavourable climatic regime. (Garry Paterson, ARC-Institute for Soil, Climate and Water, November 2014.)

- **Activity alternatives**

The environmental impact assessment process also needs to consider if the development of a mine would be the most appropriate land use for the particular site.

Prospecting of other commodities: from the surface and desktop assessment indicates that there are no indications that there are other commodities to be mined on the site, except Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA).

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

- **Design and layout alternatives**

The location of the activities will be determined based on the location of the prospecting activities, which will only be determined during phase 1 of the Prospecting Work Programme (see **Appendix 9** for the PWP).

The layout follows the limitations of the site and aspects such as, roads, site offices and workshop area.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

- **Operational alternatives**

Due to the nature of the prospecting activities, no permanent services in terms of water supply, electricity, or sewerage services are required.

Pits will be dug by an excavator for the purpose of soil sampling. If gravel is found, the applicant will determine the composition and quality of the gravel.

The applicant will proceed with this way of prospecting by means of the open cast/trenching method, simultaneously or after pitting depending on the information obtained from the earlier work done. The trenches will be dug to remove and process the gravel. Gravel will be removed by excavators and will be loaded directly into dump trucks. Ore will be hauled to the screening plant. The material will be screened where after the screened material will be moved to the processing plant where the gravel will be processed. Concentrate will be moved to the sorting plant where the concentrate will be sorted.

All data will be consolidated and processed to determine the diamond bearing resources on the property. This will be a continuous process throughout the prospecting work programme.

No feasible alternatives to the pitting and trenching method currently exists. Impacts associated with the prospecting operations will be managed through the implementation of a management plan, developed as part of the application for authorisation.

- **No-go alternative**

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section H of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged.

- **Technology alternatives**

In terms of the technologies proposed, these have been chosen based on the long-term success of their prospecting history. The prospecting activities proposed in the Prospecting Works Programme (**Appendix 9**) is dependent on the preceding phase as previously discussed, therefore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques.

The preferred technology for the proposed prospecting activity, will be to remove the diamond bearing gravel with an excavator, depositing it in the 10 – 18 feet rotary pan(s) to be washed and sorted. Please find the Prospecting Work Programme attached as **Appendix 9**.

Dense Media Separation (DMS)

Pros & Cons of the alternative **Dense Media Separation (DMS)**

Advantages	Disadvantages
DMS plants is used mostly for kimberlite deposits	10 times more expensive than Rotary pan
	Water consumption is high
	Operating costs are expensive

In a Dense Media Separation (DMS) plant, powdered ferrosilicon (an alloy of iron and silicone) is suspended in water to form a fluid near the density of diamond (3.52 g/cm3), to which the diamond bearing material is added to begin the separation process of the heavier minerals from the lighter material. Additional separation of the denser material occurs by centrifuge in "cyclones" that swirl the mixture at low and high speeds, forcing the diamonds and other dense minerals to the walls and then out the bottom of the cyclone. Waste water rises at the center of the cyclones and is sucked out and screened to remove waste particles. The DMS process results in a concentrate that generally weighs less than one percent of the original material fed into the plant at the beginning of the process.

Rotary Pan Plants

Pros & Cons of the alternative **Rotary Pan Plants**

Advantages	Disadvantages
More cost effective	The industry perception that Rotary Pan Plants yield poorer diamond recoveries
Readily available	
Generate more work opportunities	
Consume less water	
Rotary Pan Plants are most often used when mining alluvial deposits	

In a Rotary Pan plant, crushed ore, when mining kimberlite, or alluvial gravel and soil is mixed with water to create a liquid slurry called “puddle” which has a density in the 1.3 to 1.5 g/cm3 range. The mix is stirred in the pan by angled rotating “teeth”. The heavier minerals, or “concentrate”, settle to the bottom and are pushed toward an extraction point, while lighter waste remains suspended and overflows out of the centre of the pan as a separate stream of material. The concentrate, representing just a small percentage of the original kimberlite ore or alluvial gravels, is drawn off for final recovery of the diamonds.

Both methods are in actual fact used for bulk material reduction and require a further process for the final diamond recovery however, for this project the Rotary Pan will be used.

Dust Suppression

When it comes to dust suppression two main methods were considered, namely molasses stillage and the wetting (water) of roads. The table below provides a short summary of the advantages and disadvantages of each.

Water	Molasses stillage
More cost effective	Much more expensive
Could lead to the depleting of water resources	Requires less water
No damage (only if used excessively)	The product may be toxic to aquatic organisms. (As this product could have physical effects on aquatic organisms for e.g. floating, osmotic damage)
No harm to humans or animals (Only a high quantity will have harm to humans or animals)	Not Hazardous or toxic. Could cause irritation to eyes, skin or when ingested and inhaled.
Non-flammable	Non-flammable
Eye-wash fountains not needed	Eye-wash fountains in the work place are strongly recommended
	Working procedures should be designed to minimize worker exposure to this product.
Basic storing methods	Storing methods are a bit more complicated. Should be stored in a plastic, plastic lined or stainless steel, tight closed containers between 5 and 40 degrees Centigrade.

Considering the above mentioned information, water will be used for dust suppression purposes.

ii) Details of the Public Participation Process Followed

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

The Public Participation Process (PPP) must follow Regulation 41 of NEMA EIA Regulations; thus, the process needs to be transparent. However, due to the Protection of Personal Information Act (POPI Act) which commenced on 01 July 2021, Stakeholders, Landowners, surrounding landowners and registered I&AP' addresses, contact details and comments will not be included in any draft report to be circulated. All this information will form part of the final report to be submitted to the Competent Authority only.

Should you be identified as a Stakeholder, Landowner, Surrounding landowner and you do not wish to receive any further communique from Milnex CC regarding the application in question, you may request in writing that your details be removed from the Milnex CC database for this application.

Newspaper advertisement

An advertisement was placed in English in the local newspaper (**Noordkaap Bulletin**) the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Milnex CC. I&APs were given the opportunity to raise comments within 30 days of the advertisement (see **Appendix 6**).

Site notices

Site notices will be placed (as anticipated on the coordinates below) on site in English to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs will be given the opportunity to raise comments. Photographic evidence of the site notices will be included in **Appendix 6**. Below are the coordinates where the site notices will placed.

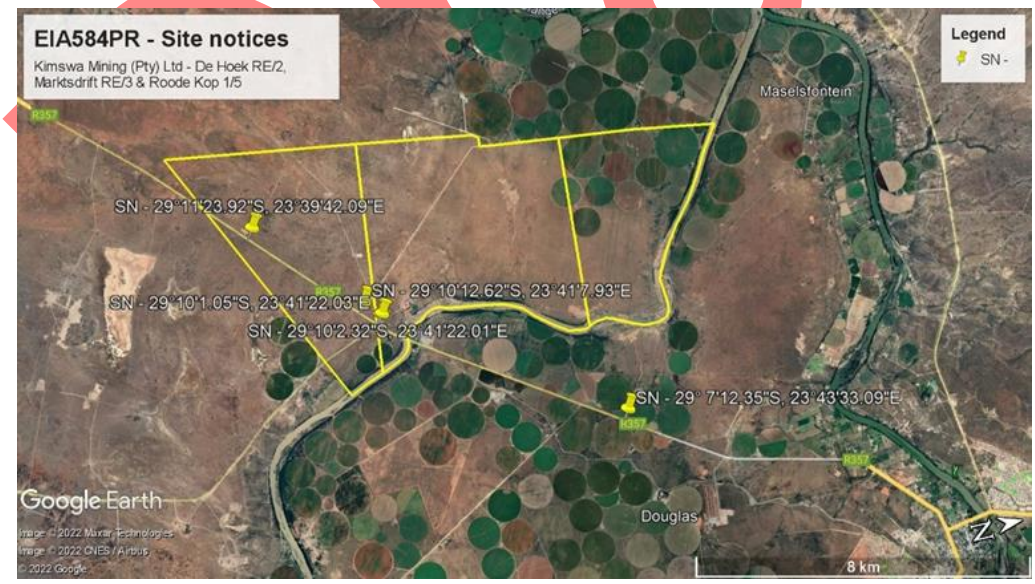


Figure 3: Site notice co-ordinates

Direct notification and circulation of Scoping Report to identified I&APs (stakeholder, landowners, surrounding landowners, and occupiers)

Identified I&APs, including key stakeholders representing various sectors, are directly informed of the proposed development and the availability of the Scoping Report via registered post on **25 August 2022** and were requested to submit comments by **25 September 2022** (30days).

A copy of the report is also available at the Milnex offices in Schweizer-Reneke, 4 Botha Street, Schweizer-Reneke and Potchefstroom (Waterberry Street, Waterberry Square, 1st floor, Office 5B, Potchefstroom), between 7:30AM and 5PM, Monday to Friday. For a complete list of stakeholder details and for proof of registered post see **Appendix 6.** The consultees included:

Table 1: List of Stakeholders, Landowners, & surrounding landowners

Stakeholders
Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (AGRINC)
Department of Economic Development and Tourism (DEDAT)
Department of Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA)
Department of Roads and Public Works (DR&PW)
Department of Transport, Safety and Liaison (DTSL)
Department of Social Development (DSD)
Northern Cape Tourism Authority
Northern Cape Heritage Resources Authority (NCHRA)
Department of Mineral Resources and Energy (DMRE)
Department of Water and Sanitation (DWS)
Pixley Ka Seme District Municipality: Municipal manager
Thembelihle Local Municipality: Municipal manager
Thembelihle Local Municipality: Ward 1 Councillor
WESSA
Landowner
Jan Augustinus van der Merwe
Nuscor Boerdery (Pty) Ltd
Surrounding landowners
De Hoek Sand (Pty) Ltd
Hercules Jacobus Erasmus
Erna Francine Erasmus
Bucklands Communal Property Association
Hein Mulke Agri CC
Barend Christiaan Geers
Vencill Trust

Direct notification and circulation of EIR & EMPr to identified I&APs (stakeholder, landowners, surrounding landowners, occupiers & I&APs)

Identified I&APs, including key stakeholders representing various sectors, are directly informed of the proposed development and the availability of the EIR & EMPr via registered post on **25 November 2022** and were requested to submit comments by **16 January 2023** (30 days). The Public Participation timeframes and commenting period excludes the period of 15 December to 05 January.

A copy of the report is also available at the Milnex offices in Schweizer-Reneke, 4 Botha Street, Schweizer-Reneke and Potchefstroom (Waterberry Street, Waterberry Square, 1st floor, Office 5B, Potchefstroom), between 7:30AM and 5PM, Monday to Friday. For a complete list of stakeholder details and for proof of registered post see **Appendix 6**.

Table 2: List of Stakeholders, Landowners, & surrounding landowners

Stakeholders
Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (AGRINC)
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Economic Development and Tourism (DEDAT)

Department of Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA)
Department of Roads and Public Works (DR&PW)
Department of Transport, Safety and Liaison (DTSL)
Department of Social Development (DSD)
Northern Cape Tourism Authority
Northern Cape Heritage Resources Authority (NCHRA)
Department of Mineral Resources and Energy (DMRE)
Department of Water and Sanitation (DWS)
Pixley Ka Seme District Municipality: Municipal manager
Thembelihle Local Municipality: Municipal manager
Thembelihle Local Municipality: Ward 1 Councillor
WESSA
Interested and affected party (I&AP)
Marc Caplan
Landowner
AC van der Merwe
Nuscor Boerdery (Pty) Ltd
Surrounding landowners
De Hoek Sand (Pty) Ltd
Hercules Jacobus Erasmus
Erna Francine Erasmus
Bucklands Communal Property Association
Hein Mulke Agri CC
Barend Christiaan Geers
Vencill Trust

Public meeting

Please note that the Stakeholders & Interested and Affected Parties (I&APs) were informed about the proposed project with the use of press advertisement, registered letters and site notices. It was mentioned that due to COVID-19, any meetings will be conducted virtually via Zoom or Microsoft Teams upon request by the I&APs.

No meeting was requested by stakeholders and/or I&APs.

Landowner consultation / meeting

Landowner consultation in progress.

Issues Raised by Interested and Affected Parties

Comments received during this period are attached as comment & response report as well as populated in the table of summary of issues raised.

iii) Summary of Issues Raised by I&APs

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

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issue and or response where incorporated
Organisation	Contact person			
De Hoek RE/2 & Marktsdrift RE/3				
Roode Kop 1/5				
Surrounding Landowners				
Blauwfontein 2/6 & Rooikop 3/4				
Blauwfontein 1/6				
Irene 2/13				
Erf 272, Erf 271, Erf 258, Erf 256				
Erf 259				
Erf 267				
Erf 257				

Rooikop 1/4				
Bateleur RE/289				
Erf 270				
Erf 285				
The Municipality in which jurisdiction the development is located				
Thembelihle Local Municipality	Municipal Manager: To whom it may concern			
Municipal councilor of the ward in which the site is located				
Thembelihle Local Municipality	Ward 1 Councillor			
Organs of state having jurisdiction				
Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (AGRINC)	**Head of Department:**			
Department of Economic Development and Tourism (DEDAT)	**Head of Department:**			
Department of Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA)	**Head of Department:**			
Department of Roads and Public Works (DR&PW)	**Deputy Information Officer:** **Head of Department:**			
Department of Transport, Safety and Liaison (DTSL)	**Head of Department**			
Department of Social Development (DSD)	**Head of Department** To whom it may concern			

Northern Cape Tourism Authority	**Chairperson:** To whom it may concern			
Northern Cape Heritage Resources Authority (NCHRA)				
Department of Mineral Resources and Energy (DMRE)				
Department of Water and Sanitation (DWS)				
Commission on Restitution of Land Rights.				
Other–				
Pixley Ka Seme District Municipality				
WESSA				
SAHRA				
Interested and Affected Party (I&AP)				

iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

BASELINE ENVIRONMENT

The baseline environment is described with specific reference to geotechnical conditions, ecological habitat and landscape features, Soil, land capability and agricultural potential, climate and the visual landscape.

DFFE Screening Report

According to the DFFE Screening Report the Environmental Sensitivity of the proposed area is as follows:

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	12/12/20/2643	Solar PV	Approved	14
2	12/12/20/1941	Solar PV	Approved	14
3	12/12/20/2512	Solar PV	Approved	0
4	12/12/20/2637	Solar PV	Approved	14

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

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

GEOLOGY AND SOILS

Qw: Aeolian sand

The Council for Geo Science describes the gravel found in the area under application as follows:

The oldest and most predominant rock type occurring in the area of interest is the Archaean (2.7 Ga) andesitic lavas of the Allanridge Formation, Ventersdorp Supergroup (Figure 1). Resting unconformably on the Ventersdorp lavas are the largely clastic and chemical sediments of the lower Griqualand West Sequence. In particular, siltstone, with subordinate shale, quartzite and andesitic lava of the Paleo-proterozoic Vryburg Formation outcrop in the area, small portions of which are exposed to the east of the Orange River (Figure 1). These are overlain by the increasingly more chemical sediments of the Schmidtsdrif Formation, which consist of interbedded shale, quartzite, dolomite and chert. These transitional lithologies between clastic and chemical sediments are more visible towards the west of the Orange River.

Also resting unconformably on the Ventersdorp lavas are small outcrops of Carboniferous

Dwyka Group glacial deposits of the Karoo Supergroup. These comprise largely tillites, diamictites and varved shales. Outcrops of these lower Karoo lithologies are very limited in extent and are preserved mostly adjacent to the Vaal and Orange Rivers (Figure 1).

Overlying much of the area are Quaternary deposits of alluvium, windblown sand and calcrete/surface limestone. Deposits of surface limestone/calcrete are characteristic of this comparatively flat region, which has a low rainfall pattern and is underlain by rocks high in calcium carbonate and calcium silicates. It is present as nodules in the superficial cover of soil and sand, or as a more or less continuous layer just below, which may crop out here and there. Much of the sand cover, particularly the area to the south of the Vaal-Orange confluence, is dominated by windblown Recent red Hutton Sands.

Surface drainage in the area is affected through the Vaal and Orange Rivers, which converge to the north of the review area (Figure 1). Although alluvium is largely restricted to the rivers, this confluence has resulted in the creation of a large floodplain immediately to the south of the confluence, which comprises alluvium that is largely covered by windblown sand. Of additional interest in this area are the presence of alluvial gravels associated with both rivers, some of which are covered by alluvium and windblown sand. Patches of these gravels outcrop immediately adjacent to the Vaal and Orange rivers, however, they are also found as higher level terrace deposits, previously deposited by the Paleo-Vaal-Orange rivers.

ECOLOGICAL HABITAT AND LANDSCAPE FEATURES

The result obtained by plotting the coordinates are as follow:

The proposed area falls within vegetation unit AZa 4 and NKu 3, which is known as the Upper Gariep Alluvial Vegetation and Northern Upper Karoo. The Upper Gariep Alluvial Vegetation is part of the Alluvial Vegetation Bioregion which is a sub-bioregion for the Inland Azonal Vegetation. The Northern Upper Karoo is part of the Upper Karoo Bioregion, which is a sub-bioregion for the Nama-Karoo Biome.

Upper Gariep Alluvial Vegetation

According to Mucina and Rutherford (2006:639), the Upper Gariep Alluvial Vegetation covers the Free State and Northern Cape Province: Broad alluvia of the Orange River, lower Caledon as well as lower stretches of the Vaal, Riet and Modder rivers as far as Groblershoop. These river stretches are surrounded by vegetation units of broad transitional regions between the dry facies of the Savanna and Grassland and northern regions of the Nama-Karoo Biome. Altitude ranging from 1000 – 1500m.

The area has flat alluvial terraces supporting complex of riparian thickets (gallery forests) dominated by native *Acacia karroo* and *Diospyros lycioides*, flooded grasslands, reed beds and ephemeral herblands populating mainly sand banks within the river and on its banks

Some other important Taxa found on in the area:

Riparian thickets

Small trees:	*Acacia karoo* (d), *Celtis Africana* (d), *Salix mucronata* subsp. *mucronata* (d)
Tall shrubs:	*Diospyros lycioides* (d), *Melianthus comosus* (d), *Rhus pyroides*
Low Shrubs:	*Asparagus setaceus, A. suaveolens.*
Woody Climber:	*Clematis brachiate.*
Succulent Shrub:	*Lycium arenicola, L. hirsutum.*
Herb:	*Rubia cordifolia*

Flooded grasslands & herblands

Graminoids:	*Melica decumbens* (d)
Herbs:	*Cineraria dregeana, C. lobate.*

Upper Gariep Alluvial Vegetation has a conservation which is vulnerable with a target of 31%. Only about 3% statutorily conserved in Tussen Die Riviere, Gariep Dam and Oviston Nature Reserve. More than 20% transformation for cultivation (vegetable grapes) and building of dams. Exotic woody species such as Salix babylonica, Eucalyptus camaldulensis, E. sideroxylon, Prosopis and

Populus species have become common dominants in patches of heavily disturbed alluvial vegetation (Mucina and Rutherford, 2006:639-640).

Northern Upper Karoo

According to Mucina and Rutherford (2006:340), the Northern Upper Karoo vegetation covers the Northern Cape and Free State Provinces which include the Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Philipstown, Petrusville and Petrusburg in the east. Bordered in the north by Niekerkshoop, Douglas and Petrusburg and in the south by Carnarvon, Pampoenpoort and De Aar. A few Patches occur in Griqualand West. It is situated on an altitude of 1000m – 1500m.

The shrubland area is dominated by dwarf karoo shrubs, grasses and *Anacia mellifera* subsp. detinens and some other low trees (especially on sandy soils in the northern parts and vicinity of the Orange River). Flat to gently sloping, with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans.

Some other important Taxa found on in the area:

Small Trees:	*Acacia mellifera* subsp. detinens, *Boscia albitrunca.*
Tall Shrubs:	*Lycium cinereum* (d) *L. horridum, L. oxycarpum, L. schizocalyx, Rhigozum trichotomum.*
Low Shrubs:	*Chrysocoma ciliata* (d), *Gnidia polycephala* (d), *Pentzia calcarea* (d), *P. globose* (d), *P. incana* (d), *P. spinescens* (d), *Rosenia humilis* (d), *Amphiglossa triflora, Aptosimum marlothii, A. spinescens, Asparagus glauce, Barleria rigida, Berkheya annectens, Eriocephalus ericoides* subsp. *ericoides, E. gladulosus, E. spinescens, Euryops asparagoides. Felicia muricata, Helichrysum lucilioides, Hermannia spinose, Leucas capensis, Limeum aethiopicum, Melolobuim candicans, Microloma armatum, Osteospermum leptolobum, O. spinescens, Pegolettia retrofracta, Pentzia lanata, Phyllanthus maderaspatensis, Plinthus karooicus, Pteronia glauca, P. sordida, Selago geniculate, S. saxatilis, Tetragonia arbuscular, Zygophyllum lichtensteinianum.*
Herbs:	*Chamaesyce inaequilatera, Convolvulus sagittatus, Dicoma capensis, Gazania krebsiana, Hermannia comosa, Indigofera alternans, Lessertia pauciflora, Radyera urens, Sesamum capense, Sutera pinnatifida, Tribulus terrestris, Vahlia capensis.*
Graminiods:	*Aristida adscensoinis* (d), *A. congesta* (d), *A. diffusa* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *E. truncata* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtuse* (d), *Eragrostis bicolor, E. porosa, Fingerhuthia Africana, Heteropogon contortus, Stipagrostis ciliata, Themeda triandra, Tragus berteronianus, T. koelerioides, T. racemosus.*
Succulent Shrubs:	*Hertia pallens, Salsola calluna, S. glabrescens, S. rabieana, S. tuberculata, Zygophyllum flexuosum.*
Semiparasitic Shrubs:	*Thesium hystrix* (d)
Succulent Herb:	*Psilocaulon coriarium.*
Geophytic Herb:	*Moraea pallida.*

Mucina and Rutherford (2006:340) also states that the conservation of the Northern Upper Karoo, is Least Threatened with a target of 21%. About 4% has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams (Houwater, Kalkfontein and Smart Syndicate Dams). Areas of human settlements are increasing in the north-eastern part of this vegetation types. Erosion is moderate at 46.2%, very low at 32% and low at 20%. According to Hoffman *et al.* (1999) as stated by Mucina and Rutherford (2006:340) *Prosopis* occurs in generally isolated patches, with densities ranging from very scattered to medium (associated with the lower Vaal River drainage system and the confluences with the Orange River) to localised closed woodland on the western borders of the unit with Bushmanland Basin Shrubland.

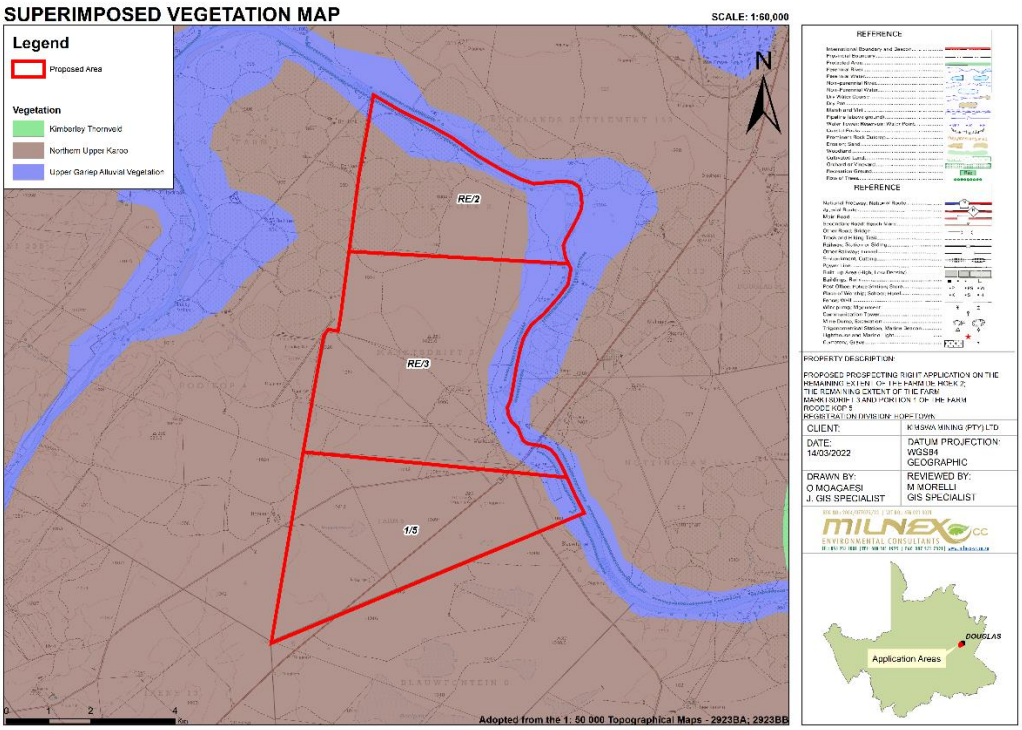


Figure 4: Vegetation Unit Map

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

2.4 Vegetation

South Africa has been recognized as having remarkable plant diversity with high levels of endemism. South Africa hosts a wide range of ecosystems, including nine biomes, namely the Fynbos, Succulent Karoo, Desert, Nama-Karoo, Grassland, Savanna, Albany Thicket, Indian Ocean Coastal Belt and Forest Biomes (Mucina & Rutherford, 2006). The project area is situated in the Nama Karoo biome (Mucina & Rutherford, 2006).

The project area overlaps the Northern Upper Karoo and Upper Gariep Alluvial vegetation units (Mucina et al., 2018). The Northern Upper Karoo vegetation unit is described as steep slopes of koppies, butts, mesas and parts of the Great Escarpment covered with large boulders and stones supporting sparse dwarf Karoo scrub with drought-tolerant grasses of genera such as Aristida, Eragrostis and Stipagrostis. The conservation status of this vegetation unit is Least concern.

The Upper Gariep Alluvial vegetation unit is described as flat alluvial terraces supporting complex of riparian thickets (gallery forests) dominated by native Vachellia karroo and Diospyros lycioides, flooded grasslands, reed beds and ephemeral herblands populating mainly sand banks within the river and on its banks. The conservation status of this vegetation unit is Least concern.

4.1 Vegetation units

The project areas can be divided into the following vegetation / land use units (Figure 10):

1) Senegalia mellifera - Lycium cinereum karoo
2) Vachellia karroo - Ziziphus mucronata riparian zone
3) Pan
4) Rocky outcrop
5) Area disturbed by mining
6) Agricultural crops
7) Buildings.

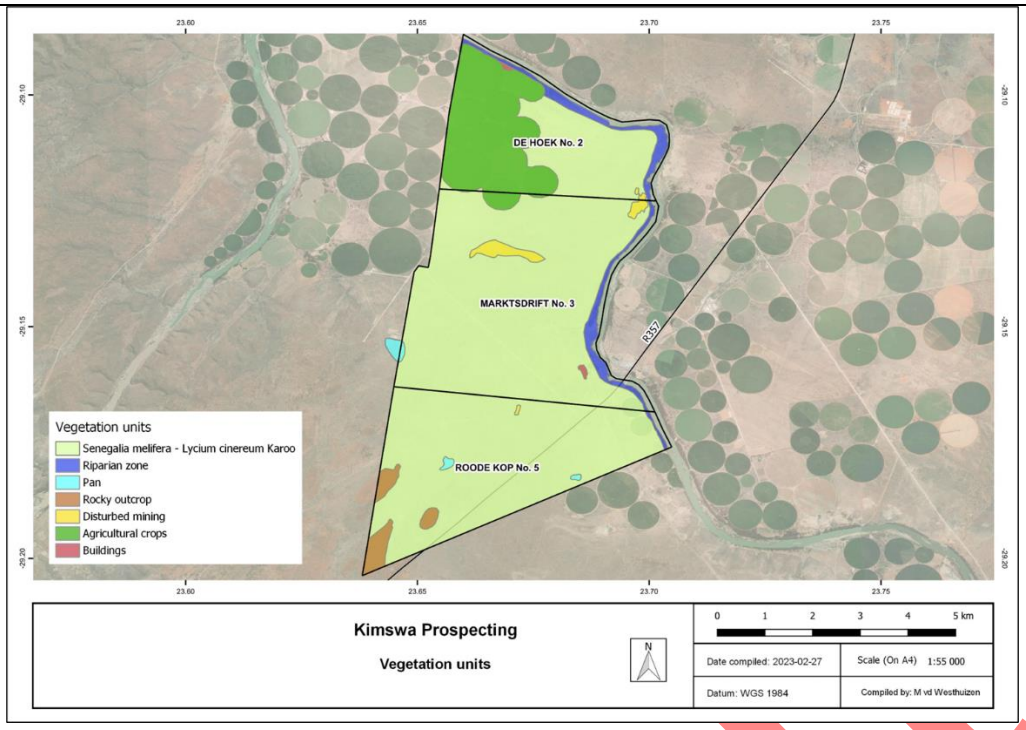


Figure 10: Vegetation units

4.1.1 Senegalia mellifera - Lycium cinereum karoo

This vegetation unit occurs on sandy, rocky plains. It is currently used for cattle grazing. The slope is very gentle. The dominant tree species is Senegalia mellifera. Dominant shrubs include Lycium cinereum, Pentzia calcarean, Phaeoptilum spinosum, Asparagus spp. and Rosenia humilis. Dominant grasses include Eragrostis lehmanniana, Aristida congesta, Stipagrostis ciliata and Eragrostis echinochloidea. Dominant forbs are Heliotropium ciliatum, Peliostomum leucorrhizum, Aptosimum albomarginatum and Melhania rehmannii. This vegetation unit is in a relative good condition, with some disturbance. The rainfall was above average for the previous year, which caused the grasses to be more abundant than would be expected under normal conditions. The state of the vegetation is indicated in Figure 11, while the characteristics of the variations of this vegetation unit are summarised in Table 3.

Table 3. Botanical analysis and characteristics of Senegalia mellifera - Lycium cinereum karoo

State of the vegetation:	Good condition, some bush encroachment
Conservation priority	Low
Soils & Geology	Sandy, rocky soil
Density of woody layer	Shrubs: 25% (avg. height: 1m) and trees: 15% (avg. height: 2m)
Density of herbaceous layer	Grasses: 40% (avg. height: 0,5m) Forbs: 15% (avg. height: 10cm)
Sensitivity	Medium
Dominant plant species	*Senegalia mellifera, Lycium cinereum, Pentzia calcarean, Phaeoptilum spinosum, Asparagus spp., Rosenia humilis, Eragrostis lehmanniana, Aristida congesta, Stipagrostis ciliata, Eragrostis echinochloidea, Heliotropium ciliatum, Peliostomum leucorrhizum, Aptosimum albomarginatum, Melhania rehmannii.*
Red data species (NEMBA)	None observed
Protected tree species (DFFE)	*Boscia albitrunca, Vachellia erioloba*

The vegetation unit is classified as having a Medium, as no red or orange listed species were recorded. The vegetation unit into which it falls is Least concern. Two protected tree species (Boscia albitrunca and Vachellia erioloba) and one provincially

protected plant (Boscia foetida) was recorded.

4.1.2 Vachellia karroo - Ziziphus mucronata riparian zone

This vegetation unit occurs next to the Orange River in sandy soil. It is characterised by tall trees, including Vachellia karroo, Ziziphus mucronata, Searsia lancea and Diospyros lycioides. The dominant grasses are Stipagrostis namaquensis and Cynodon dactylon. Reeds (Phragmites australis) and sedges (Cyperus eragrostis and others) are also present. Dominant forbs include Boerhavia diffusa, Indigofera alternans and Cucumis africanus.

No provincially protected plant species or protected trees were recorded in this vegetation unit. The characteristics of this vegetation unit are summarised in Table 4.

Table 4. Botanical analysis and characteristics of Vachellia karroo - Ziziphus mucronata riparian zone

State of the vegetation:	Good condition, some small sections are disturbed
Conservation priority	Medium-low
Soils & Geology	Deep sandy soil. Rocky in some sections.
Density of woody layer	Shrubs and trees: 50 % (avg. height: 3,5m)
Density of herbaceous layer	Grasses: 30% (avg. height: 0,5m) Forbs: 20% (avg. height: 0,5m)
Sensitivity	Medium-Low
Dominant plant species	*Vachellia karroo, Ziziphus mucronata, Searsia lancea, Diospyros lycioides, Stipagrostis namaquensis, Cynodon dactylon, Phragmites australis, Cyperus eragrostis* and other sedges, *Boerhavia diffusa, Indigofera alternans* and *Cucumis africanus*
Red data species (NEMBA)	None observed
Protected tree species (DFFE)	None observed

The vegetation unit is classified as having a Medium-Low sensitivity. Generally, it is in a good condition and provides habitat for many species No provincially protected plant species or protected trees were recorded in this vegetation unit.

4.1.3 Pans

There are three pans inside the project area. These are low-lying areas where water accumulates when it rains a lot. During the site visit all three pans were dry (as they are most of the time). Soil is sandy to clayey. Vegetation consists of grasses and forbs. There are no trees. Dominant species includes the grasses Aristida spp., Eragrostis spp. and the forbs Jamesbrittenia aurantiaca, Argemone ochroleuca, Laggera decurrens, Malva parviflora and the dwarf shrub Pentzia calcarea. The pans are disturbed by grazing, as it is favoured by cattle and game. No plant species of conservation concern or protected trees were recorded. The state of the vegetation is indicated in Figure 13 - 15, while the characteristics of the variations of this vegetation unit are summarised in Table 5.

Table 5. Botanical analysis and characteristics of the pans

State of the vegetation:	Moderately disturbed
Conservation priority	Medium
Soils & Geology	Sandy
Density of woody layer	Dwarf shrubs: 10 %
Density of herbaceous layer	Grasses: 20 - 60% (avg. height: 1m) Forbs: 30% (avg. height: 0,8m)
Sensitivity	Medium

Dominant plant species	*Aristida spp., Eragrostis spp., Jamesbrittenia aurantiaca, Argemone ochroleuca, Laggera decurrens, Malva parviflora, Pentzia calcarea*
Red data species	None observed
Protected tree species (DFFE)	None observed

The vegetation unit is classified as having a Medium sensitivity. It is moderately disturbed. No plant species of conservation concern or protected trees were recorded.

4.1.4 Rocky outcrop

In the western section of Roode Kop, there are some rocky outcrops. These areas are characterised by very rocky soils and a somewhat steeper slope than the adjacent plains. Dominant trees are Senegalia mellifera and Boscia albitrunca, which is a protected tree. Dominant shrubs include Lycium cinereum and Peliostomum leucorrhizum. Dominant grasses are Heteropogon contortus, Enneapogon scoparius, Eragrostis lehmanniana, Eragrostis echinochloidea and Aristida spp. Forbs include Boerhavia diffusa, Barleria rigida and Barleria lichtensteiniana.

This vegetation unit is in a good condition with little disturbance. No plant species of conservation concern were recorded. One protected tree species was recorded, namely Boscia albitrunca. The state of the vegetation is indicated in Figure 16, while the characteristics of this vegetation unit are summarised in Table 6:

Table 6: Botanical analysis and characteristics of the rocky outcrops

State of the vegetation:	Good condition
Conservation priority	Medium
Soils & Geology	Very rocky, sandy soil
Density of woody layer	Shrubs and trees: 15 % (avg. height: 2m)
Density of herbaceous layer	Grasses: 35% (avg. height: 0,6m) Forbs: 30% (avg. height: 0,3m)
Sensitivity	Medium
Dominant plant species	*Senegalia mellifera, Boscia albitrunca, Lycium cinereum, Peliostomum leucorrhizum, Heteropogon contortus, Enneapogon scoparius, Eragrostis lehmanniana, Eragrostis echinochloidea Aristida spp., Boerhavia diffusa, Barleria rigida and Barleria lichtensteiniana*
Red data species (NEMBA)	None observed
Protected tree species (DFFE)	*Boscia albitrunca* (Shepherd's Tree)

The vegetation unit is classified as having a Medium sensitivity due to the fact that it is in a good condition and one protected tree species occurs in this unit.

4.1.5 Area disturbed by mining

Some patches inside the Senegalia mellifera - Lycium cinereum karoo vegetation unit have been disturbed by prospecting or mining and were left unrehabilitated. Vegetation has recovered to some extent, but the impact on the vegetation is still clearly visible. Dominant species include the grass Aristida congesta, the forbs Flaveria bidentis, Hemizigia sp, and Geigeria filifolia and some dwarf shrubs like Rosenia humilis.

No plant species of conservation concern or protected trees were recorded. The state of the vegetation is indicated in Figure 18, while the characteristics of the variations of this vegetation unit are summarised in Table 7.

Table 7. Botanical analysis and characteristics of the area disturbed by mining

State of the vegetation:	Very disturbed
Conservation priority	Low
Soils & Geology	Sandy, rocky soil
Density of woody layer	Shrubs and trees: 5 % (avg. height: 0,8m)
Density of herbaceous layer	Grasses: 300% (avg. height: 0,5m) Forbs: 20% (avg. height: 0,35m)
Sensitivity	Low
Dominant plant species	*Aristida congesta, Flaveria bidentis, Hemizigia sp., Geigeria filifolia, Rosenia humilis.*
Red data species	None observed
Protected tree species (DFFE)	None observed

The vegetation unit is classified as having a Low sensitivity due to the fact that it is very disturbed. No plant species of conservation concern or protected trees were recorded.

4.1.6 Agricultural crops

There are several maize fields under pivot irrigation, especially in the western half of De Hoek. These areas have a low species diversity, which consists of maize and weeds. The sections between the pivots are also disturbed, as can be seen by the presence of weeds such as Conyza bonariensis, and the declared invaders Argemone ochroleuca and Sorghum halepense.

4.1.7 Buildings

There are some houses and other buildings in the project area. This area has little natural vegetation and therefore has low sensitivity.

According to the DFFE Screening Report the Plant Species theme sensitivity of the proposed area falls in a low sensitivity. Please see **Appendix 7** for the colour map.

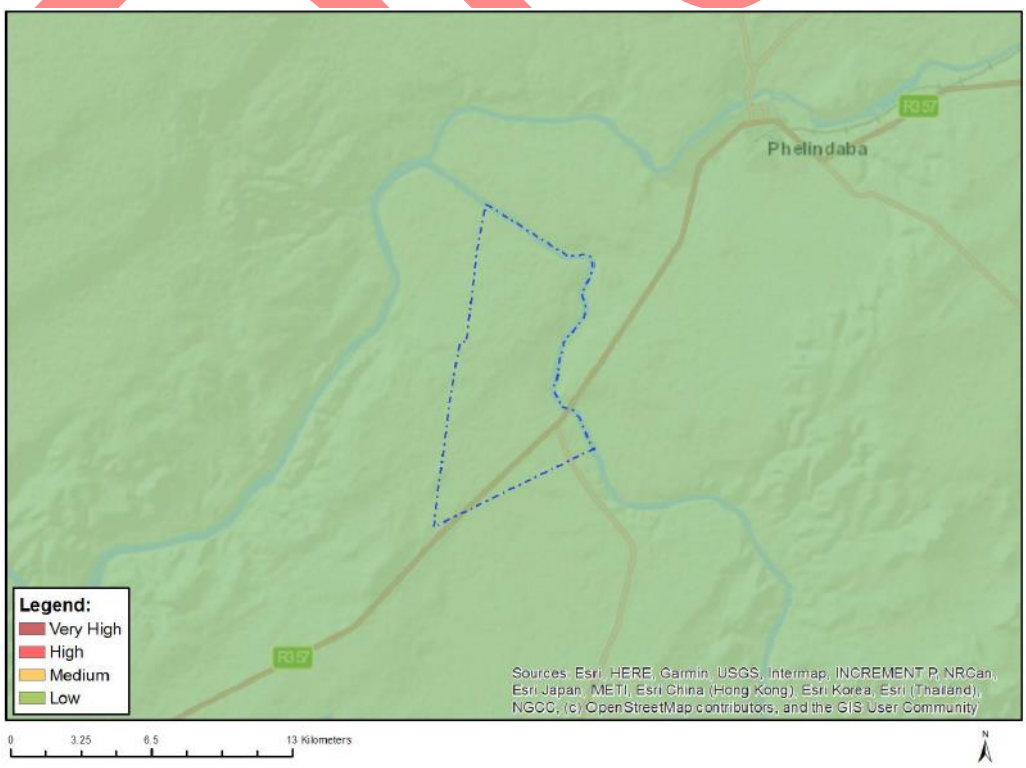


Figure 5: Plant Species Combined Sensitivity

SPECIALIS ASSESSMENT

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Plant species level assessment

South Africa has been recognized as having remarkable plant diversity with high levels of endemism. This is however not the case of the project area, as species diversity is not particularly high, as in the grassland biome for example. The major threats to plants in the study area are agriculture and mining. The objective of this section was to compile a list of plant species present in the study area. Their status, whether they are exotic, indigenous, endemic or protected is included for each species.

4.2.1 Species list

Find the species list for the project site below.

Table 8: Trees and shrubs

Scientific name	***Common name***	***Exotic***	***Status***
Asparagus laricinus	*Wild asparagus*	*No*	*Least Concern*
Asparagus spp		*No*	*Least Concern*
Boscia albitrunca	*Shepherd's Tree*	*No*	*Least concern - Protected tree*
Boscia foetida	*Stink Shepherd's tree*	*No*	*Least Concern - NC Protected*
Diospyros lycioides	*Bluebush*	*No*	*Least Concern*
Ehretia alba	*White Puzzle-bush*	*No*	*Least Concern*
Eriocephalus spinescens	*Doringkapok*	*No*	*Least Concern, Endemic (SA)*
Grewia flava	*Raisin bush*	*No*	*Least Concern*
Gymnosporia buxifolia	*Common spike-thorn*	*No*	*Least Concern - NC Protected*
Lycium cinereum	*Kriedoring*	*No*	*Least Concern*
Opuntia ficus-indica	*Prickly Pear*	*Yes*	*Declared invader 1b*
Opuntia robusta	*Blue-leaf cactus*	*Yes*	*Declared invader 1b*
Pentzia calcarea	*Meerkatkaroo*	*No*	*Least Concern*
Pentzia incana	*Anchor Karoo*	*No*	*Least Concern*
Phaeoptilum spinosum	*Brittle Thorn*	*No*	*Least Concern*
Prosopis glandulosa	*Honey Mesquite*	*Yes*	*Declared invader 1b*
Roepera lichtensteiniana	*Skilpadbos*	*No*	*Least Concern, Endemic (SA)*
Rosenia humulis	*Hardbeeskaroo*	*No*	*Least Concern*
Searsia lancea	*Karree*	*No*	*Least Concern*
Senegalia mellifera subsp. detinens	*Hook thorn*	*No*	*Least Concern*
Tarchonanthus camphoratus	*Wild camphor bush*	*No*	*Least Concern*
Vachellia erioloba	*Camel thorn*	*No*	*Least concern - Protected tree*
Vachellia karroo	*Sweet thorn*	*No*	*Least Concern*
Vachellia tortilis subsp. heteracantha	*Umbrella thorn*	*No*	*Least Concern*
Ziziphus mucronata	*Buffalo-thorn*	*No*	*Least Concern*

Table 9: Grasses and sedges

Scientific name	***Common name***	***Exotic***	***Status***
Anthephora pubescens	*Wool grass*	*No*	*Least concern*
Aristida congesta subsp. barbicollis	*Spreading Three-awn*	*No*	*Least concern*
Aristida congesta subsp. congesta	*Tassel three-awn*	*No*	*Least concern*
Aristida diffusa	*Iron grass*	*No*	*Least concern*
Cynodon dactylon	*Couch Grass*	*No*	*Least concern*

Cyperus eragrostis		*Yes*	*Least concern*
Cyperus rotundus	*Purple Nutsedge*	*No*	*Least concern*
Enneapogon scoparius	*Bottlebrush grass*	*No*	*Least concern*
Eragrostis echinochloidea	*Tick grass*	*No*	*Least concern*
Eragrostis obtusa	*Dew Grass*	*No*	*Least concern*
Eragrostis lehmanniana	*Lehmann's Love Grass*	*No*	*Least concern*
Eragrostis nindensis	*Wether love grass*	*No*	*Least concern*
Eragrostis superba	*Saw-tooth love grass*	*No*	*Least concern*
Fingerhuthia africana	*Thimble grass*	*No*	*Least concern*
Gymnosporia buxifolia	*Common spike-thorn*	*No*	*Least concern*
Heteropogon contortus	*Spear grass*	*No*	*Least concern*
Melinis repens	*Natal red top*	*No*	*Least concern*
Phragmites australis	*Common reed*	*No*	*Least concern*
Schmidtia pappophoroides	*Sand quick*	*No*	*Least concern*
Setaria verticillata	*Bur bristle grass*	*No*	*Least concern*
Sorghum halepense	*Johnson grass*	*Yes*	*Declared invader 2*
Stipagrostis namaquensis	*River bushman grass*	*No*	*Least concern*

Table 10: Forbs

Scientific name	***Common name***	***Exotic***	***Status***
Alternanthera pungens	*Khaki Burrweed*	*Yes*	*Exotic*
Aptosimum albomarginatum	*Witstamviooltjie*	*No*	*Least concern*
Aptosimum lineare		*No*	*Least concern*
Argemone ochroleuca	*White-flowered Mexican poppy*	*Yes*	*Declared invader 1b*
Barleria lichtensteiniana	*Rolvarkie*	*No*	*Least concern*
Barleria rigida	*Scorpion thistle*	*No*	*Least concern*
Bidens bipinnata	*Spanish blackjack*	*Yes*	*Exotic*
Boerhavia diffusa	*Spiderling*	*Yes*	*Exotic*
Chascanum pinnatifidum	*Dainty Trumpets*	*No*	*Least concern*
Chenopodium album	*White goosefoot*	*Yes*	*Exotic*
Chenopodium carinatum	*Green goosefoot*	*Yes*	*Exotic*
Cleome gynandra	*Spider-wisp*	*No*	*Least concern*
Conyza bonariensis	*Flax-leaf fleabane*	*Yes*	*Exotic*
Cucumis africanus	*Wild Cucumber*	*No*	*Least concern*
Dicoma schinzii	*Fluweel-stekelsterretjie*	*No*	*Least concern*
Datura ferox	*Large thorn-apple*	*Yes*	*Declared invader 1b*
Datura stramonium	*Thorn apple*	*Yes*	*Declared invader 1b*
Felicia australis	*Sambreelastertjie*	*No*	*Least concern, Endemic (SA)*
Flaveria bidentis	*Smelter's bush*	*Yes*	*Not evaluated*
Geigeria filifolia	*Vermeerbos*	*No*	*Least concern*
Gisekia africana	*Rooi-rankopslag*	*No*	*Least concern*
Gomphocarpus fruticosus	*Milkweed*	*No*	*Least concern*
Heliotropium ciliatum	*Kalahari String-of-stars*	*No*	*Least concern*
Hermannia tomentosa		*No*	*Least concern*
Indigofera alternans	*Skaap-ertjie*	*No*	*Least concern*

Jamesbrittenia atropurpurea	*Bruinsafraanbos*	*No*	*Least concern*
Jamesbrittenia aurantiaca	*Cape saffron*	*No*	*Least concern*
Justicia incana	*Blouganna*	*No*	*Least concern*
Kyphocarpa angustifolia	*Silky burweed*	*No*	*Least concern*
Laggera decurrens	*Silky sage*	*No*	*Least concern*
Ledebouria undulata		*No*	*Least concern, Endemic (SA)*
Limeum argute-carinatum	*Koggelmandervoetkaroo*	*No*	*Least concern*
Medicago sativa	*Lucern*	*Yes*	*Exotic*
Melhania rehmannii		*No*	*Least concern*
Nerine laticoma	*Gifbol*	*No*	*Least concern*
Nidorella resedifolia	*Pverty*	*No*	*Least concern*
Oxalis lawsonii	*Vlaktesuring*	*No*	*Least concern*
Peliostomum leucorrhizum	*Veld Violet*	*No*	*Least concern*
Pollichia campestris	*Waxberry*	*No*	*Least concern*
Portulaca kermesina	*Haaskos*	*No*	*Least concern*
Portulaca oleracea	*Purslane*	*Yes*	*Exotic*
Ptycholobium biflorum		*No*	*Least concern*
Radyera urens	*Pampoenbossie*	*No*	*Least concern*
Salvia verbenaca	*Wild Clary*	*No*	*Least concern*
Senna italica subsp. arachoides	*Eland's Pea*	*No*	*Least concern*
Solanum capense	*Nightshade*	*No*	*Least concern, Endemic (SA)*
Tagetes minuta	*Tall khaki weed*	*Yes*	*Not evaluated*
Tapinanthus oleifolius	*Mistletoe*	*No*	*Least concern*
Tribulus terrestris	*Devil's Thorn*	*No*	*Least concern*
Xanthium spinosum	*Spiny cocklebur*	*Yes*	*Declared invader 1b*

4.2.2 Protected plants

No nationally listed protected species were recorded on site (NEMBA listed species, 2005).

The following plants that are protected according to Northern Cape Nature Conservation Act 9 of 2009 were recorded at the project area:

Table 11: Provincially protected plants

Provincially protected plant species	
Scientific name	***Common name***
Boscia albitrunca	*Shepherd's Tree*
Boscia foetida	*Stink Shepherd's tree*
Gymnosporia buxifolia	*Common spike-thorn*
Jamesbrittenia atropurpurea	*Bruinsafraanbos*
Jamesbrittenia aurantiaca	*Cape saffron*
Oxalis lawsonii	*Vlaktesuring*

All species of the genus Boschia, Gymnosporia, Jamesbrittenia and Oxalis are protected in the Northern Cape Province (Northern Cape Province, 2005). A permit should be obtained from authorities should any of these species be removed during the proposed prospecting.

Five endemic species were recorded:

Table 12: Endemic species

South Africa Endemic	
Scientific name	***Common name***
Eriocephalus spinescens	*Doringkapok*
Roepera lichtensteiniana	*Skilpadbos*
Felicia australis	*Sambreelastertjie*
Ledebouria undulata	
Solanum capense	*Nightshade*

4.2.3 Protected trees

Two protected tree species were recorded:

Table 13: Protected trees

Protected trees	
Scientific name	***Common name***
Boscia albitrunca	*Shepherd's Tree*
Vachellia erioloba	*Camel thorn*

The location of the protected trees and the provincially protected tree (Boscia foetida) is indicated in the map below. Note that not all individuals were recorded due to limited time.

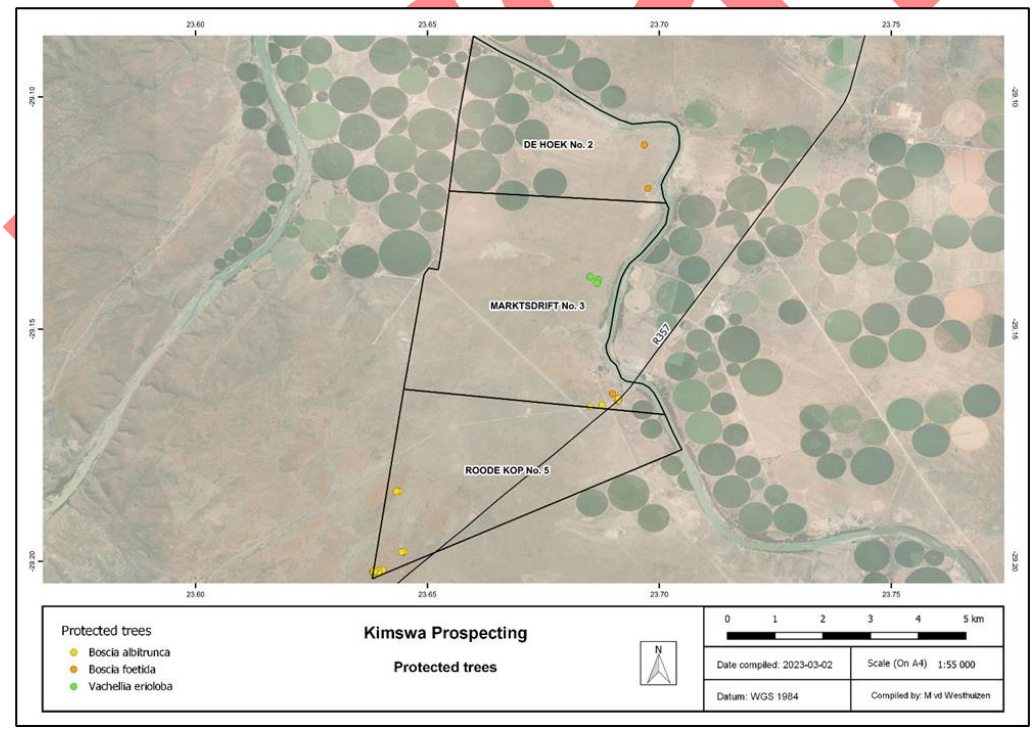


Figure 20: Map of recorded protected trees

4.3 Declared invaders

The following declared invaders were recorded in the project area and must be controlled:

Table 14: Declared invader plant species recorded in the project area (NEMBA: Alien and invasive species lists, 2020)

Scientific name	Common name	Invader category
Argemone ochroleuca	*White-flowered Mexican poppy*	*1b*
Datura ferox	*Large thorn apple*	*1b*
Datura stramonium	*Thorn apple*	*1b*
Flaveria bidentis	*Smelter's bush*	*1b*
Opuntia ficus-indica	*Sweet prickly pear, boereturksvy*	*1b*
Opuntia robusta	*Blue-leaf cactus*	*1a*
Prosopis glandulosa		*1b*
Sorghum halepense	*Johnson grass*	*2*
Xanthium spinosum	*Spiny cocklebur*	*1b*

***Category 1** plants are prohibited plants which must be controlled or eradicated. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals or the environment.*

- *Category 1a: Plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned*
- *Category 1b: Plants are widespread invasive species controlled by a management program.*

***Category 2** plants are invaders with certain useful qualities, such as commercial use or for woodlots, animal fodder, soil stabilisation, etc. These plants are allowed in demarcated areas under controlled conditions and in biocontrol reserves.*

***Category 3** plants are alien plants that are currently growing in, or have escaped from areas such as gardens, but that are proven invaders. No further planting is allowed (except with special permission), nor trade in propagative material. Existing plant may remain but must be prevented from spreading. Plants within the flood line and watercourses must be removed (Bromilow, 2010).*

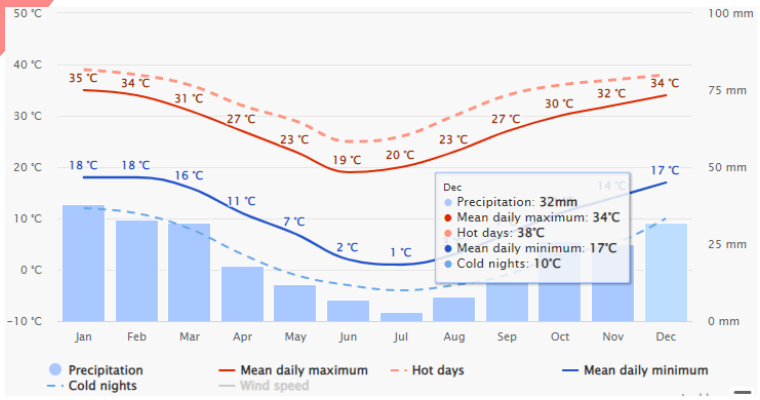
CLIMATE

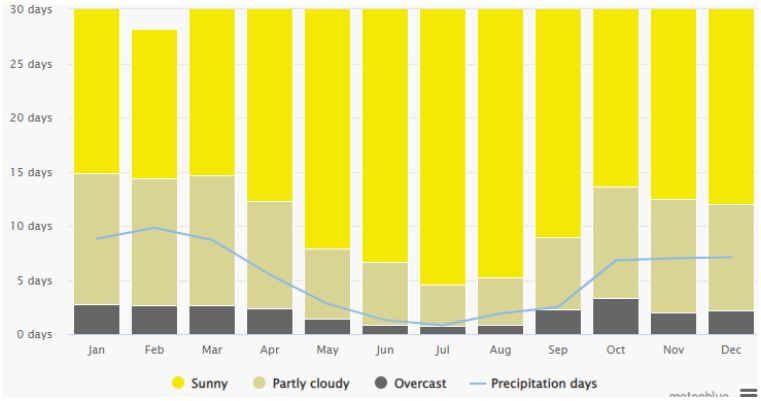
Douglas Climate

The meteoblue climate diagrams are based on 30 years of hourly weather model simulations and available for every place on Earth. They give good indications of typical climate patterns and expected conditions (temperature, precipitation, sunshine and wind). The simulated weather data have a spatial resolution of approximately 30 km and may not reproduce all local weather effects, such as thunderstorms, local winds, or tornadoes, and local differences as they occur in urban, mountainous, or coastal areas.

Average temperatures and precipitation

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Douglas. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years

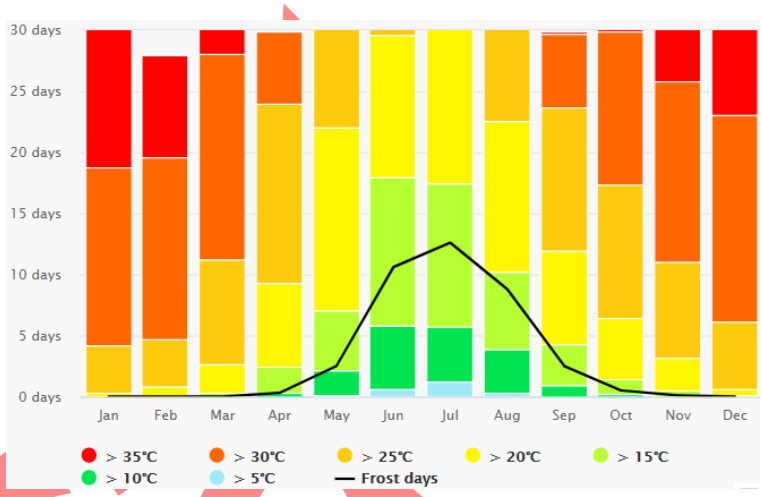


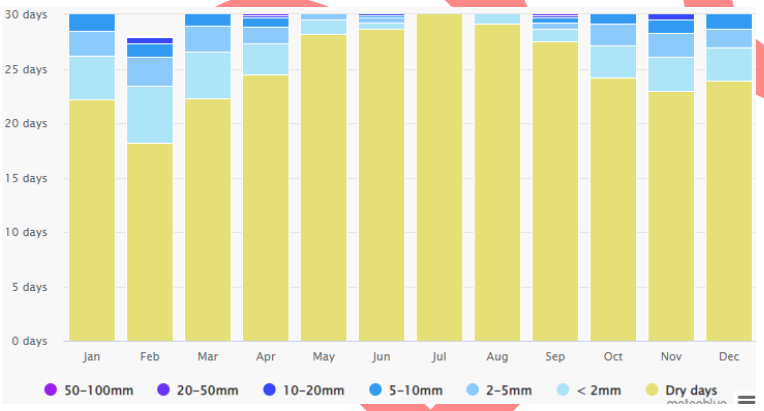


Cloudy, sunny, and precipitation days

Maximum temperatures

The maximum temperature diagram for Douglas displays how many days per month reach certain temperatures.



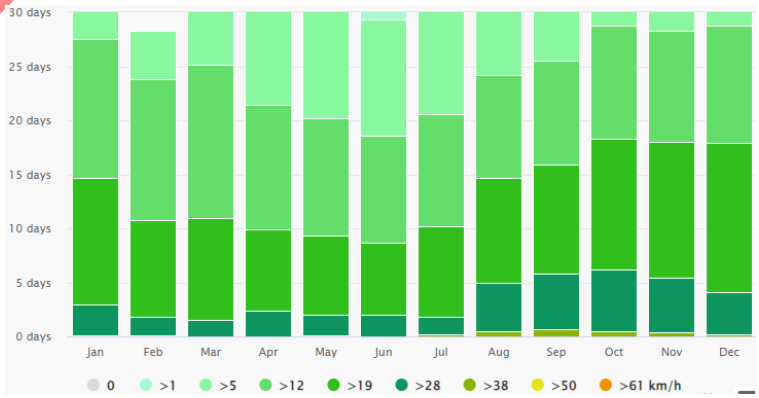


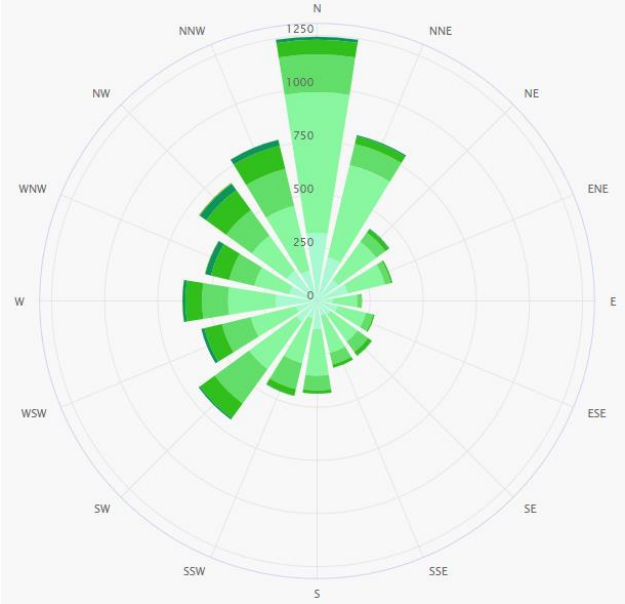
Precipitation amounts

The precipitation diagram for Douglas shows on how many days per month, certain precipitation amounts are reached.

Wind speed

The diagram for Douglas shows the days per month, during which the wind reaches a certain speed.





Wind rose

The wind rose for Douglas shows how many hours per year the wind blows from the indicated direction

LAND CAPABILITY AND AGRICULTURAL POTENTIAL

According to an article on the Grain SA website by Garry Paterson from ARC-Institute for Soil, Climate and Water on the Grain SA website, agriculture rests on three pillars where natural resources are concerned. These are the soil (comprising the growth medium for the plant), the climate conditions (which supply the plant with sufficient water and heat) and the terrain (enabling the crop to be physically planted, to grow and to be harvested sustainably).

The concept of land capability combines the three natural resource elements or factors listed above (soil, climate and terrain) and uses set parameters to determine a specific class for a given area. The basis of the land capability assessment in South Africa is the well-known Land Type Survey, which is a country-wide inventory of natural resources, i.e. soil pattern, macroclimate and terrain type, carried out between 1972 and 2002 by the ARC-Institute for Soil, Climate and Water.

Each unique land type is allocated to one of eight land capability classes. These classes are based on the original USDA land capability system, whereby Classes I and II comprise areas with little or no limitations to rainfed agriculture, Classes III and IV comprise those areas which are still considered arable, but with moderate to severe restrictions. Classes V to VIII comprise non-arable land with increasingly serious restrictions, either in terms of restricted soil, steep terrain, rockiness and/or an unfavourable climatic regime. (Garry Paterson, ARC-Institute for Soil, Climate and Water, November 2014.)

The proposed area falls within Land in Class 7 (vii) (refer to Land capability map on **figure 6** and attached as **Appendix 5**).

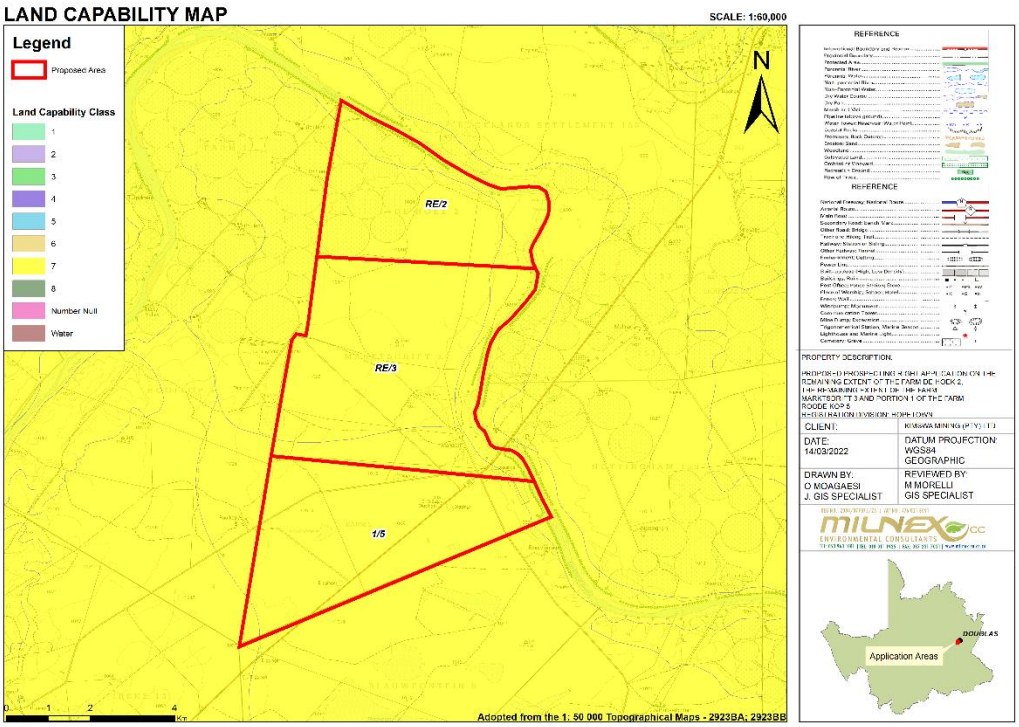


Figure 6: Land capability

According to the DFFE Screening Report the Agriculture theme sensitivity of the proposed area fall mostly within low sensitivity, with areas off Medium, High and Very High sensitivity. Please see **Appendix 7** for the colour map.

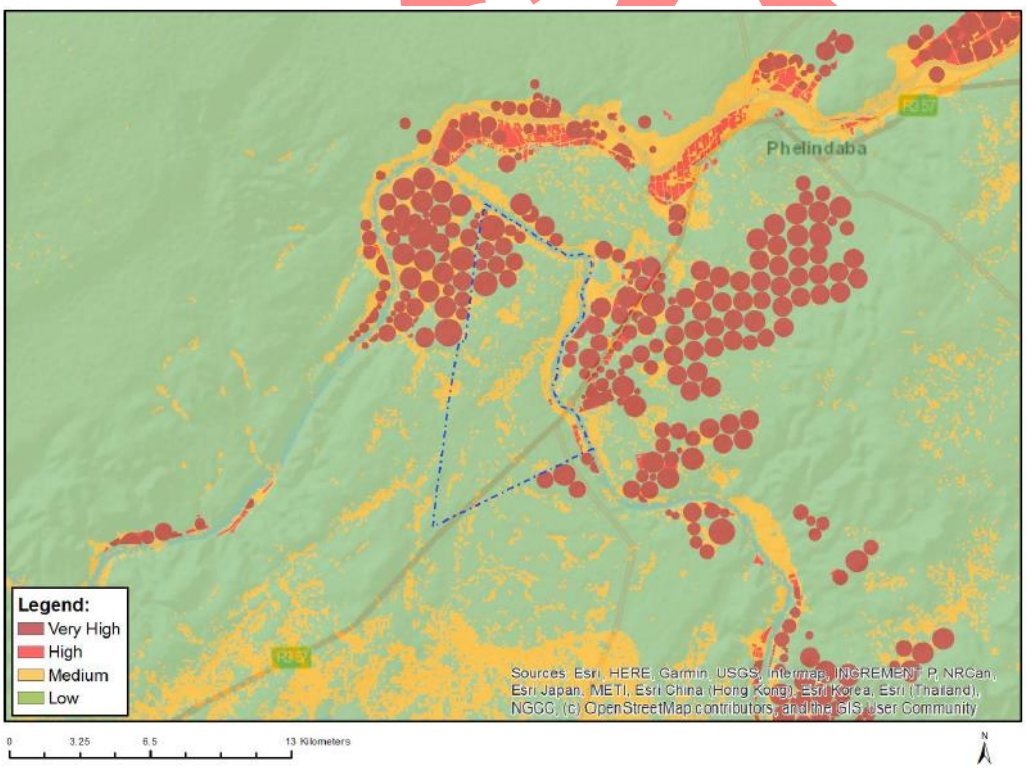


Figure 7: Agriculture Combined Sensitivity

THREATENED ECOSYSTEMS

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Driver *et al*. 2011). Datasets have been developed by SANBI (2016) in order to outline threatened ecosystems, with the primary objective of limiting the rate of ecosystem extinctions. Four established categories group these ecosystems namely: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Protected.

The proposed portion does not fall within a threatened ecosystem according to **Figure 8**.

SPECIALIST STUDY

A Terrestrial Biodiversity Impact Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

The project area does not overlap any threatened ecosystem.

PROTECTED AREAS

According to the data for protected areas (**Figure 8**), the proposed area does not fall within a formally protected area.

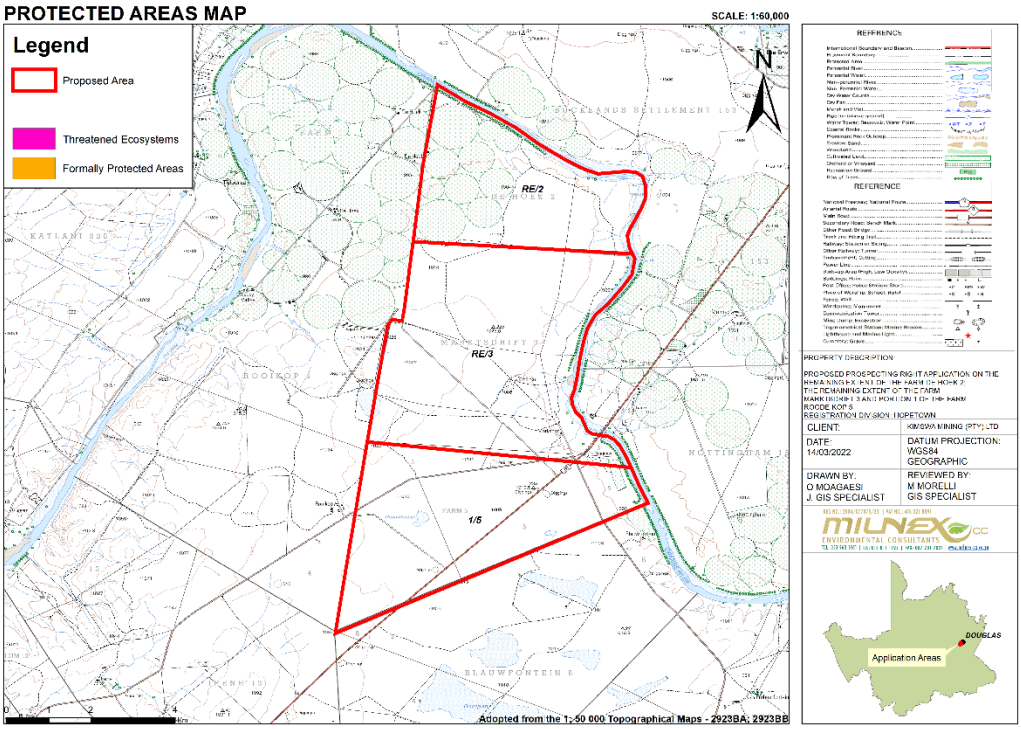


Figure 8: Threatened and Protected Areas Map

SPECIALIST STUDY

A Terrestrial Biodiversity Impact Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

The project area does not fall into a National Protected Area or a National Protected Area Expansion Strategy (NPAES) area. The closest protected area is Mokala National Park, which is 52km east of the project area. The closest NPAES area is the Gariep NPAES, which is 48km to the west (Figure 9) (Government of South Africa, 2010). This project will not affect any protected areas or NPAES areas.

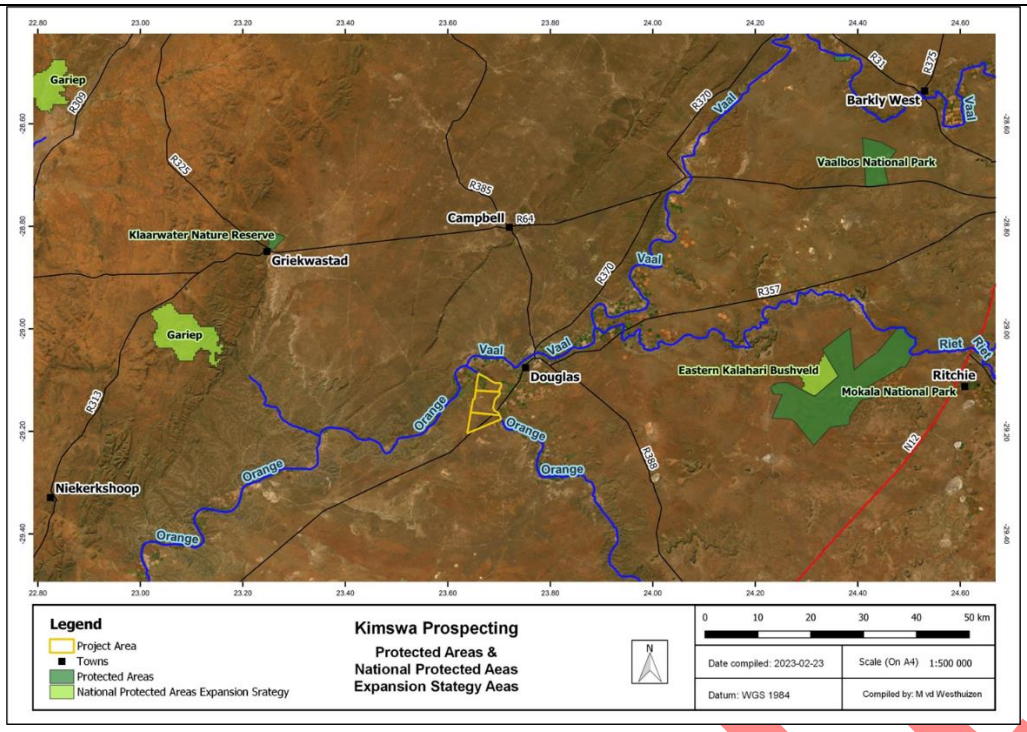


Figure 9: Protected Areas and National Protected Areas Expansion Strategy

CRITICAL BIODIVERSITY AREA

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of high biodiversity value that need to be conserved and maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services (MTPA, 2014). According to the National Environmental Management Act (NEMA) (Act no. 107 of 1998) certain activities have strict guidelines or are prohibited within CBAs and ESAs. Refer to the listed activities under the NEMA: Environmental Impact Assessment Regulations of 2014 (GNR 982) as promulgated in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) [as amended] for a comprehensive breakdown. The following terms are used to categorise the various land used types according to their biodiversity and environmental importance:

- Critical Biodiversity Area One (CBA1);
- Critical Biodiversity Area Two (CBA2);
- Ecological Support Area (ESA);
- Other Natural Areas (ONA); and
- Protected Area (PA).

Based on the desktop information (**Figure 9**), the proposed area falls within CBA 1, CBA 2 and other.

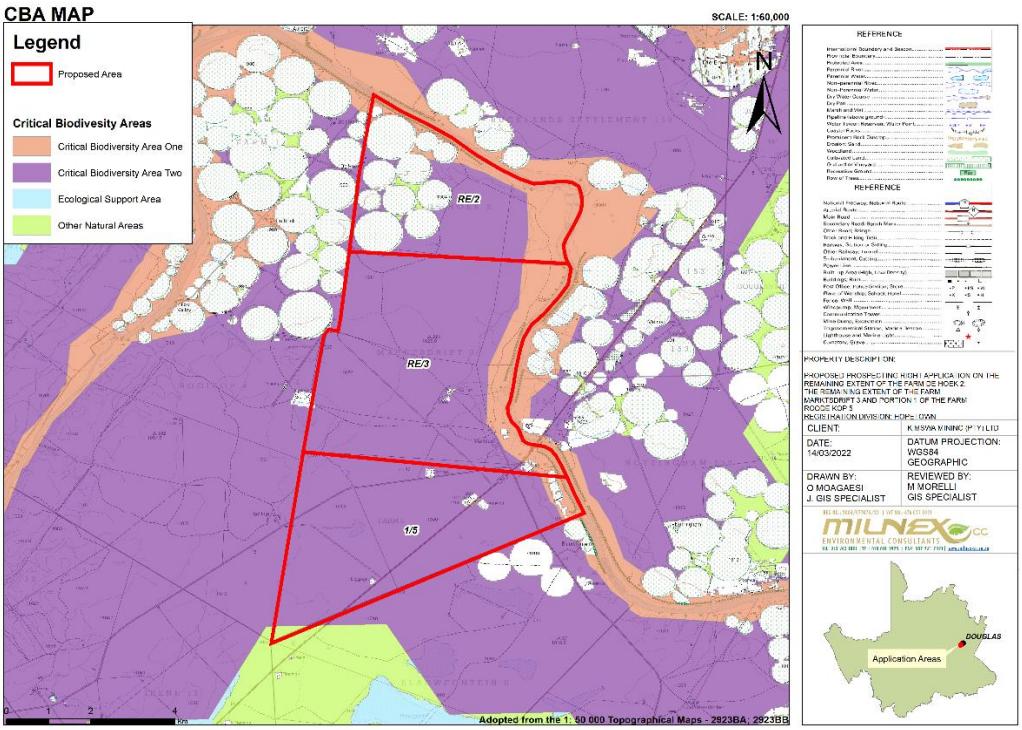


Figure 9: Critical Biodiversity Areas Map.

SPECIALIST STUDY

A Terrestrial Biodiversity Impact Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes (SANBI Biodiversity Advisor, 2017).

Most of the project area is classified as CBA2. The section next to the Orange River is a CBA1 and then there are very small sections which is classified as Other (see Figure 7) (Northern Cape Department of Environment and Nature Conservation, 2016).

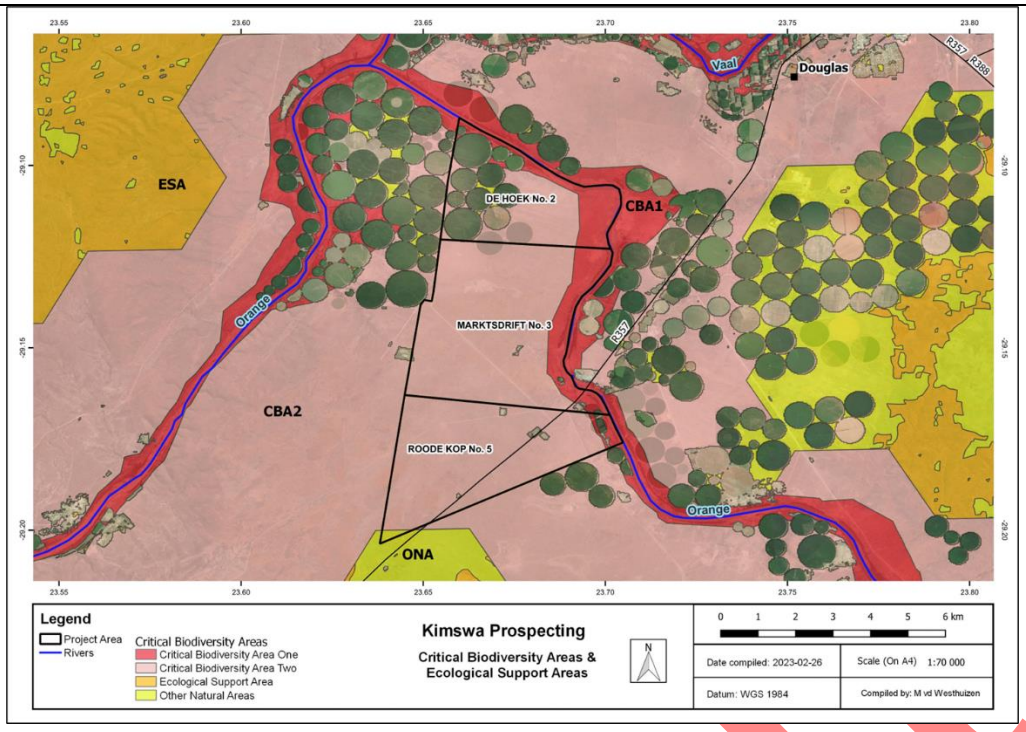


Figure 7: Critical Biodiversity Areas and Ecological Support Areas (Northern Cape Department of Environment and Nature Conservation, 2016)

According to the DFFE Screening Report most of the proposed area falls mostly within Low Aquatic Biodiversity sensitivity with some areas within Very High sensitivity. Please see **Appendix 7** for the colour map.

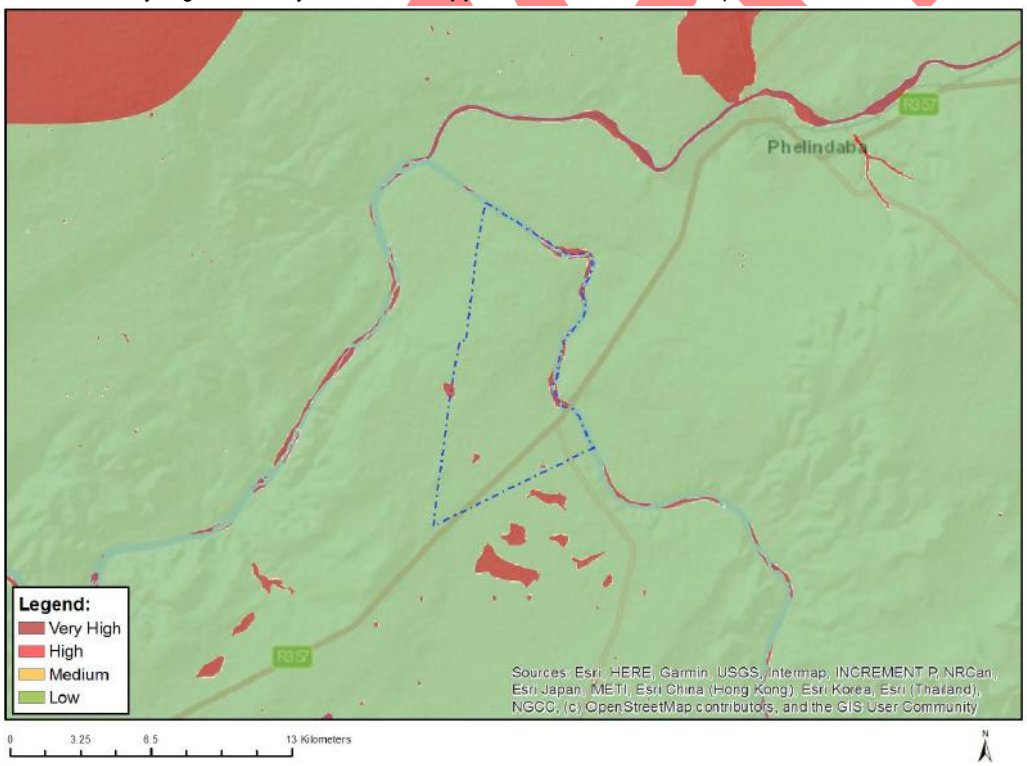


Figure 10: Aquatic Biodiversity Combined Sensitivity

According to the DEA Screening Report the proposed area falls mostly within High Terrestrial Biodiversity theme sensitivity followed by very high sensitivity along the Orange river and low where the central pivots are located on the proposed area. Please see **Appendix 7** for the colour map.

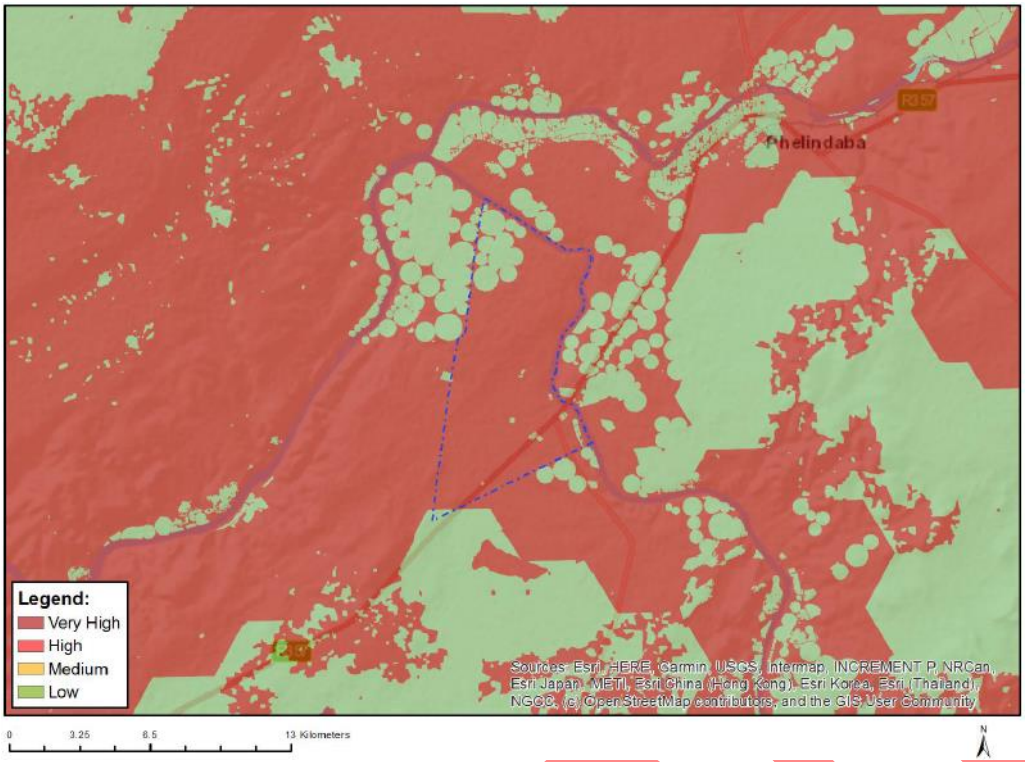


Figure 11: Terrestrial Biodiversity Combined Sensitivity

According to the DEA Screening Report the proposed portions fall within medium and low Animal Species theme sensitivity. Please see **Appendix 7** for the colour map

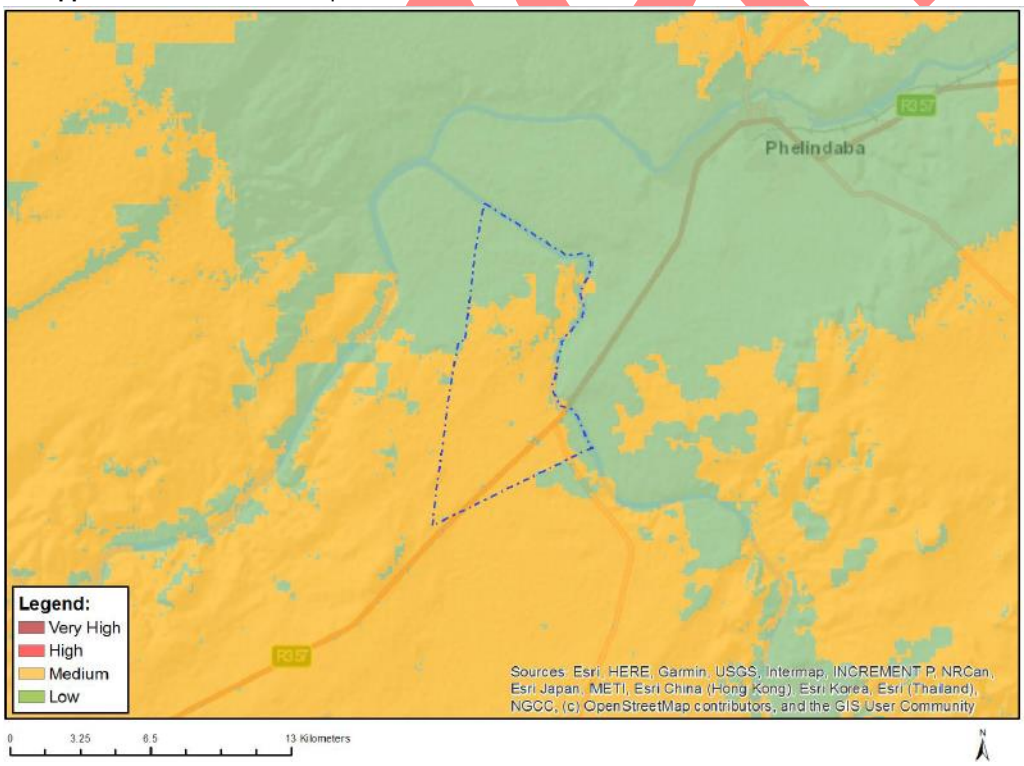


Figure 12: Animal Species theme sensitivity.

SPECIALIS ASSESSMENT

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

4.4 Fauna in and around the project area

4.4.1 Fauna habitat types

The number of mammal species supported by a plant community depends on several factors like the primary production, seasonal availability of resources, floral heterogeneity, diversity of plant structure, nature of the substratum and previous history (Delany, 1982). Each mammal species has a particular niche, which can be regarded as the sum of all ecological requirements of a species namely food, space, shelter and physical conditions. Mills & Hes (1997) stated that the distribution and abundance of animal species does not rigorously follow that of plant communities or biomes. Instead, mammal species seem to have certain preferences for a specific habitat type (Skinner & Smithers, 1990).

A survey was conducted during 13 to 16 February 2023 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid.

The following habitat types were identified:

- *Indigenous karoo*
- *Riparian area with tall trees, next to Orange River*
- *Rocky outcrops*
- *Agricultural field and old agricultural fields*
- *Power pylons (Some birds of prey breed on power pylons)*

4.4.2 Fauna species lists

Fauna species confirmed to be present on site is given in Table 15.

Fauna species are listed if they have been recorded in the quarter degree grid on the Virtual Museum of Biodiversity and Development Institute (Virtual Museum, 2022). Species confirmed to be present and Species of conservation concern is included in this section. For a complete species list of species recorded in the quarter degree grid, see Appendix A.

Red list categories are as follows:

***CR:** Critically Endangered, indicating that the species is facing an extremely high risk of extinction.*

***EN:** Endangered, indicating that the species is facing a very high risk of extinction.*

***VU:** Vulnerable, indicating that the species is facing a high risk of extinction.*

***NT:** Near Threatened, is likely to become at risk of extinction in the near future.*

***Declining:** A species is Declining when there are threatening processes causing a continuing decline of the species.*

***LC:** Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.*

Table 15: Mammals confirmed to be present on site

Family	***Scientific name***	***Common name***	***Red list***
Bovidae	*Antidorcas marsupialis*	*Springbok*	*LC*
Bovidae	*Raphicerus campestris*	*Steenbok*	*LC*
Bovidae	*Tragelaphus strepsiceros*	*Greater Kudu*	*LC*
Canidae	*Canis mesomelas*	*Black-backed Jackal*	*LC*
Cercopithecidae	*Chlorocebus pygerythrus*	*Vervet Monkey*	*LC*
Herpestidae	*Cynictis penicillata*	*Yellow Mongoose*	*LC*
Hystricidae	*Hystrix africaeaustralis*	*Cape Porcupine*	*LC*
Mustelidae	***Hydrictis maculicollis***	***Spotted-necked Otter***	***NT***
Orycteropodidae	*Orycteropus afer*	*Aardvark*	*LC*
Sciuridae	*Xerus inauris*	*Cape Ground Squirrel*	*LC*
Suidae	*Phacochoerus africanus*	*Common Warthog*	*LC*

The spotted-necked otters reside in the riparian zone next to the Orange River.

Table 16: Mammals of conservation concern recorded in QDS (Virtual Museum)

Family	Scientific name	Common name	Red list category
Manidae	Smutsia temminckii	Ground Pangolin	VU (2016)

Smutsia temminckii (Ground Pangolin)
The Ground Pangolin is a predominantly solitary, terrestrial species that is present in various woodland and savannah habitats, preferring arid and mesic savannah and semi-arid environments at lower altitudes, often with thick undergrowth, where average annual rainfall ranges between 250 and 1,400 mm (Skinner & Chimimba 2005). They also occur in floodplain grassland, rocky slopes and sandveld up to 1,700 m (Coulson 1989; Pietersen 2013), ***but are absent from Karroid regions****, tropical and coastal forests, Highveld grassland and coastal regions.*

The land owner and other people living on the farms say that they have never seen a Ground Pangolin there. It is not expected to occur there.

Table 17: Birds confirmed to be present in the project area

Family	Scientific name	Common name	Red list category
Otididae	Neotis ludwigii	Ludwig's Bustard	Endangered
Gruidae	Anthropoides paradiseus	Blue Crane	Near Threatened
Sagittariidae	Sagittarius serpentarius	Secretary bird	Vulnerable
Accipitridae	Haliaeetus vocifer	African Fish-Eagle	Least Concern
Ardeidae	Ardea cinerea	Grey Heron	Least Concern
Columbidae	Oena capensis	Namaqua dove	Least Concern
Corvidae	Corvus albus	Pied Crow	Least Concern
Meropidae	Merops nubicoides	Southern carmine bee-eater	Least Concern
Meropidae	Merops apiaster	European bee-eater	Least Concern
Ploceidae	Euplectes orix	Southern Red (Red) Bishop	Least Concern
Ploceidae	Quelea quelea	Red-billed Quelea	Least Concern

Ludwig's Bustard and the Secretary birds lives in the Senegalia mellifera - Lycium cinereum karoo. Blue cranes are sometimes seen in the agricultural fields.

No bird species of conservation concern are listed for the QDS on the Virtual Museum.

The following reptiles are confirmed to be present in the project area:

Table 18: Reptiles confirmed to be present in the project area

Family	Scientific name	Common name	Red list category
Viperidae	Bitis arietans	Puff adder	Least Concern
Elapidae	Hemachatus haemachatus	Rinkhals	Least Concern
Elapidae	Naja nivea	Cape cobra	Least Concern

No amphibian or reptile species of conservation concern distribution overlaps with the project area.

4.4.2.1 EIA screening tool species of conservation concern (SCC)
The national web-based environmental screening tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended, lists one fauna species of conservation concern, namely Neotis ludwigii (Ludwig's Bustard) and it has been confirmed to be present at site. It is endangered.

BIODIVERSITY PRIORITY AREAS FOR MINING

The Mining and Biodiversity Guideline was developed in 2013 for the purpose of mainstreaming biodiversity management practices into the mining sector (DEA, DMR, Chamber of Mines, SAMBF & SANBI 2013). This Guideline provides explicit direction in terms of where mining-related impacts are legally prohibited, where biodiversity priority areas may present high risks for mining projects, and where biodiversity may limit the potential for mining. The Guideline distinguishes between four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service perspective as well as the implications for mining in these areas (**Table 2**).

Table 2: Four categories of biodiversity priority areas in relation to their biodiversity importance and implications for mining.

Category	Biodiversity Priority Areas	Risks for Mining	Implications for Mining
A. Legally Protected	• Protected areas (including National Parks, Nature Reserves, World Heritage Sites, Protected Environments, Nature Reserves) • Areas declared under Section 49 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002)	**Mining Prohibited**	Mining projects cannot commence as mining is legally prohibited. Although mining is prohibited in Protected Areas, it may be allowed in Protected Environments if both the Minister of Mineral Resources and Minister of Environmental Affairs approve it. In cases where mining activities were conducted lawfully in protected areas before Section 48 of the Protected Areas Act (No. 57 of 2003) came into effect, the Minister of Environmental Affairs may, after consulting with the Minister of Mineral Resources, allow such mining activities to continue, subject to prescribed conditions that reduce environmental impacts.
B. Highest Biodiversity Importance	• Critically endangered and endangered ecosystems • Critical Biodiversity Areas (or equivalent areas) from provincial spatial biodiversity plans • River and wetland Freshwater Ecosystem Priority Areas (FEPAs) and a 1km buffer around these FEPAs • Ramsar Sites	**Highest Risk for Mining**	Environmental screening, environmental impact assessment (EIA) and their associated biodiversity specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. An EIA should include the strategic assessment of optimum, sustainable land use for an area and will determine the significance of the impact on biodiversity. This assessment should fully consider the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into licence agreements and/or authorisations.

C. High Biodiversity Importance	• Protected area buffers (including buffers around National Parks, World Heritage Sites* and Nature Reserves) • Transfrontier Conservation Areas (remaining areas outside of formally proclaimed protected areas) • Other identified priorities from provincial spatial biodiversity plans • High water yield areas • Coastal Protection Zone • Estuarine functional zone *Note that the status of buffer areas of World Heritage Sites is subject to a current intra-governmental process	**High Risk for Mining**	These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, and for maintaining important ecosystem services for communities or the country. An EIA should include an assessment of optimum, sustainable land use for an area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and limitations for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.
D. Moderate Biodiversity Importance	• Ecological support areas • Vulnerable ecosystems • Focus areas for protected area expansion (land-based and offshore protection)	**Moderate Risk for Mining**	These areas are of moderate biodiversity value. EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened (land-based and offshore protection) species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.

Based on **Figure 13,** the area doesn't overlap with any category.

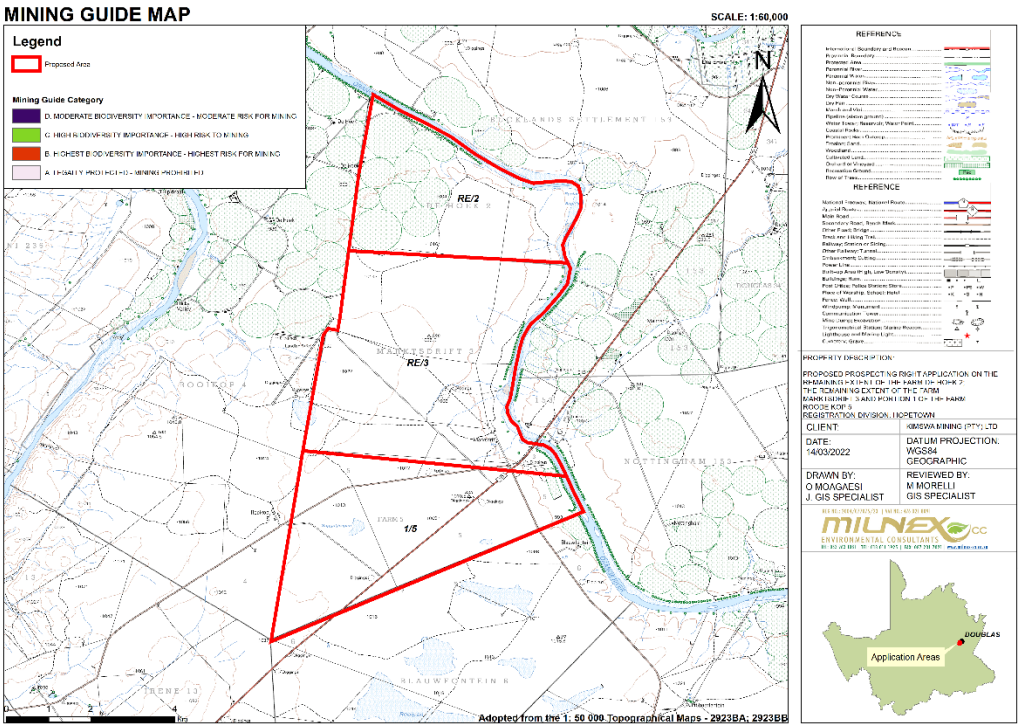


Figure 13: Biodiversity priority areas, in accordance with the Mining of Biodiversity Guidelines, associated with the study site.

WETLAND AREAS

In terms of Section 1 of the National Water Act (No. 36 of 1998) (NWA), wetlands are legally defined as: "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*" (NWA 1998).

Wetlands are defined by the presence of unique soils and vegetation that do not occur in terrestrial and purely aquatic environments (Edwards *et al.* 2018). Wetland soils are referred to as hydric soils that develop under anaerobic conditions (condition where oxygen is virtually absent from the soil). Wetlands are also typically characterized by relatively large and dense stands of plants sticking out of shallow water or wet soil. Plants adapted to such waterlogged conditions are referred to as hydrophytes. Wetlands are distinct from true aquatic ecosystems like river ecosystems, which are characterized by fast flowing water within channels, and lake ecosystems, that are flooded to great depth; both of which are not primarily characterized by the occurrence of hydric soils and hydrophytes.

A wide variety of wetland types are present in South Africa, and can be classified into six broad types, namely floodplain wetlands, unchannelled valley bottom wetlands, channelled valley bottom wetlands, seeps, depressions and wetland flats. Owing to the large variations in climate and topography across South Africa, vegetation and habitat associated with these wetland types vary tremendously from subtropical reed beds and tall swamp forests to arid salt pans, which all support unique and varied animal life.

Figure 14 i illustrates all wetland types associated with the study area. According to the Wetland areas map there are a Channelled valley-bottom wetland, Unchannelled valley-bottom wetlands, Depressions and Flats on the proposed area. The Orange River bordering the proposed area is a Floodplain wetland.

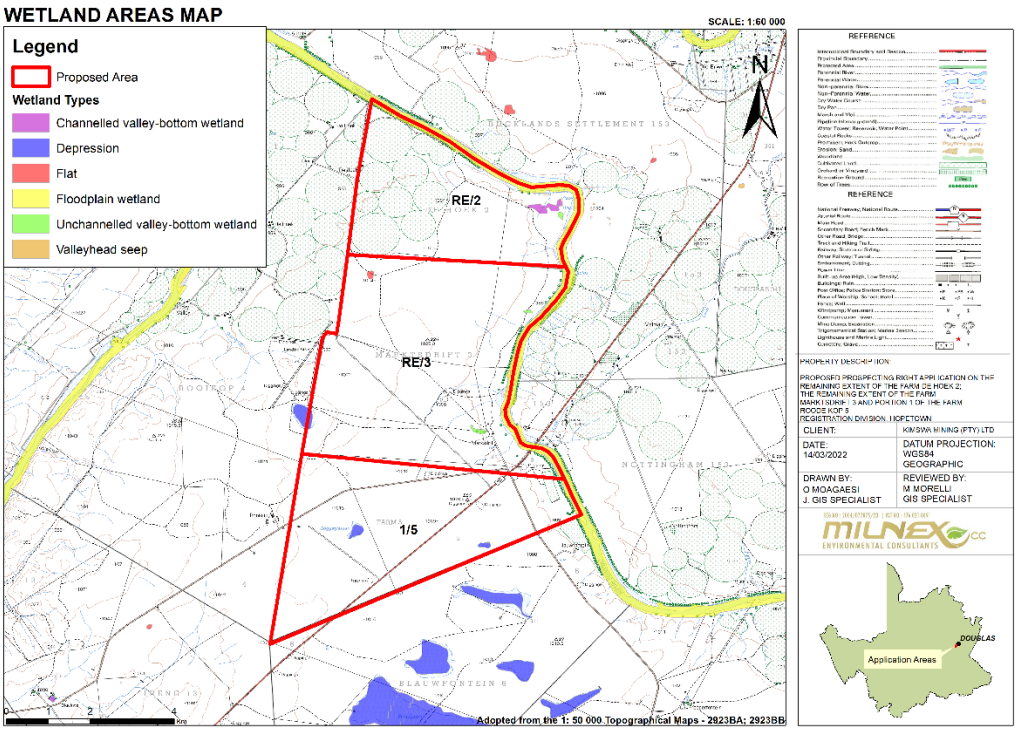


Figure 14: Wetland types located within or near the study site.

The Wetland vegetation that the site has been associated with the Eastern Kalahari Bushveld Group 3 and Upper Nama Karoo, as depicted in the figure below.

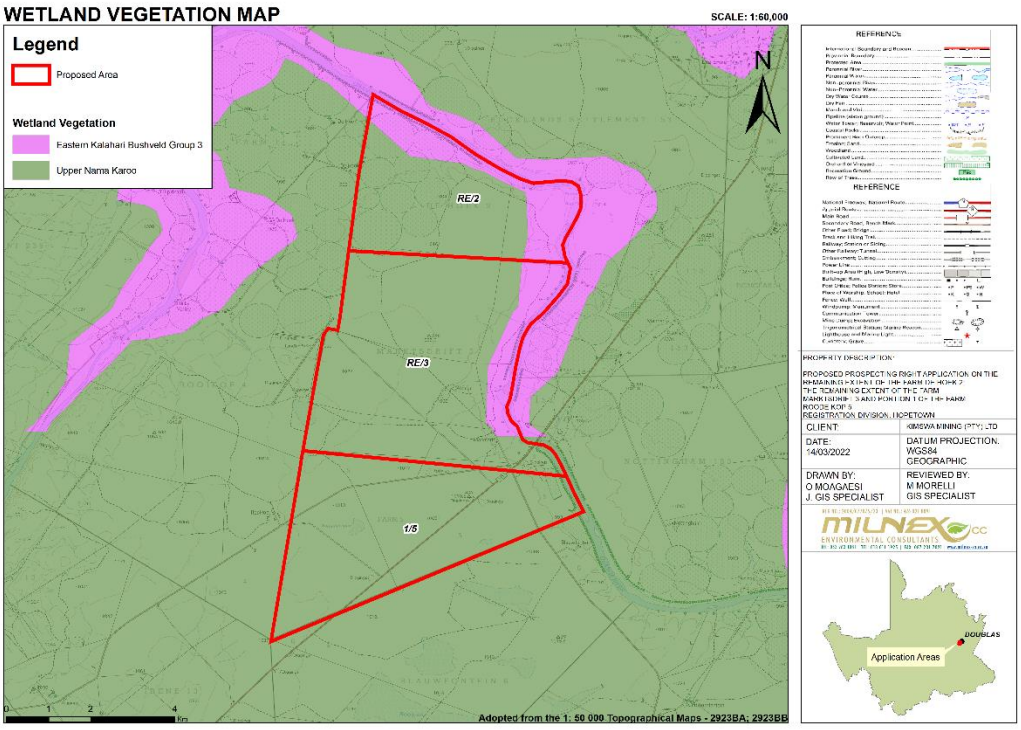


Figure 15: Wetland vegetation type

SPECIALIST STUDY

A Wetland Delineation and Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

3.6 National Freshwater Ecosystem Priority Areas (NFEPAs)

South Africa's freshwater ecosystems are diverse, ranging from sub-tropical in the north-eastern part of the country, to semi-arid and arid in the interior, to the cool and temperate rivers of the fynbos. "Freshwater ecosystems" refer to all inland water bodies whether fresh or saline, including rivers, lakes, wetlands, sub-surface waters and estuaries. Consistent with global trends, high levels of threat have been reported for freshwater ecosystems. According to the National Biodiversity Assessment 2018 nearly 80% of inland wetland ecosystem types in South Africa are threatened and approximately 75% of inland wetland ecosystem types are both threatened and under-protected (SANBI, 2019). South Africa's freshwater fauna also displays high levels of threat: at least one third of freshwater fish indigenous to South Africa are reported as threatened, and a recent southern African study on the conservation status of major freshwater-dependent taxonomic groups (fishes, molluscs, dragonflies, crabs and vascular plants) reported far higher levels of threat in South Africa than in the rest of the region.

Urgent attention is needed to ensure that we conserve some representative natural examples of the different ecosystems that make up the natural heritage of this country for current and future generations. NFEPA responds to this need, providing strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources (Driver et al., 2011)

The Orange River is a NFEPA river and sections of its banks are NFEPA wetlands. There are also some pans in the area (Figure 4) (Nel et al., 2011).

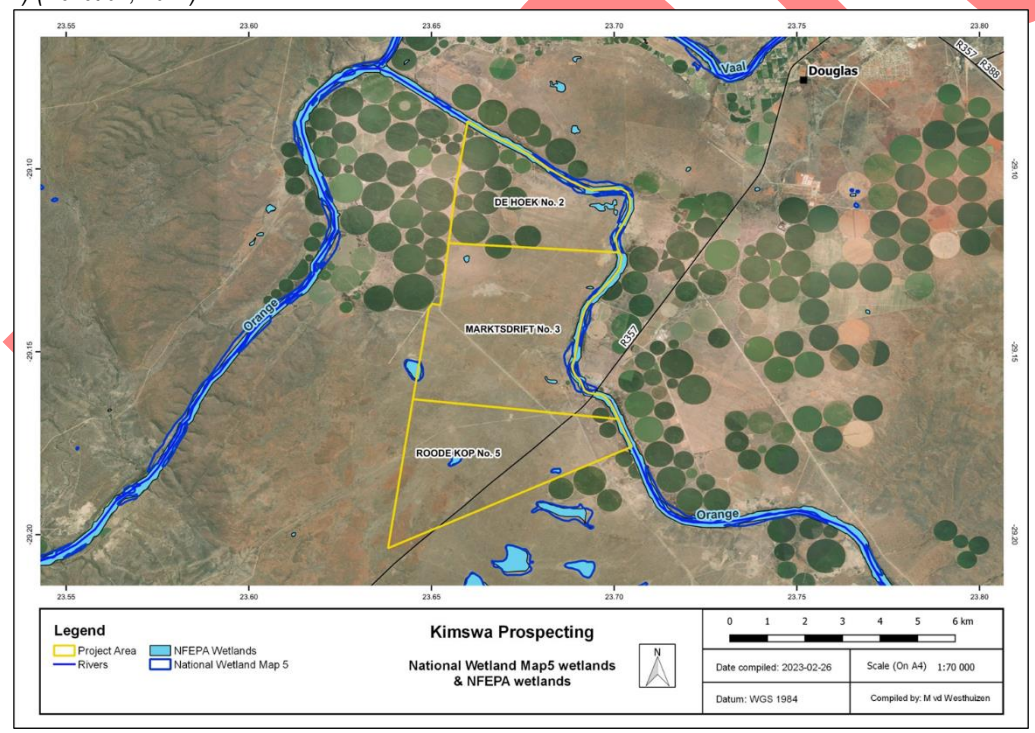


Figure 4: National Freshwater Ecosystem Priority Areas (NFEPA) rivers and wetlands (Nel et al., 2011)

3.7 National Wetland Map 5

The National Wetland Map version 5 (NWM5) shows the distribution of inland wetland ecosystem types across South Africa and includes estuaries and the extent of some rivers (CSIR, 2018).

There are several NWM5 wetlands in the project area, some are associated with the Orange River and some are pans (Figure 4).

5 RESULTS

5.1 WETLAND DELINEATION AND CLASSIFICATION

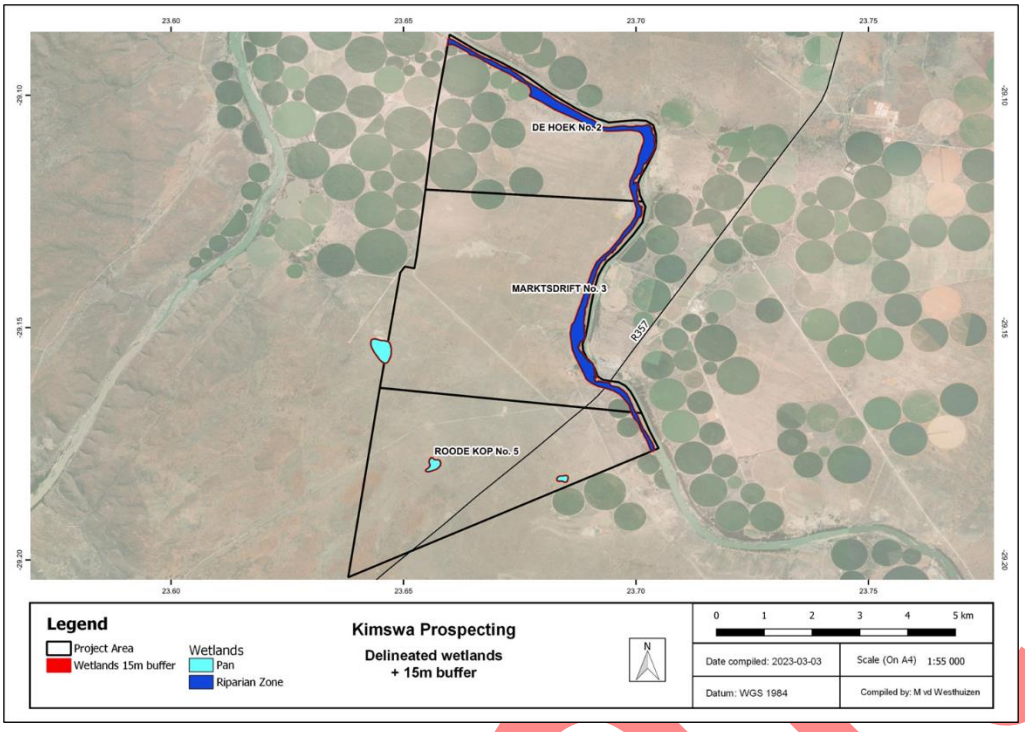


Figure 7 indicates the wetland delineation.

The wetlands in the project area are classified as a Floodplain River and Endorheic Depression Wetlands (pans).

5.1.1 Floodplain River (active channel and riparian area)

The project area borders on the Orange River, which is classified as a floodplain river. The perennial Orange River floodplain is not classified as a floodplain wetland, but a river with some wetland characteristics in the channel and its banks. A floodplain, is a flat or nearly flat land adjacent to a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge. It includes the floodway, which consists of the stream channel and adjacent riparian woodland that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. In other words, a floodplain is an area near a river or a stream which floods easily. Floodplains are made by a meander eroding sideways as it travels downstream. When a river breaks its banks and floods, it leaves behind layers of rock and mud. These gradually build up to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream. These are accumulations of sand, gravel, loam, silt, and/or clay, and are often important aquifers, the water drawn from them being pre-filtered compared to the water in the river.

There is a strip of riparian woodland next to the river consisting of trees and shrubs (mostly Vachellia karroo, Ziziphus mucronata, Searsia lancea and Diospyros lycioides). All wetland and riparian vegetation in the project area have a high ecologically importance, forming important, limited and specialised habitats for several plant and fauna species. These habitats also form linear corridors linking different open spaces. The riparian woodland would be an important dry season refuge area for many fauna species in their natural state. It is also a centre of floral diversity. Impacts on the sensitive riparian ecosystems, regardless of the source, need to be restricted. Riparian vegetation is very important for connectivity with adjacent vegetation as well as a migratory route for fauna associated with the riparian habitat.

5.1.2 Endorheic depression wetland

A depression is a wetland or aquatic ecosystem with closed (or near-closed) elevation contours, which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates (Ollis et al., 2013). An 'endorheic' depression is inward-draining, meaning it has no outflow (Ollis et al., 2013).

There are three endorheic depression wetland (pans) in the project area. They are dry most of the time, but with heavy rain water accumulates in them.

The pans can further be classified as grass pans. Grass pans are usually small, often temporary and only contain water for short periods. They typically contain fresh to slightly saline water and is mainly covered by various sedges and grasses (De Klerk et al., 2016).

The pans are frequented by cattle and game and therefore disturbed, especially Goggatjiespan.

The vegetation associated with these pans is dominated by grasses. There are no trees. Dominant species includes the grasses Aristida spp., Eragrostis spp. and the forbs Jamesbrittenia aurantiaca, Argemone ochroleuca, Laggera decurrens, Malva parviflora and the dwarf shrub Pentzia calcarea.
See Figure 9 to Figure 10.

Table 6: Characteristics of River and riparian zone and wetlands

Feature	1. Orange River & Riparian Area	2. Endorheic depression 1
Catchment Features and Current Impacts	*The catchment area of the Orange River consists mostly of agricultural activities like crop production and grazing.*	*The catchment area of the assessed wetlands consists mostly natural veld which is used for grazing. There is one mine in the area which is no longer in use.*
Wetland Type	*River & Riparian Area*	*Endorheic Depression Wetland*
Downstream Features	*Mostly crop fields, natural veld and some houses*	*None, endorheic depressions do not have an outflow.*
Vegetation Characteristics	*It is characterised by tall trees, including Vachellia karroo, Ziziphus mucronata, Searsia lancea and Diospyros lycioides. The dominant grasses are Stipagrostis namaquensis and Cynodon dactylon. Reeds (Phragmites australis) and sedges (Cyperus eragrostis and others) are also present. Dominant forbs include Boerhavia diffusa, Indigofera alternans and Cucumis africanus.*	*Dense grass layer consisting mostly of Aristida spp. Other dominant plant species include Eragrostis spp., the forbs Jamesbrittenia aurantiaca, Argemone ochroleuca, Laggera decurrens, and the dwarf shrub Pentzia calcarea.*
Algae Presence	*No*	*No standing water during site visit*
Depth Characteristics	*Not measured*	*No water*
Flow Conditions	*Strong flow*	*No flow*
Water Clarity	*Moderate turbidity*	*N/A*
Water Odour	*None detected*	*N/A*
Erosion Impacts	*Some erosion gullies formed next to the river*	*Low erosion potential as the wetland vegetation is dense.*
Soil characteristics	*Deep, sandy soil (alluvial soil)*	*Some gleying present*

Feature	3. Endorheic depression 2	4. Endorheic depression 3
Catchment Features and Current Impacts	*The catchment area of the assessed wetland consists mostly natural veld which is used for grazing.*	*The catchment area of the assessed wetland consists mostly natural veld which is used for grazing.*
Wetland Type	*River & Riparian Area*	*Endorheic Depression Wetland*

Downstream Features	*Endorheic Depression Wetland*	*None, endorheic depressions do not have an outflow.*
Vegetation Characteristics	*Grass layer was burnt recently. Dominant species includes the grasses Aristida spp., Eragrostis spp. and the forbs Jamesbrittenia aurantiaca, Argemone ochroleuca, and the dwarf shrub Pentzia calcarea*	*Plant layer grass and weeds, due to grazing and trampling by cattle. Dominant plant species include the Grassess Aristida spp. and Eragrostis spp., the forbs, Malva parviflora, Argemone ochroleuca, and the dwarf shrub Pentzia calcarea.*
Algae Presence	*No standing water during site visit*	*No standing water during site visit*
Depth Characteristics	*No water*	*No water*
Flow Conditions	*No flow*	*No flow*
Water Clarity	*N/A*	*N/A*
Water Odour	*N/A*	*N/A*
Erosion Impacts	*Moderate erosion potential. Vegetation cover is very low, but it does not rain much in Douglas.*	*Moderate erosion potential. Vegetation cover is low, but it does not rain much in Douglas.*
Soil characteristics	*Some gleying present*	*Some gleying present*

5.2 RIPAREAN AREA AND WETLAND INTEGRITY ASSESSMENTS

In determining the integrity of the riparian area and wetland, the condition of the site and the indirect and direct disturbances are considered. The impoundments, roads, alien invasive vegetation species, pollution, sedimentation and density roughness elements was taken into account in determining the PES and EIS of the wetland units on site.

5.2.1 WET-Health Assessment

Three modules, namely hydrology, geomorphology and vegetation, were assessed as a single unit for the HGM Units and subsequently an area weighted score was obtained for the HGM Units. The potential impacts of activities such as agriculture, drought and altered hydrological functions within the greater catchment were taken into consideration during the assessment. The results are summarised in the tables below.

Table 7: Present Ecological State of river and riparian area

Final (adjusted) Scores				
PES Assessment	***Hydrology***	***Geomorphology***	***Water Quality***	***Vegetation***
Impact Score	*1,4*	*0,9*	*4,0*	*1,8*
PES Score (%)	*86%*	*91%*	*60%*	*82%*
Ecological Category	***B***	***A***	***D***	***B***
Trajectory of change	→	→	→	→
Confidence (revised results)	*Medium*	*Medium*	*Medium*	*Medium*
Combined Impact Score	*1,9*			
Combined PES Score (%)	*81%*			
Combined Ecological Category	***B***			
Hectare Equivalents	*786,6 Ha*			

The PES Category for the river and riparian area is B, meaning that it is largely natural with few modifications, but with some loss of natural habitats. Only a section of 32 km of the Orange River was used for calculations, not the whole Orange River.

Table 8: Present Ecological State of Pan 1-3

Final PES Scores Pan 1 - 3				
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	*1,7*	*1,5*	*4,8*	*4,0*
PES Score (%)	*83%*	*85%*	*52%*	*60%*
Ecological Category	***B***	***B***	***D***	***D***
Trajectory of change	→	→	→	→
Confidence (revised results)	*Medium*	*Medium*	*Medium*	*Medium*
Combined Impact Score	*2,8*			
Combined PES Score (%)	*72%*			
Combined Ecological Category	***C***			
Hectare Equivalents	*7,9 Ha*			

The PES Category for the depression wetlands is C, meaning that the functionality of the wetland is Moderately modified but with some loss of natural habitats. Based on the Trajectory of change, the wetlands PES is likely to remain stable over the next 5 years.

5.2.2 Ecological Importance and Sensitivity

The EIS assessment was applied to all wetland features within the study area in order to ascertain the levels of sensitivity and ecological importance of the features. The results of these assessments are summarised in Table 9 below.

Table 9: EIS scores obtained for the Wetlands (DWAF, 1999).

Ecological Importance and Sensitivity								
	1. River and riparian area		**2. Endorheic depression wetland (Pan) 1**		**3. Endorheic depression wetland (Pan) 2**		**4. Endorheic depression wetland (Pan) 3**	
Determinant	**Score**	**Confidence**	**Score**	**Confidence**	**Score**	**Confidence**	**Score**	**Confidence**
Biotic determinants								
Rare and endangered biota	*4*	*4*	*0*	*3*	*0*	*3*	*0*	*3*
Unique biota	*0*	*2*	*0*	*2*	*0*	*2*	*0*	*2*
Intolerant biota	*3*	*3*	*0*	*4*	*0*	*4*	*0*	*4*
Species/taxon richness	*3*	*3*	*1*	*3*	*1*	*3*	*1*	*3*
Habitat (instream and riparian) determinants								
Diversity of aquatic habitat types or features	*3*	*4*	*1*	*4*	*1*	*4*	*1*	*4*
Refuge value of habitat types	*4*	*3*	*1*	*3*	*1*	*3*	*1*	*3*
Sensitivity of habitat to flow changes	*2*	*3*	*1*	*4*	*1*	*4*	*1*	*4*
Sensitivity to flow related water quality changes	*2*	*3*	*1*	*4*	*1*	*4*	*1*	*4*
Migration route/corridor for instream and riparian biota	*3*	*3*	*0*	*4*	*0*	*4*	*0*	*4*
National parks, Wilderness areas, Nature reserves, Natural Heritage sites, Natural areas	*0*	*4*	*0*	*4*	*0*	*4*	*0*	*4*
Total	*24*		*5*		*5*		*5*	
Average score	***2,4***		***0,5***		***0,5***		***0,5***	
Category	***High***		***Low / marginal***		***Low / marginal***		***Low / marginal***	

The Ecological Importance and Sensitivity of the Orange River is High. This means that it is considered to be unique on a national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but may have a substantial capacity for use

The Ecological Importance and Sensitivity of the pans is Low / marginal. This means that they are not unique at any scale. These wetlands (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have a substantial capacity for use.

Recommended Ecological Category (REC)

The Recommended Ecological Category is:

- *Orange River and riparian area: A/B - Improve*
- *Endorheic depression wetlands (Pans): C - Maintain*

Table 1: Summary of results

Classification	*Orange River and riparian area*	*Endorheic depression wetlands*
PES	*B: Largely natural*	*C: Moderately modified*
EIS	*2,4: High*	*0,5: Low / marginal*
REC	*A/B: Improve*	*C: Maintain*
Calculated buffer	*15m*	*15m*

STRATEGIC WATER SOURCE AREAS

SPECIALIST STUDY

A Wetland Delineation and Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Water source areas are those areas that supply a disproportionate amount of mean annual runoff to a geographical region of interest. Strategic water source areas (SWSA) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy (Nel et al., 2013).

The study area is not found in a strategic water source area, but it is located 13km south-east of the Southern Ghaap Plateau strategic water source area.

IMPORTANT BIRD AND BIODIVERSITY AREAS

Important Bird and Biodiversity Areas (IBAs) are a network of sites that are significant for the long-term viability of naturally occurring bird populations (Birdlife 2019). Many sites are also important for other forms of biodiversity; therefore, the conservation of Important Bird & Biodiversity Areas ensures the survival of a correspondingly large number of other animals and plants.

No IBAs were identified within the vicinity of the study site (**Figure 16**).

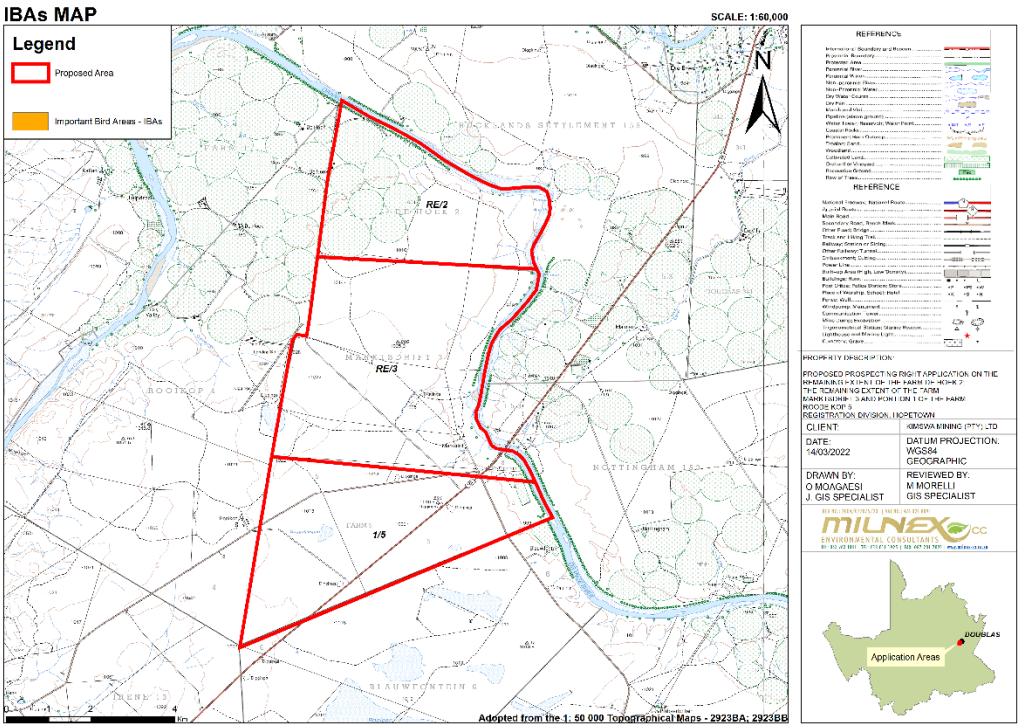


Figure 16: Important Bird and Biodiversity Areas associated with the study site.

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Important Bird Areas (IBAs) are sites of global significance for bird conservation (Marnewick et al., 2015). The project area is not located in or close to an Important Bird Area.

4.4 Fauna in and around the project area

Table 2: Birds confirmed to be present in the project area

Family	Scientific name	Common name	Red list category
Otididae	*Neotis ludwigii*	Ludwig's Bustard	Endangered
Gruidae	*Anthropoides paradiseus*	Blue Crane	Near Threatened
Sagittariidae	*Sagittarius serpentarius*	Secretary bird	Vulnerable
Accipitridae	*Haliaeetus vocifer*	African Fish-Eagle	Least Concern
Ardeidae	*Ardea cinerea*	Grey Heron	Least Concern
Columbidae	*Oena capensis*	Namaqua dove	Least Concern
Corvidae	*Corvus albus*	Pied Crow	Least Concern
Meropidae	*Merops nubicoides*	Southern carmine bee-eater	Least Concern
Meropidae	*Merops apiaster*	European bee-eater	Least Concern
Ploceidae	*Euplectes orix*	Southern Red (Red) Bishop	Least Concern
Ploceidae	*Quelea quelea*	Red-billed Quelea	Least Concern

Ludwig's Bustard and the Secretary birds lives in the *Senegalia mellifera - Lycium cinereum* karoo. Blue cranes are sometimes seen in the agricultural fields.

No bird species of conservation concern are listed for the QDS on the Virtual Museum.

RIVER ECOSYSTEM STATUS

According to **Figure 17**, the Orange river boarding the proposed area on the East falls in Class D: Largely Modified.

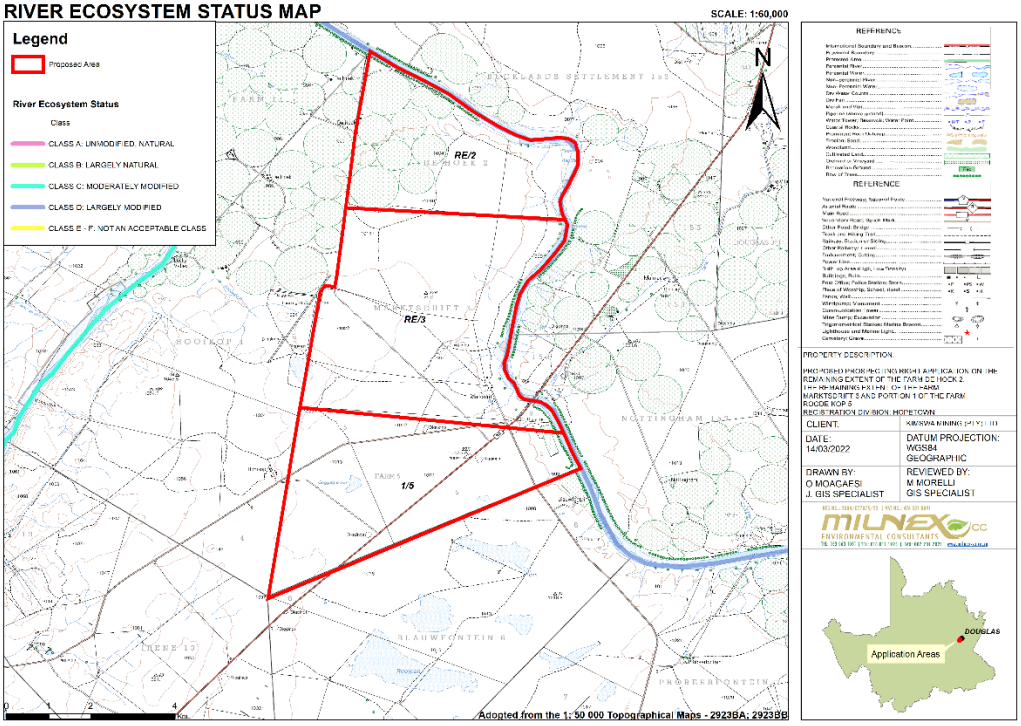


Figure 17: Ecosystem status of the rivers occurring in close proximity to the study site.

SPECIALIST STUDY

A Wetland Delineation and Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

3.6 National Freshwater Ecosystem Priority Areas (NFEPAs)
The Orange River is a NFEPA river and sections of its banks are NFEPA wetlands. There are also some pans in the area (Figure 4) (Nel et al., 2011).

CULTURAL AND HERITAGE ASPECTS

According to the DFFE Screening Report the proposed area falls mostly within low Archaeological and Cultural Heritage Theme Sensitivity and a certain area within very high. Please see map colour map under **Appendix 7.**

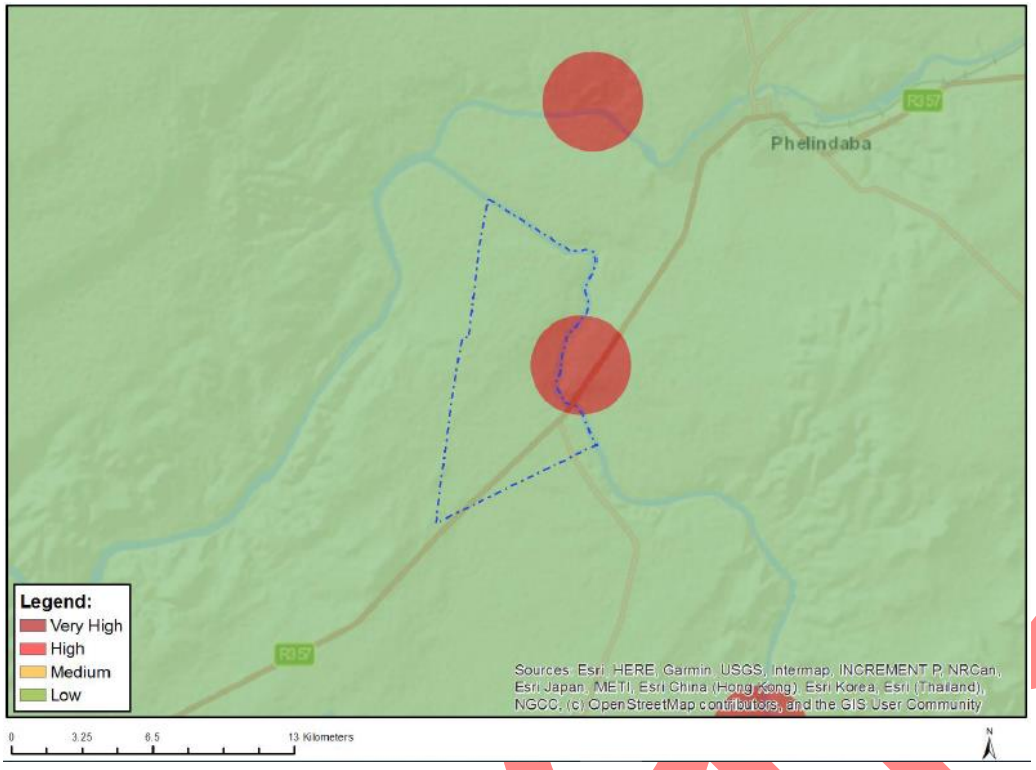


Figure 18: Archaeological and Cultural Heritage Combined Sensitivity

SPECIALIST STUDY

A Cultural Heritage Impact Assessment was conducted by Francois P Coetzee. The report is available under **Appendix 12**. Please see the findings in the table below:

7. The Cultural Heritage Sites

7.1. Isolated occurrences

Isolated occurrences are artefacts or small features recorded on the surface with no contextual information. No other associated material culture (in the form of structures or deposits) was noted that might provide any further context. This can be the result of various impacts and environmental factors such as erosion and modern developments. By contrast archaeological sites are often complex sites with evidence of archaeological deposit and various interrelated features such as complex deposits, stone walls and middens. However, these isolated occurrences are seen as remains of erstwhile complex or larger sites and they therefore provide a broad indication of possible types of sites or structures that might be expected to occur or have occurred in the survey footprint.

Throughout the survey area several isolated occurrences were recorded usually associated with the Middle Stone Age. These surface finds were recorded near open areas in the southern section of the survey area. As such a general A°/m² index for the survey footprint is 0 – 5 artefacts per m2 which is low.

AS discussed above, please note that widespread surface 'background scatter' of Middle Stone Age artefacts throughout the survey footprint. This phenomenon has also been defined and clearly characterised by Orton (2016).

Figure 38: Surface scatter of Middle Stone Age artefacts recorded in the survey footprint

7.2 Heritage sites

A total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1). The lower-level bridge was probable used from the early 20th century and was replaced with the bridge that is currently in use.

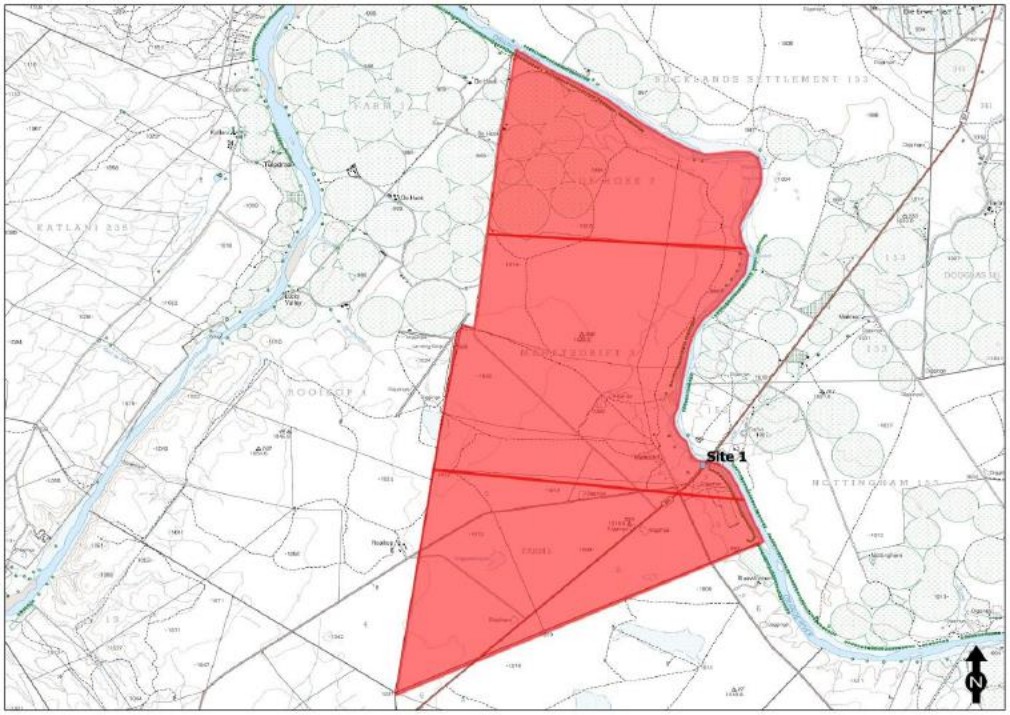


Figure 39: Location of the heritage site recorded during the survey

8. Locations and Evaluation of Sites

Table 7: Location and evaluation of sites

Site No	Coordinates	Site Type	Field Rating of Significance	Impact	Proposed Mitigation
1	29.162096°S 23.693785°E	Historical bridge	Generally Protected C Low significance	None	• Buffer zone 50 metres

9. Management Measures

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

9.1 Objectives

- *Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.*
- *The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities*

The following shall apply:

- *Known sites should be clearly marked in order that they can be avoided during construction activities.*
- *The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.*
- *Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;*
- *All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;*
- *Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and*
- *Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).*

9.2 Control

In order to achieve this, the following should be in place:

- *A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.*
- *Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.*
- *In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.*

According to the DFFE Screening Report the proposed area falls mostly within Medium and High Paleontology Theme Sensitivity and to a lesser extent within low sensitivity. Please see map colour map under **Appendix 7**.

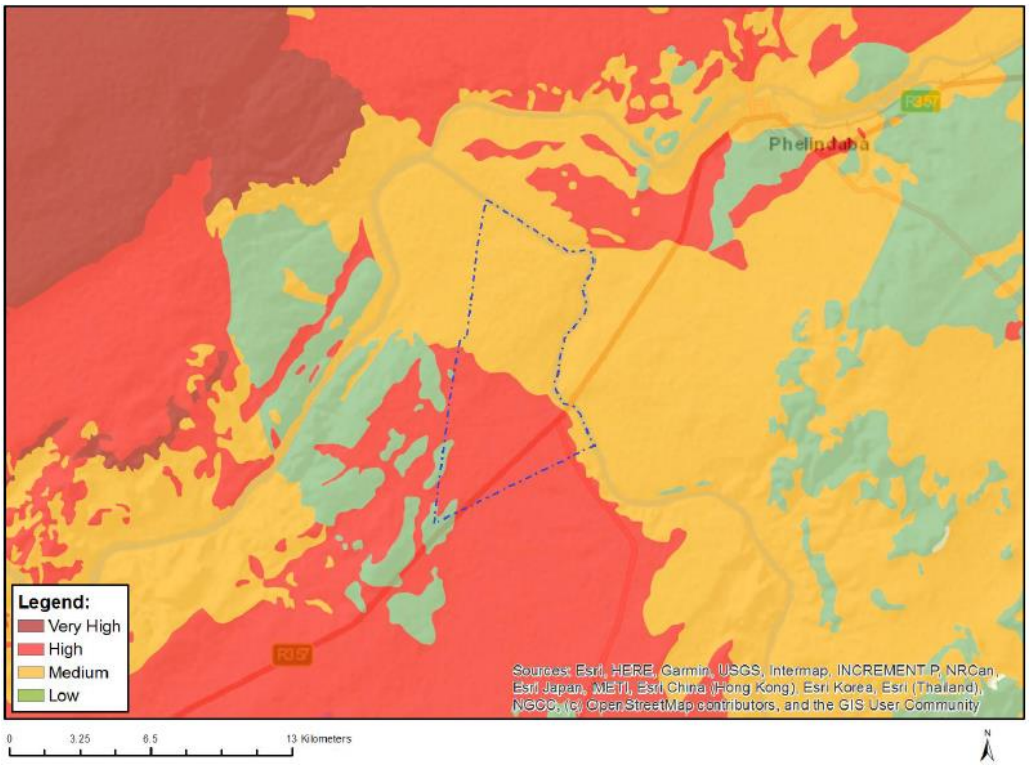


Figure 19: Relative Paleontology Theme Sensitivity

SPECIALIST STUDY

A Palaeontological Desktop Assessment was conducted by Elize Butler from Banzai Environmental (Pty) Ltd. The report is available under **Appendix 12**. Please see the findings in the table below:

5. GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Prospecting Right Application is depicted on the 2922 Prieska (1995) Geological map (Council of Geoscience, Pretoria) (Figure 3). The proposed development is underlain by Quaternary sands (Qs, yellow), Tertiary to Quaternary calcretes (T-Qc, dark yellow), with a small portion in the south underlain by the Allanridge Formation (Ra-dark, green) (Ventersdorp Supergroup). Updated geology (Figure 4) indicates that the development is mainly underlain by the Kalahari Group with a small portion in the south underlain by the Allanridge Formation (Platberg Group, Ventersdorp Supergroup). According to the South African Heritage Resources Information System, the Palaeontological Sensitivity of the Quaternary calcretes are High (orange), the Quaternary sands has a Moderate Palaeontological Sensitivity while that of the Allanridge Formation is Low (blue) (Figure 5).

The late Cretaceous to Recent Kalahari Group has been reviewed by the following authors: Thomas (1981), Dingle et al. (1983), Thomas & Shaw 1991, Haddon (2000) and Partridge et al. 2006. The Quaternary Gordonia Formation (Kalahari Group) are dated as Late Pliocene/Early Pleistocene to Recent times by the Middle to Later Stone Age stone tools recovered from them (Dingle et al (1983). The fossil assemblages of the Quaternary are generally Low in diversity and occur over a wide range and mostly has a Moderate Paleontologically Sensitivity. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods, and trace fossils. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile skeletons have been uncovered where the depositional settings in the past were wetter.

The Quaternary deposits are very important because palaeoclimatic changes are reflected in the different geological formations (Hunter et al., 2006). During the climate fluctuations in the Cenozoic Era most geomorphologic features in southern Africa where formed (Maud, 2012). Barnosky (2005) indicated that various warming and cooling events occurred in the Cenozoic but states that climatic changes during the Quaternary Period, specifically the last 1.8 Ma, were the most drastic climate changes relative to all climate variations in the past. Climate variations that occurred in the Quaternary Period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth et al., 2004).

The Late Tertiary to Quaternary calcretes (T-Qc) may be stratigraphically comparable to the Pleistocene or Late Pliocene Mokalanen Formation of the Kalahari Group (Figure 7), while others may be younger (Partridge et al. 2006, Moen 2007). These sediments include layers of nodular or structureless calcretes overlying the Namaqua-Natal Province basement rocks. Quaternary alluvium is present closer to the Orange River and could contain fossils of Miocene age (Hendy 1984, Schneider & Marias 2004) but is not present in the proposed development.

Four basins developed on the Kaapvaal Craton about 3000 to 2100 million years ago. The Ventersdorp Supergroup was the third Basin to develop and provides an exceptional volcano-sedimentary supracrustal record. The Ventersdorp Supergroup comprise of the biggest and most wide-spread system of volcanic rocks in the Kaapvaal Craton.

Some of the best exposures of the Ventersdorp Supergroup are in the Northern Cape Province. This Supergroup consists of the Klipriviersberg Group (oldest) which is overlain by the Platberg Group, followed by the sedimentary Bothaville Formation (Rb) and the volcanic Allanridge Formation (Ra) (uppermost Ventersdorp unit, youngest Formation and present in the development). The Allanridge Formation comprise mostly of light-greenish grey porphyritic lava, dark-green amygdaloidal lava, and pyroclastic rocks. The lavas are approximately 2700 million years old and comprise of basaltic andesites. The Allanridge Formation is not known to be fossiliferous.

The Platberg Group is subdivided in four formations i.e., the Kameeldoorns-, Goedgenoeg-, Makwassie-, and Rietgat Formations (Rr). These formations consist of heterogenous rock varying from chemical and classic sediments, to felsic and mafic volcanics. These rocks were deposited in linear vault troughs during grabed development (Visser et al, 1975-1976, Buck, 1980). These deep intermontane grabens formed in older underlying andesitic terranes and formed areas of debris and scree flows as well as alluvial fan deposits. In these fine-grained chemical and terrigenous sediments, ooids and stromatolites accumulated under lacustrine conditions (Buck, 1980). In time fluvial processes prevailed causing widespread prograding of alluvial fans across basins. The Rietgat Formation consist of alternating sedimentary and volcanic rocks which varies in thickness across the basin.

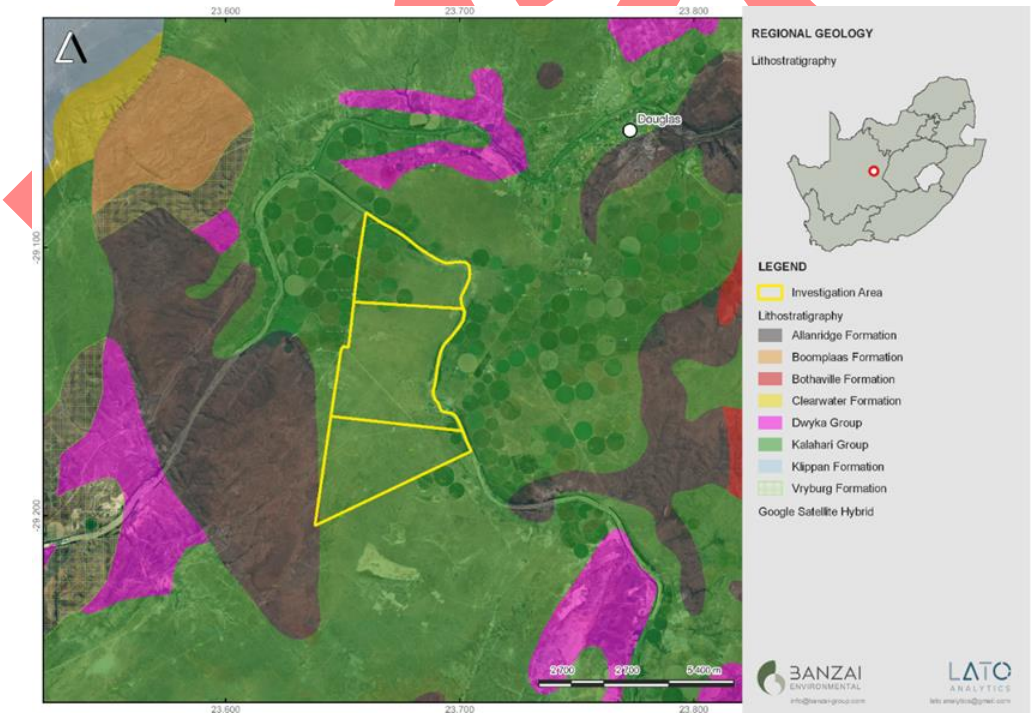


Figure 4: Updated geology (Council for Geosciences, Pretoria) of the proposed development indicates that the development is mainly underlain by the Kalahari Group, with a minute portion of the Allanridge Formation (Platberg Group Ventersdorp Supergroup) in the southern tip

According to the SAHRIS Palaeosensitivity map (Figure 5) the proposed development is underlain by sediments with a High (orange), Moderate (green), Low (blue) Palaeontological Significance.

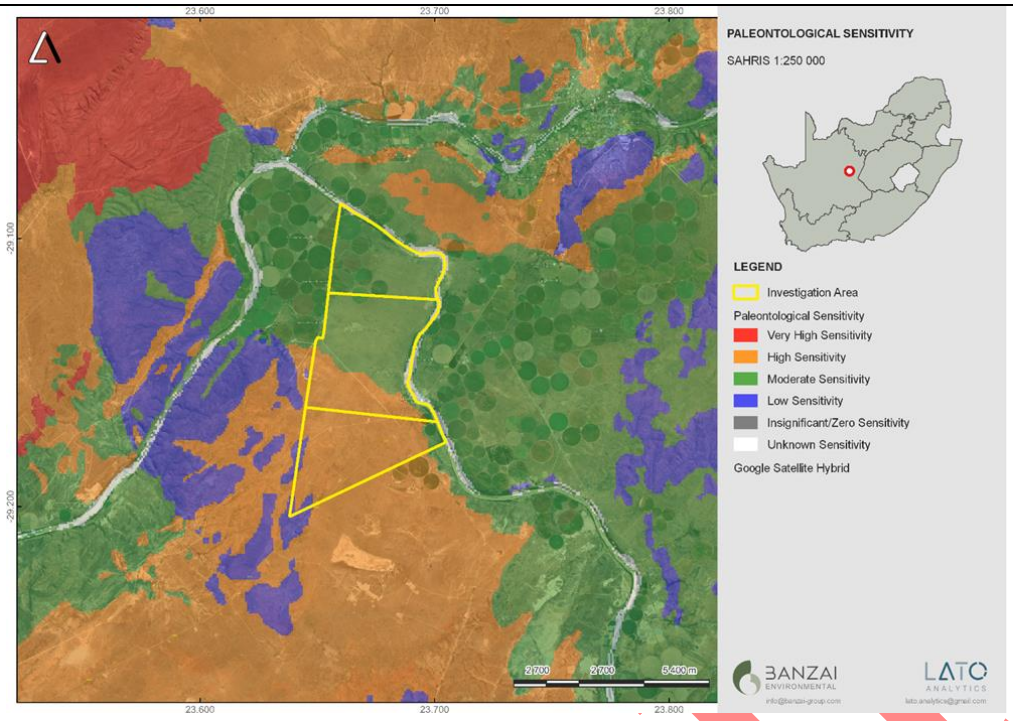


Figure 5: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the Palaeontological Sensitivity of the proposed development.

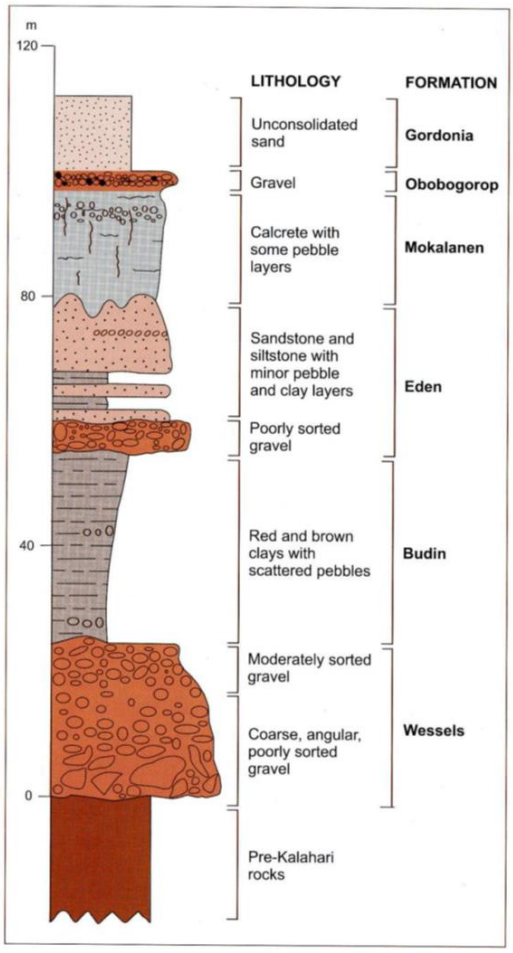


Figure 7: Stratigraphy of the Kalahari Group (Image taken from Partridge et al., 2006). Calcretes and aeolian sands of the Gordonia Formation possibly corresponds to the Mokalanen Formation

DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT

- Socio-economic conditions

Thembelihle Local Municipality

The Pixley Ka Seme District Municipality is a Category C municipality situated in the south-east of the Northern Cape Province. It shares its borders with three other provinces, namely the Free State to the east, the Eastern Cape to the south-east, and the Western Cape to the south-west. It is the second-largest district of the five in the province, but makes up almost a third of its geographical area. The district is comprised of eight local municipalities: Ubuntu, Umsobomvu, Emthanjeni, Kareeberg, Renosterberg, Thembelihle, Siyathemba and Siyancuma. Its main town is De Aar. Traffic flows through the region, linking the major industrial areas of the country. The area has a low rainfall, while the largest river in South Africa flows through it. Two of the major dams in South Africa, the Vanderkloof and Gariep Dams, are situated on the borders of the district municipality

Key Statistics Summary

Demographic Information

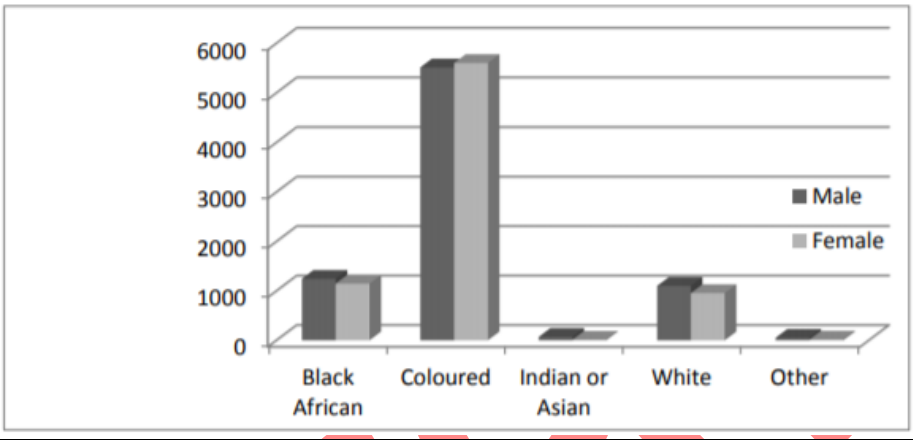
	2016	2011
Population	16 230	15 701
Age Structure		
Population under 15	25.0%	30.9%
Population 15 to 64	68.5%	62.8%
Population over 65	6.5%	6.4%
Dependency Ratio		
Per 100 (15-64)	46.0	59.3
Sex Ratio		
Males per 100 females	104.6	103.3
Population Growth		
Per annum	0.75%	n/a
Labour Market		
Unemployment rate (official)	n/a	28.4%
Youth unemployment rate (official) 15-34	n/a	35.2%
Education (aged 20 +)		
No schooling	10.8%	15.1%
Matric	22.2%	19.9%
Higher education	5.0%	6.6%
Household Dynamics		
Households	4 736	4 140
Average household size	3.4	3.7
Female headed households	32.4%	32.3%
Formal dwellings	77.4%	77.5%
Housing owned	51.0%	51.4%
Household Services		
Flush toilet connected to sewerage	66.4%	60.0%
Weekly refuse removal	59.4%	68.4%
Piped water inside dwelling	39.9%	33.5%
Electricity for lighting	84.2%	75.2%

The chart below shows the population growth from 2011 to 2016 in the Thembelihle Local Municipality.

Population Census 2011

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

The population has grown from 15 705 in 2011 to 16 230 in 2016, which represents a population growth of 0.75% per annum. See the below figure for the demographics of the municipality.



Employment status across population groups

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

a. Description of the current land uses.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

If applicable a Water Use License Application will be launched for conducting prospecting operations.

All infrastructure will be temporary and/or mobile.

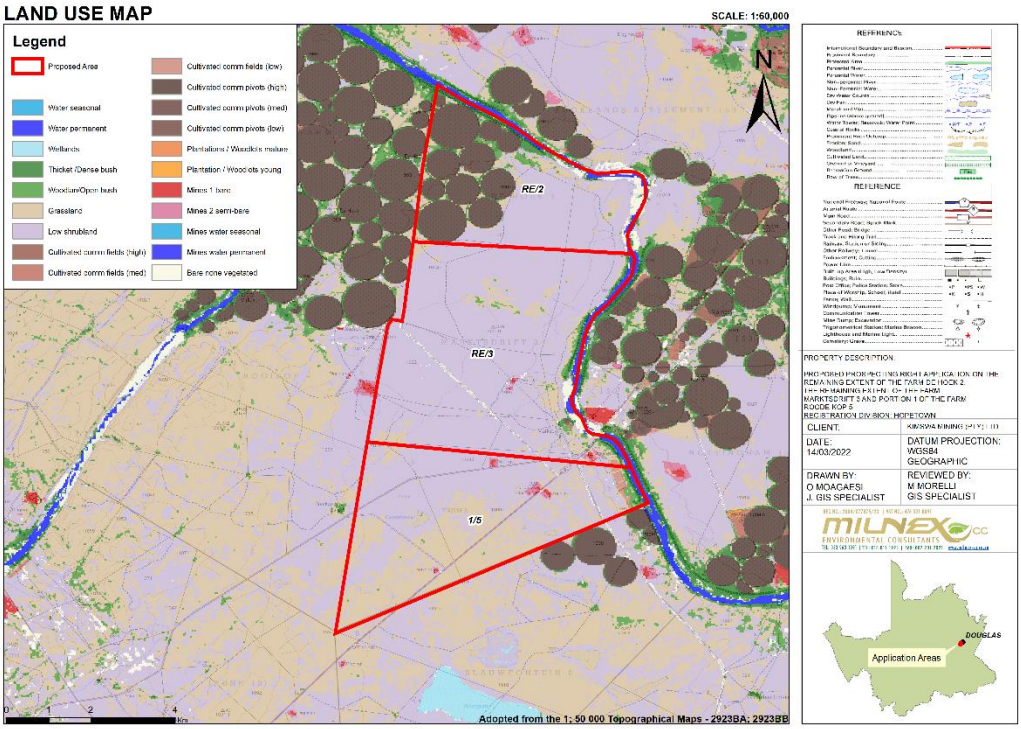


Figure 20: Land use map associated with study site and surrounding areas.

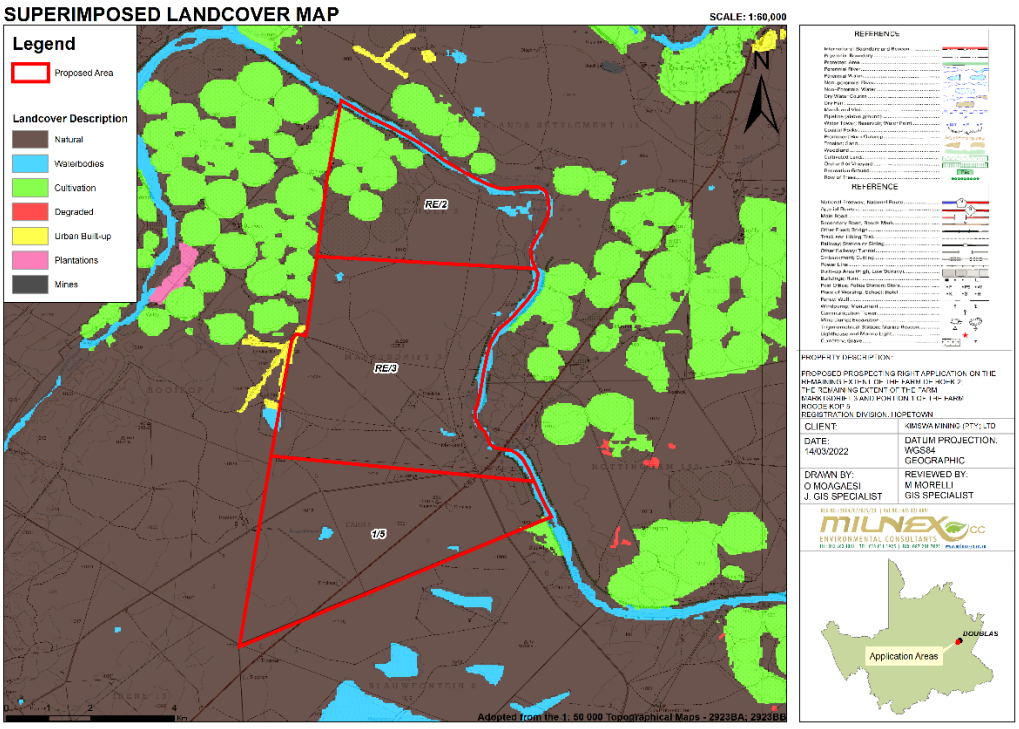


Figure 21: Landcover map associated with study site and surrounding areas.

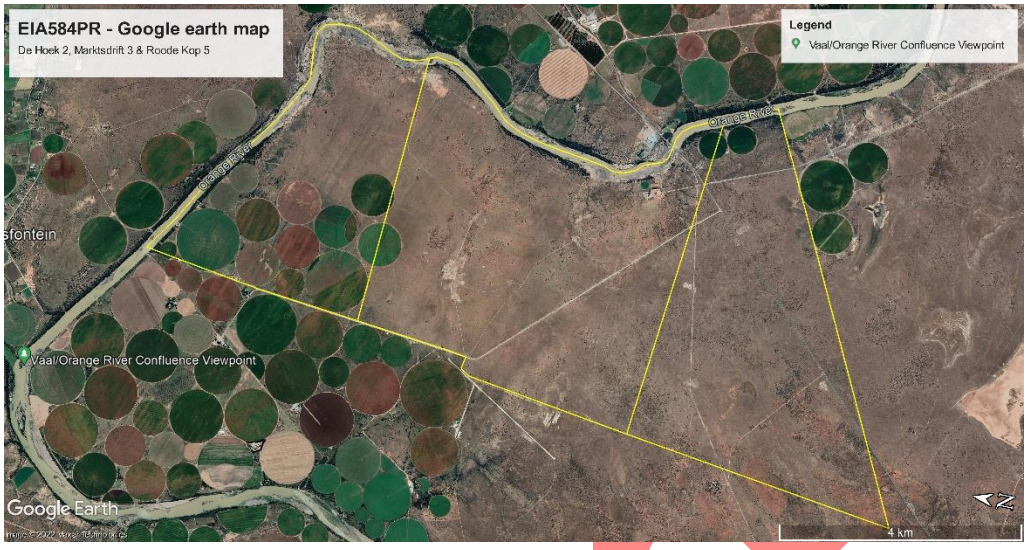


Figure 22: Google earth map of the proposed area.

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

(aa) can be reversed;
(bb) may cause irreplaceable loss of resources; and
(cc) can be avoided, managed or mitigated;

Please see heading **J) AN ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK**, for the impacts identified and their assessment.

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

Method of environmental assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed development. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in the Table below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the following project phases:

- Construction
- Operation
- Decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

Table: *The rating system*

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.

4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

ACTIVITY	PHASE	POTENTIAL NEGATIVE IMPACTS
Site preparation Site Clearance, establishing construction area	Construction Operation Decommissioning	Physical destruction and disturbance of: • Biodiversity (thicket is mostly invasive tree species and area is already disturbed by agricultural activities) • Air pollution • Disturbing noise • Visual impacts
Earthworks	Construction Operation Decommissioning	Excavations: • Loss of soil resources and land capability • Physical destruction and disturbance of biodiversity (thicket is mostly invasive tree species and area is already disturbed by agricultural activities) • Possible pollution of surface water resources • Possible alteration of natural drainage patterns • Possible contamination of groundwater • Air pollution • Disturbing noise • Visual impacts
Civil works Erection of structures, concrete work, steel work, electrical installation, establishing pipelines (if any)	Construction Operation Decommissioning	• Loss of mineral reserves • Hazardous structures/excavations/surface subsidence • Loss of soil resources and land capability • Possible pollution of surface water resources • Possible contamination of groundwater • Air pollution • Disturbing noise • Visual impacts
Open-pit mining Mining, load, and hauling	Construction Operation	• Loss of mineral resources • Loss of soil resources and land capability Physical destruction and disturbance of: • Biodiversity (thicket is mostly invasive tree species and area is already disturbed by agricultural activities) • Air pollution • Disturbing noise • Visual impacts • Possible pollution of surface water resources • Possible contamination of groundwater • Dewatering impacts

Waste rock management Storage, stockpile or final disposal	Operation Decommissioning Closure (final land form)	• Loss of soil resources and land capability • Disturbance of biodiversity (thicket is mostly invasive tree species and area is already disturbed by agricultural activities) • Possible pollution of surface water resources • Possible contamination of groundwater • Air pollution • Disturbing noise • Negative landscape and visual impact
Dirty water management Collection, storage of dirty water for re-use, recycling	Construction Operation Decommissioning	• Possible pollution of surface water resources • Possible contamination of groundwater • Disturbing noise
Stormwater management Stormwater channels and berms, collection of dirty water, storage for re- use	Construction Operation Decommissioning	• Possible alteration of drainage patterns • Possible pollution of surface water resources • Possible contamination of groundwater
Transport systems Use of access points, road transport to and from site for employees and supplies, movement within site boundary (haul roads, conveyors, pipelines), taxi areas	Construction Operation Decommissioning	• Disturbance of biodiversity • Noise • Traffic impacts • Visual impacts
Storage and maintenance services/ facilities Washing vehicles and machinery, storage and handling non-process materials	Construction Operation Decommissioning	• Possible pollution of surface water resources • Possible contamination of groundwater resulting from hydrocarbon spills and soil erosion • Disturbing noise
Demolition Dismantling, demolition, removal of equipment	Operation (as part of maintenance) Decommissioning	• Hazardous structures (e.g., fuel tanks) • Loss of soil resources and land capability • Disturbance of biodiversity • Air pollution • Disturbing noise • Visual impacts
Non-mineralized waste management Transportation of waste materials to waste facility	Construction Operation Decommissioning Closure (limited)	• Pollution if not managed and stored properly
Rehabilitation Replacing soil, slope stabilization, landscaping, re-vegetation, restoration	Construction Operation Decommissioning Closure	• Disturbance of biodiversity • Alteration of natural drainage patterns • Contamination of groundwater • Air pollution • Visual impacts

ACTIVITY	PHASE	POTENTIAL POSITIVE IMPACTS
Job creation	Construction Operation	• Temporary employment and other economic benefits
Maintenance and aftercare Inspection and maintenance of remaining facilities and rehabilitated areas	Closure	• Re-establishment of biodiversity

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

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

Adverse environmental associated with the prospecting activity have been identified through the Scoping & EIR process. Mitigation measures as set out in the Environmental Management Programme (EMPr) attached in Part B must be implemented in order to minimise any potential impacts.

All comments received during the review period of the Scoping and EIR report, as well as response provided is captured and recorded within the Comments and Response Report and will be attached in the final EIR.

POTENTIAL IMPACT	POSSIBLE MITIGATION MEASURES
Influx of persons (job seekers)	• Establish and maintain site security measures • Control site and facility access
Hazardous waste pollution	• Implement hazardous waste, dirty water and mineralised and non- mineralised waste management procedures
Loss of soil resources and land capability through physical disturbance	• Implementation of a soil management plan • Limit disturbance of soil to what is necessary • Stripping, storing, maintenance and replacement of topsoil in accordance with soil management procedures
Physical destruction or disturbance of biodiversity	• Implement a biodiversity management plan • Restrict project footprint • Provide alternative habitat (where appropriate and necessary) • Implement a monitoring programme • Rehabilitate disturbed areas • Prevention of the killing of animal species and harvesting of plant species • Implementation of dust control measures • Pollution prevention measures (water, soil etc.) • Prevention of the disturbance of ecosystems as far as possible.
Surface water pollution	• Appropriate design of polluting facilities and pollution prevention facilities • Implement and maintain stormwater controls that meet regulatory requirements • Implement a monitoring programme (water use, process water quality, rainfall-related discharge quality) • Implement emergency response • Authorise all water uses as defined in the NWA
Groundwater contamination	• Appropriate design of polluting facilities (by qualified person) • Correct handling of hazardous wastes, mineralised and non-mineralised wastes • Compensation for loss • Implementation of a monitoring programme
Dewatering	• Authorise all water uses as defined in the NWA Compliance with relevant license requirements
Air pollution	• Implementation of air quality management plan • Implementation of an air quality monitoring plan • Control dust plumes • Implementation of an air complaints procedure • Maintenance of abatement equipment Implement an emergency response
Noise pollution	• Maintenance of equipment and machinery in good working order • Equip machinery with silencers • Construction of noise attenuation measures (if complaints received)

	• Implementation of noise monitoring programme (if complaints received)
Visual impacts	• Limit the clearing of vegetation as far as possible • Limit the emissions of visual dust plumes • Use of screening berms Concurrent rehabilitation • Painting infrastructure to compliment the surrounding environment Implementation of a closure plan • Management through care and aftercare
Traffic increases	• Implement speed allaying measures where appropriate, e.g. speed humps where necessary • Education and awareness training of workers • Enforce strict speed limits on mine access roads
Heritage and cultural	• Avoid heritage and cultural resources as far as practically possible • Apply for the relevant permits to remove or destroy heritage sites (if applicable) • Exhumation and relocation of graves according to legal requirements (if applicable) • Mark remaining heritage sites on plan
Economic impact	• Hire people from closest communities as far as practically possible • Local procurement of goods and services as far as practically possible • Compensation for loss of land use • Closure planning will consider skills, economic consideration, and the needs of future farming
Land uses	• Implementation of EMPr commitments that focus on environmental and social impacts • Take necessary steps to prevent negative impact on surrounding land • Compensation for loss • Closure planning to incorporate measures to achieve future land use plans

ix) if no alternative development [location] footprints for the activity were investigated, the motivation for not considering such; and

As discussed in the previous section, based on outcomes of previous studies in the vicinity of the proposed site, it is expected that high volumes of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province.

x) a concluding statement indicating the location of the preferred alternative development [location] footprint within the approved site as contemplated in the accepted scoping report;
(Provide a statement motivating the final site layout that is proposed)

The layout follows the limitations of the site and aspects such as, roads, site offices and workshop area as well as fencing.

I. A FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS THE ACTIVITY AND ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED [LOCATION] DEVELOPMENT FOOTPRINT ON THE APPROVED SITE
(AS CONTEMPLATED IN THE ACCEPTED SCOPING REPORT THROUGH THE LIFE OF THE ACTIVITY, INCLUDING—.)

i. A description of all environmental issues and risks that are identified during the environmental impact assessment process

Process for the identification of key issues

The methodology for the identification of key issues aims, as far as possible, to provide a user-friendly analysis of information to allow for easy interpretation.

- Checklist: The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix: The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies, which will be submitted as part of the Environmental Impact Report in order to address the potentially most significant impacts.

Checklist analysis

The site visit was conducted to ensure a proper analysis of the site specific characteristics of the study area. The table below provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format.

Table: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	✕			A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**.
II. A conservation or open space area		✕		A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**.
III. An area that is of cultural importance	✕			According to the Cultural Heritage Impact Assessment (**Appendix 12**), a total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1) and a buffer zone of 50 metres should be maintained The study recommends from a cultural heritage perspective, that the proposed prospecting activities may proceed.

IV. Site of geological significance		×		A Palaeontological Desktop Assessment was conducted, please see **Appendix 12**. According to the study it is considered that the proposed prospecting will not lead to detrimental impacts on the palaeontological heritage of the area.
V. Areas of outstanding natural beauty			×	
VI. Highly productive agricultural land	×			According to the Land Capability map the proposed area falls within land capability Class 7 (**Appendix 5**). The DFFE Screening Report shows the Agriculture Theme Sensitivity is mostly low with areas of very high and medium sensitivity (**Appendix 7**).
VII. Floodplain	×			A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**.
VIII. Indigenous forest			×	According to the land use map the proposed area is mostly covered in Low Shrubland (**Appendix 5**).
IX. Grass land	×			According to the land use map the proposed area is mostly covered by Low Shrubland and to a lesser extent, Grasslands (**Appendix 5**).
X. Bird nesting sites			×	A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**.
XI. Red data species		×		A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**.
XII. Tourist resort		×		
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			Visual impacts will be managed.
III. Noise pollution	×			The noise impact will be limited to working hours.
IV. Construction of an access road		×		Access will be obtained from existing gravel roads off the R357.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.		×		Employment opportunities will be created during the construction and operational phase of the project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			Water will be used during the washing of the gravel and for dust suppression.
VIII. Job creation	×			Employment opportunities will be created during the construction and operational phase of the project.
IX. Traffic generation		×		None.

X. Soil erosion	✕			Only areas earmarked for mining will be cleared. prospecting will be phased and the topsoil stockpiled separately. Concurrent rehabilitation will take place.
XI. Installation of additional bulk telecommunication transmission lines or facilities		✕		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	✕			The Orange River
II. A conservation or open space area		✕		
III. An area that is of cultural importance			✕	According to the DFFE Screening Report the area falls mostly within low Archaeological and Cultural Heritage Theme Sensitivity and certain areas within very high (**Appendix 7**).
IV. A site of geological significance			✕	
V. An area of outstanding natural beauty		✕		
VI. Highly productive agricultural land	✕			According to the Land Capability map the surrounding area falls within land capability Class 7 (**Appendix 5**). The surrounding area have many central pivot irrigation systems for crop production.
VII. A tourist resort			✕	
VIII. A formal or informal settlement		✕		

Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts, and the mitigation of the potential impacts. The matrix also highlights areas of particular concern, which requires more in depth assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented. The matrix also provides an indication if mitigation measures are available.

In order to conceptualise the different impacts the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor**: Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

ii. An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS			MITIGATION OF POTENTIAL IMPACTS	SPECIALIST STUDIES / INFORMATION
		Receptors		Impact description	Minor	Major	Duration	Possible Mitigation	
CONSTRUCTION PHASE									
Listing Notice 1, (GNR 327), Activity 9: *"The development of infrastructure exceeding 1 000 meters in length for the bulk transportation of water or storm water –* *(i) with an internal diameter of 0,36 metres or more: or* *(ii) with a peak throughput of 120 litres per second or more"* ***Listing Notice 1, (GNR 327), Activity 19:*** *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* **Listing Notice 2 (GNR 325), Activity 15:***" The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan."* **Listing Notice 3 (GNR 324), Activity 4:** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***(g)*** *Northern Cape* ***(ii)*** *Outside urban areas;* ***(ee)*** *Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority* **Listing Notice 3 (GNR 324), Activity 12:** "*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***(g)*** *Northern Cape* ***(ii)*** *Critical Biodiversity Areas as identified in biodiversity plans ".*	<u>Site clearing and preparation</u> Areas earmarked for prospecting will need to be cleared, topsoil will be stockpiled separately.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss or fragmentation of indigenous natural vegetation. • Loss of sensitive species. • Loss or fragmentation of habitats.		-	S	Yes	-
			Air	• Air pollution due to the increase of traffic. • Dust from mining/prospecting activities	-		M	Yes	-
			Soil	• Soil degradation, including erosion. • Loss of topsoil. • Disturbance of soils and existing land use (soil compaction).	-	-	S	Yes	-
			Geology	• It is not foreseen that the removal of indigenous vegetation will impact on the geology or vice versa.	-		S	Yes	-
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant.	-		S	Yes	-
			Ground water	• Pollution due to construction vehicles.	-		S	Yes	-
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion. • Destruction of watercourses (pans/dams/streams/wetlands).		-	S	Yes	-
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	S	Yes	-
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility.	-		L	Yes	-
			Traffic volumes	• Increase in construction vehicles.	-		S	Yes	-
			Health & Safety	• Air/dust pollution. • Road safety. • Increased risk of veld fires.		-	S	Yes	-
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills, excavators, dumper trucks and people working on the site.	-		L	Yes	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the construction activities will not have an impact on tourism in the area.	-		M	Yes	-

			Heritage resources	• Removal or destruction of archaeological and/or paleontological sites. • Removal or destruction of buildings, structures, places and equipment of cultural significance. • Removal or destruction of graves, cemeteries and burial grounds.		-	L	Yes	-
OPERATIONAL PHASE									
Listing Notice 1 (GNR327), Activity 9: *"The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;"* ***Listing Notice 1, (GNR 327), Activity 19:*** *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* **Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):** *"Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the prospecting right"* **Listing Notice 2 (GNR 325), Activity 15:** *" The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan."* **Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021):** *"The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission.* **Listing Notice 3 (GNR 324), Activity 4:** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***(g)*** *Northern Cape* ***(ii)*** *Outside urban areas;* ***(ee)*** *Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority* **Listing Notice 3 (GNR 324), Activity 12:** "*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***(g)*** *Northern Cape* ***(ii)*** *Critical Biodiversity Areas as identified in biodiversity plans ".*	The key components of the proposed project are described below: • <u>Supporting Infrastructure</u> - A control facility with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 50m² or less. Other supporting infrastructure includes a site office and workshop area. • <u>Roads</u> – Access will be obtained from existing gravel roads off the R357. • <u>Fencing</u> - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Fragmentation of habitats. • Establishment and spread of declared weeds and alien invader plants (operations).		-	L	Yes	-
			Air quality	• Air pollution due to the mining / prospecting activity and transport of the gravel to the designated areas.	-		S	Yes	-
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Loss of agricultural potential (medium - high significance relative to agricultural potential of the site).	-		L	Yes	-
			Geology	• Collapsible soil. • Seepage (shallow water table). • Active soil (high soil heave). • Erodible soil. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		L	Yes	-
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increased consumption of water, dust suppression.	-		L	Yes	-
			Ground water	• Leakage of hazardous materials. The machinery on site require oils and fuel to function. Leakage of these oils and fuels can contaminate water supplies.	-		L	Yes	-
			Surface water	• Increase in storm water runoff. The development will potentially result in an increase in storm water run-off that needs to be managed to prevent soil erosion. • Destruction of watercourses (pans/dams/streams/wetlands). • Leakage of hazardous materials. The machinery on site require oils and fuel to function. Leakage of these oils and fuels can contaminate water supplies.		-	L	Yes	-
			Local unemployment rate	• Job creation. Security guards will be required for 24 hours every day of the week. • Skills development.		+	L	Yes	-
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	• The proposed portions are used for livestock grazing and cultivation which will still take place simultaneously with the prospecting activity, however this depends on the location of the activity.	-		L	Yes	-
			Traffic volumes	• Increase in vehicles collecting gravel for distribution.	-		S	Yes	-
			Health & Safety	• Air/dust pollution. • Road safety.	-		S	Yes	-
			Noise levels	• The proposed development will result in noise pollution during the operational phase.	-		M	Yes	-

			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities may have an impact on tourism in the area.	-		M	Yes	-
			Heritage resources	• It is not foreseen that the proposed activity will impact on heritage resources or vice versa.	N/A	N/A	N/A	N/A	-
DECOMMISSIONING PHASE									
-	<u>Mine closure</u> During the mine closure the Mine and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Re-vegetation of exposed soil surfaces to ensure no erosion in these areas.		+	L	Yes	-
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	Yes	-
			Soil	• Backfilling of all voids • Placing of topsoil on backfill		+	L	Yes	-
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	-
			Existing services infrastructure	• Generation of waste that need to be accommodated at the local landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		S	Yes	-
			Ground water	• Pollution due to construction vehicles.	-		S	Yes	-
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion. • Destruction of watercourses (pans/dams/streams/wetlands).	-		S	Yes	-
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Loss of employment.	-		L	Yes	-
			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility.	-		S	Yes	-
			Traffic volumes	• Increase in construction vehicles.	-		S	Yes	-
			Health & Safety	• Air/dust pollution. • Road safety. • Increased crime levels. The presence of mine workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.		-	L	Yes	-
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		S	Yes	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	+		S	Yes	-
			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.	N/A	N/A	N/A	N/A	-

(N/A) No impact (+) Positive Impact (-) Negative Impact (S) Short Term (M) Medium Term (L) Long Term

J. AN ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK, INCLUDING—

i. cumulative impacts;
ii. the nature, significance and consequences of the impact and risk;
iii. the extent and duration of the impact and risk;
iv. the probability of the impact and risk occurring;
v. the degree to which the impact and risk can be reversed;
vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and
vii. the degree to which the impact and risk can be mitigated;

Significance of potential impacts

The following sections present the outcome of the significance rating exercise. The results suggest that almost none of the key issues identified as part of the EIR process had a negative high environmental significance. Instead the overall score indicate a low environmental significance score.

INITIAL CLEARANCE AND SITE PREPARATION PHASE

Direct impacts: During this phase minor negative impacts are foreseen over the short term. The latter refers to a period of weeks. The site preparation may result in the loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats, soil erosion, hydrology, and temporary noise disturbance, generation of waste, visual intrusions, increase in heavy vehicle traffic, and risk to safety, livestock/game and farm infrastructure, and increased risk of veld fires. The abovementioned impacts are discussed in more detail below:

- **Loss or fragmentation of indigenous natural fauna and flora:**

The proposed area falls within vegetation unit AZa 4 and NKu 3, which is known as the Upper Gariep Alluvial Vegetation and Northern Upper Karoo. The Upper Gariep Alluvial Vegetation is part of the Alluvial Vegetation Bioregion which is a sub-bioregion for the Inland Azonal Vegetation. The Northern Upper Karoo is part of the Upper Karoo Bioregion, which is a sub-bioregion for the Nama-Karoo Biome.

Upper Gariep Alluvial Vegetation

Upper Gariep Alluvial Vegetation has a conservation which is vulnerable with a target of 31%. Only about 3% statutorily conserved in Tussen Die Riviere, Gariep Dam and Oviston Nature Reserve. More than 20% transformation for cultivation (vegetable grapes) and building of dams. Exotic woody species such as Salix babylonica, Eucalyptus camaldulensis, E. sideroxylon, Prosopis and Populus species have become common dominants in patches of heavily disturbed alluvial vegetation (Mucina and Rutherford, 2006:639-640).

Northern Upper Karoo

Mucina and Rutherford (2006:340) also states that the conservation of the Northern Upper Karoo, is Least Threatened with a target of 21%. About 4% has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams (Houwater, Kalkfontein and Smart Syndicate Dams). Areas of human settlements are increasing in the north-eastern part of this vegetation types. Erosion is moderate at 46.2%, very low at 32% and low at 20%. According to Hoffman *et al.* (1999) as stated by Mucina and Rutherford (2006:340) *Prosopis* occurs in generally isolated patches, with densities ranging from very scattered to medium (associated with the lower Vaal River drainage system and the confluences with the Orange River) to localised closed woodland on the western borders of the unit with Bushmanland Basin Shrubland.

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

The vegetation units in which the project area is located are both Least Concern. The area is relatively undisturbed (except for agricultural field and mining areas). Several species of conservation concern are present in the area which contributes to it having a higher sensitivity.

The largest vegetation unit, the Senegalia mellifera - Lycium cinereum karoo is in a relatively good condition, well connected and provides a habitat for the endangered Ludwig's Bustard, the vulnerable Secretary bird, two protected tree species (Boscia albitrunca and Vachellia erioloba) and the provincially protected Boscia foetida. It therefore has a medium-high sensitivity.

The rocky outcrops are also relatively undisturbed. The protected tree Boscia albitrunca is quite common in this vegetation unit and therefore the sensitivity is medium.

The riparian area is very well connected (to the rest of the Orange River). The Near Threatened Spotted-necked Otter is present in this unit. The sensitivity of the riparian area is medium.

The agricultural field are very disturbed with a low species diversity, but due to the occasional presence of the Near Threatened Blue Crane it is considered to have a medium-low sensitivity (Figure 21).

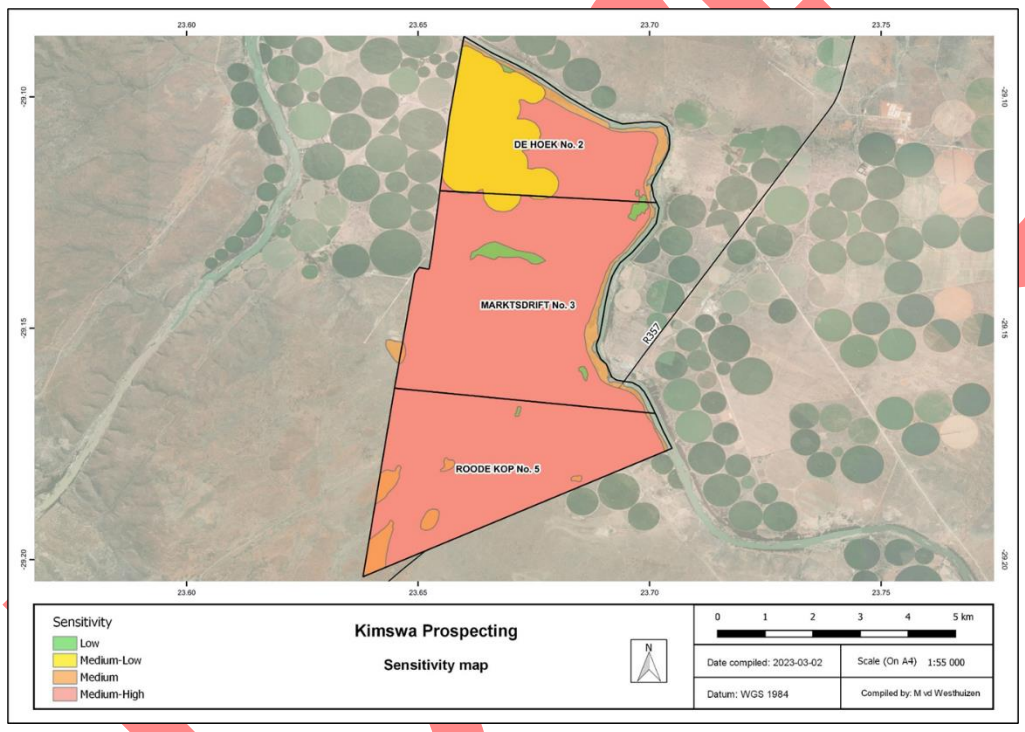


Figure 21: Sensitivity map

- **Loss or fragmentation of habitats**

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

5.1 Direct habitat destruction and fragmentation

5.1.1 Description of impact:

When prospecting takes place vegetation will be disturbed and habitat will be lost. If rehabilitation does not take place, damage will be permanent or very long term. Vegetation will be disturbed and damaged as vehicles drive through the veld. Trees will likely be removed and burrows that are used by a variety of animals will be destroyed. These animals include aardvarks, wathogs, ground squirrels, mongoose and snakes.

Vegetation communities are likely to be impacted on a small spatial scale in comparison to the extent of the vegetation communities' total area in the region.

The impact of the habitat destruction will be on the flora and fauna of the study area in the following ways:

- *The prospecting will lead to the loss of individual plants such as grasses, forbs, trees, and shrubs that will be cleared for prospecting purposes*
- *Due to habitat loss and construction activities, animals will migrate from the construction area and animal numbers will decrease.*
- *Loss of species of conservation concern: Disturbance of habitats and noise may displace species of conservation concern of which several are present in the project area (See section 4).*
- *Changes in the community structure: It is expected that the faunal species composition will shift, due to an anticipated loss in habitat surface area. In addition, it is predicted that more generalist species (and a loss of functional guilds) will dominate the study area. Attempts to rehabilitate will attract taxa with unspecialised and generalist life-histories. It is predicted that such taxa will persist for many years before conditions become suitable for succession to progress.*

5.1.2 Mitigation measures:

- *Rehabilitation of areas where prospecting took place is essential. Rehabilitation has to occur concurrently with prospecting. Soil must be replaced and areas must be revegetated with indigenous plant species. One area has to be rehabilitated before the next is disturbed. Waste has to be removed throughout the project.*
- *Protected trees and provincially protected plant species should not be removed as far as possible. If any protected tree or provincially protected plant is to be removed, the necessary licenses or permits have to be applied for.*
- *Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum.*
- *Sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.*
- *All prospecting activities should be restricted to specific recommended areas. Storage of equipment, fuel and other materials should be limited to demarcated areas.*
- *Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. They should specifically be made aware of the species of conservation concern present in the project area.*
- *Use existing facilities (e.g., impacted areas and roads) to the extent possible to minimise the amount of new disturbance.*
- *Disturbance in the pans and riparian areas must be minimised.*

- **Loss of fauna**

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

5.2 Loss of fauna

5.2.1 Description of impact:

An increase in human activity on the site and surrounding areas is anticipated. The risk of snaring, killing, and hunting of certain faunal species is increased. If staff compounds are erected for construction workers, the risk of pollution because of litter and inadequate sanitation and the introduction of invasive fauna and flora are increased. The presence of many workers on site over a protracted period will result in a greatly increased risk of uncontrolled fires arising from cooking fires, improperly disposed cigarettes etc.

Large numbers of fauna are also killed daily on roads. They are either being crushed under the tyres of vehicles in the case of crawling species, or by colliding with the vehicle itself in the case of avifauna or flying invertebrates. The impact is intensified at night, especially for flying insects, as result of their attraction to the lights of vehicles.

5.2.2 Mitigation measures:

- *Site clearing to take place in a phased manner (where possible) to allow for any faunal species present to move away from the study site to the surrounding open space areas.*
- *Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.*
- *Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by a suitably qualified ECO trained in the handling and relocation of animals.*
- *Should any sensitive or Red Data animal or bird species be encountered during the construction, operation and decommissioning activities, these should be relocated to natural areas in the vicinity.*
- *Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance.*
- *General avoidance of snakes is the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area.*
- *No hunting, trapping or killing of fauna are allowed.*
- *Trenches and deep excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are exposed should contain soil ramps allowing fauna to escape the trench.*
- *No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site.*
- *Educate construction workers regarding risks and correct disposal of cigarettes.*
- *More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences).*
- *Travelling at night should be avoided or limited as much as possible.*
- *Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.*
- *Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.*

- **Increased Soil erosion and sedimentation**

Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal and the establishment of roads. Erosion will cause loss and deterioration of soil resources. The erosion risk is low due to the low slope gradients.

SPECIALIST STUDY

A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**. Please see the findings in the table below:

Terrestrial Biodiversity Impact Assessment

Please see the findings in the table below:

5.3 Increased Soil erosion and sedimentation

5.3.1 Description of impact:

Prospecting may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora.

5.3.2 Mitigation measures:

- *Rehabilitation has to occur concurrently with prospecting. Soil must be replaced in trenches and areas must be revegetated with indigenous plant species. One area has to be rehabilitated before the next is disturbed.*
- *Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.*
- *Protect sloping areas and drainage channel banks that are susceptible to erosion.*

- *Repair all erosion damage as soon as possible.*

A Wetland Delineation and Assessment
Please see the findings in the table below:

6.1 Soil Erosion and Sedimentation

6.1.1 Description of impact:

Groundworks for the proposed prospecting will disturb the soil. If the soil is not protected or quickly rehabilitated, this will lead to soil erosion and sedimentation of the river and pans. Compaction by heavy vehicles will also increase runoff and potentially contribute towards soil erosion and sedimentation.

6.1.2 Mitigation measures

- *Compaction of soils must be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish must be cleared and follow-up undertaken for the duration of the construction and decommissioning phases. It is to be undertaken by the Internal Environmental Officer or the Environmental Control Officer. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area).*
- *Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion.*
- *If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted.*
- *Vehicle traffic must not be allowed on the rehabilitated areas, except on allocated roads, due to adverse impacts of dispersive/compaction characteristics of soils and its implications on the long term.*
- *The indiscriminate use of machinery within the wetland area will lead to compaction of soils and destruction of vegetation and must therefore be strictly controlled.*

- **Soil and water pollution**

SPECIALIST STUDY
A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**. Please see the findings in the table below:

Terrestrial Biodiversity Impact Assessment
Please see the findings in the table below:

5.4 Soil and water pollution

5.4.1 Description of impact:

Prospecting carries a risk of soil and water pollution, with earth moving equipment contributing due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or groundwater, leading to potential medium/long-term impacts on fauna and flora.

5.4.2 Mitigation measures:

- *Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way.*
- *Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.*
- *Spill kits should be on-hand to deal with spills immediately.*
- *All vehicles should be inspected for oil and fuel leaks on a regular basis.*
- *After decommissioning all materials must be disposed of in a responsible manner.*

Wetland Delineation and Assessment
Pease see the findings below:

6.2 Soil and water pollution

6.2.1 Description of impact:

Prospecting will also carry a risk of soil and water pollution, with earth moving equipment contributing due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora.

6.2.2 Mitigation measures

- *Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.*
- *No dumping of waste must take place within the wetlands or their buffer zones. If any spills occur, they must be cleaned up immediately.*
- *Appropriate sanitary facilities must be provided for the duration of the proposed prospecting and all waste removed to an appropriate waste facility.*
- *Excess waste or chemicals must be removed from site and discarded in an environmentally friendly way. The Environmental Control Officer (ECO) must enforce this rule rigorously.*
- *Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off.*
- *Spill kits must be on-hand to deal with spills immediately.*
- *All vehicles must be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site must make provision for drip trays to capture spills. Drip trays must be emptied into a holding tank and returned to the supplier.*
- *A speed limit (preferably 40 km/hour) must be enforced on dirt roads.*
- *Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with the label and application permit directions and stipulations for terrestrial and aquatic applications.*

- **Spread and establishment of alien invasive species**

SPECIALIST STUDY

A Wetland Delineation and Assessment and Terrestrial Biodiversity Impact Assessment were conducted by Mari van der Westhuizen. The reports are available under **Appendix 12**. Please see the findings in the table below:

Terrestrial Biodiversity Impact Assessment

Please see the findings in the table below:

5.5 Spread and establishment of alien invasive species

5.5.1 Description of impact:

Continued movement of vehicles on and off the site during prospecting will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. Habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.

Nine alien invasive plant species were recorded in the project area (See Section 4.3). These species will likely spread and increase in numbers due to disturbance caused by prospecting activities.

5.5.2 Mitigation measures:

- *Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys.*
- *Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.*

- *Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species do not spread to surrounding natural ecosystems.*
- *After decommissioning, the site has to be rehabilitated by sowing indigenous grass species. The control and monitoring of declared invaders have to continue for two years after prospecting or mining is completed.*

Wetland Delineation and Assessment

Please see the findings below:

6.4 Spread and establishment of alien invasive species

6.4.1 Description of impact:

The prospecting activities carries the greatest risk of alien invasive species being imported to the site, and habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.

Continued movement of personnel and vehicles on and off the site, will result in a risk of importation of alien species throughout the life of the project.

Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced.

6.4.2 Mitigation measures

- *Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas. Control must begin prior to construction phase considering that small populations of invader plant species occur around the project area.*
- *Institute strict control over materials brought onto site, which must be inspected for seeds and steps taken to eradicate these before transport to the site. The contractor is responsible for the control of weeds and invader plants.*
- *Rehabilitate disturbed areas as quickly as possible.Institute a monitoring programme during construction, undertaken by the IEO or the ECO, to detect alien invasive species early. Monitoring must be done periodically by the ECO.*
- *Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas.*

- **Disturbance of watercourse habitat and fringe vegetation**

SPECIALIST STUDY

A *Wetland Delineation and Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**.

Please see the findings in the table below:

6.2 Disturbance of watercourse habitat and fringe vegetation

6.2.1 Description of impact:

Disturbance to riparian area and pans during prospecting activities is inevitable as earth moving vehicles will operate in the area. As habitat is disturbed, fauna and flora will be negatively impacted. Vegetation structure may change, affecting wetland properties and fauna.

6.2.2 Mitigation measures

- As far as possible, disturbance must be kept outside of the wetlands and their buffer zones.
- Existing access roads must be used where possible.

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Table 19: Impact rating

Impact	Without (WOM) or With Mitigation (WM)	Nature of Impact (Negative or Positive)	GEOGRAPHICAL EXTENT		PROBABILITY		DURATION		REVERSIBILITY		IRREPLACEABLE LOSS OF RESOURCES		CUMULATIVE EFFECT		INTENSITY/ MAGNITUDE		SIGNIFICANCE	
			Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score
Habitat destruction and fragmentation	WOM	Negative	Site	1	Definite	4	Long term	3	Partly reversible	2	Marginal	2	Low	2	Medium	2	Low	28
	WM	Negative	Site	1	Definite	4	Medium term	2	Partly reversible	2	No loss	1	Negligible	1	Low	1	Low	11
Loss of fauna	WOM	Negative	Site	1	Probable	3	Long term	3	Barely reversible	3	Marginal	2	Medium	3	High	3	Medium	45
	WM	Negative	Site	1	Probable	3	Short term	1	Partly reversible	2	No loss	1	Low	2	Medium	2	Low	20
Increased Soil erosion and sedimentation	WOM	Negative	Site	1	Probable	3	Long term	3	Partly reversible	2	Marginal	2	Low	2	Medium	2	Low	26
	WM	Negative	Site	1	Possible	2	Medium term	2	Partly reversible	2	No loss	1	Negligible	1	Low	1	Low	9
Soil and water pollution	WOM	Negative	Site	1	Probable	3	Long term	3	Barely reversible	3	Marginal	2	Low	2	Medium	2	Low	28
	WM	Negative	Site	1	Possible	2	Medium term	2	Partly reversible	2	No loss	1	Negligible	1	Low	1	Low	9
Spread and establishment of alien invasive species	WOM	Negative	Site	1	Definite	4	Long term	3	Partly reversible	2	Marginal	2	Medium	3	Medium	2	Medium	30
	WM	Negative	Site	1	Possible	2	Medium term	2	Completely reversible	1	No loss	1	Low	2	Low	1	Low	9

SPECIALIST STUDY

A *Wetland Delineation and Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

6.5 Impact rating

As can be seen in Table 11 all the risks are rated as moderate. The reason for this is that any impact that takes place inside a wetland automatically receives a severity value of 5. As we do not yet know where prospecting will take place, it is assumed that it will be inside the wetlands. If however, all disturbance are kept outside of the riparian area and pans, the risk on wetlands will be low.

Table 11: Risk Matrix Assessment: Floodplain (river and riparian area) and endorheic depression wetlands (pans)

RISK MATRIX (BasedA1:W28 on DWS 2015 publication: Section 21 c and I water use Risk Assessment Protocol)
NAME and REGISTRATION No of SACNASP Professional member: Mari van der Westhuizen..... Reg no. 400166/15
Risk to be scored for construction and operational phases of the project. MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

No.	Wetlands	Activity	Aspect	Impact	Severity															
					Flow Regime	Water quality	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures Mitigation Measures	PES AND EIS OF WATERCOURSE
1	Floodplain	Earth works for prospecting	Compaction and exposure of soil	Soil Erosion and Sedimentation	5	5	5	5	5	1	3	9	2	2	5	1	10	90	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class B: Largely natural; EIS - High
	Pans		Compaction and exposure of soil	Soil Erosion and Sedimentation	5	5	5	5	5	1	3	9	2	2	5	1	10	90	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class C: Moderately Modified; EIS - Low/Marginal
2	Floodplain	Earth works, destruction and disturbance of vegetation	Excavation of gravel	Disturbance of watercourse habitat and fringe vegetation	5	5	5	5	5	1	3	9	2	3	5	1	11	99	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class B: Largely natural; EIS - High
	Pans		Excavation of gravel	Disturbance of watercourse habitat and fringe vegetation	5	5	5	5	5	1	3	9	2	3	5	1	11	99	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class C: Moderately Modified; EIS - Low/Marginal
3	Floodplain	Movement of vehicles on site	Spillage of harmful substances Leakages by vehicles	Soil and Water pollution	5	5	5	5	5	1	2	8	2	1	5	2	10	80	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class B: Largely natural; EIS - High
	Pans		Spillage of harmful substances Leakages by vehicles		5	5	5	5	5	1	2	8	2	1	5	2	10	80	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class C: Moderately Modified; EIS - Low/Marginal
4	Floodplain	Movement of people and vehicles to and from the development site	Import of invasive species and disturbance of soil	Import and spread of alien invasive vegetation	5	5	5	5	5	1	2	8	2	4	5	1	12	96	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class B: Largely natural; EIS - High
	Pans		Import of invasive species and disturbance of soil		5	5	5	5	5	1	2	8	2	4	5	1	12	96	Moderate Risk	80%	Please refer to wetland assessment report	PES - Class C: Moderately Modified; EIS - Low/Marginal

- **Loss of topsoil**

Topsoil may be lost due to poor topsoil management (burial, erosion, etc.) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.) The effect will be the loss of soil fertility on disturbed areas after rehabilitation.

Loss of topsoil	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Geographical extent	Site (1)	Site (1)
Probability	Definite (4)	Possible (2)
Duration	Permanent (4)	Medium term (2)
Magnitude	High (3)	Medium (2)
Reversibility	Barely reversible (3)	Completely reversible (1)
Irreplaceable loss of resources	Significant loss of resource (3)	Marginal loss (2)
Cumulative impact	Medium cumulative impact (3).	
Significance	**Negative high (54)**	**Negative Low (22)**
Can impacts be mitigated?	The following mitigation or management measures are provided: • If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. • Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. • Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land. • During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. • Erosion must be controlled where necessary on top soiled areas. Establish an effective record keeping system for each area where soil is disturbed for constructional purposes. These records should be included in environmental performance reports, and should include all the records below. • Record the GPS coordinates of each area. • Record the date of topsoil stripping. • Record the GPS coordinates of where the topsoil is stockpiled. • Record the date of cessation of constructional (or operational) activities at the particular site. • Photograph the area on cessation of constructional activities. • Record date and depth of re-spreading of topsoil. • Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time. Section (f) of the EMPr also provide mitigation measures related to topsoil management.	

- **Temporary noise disturbance**

Preparation activities will result in the generation of noise over a period of months. Sources of noise are likely to include vehicles, the use of machinery such as back actors and people working on the site. The noise impact is unlikely to be significant; but activities should be limited to normal working days and hours (6:00 – 18:00).

Agricultural activities and other mining activities in the area also contribute to noise disturbance.

Temporary noise disturbance	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Possible (2)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Medium (2)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2).	
Significance	**Negative low (20)**	**Negative low (18)**
Can impacts be mitigated?	Yes, management actions related to noise pollution are included in section (f) of the EMPr.	

- **Generation of waste - general waste, construction waste, sewage and grey water**

The workers on site are likely to generate general waste such as food wastes, packaging, bottles, etc. Construction waste is likely to consist of packaging, scrap metals, waste cement, etc If any). The applicant will need to ensure that general and construction waste is appropriately disposed of i.e. taken to the nearest licensed landfill. Sufficient ablution facilities must be provided, in the form of portable/VIP toilets.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Possible (2)	Possible (2)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resource (2)	No loss of resource (1)
Cumulative impact	Low cumulative impact (2) - An additional demand for landfill space could result in significant cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	
Significance	**Negative low (26)**	**Negative low (12)**
Can impacts be mitigated?	Yes, it is therefore important that all management actions and mitigation measures included in section (f) of the EMPr are implemented.	

- **Impacts on heritage and palaeontology.**

Palaeontological Desktop Assessment

A Palaeontological Desktop Assessment was conducted by Elize Butler from Banzai Environmental (Pty) Ltd. The report is available under **Appendix 12**. Please see the findings in the table below:

Loss of fossil heritage will be a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur and are regarded as having a Low probability. As fossil heritage will be destroyed the impact is irreversible. The significance of the impact occurring will be low.

Table 7: Summary of Impact Tables

	Site	Probability	Duration	Magnitude	Reversibility	Irreplicable Loss	Cumulative Effect	Significance
	1	2	4	1	4	4	2	17

Cultural Heritage Impact Assessment

A Cultural Heritage Impact Assessment was conducted by Francois P Coetzee. The report is available under **Appendix 12**. Please see the findings in the table below:

A total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1). The lower-level bridge was probable used from the early 20th century and was replaced with the bridge that is currently in use.

As a result the following recommendations and mitigation measures are proposed:

- *A buffer zone of 50 metres should be maintained*

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective, that the proposed prospecting activities may proceed.

Nature: Historical bridge (Site 1)		
	Without mitigation	**With mitigation**
Operational (Mining) Phase		
Probability	Definite (5)	Very Improbable (1)
Duration	Permanent (5)	Short term (2)
Extent	Limited to the site (1)	Limited to the site (1)
Magnitude	Very High (10)	Minor (2)
Significance of Impact	**80 (High)**	**5 (Low)**
Status (positive or negative)	Negative	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	None
Cumulative impacts and indirect impacts	Mining activities result in extensive heavy vehicle traffic, extraction of deposits, movements of heavy machinery which culminate in vibrations and dust.	
Can impacts be mitigated?	Yes, a 50 metres buffer zone	

Table 8: Significance of the impact

Also, please note:
Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

Impacts on heritage and palaeontology.	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Probable (3)	Possible (2)
Duration	Short term (1)	Short term (1)
Magnitude	Very High (4)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Significant loss of resource (3)	Marginal loss of resource (2)

Cumulative impact	Low cumulative impact (2). Should these impacts occur, there may be a cumulative impact on the preservation of heritage objects in the area.	
Significance	**Negative High (56)**	**Negative low (24)**
Can impacts be mitigated?	If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. Also refer to section (f) of the EMPr. The following shall apply: • Known sites should be clearly marked in order that they can be avoided during construction activities. • The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. • Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible; • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental • Control Officer will advise the necessary actions to be taken; • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1). In order to achieve this, the following should be in place: • A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage. • Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above. • In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.	

Indirect impacts: The nuisance aspects generally associated with the installation of infrastructure or ground preparation will also be applicable to this development, which relates primarily to the increase in vehicle traffic associated with prospecting practices, the influx of job seekers to the area, risk to safety, livestock/game and farm infrastructure, and increased risk of veld fires.

- **Increase in vehicle traffic**

The movement of heavy vehicles during the clearance of vegetation and topsoil has the potential to damage local farm roads and create dust and safety impacts for other road users in the area. Access will be obtained from existing gravel roads off the R357. While the volume of traffic along this gravel roads off the R357 is Low, the movement of heavy vehicles along this road is likely to damage the road surface and impact on other road users. The contractor should be required to ensure that damage to the road is repaired periodically. The movement of additional heavy vehicle traffic will add significantly to the current traffic load on the gravel roads and the R357. The impact on the roads is therefore likely to be moderate.

Increase in vehicle traffic	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Medium term (2)
Magnitude	Medium (2)	Medium (2)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3). If damage to roads is not repaired, then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.	
Significance	**Negative low impacts (26)**	**Negative low (20)**
Can impacts be mitigated?	The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include: • The contractor must ensure that damage caused by construction on the roads are repaired. The costs associated with the repair must be borne by the contractor; • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers; • All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. Also refer section (f) of the EMPr. For mitigation measures related to traffic.	

- **Risk to safety, livestock/game, and farm infrastructure**

The presence on and movement of workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site threat. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of mine workers on the site.

Risk to safety, livestock/game, and farm infrastructure	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Unlikely (1)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Low (1)

Reversibility	Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources	Marginal resource (2)	Marginal resource (2)
Cumulative impact	Low cumulative effects (2), provided losses are compensated for.	
Significance	**Negative low (24)**	**Negative low (10)**
Can impacts be mitigated?	Key mitigation measures include: • **Kimswa Mining (Pty) Ltd** should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences; • The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area; • Contractors appointed by **Kimswa Mining (Pty) Ltd** should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties; • **Kimswa Mining (Pty) Ltd** should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below); • The Environmental Management Programme (EMPr) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock/game if ingested; • Contractors appointed **Kimswa Mining (Pty) Ltd** must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by **Kimswa Mining (Pty) Ltd** must ensure that construction workers who are found guilty of trespassing, stealing livestock/game and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation; • The housing of construction workers on the site should be strictly limited to security personnel (if any).	

- **Increased risk of veld fires**

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could in turn pose a threat to livestock/game, crops, wildlife and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. The potential risk of grass fires was heightened by the windy conditions in the area, especially during the dry, windy winter months from May to October. In terms of potential mitigation measures, a fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase. In addition, fire-fighting equipment should be provided on site during the different phase of prospect.

Increased risk of veld fires	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Site (1)
Probability	Probable (3)	Possible (2)
Duration	Medium term (2)	Medium term (2)
Magnitude	Very high (4)	Medium (2)
Reversibility	Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources	Significant loss (3)	Marginal loss (2)
Cumulative impact	Medium cumulative effects (3), provided losses are compensated for.	
Significance	**Negative high (60)**	**Negative low (22)**
Can impacts be mitigated?	The mitigation measures include: • A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase; • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas; • Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months; • Contractor to provide adequate firefighting equipment on-site, including a fire fighting vehicle; • Contractor to provide fire-fighting training to selected construction staff; • No construction staff, with the exception of security staff, to be accommodated on site over night; • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the firefighting costs borne by farmers and local authorities.	

OPERATIONAL PHASE

Direct impacts: During the operational phase the study area will serve as an prospecting area and the impacts are generally associated with soil erosion, change in land use, impacts associated with the, increase in storm water runoff, increased consumption of water, visual intrusion, the generation of general waste, leakage of hazardous materials, and the change in the sense of place. The operational phase will also have a direct positive impact through the provision of permanent employment opportunities and facilitating a positive economic growth. The abovementioned impacts are discussed in more detail below:

- **Soil erosion**

The largest risk factor for soil erosion will be during the operational phase when the prospecting activity ensues, and soil is left bare until rehabilitation is initiated. Erosion will be localised within the site. This will ultimately lead to the irretrievable commitment of this resource. The measurable effect of reducing erosion by utilizing mitigation measures may reduce possible erosion significantly.

Concurrent backfilling will take place in order to rehabilitate.

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

5.3 Increased Soil erosion and sedimentation

5.3.1 Description of impact:

Prospecting may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora.

5.3.2 Mitigation measures:

- Rehabilitation has to occur concurrently with prospecting. Soil must be replaced in trenches and areas must be revegetated with indigenous plant species. One area has to be rehabilitated before the next is disturbed.
- Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.
- Protect sloping areas and drainage channel banks that are susceptible to erosion.
- Repair all erosion damage as soon as possible.

- **Soil and water pollution**

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

5.4 Soil and water pollution

5.4.1 Description of impact:

Prospecting carries a risk of soil and water pollution, with earth moving equipment contributing due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or groundwater, leading to potential medium/long-term impacts on fauna and flora.

5.4.2 Mitigation measures:

- Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way.
- Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.
- Spill kits should be on-hand to deal with spills immediately.
- All vehicles should be inspected for oil and fuel leaks on a regular basis.
- After decommissioning all materials must be disposed of in a responsible manner.

- **Spread and establishment of alien invasive species**

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

5.5 Spread and establishment of alien invasive species

5.5.1 Description of impact:

Continued movement of vehicles on and off the site during prospecting will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. Habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.

Nine alien invasive plant species were recorded in the project area (See Section 4.3). These species will likely spread and increase in numbers due to disturbance caused by prospecting activities.

5.5.2 Mitigation measures:

- Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner

prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys.

- Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.
- Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species do not spread to surrounding natural ecosystems.
- After decommissioning, the site has to be rehabilitated by sowing indigenous grass species. The control and monitoring of declared invaders have to continue for two years after prospecting or mining is completed.

SPECIALIST STUDY

A *Terrestrial Biodiversity Impact Assessment was conducted by* Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

Table 19: Impact rating

Impact	Without (WOM) or With Mitigation (WM)	Nature of Impact (Negative or Positive)	GEOGRAPHICAL EXTENT		PROBABILITY		DURATION		REVERSIBILITY		IRREPLACEABLE LOSS OF RESOURCES		CUMULATIVE EFFECT		INTENSITY/ MAGNITUDE		SIGNIFICANCE	
			Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score
Increased Soil erosion and sedimentation	WOM	Negative	Site	1	Probable	3	Long term	3	Partly reversible	2	Marginal	2	Low	2	Medium	2	Low	26
	WM	Negative	Site	1	Possible	2	Medium term	2	Partly reversible	2	No loss	1	Negligible	1	Low	1	Low	9
Soil and water pollution	WOM	Negative	Site	1	Probable	3	Long term	3	Barely reversible	3	Marginal	2	Low	2	Medium	2	Low	28
	WM	Negative	Site	1	Possible	2	Medium term	2	Partly reversible	2	No loss	1	Negligible	1	Low	1	Low	9
Spread and establishment of alien invasive species	WOM	Negative	Site	1	Definite	4	Long term	3	Partly reversible	2	Marginal	2	Medium	3	Medium	2	Medium	30
	WM	Negative	Site	1	Possible	2	Medium term	2	Completely reversible	1	No loss	1	Low	2	Low	1	Low	9

- **Change in land-use**

The use of the area for the operation of the prospecting activity will not disturb existing activities on most of the portions as both (existing activities and prospecting activities) can be done concurrently. However, it does depend on where they plan to prospect. If they prospect where the central pivots are located, the applicant will have to draw up a prepare use agreement.

Change in land use	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Unlikely (1)
Duration	medium term (2)	medium term (2)
Magnitude	Medium (2)	Low (1)
Reversibility	Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	No loss of resource (1)
Cumulative impact	Medium cumulative impacts (3).	
Significance	**Negative medium (26)**	**Negative low (10)**
Can impacts be mitigated?	The proponent should establish a Rehabilitation Fund to be used to rehabilitate the area once the proposed facility has been decommissioned. The fund should be funded by revenue generated during the operational phase of the project. The motivation for the establishment of a Rehabilitation Fund is based on the experience in the mining sector where many mines on closure have not set aside sufficient funds for closure and decommissioning. Also refer to section (f) of the EMPr.	

- **Generation of alternative land use income**

Income generated through the Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) mine will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of farming on site.

Generation of alternative land use income	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Geographical extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Medium (2)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	Medium cumulative impact (3).	
Significance	**Positive Low (24)**	**Positive Low (24)**
Can impacts be mitigated?	No mitigation required.	

- Increase in storm water runoff

The development will potentially result in an increase in storm water run-off that needs to be managed to prevent soil erosion, especially where vegetation will be cleared. Not all the vegetation should be removed at once. Only the specific trench being excavated at the specific time should be cleared and concurrent rehabilitation must be implemented.

Increase in storm water runoff	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Site (1)

Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Medium term (2)
Magnitude	High (3)	Low (1)
Reversibility	Barely reversible (3)	Completely reversible (1)
Irreplaceable loss of resources	Significant loss of resource (3)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3) - Should these impacts occur, there will be a cumulative impact on the wider area.	
Significance	**Negative medium (48)**	**Negative low (10)**
Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in section (f) of the EMPr. are implemented to ensure that these impacts do not occur The cut-off trenches and silt fences will be installed where necessary as to control runoff storm water by attenuating it and control the movement of sediment on the premises. These structures will be monitored on a regular basis. It is suggested that it be monitored on a weekly basis during the rainy season, and after possible rain events during the dry season. If these practices is found to be insufficient for the control of storm water and sedimentation, other alternatives should immediately be investigated and implemented.	

- **Increased consumption of water**

Since 1 x 16 feet washing pans will be used, the amount of water for the pans will be 17 000 L/hour from which 30% is re-used. Water will also be used for dust suppression.

Increased consumption of water	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Medium term (3)	Medium term (2)
Magnitude	High (3)	Medium (2)
Reversibility	Irreversible (4)	Barely reversible (4)
Irreplaceable loss of resources	Significant loss of resources (3)	Marginal loss of resources (2)
Cumulative impact	Medium cumulative impacts (3) - An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water.	
Significance	**Negative High impact (57)**	**Negative medium (34)**
Can impacts be mitigated?	Yes, management actions and mitigation measures related to the use of water are included in section (f) of the EMPr.	

- **Generation of waste**

Approximately 15 Workers will be present on site from 6:00 – 18:00, Monday to Saturday. Sources of general waste will be waste food, packaging, paper, etc. General waste will be stored on-site in a skip bin with a lid, when the skip bin is full the content must be removed to a licensed landfill site.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative

Extent	Local (2)	Local (2)
Probability	Probable (3)	Possible (2)
Duration	Medium term (2)	Medium (2)
Magnitude	medium (2)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal of resource (2)	No loss of resource (1)
Cumulative impact	Low cumulative impact (2) - An additional demand for landfill space could result in significant cumulative impacts with regards to the availability of landfill space.	
Significance	**Negative low (26)**	**Negative low (11)**
Can impacts be mitigated?	Yes, management actions related to waste management are included in section (f) of the EMPr.	

- **Leakage of hazardous materials**

The proposed prospecting activity will make use of machinery that use fuel and oil. Leakage of these oils and fuel can contaminate water supplies and must be prevented by constructing oil and diesel permeable bunds to ensure that any spills are suitably attenuated and not released into the environment.

Leakage of hazardous materials	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Site (1)
Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Barely reversible (3)	Partly reversible (2)
Irreplaceable loss of resources	Significant loss of resources (3)	Marginal loss of resource (2)
Cumulative impact	High cumulative impacts (4) if impact occurs and not mitigated.	
Significance	**Negative high (51)**	**Negative low (22)**
Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in the section (f) of EMPr are implemented to ensure that these impacts do not occur.	

- **Noise disturbance**

Prospecting activities will result in the generation of noise over a period of approximately 5 years. Sources of noise are likely to include vehicles, the use of machinery such as backactors, rotary pans and people working on site. Noise may impact on the existing activities however, this depends on where the prospecting activities will take place, which will only be determined during Phase 1 and Phase 2 (PWP) of the prospecting activities.

Existing activities on the proposed area include but is not limited to agricultural activities (game / livestock grazing, crop production under a central pivot irrigation system) and homesteads. Agricultural activities in the area also contribute to noise disturbance.

Temporary noise disturbance	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Possible (2)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	The impact would result in low cumulative effects (2).	

Significance	**Negative low (22)**	**Negative low (11)**
Can impacts be mitigated?	Yes, management actions related to noise pollution are included in section (f) of the EMPr.	

Indirect impacts: The operational phase will have an indirect negative impact through the change in the sense of place and an indirect positive impact through the provision of additional electrical infrastructure.

- Potential impact on tourism

The impact of the proposed prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) on the areas sense of place with mitigation is likely to be low since there are no tourist facilities in close proximity of the proposed area.

Potential impacts on tourism	**Pre-mitigation impact rating**	**Post mitigation impact rating**
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Unlikely (1)	Unlikely (1)
Duration	Medium term (2)	Medium term (2)
Magnitude	Low (1)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	Medium cumulative impacts (3)	
Significance	**Negative low (9)**	**Negative low (9)**
Can impacts be mitigated?	The proponent may compensate the income losses the Apiesdeel Fishing Report may endure due to loss of visitors as a result of the prospecting activities. Proof must be provided that losses are due to prospecting activities.	

DECOMMISIONING PHASE (MINE CLOSURE AND REHABILITATION)

Direct impacts: Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live. If infrastructures are removed after a 3/5 year period, the site will be returned to its natural state. Therefore, the physical environment will benefit from the closure of the prospecting area.

- **Rehabilitation of the physical environment**

The physical environment will benefit from the closure of the prospecting area since the site will be restored to its pre-prospecting state. The areas to be prospected must be rehabilitated in such a way that it can support the existing pre-prospecting activity of that specific area. Existing pre-prospecting activities include but is not limited to agricultural activities (game/livestock grazing & crop production under central pivot irrigation).

Rehabilitation of the physical environment	**Pre-mitigation impact rating**	**Post mitigation impact rating**
Status (positive or negative)	Positive	Positive
Extent	Site (1)	Site (1)
Probability	Possible (2)	Definite (4)
Duration	Permanent (4)	Permanent (4)
Magnitude	Very High (4)	Very High (4)
Reversibility	N/A	N/A
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	**Positive medium (32)**	**Positive medium (40)**

Can impacts be mitigated?	No mitigation measures required.

- **Loss of employment**

The decommissioning of the facility has the potential to have a negative social impact on the local community as it will create job losses.

Loss of employment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Permanent (4)	Permanent (4)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impacts (3)	
Significance	**Negative medium (34)**	**Negative medium (34)**
Can impacts be mitigated?	The following mitigation measures are recommended: • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning; • **Kimswa Mining (Pty) Ltd** should establish an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas.	

Indirect impacts: No indirect impacts are anticipated from the decommissioning phase of the proposed development.

K. SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF ANY SPECIALIST REPORT

(where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;)

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Palaeontological Desktop Assessment was conducted by Elize Butler from Banzai Environmental (Pty) Ltd.	**FINDINGS AND RECOMMENDATIONS** The proposed development is underlain by Quaternary sands, Tertiary to Quaternary calcretes, with a small portion in the south underlain by the Allanridge Formation (Ventersdorp Supergroup). Updated geology indicates that the development is mainly underlain by the Kalahari Group with a small portion in the south underlain by the Allanridge Formation (Platberg Group, Ventersdorp Supergroup). According to the South African Heritage Resources Information System, the Palaeontological Sensitivity of the Quaternary calcretes are High (orange), the Quaternary sands has a Moderate Palaeontological Sensitivity while that of the Allanridge Formation is Low. It is therefore considered that the proposed prospecting will not lead to detrimental impacts on the palaeontological heritage of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO or site manager in charge of these developments. Fossil discoveries ought to be protected and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that suitable mitigation (recording and collection) can be carried out It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.	**X**	
Cultural Heritage Impact Assessment was conducted by Francois P Coetzee	***Recommendations and Conclusions***	**X**	

A total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1). The lower-level bridge was probable used from the early 20th century and was replaced with the bridge that is currently in use.

As a result the following recommendations and mitigation measures are proposed:

- *A buffer zone of 50 metres should be maintained*

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective, that the proposed prospecting activities may proceed.

Nature: Historical bridge (Site 1)		
	Without mitigation	**With mitigation**
Operational (Mining) Phase		
Probability	Definite (5)	Very Improbable (1)
Duration	Permanent (5)	Short term (2)
Extent	Limited to the site (1)	Limited to the site (1)
Magnitude	Very High (10)	Minor (2)
Significance of Impact	**80 (High)**	**5 (Low)**
Status (positive or negative)	Negative	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	None
Cumulative impacts and indirect impacts	Mining activities result in extensive heavy vehicle traffic, extraction of deposits, movements of heavy machinery which culminate in vibrations and dust.	
Can impacts be mitigated?	Yes, a 50 metres buffer zone	

Table 8: Significance of the impact

Also, please note:
Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

<table>
<tr>
<td>Wetland Delineation and Assessment was conducted by Mari van der Westhuizen</td>
<td>
DISCUSSION & CONCLUSION
According to the NEMA screening tool the site has a very high sensitivity from an aquatic biodiversity perspective. A post-screening site visit was therefore conducted to determine if the assessment was accurate. The following was concluded:

• The site has a High sensitivity from an Aquatic biodiversity perspective. The project are borders the Orange River, which is a very important river. The river and riparian area provides habitat for many plant and animal species of which one, the spotted-necked otter, is Near Threatened.

The wetland delineation and classification for the project was done according to the criteria set by the Department of Water Affairs and Forestry (2005) guidelines and the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis et al., 2013). The soils and vegetation associated with wetlands and landscape were all used as parameters in identifying the wetlands.

Apart from the Orange River and its associated riparian area, one wetland type was identified and classified as Endorheic depression wetland (pan) wetlands.

The results from the wetland functionality assessment are given in the table below:
<table>
<tr><th>Classification</th><th>Orange River and riparian area</th><th>Endorheic depression wetlands</th></tr>
<tr><td>PES</td><td>B: Largely natural</td><td>C: Moderately modified</td></tr>
<tr><td>EIS</td><td>2,4: High</td><td>0,5: Low / marginal</td></tr>
<tr><td>REC</td><td>A/B: Improve</td><td>C: Maintain</td></tr>
<tr><td>Calculated buffer</td><td>15m</td><td>15m</td></tr>
</table>
A risk matrix assessment was conducted for the riparian area and wetlands on site in addition to the mitigation measures recommended to ensure the protection of the wetlands. Impacts relating to the proposed development on the wetlands / riparian zones are as follows:
• Soil Erosion and Sedimentation.
• Disturbance of watercourse habitat and fringe vegetation.
</td>
<td>X</td>
<td></td>
</tr>
</table>

	• *Soil and water pollution.* • *Import and spread of alien invasive vegetation.* *The impacts were all Moderate due to the fact that prospecting may occur inside the riparian area and wetlands.* *The proposed prospecting can be supported from a wetland perspective, provided that the mitigation measures are implemented.*		
Terrestrial Biodiversity Impact Assessment was conducted by Mari van der Westhuizen	***CONCLUSIONS*** *According to the national web-based environmental screening tool in terms of National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), the site has the following sensitivities:* • *Terrestrial Biodiversity: Very High Sensitivity.* • *Animal Species Theme: Medium Sensitivity.* • *Plant Species Theme: Low Sensitivity.* *A post-screening site visit was therefore conducted to determine if the assessment was accurate. After the site visit and desktop survey the following was concluded:* • *The site has a High Sensitivity from a terrestrial biodiversity perspective due to the fact that the area is in a CBA 1 and CBA 2 and the project area is relatively undisturbed.* • *The site has a High Sensitivity from an Animal Species Theme Perspective due to the presence of four fauna species of conservation concern.* • *The site has a Medium-Low Sensitivity from a Plant Species Theme Perspective. No species of conservation concern was recorded, but two protected tree species and six provincially protected plant species were recorded.* *The desktop survey indicates that:* • *The project area overlaps the Northern Upper Karoo and Upper Gariep Alluvial vegetation units. The conservation status of both units is Least Concern.* • *Most of the project area is classified as CBA2. The section next to the Orange River is a CBA1 and then there are very small sections which is classified as Other.* • *The Orange River is a NFEPA river and sections of its banks are NFEPA wetlands. There are also some pans in the area.*	**X**	

	• *There are several NWM5 wetlands in the project area, some are associated with the Orange River and some are pans.* • *The project area is not located in or close to an Important Bird Area.* • *The study area is not found in a strategic water source area, but it is located 13km south-east of the Southern Ghaap Plateau strategic water source area.* *The project areas can be divided into the following vegetation / land use units:* 1. *Senegalia mellifera - Lycium cinereum karoo* 2. *Vachellia karroo - Ziziphus mucronata riparian zone* 3. *Pan* 4. *Rocky outcrop* 5. *Area disturbed by mining* 6. *Agricultural crops* 7. *Buildings.* *Two protected tree species were recorded, namely Boscia albitrunca and Vachellia erioloba. Six provincially protected plant species were recorded, namely Boscia albitrunca, Boscia foetida, Gymnosporia buxifolia, Jamesbrittenia atropurpurea, Jamesbrittenia aurantiaca and Oxalis lawsonii.* *Four fauna species of conservation concern are present at the project area, namely Ludwig's Bustard (Endangered), Blue Crane (Near Threatened), Spotted-necked Otter (Near Threatened) and the Secretary Bird (Vulnerable),* *Nine declared invader plant species were recorded.* *The sensitivity analysis indicated that sensitivity varies from low to medium-high.* *Potential impacts were described and rated and mitigation measures were discussed. Impacts include habitat destruction and fragmentation, loss of fauna, soil erosion, pollution and spread of declared invader plant species. Before mitigation some impacts had a medium rating (Loss of fauna and the spread and establishment of alien invasive species), but after mitigation all impacts were low.*		

	If mitigation measures, as discussed in Section 5, are strictly adhered to, the development can be supported from a biodiversity point of view.		

According to the DFFE Screening Report, nine (9) specialist assessments have been identified for inclusion in the assessment report. Please see the table below for the list of these studies and also our response. Please refer to **Appendix 7.**

Specialist study according to DEA Screening tool		Response
Agriculture Impact Assessment		We do not see a need for this study. The prospecting activity will not disturb existing activities on the portions as both (existing activities and prospecting activities) can be done concurrently. The proposed area is currently being used for game/livestock grazing and crop production under central pivot irrigation. According to the DFFE Screening Report the Agriculture theme sensitivity of the proposed area fall mostly within low sensitivity, with areas off Medium, High and Very High sensitivity. The land capability for the proposed area and surrounding area also falls within Land in Class 7. The Prospecting Work Programme (PWP) states 250 pits [4m (length) x 4m (breath) x 5m (depth)] and 80 trenches [40m (length) x 50m (breath) x 5m (depth)] will be dug. This calculates to a disturbance of ± 16.04ha. The whole application area is 4209.3984ha thus the ±16.04ha disturbance is small compared to the size of the application area. Mitigation measures as in the EMPr will be implemented. Concurrent backfilling will also take place in order to rehabilitate which means only 0.5ha will be disturbed at any given time. Due to the low disturbance (±16.04ha over a 4209.3984ha area) the impact is expected to be low, since mitigation measures will be implemented and concurrently rehabilitation will take place.
Biodiversity study	**Animal Species Assessment**	Specialist studies were conducted, please see the table above. The studies are available under **Appendix 12.**
	Aquatic Biodiversity Impact Assessment	
	Plant Species Assessment	
	Terrestrial Biodiversity Impact Assessment	

Archaeological and Cultural Heritage Impact Assessment	Specialist studies were conducted. Please see **Appendix 12.**
Palaeontology Impact Assessment	
Noise Impact Assessment	We do not see the need for this study as noise is limited to working hours.
Radioactivity Impact Assessment	This study is not necessary since the process of mining Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) does not have any radioactive effects.

L. AN ENVIRONMENTAL IMPACT STATEMENT WHICH CONTAINS—

(i) a summary of the key findings of the environmental impact assessment:

This section provides a summary of the assessment and conclusions drawn from the proposed prospecting area. In doing so, it draws on the information gathered as part of the environmental impact assessment process and the knowledge gained by the environmental consultant during the course of the process and presents an informed opinion on the environmental impacts associated with the proposed project. The following conclusions can be drawn for the proposed prospecting activity:

➢ Potential impacts on biodiversity:

A *Terrestrial Biodiversity Impact Assessment and Wetland Delineation & Assessment were conducted by* Mari van der Westhuizen. The reports are available under **Appendix 12**. Please see the findings in the table below:

Wetland Delineation & Assessment

Please see the findings below for the Wetland Delineation & Assessment:

DISCUSSION & CONCLUSION

According to the NEMA screening tool the site has a very high sensitivity from an aquatic biodiversity perspective. A post-screening site visit was therefore conducted to determine if the assessment was accurate. The following was concluded:

- *The site has a High sensitivity from an Aquatic biodiversity perspective. The project are borders the Orange River, which is a very important river. The river and riparian area provides habitat for many plant and animal species of which one, the spotted-necked otter, is Near Threatened.*

The wetland delineation and classification for the project was done according to the criteria set by the Department of Water Affairs and Forestry (2005) guidelines and the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis et al., 2013). The soils and vegetation associated with wetlands and landscape were all used as parameters in identifying the wetlands.

Apart from the Orange River and its associated riparian area, one wetland type was identified and classified as Endorheic depression wetland (pan) wetlands.

The results from the wetland functionality assessment are given in the table below:

Classification	Orange River and riparian area	Endorheic depression wetlands
PES	B: Largely natural	C: Moderately modified
EIS	2,4: High	0,5: Low / marginal
REC	A/B: Improve	C: Maintain
Calculated buffer	15m	15m

A risk matrix assessment was conducted for the riparian area and wetlands on site in addition to the mitigation measures recommended to ensure the protection of the wetlands. Impacts relating to the proposed development on the wetlands / riparian zones are as follows:

- *Soil Erosion and Sedimentation.*
- *Disturbance of watercourse habitat and fringe vegetation.*
- *Soil and water pollution.*
- *Import and spread of alien invasive vegetation.*

The impacts were all Moderate due to the fact that prospecting may occur inside the riparian area and wetlands.

The proposed prospecting can be supported from a wetland perspective, provided that the mitigation measures are implemented.

Terrestrial Biodiversity Impact Assessment

Please see the findings below for the Terrestrial Biodiversity Impact Assessment:

According to the national web-based environmental screening tool in terms of National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), the site has the following sensitivities:

- *Terrestrial Biodiversity: Very High Sensitivity.*
- *Animal Species Theme: Medium Sensitivity.*
- *Plant Species Theme: Low Sensitivity.*

A post-screening site visit was therefore conducted to determine if the assessment was accurate. After the site visit and desktop survey the following was concluded:

- *The site has a High Sensitivity from a terrestrial biodiversity perspective due to the fact that the area is in a CBA 1 and CBA 2 and the project area is relatively undisturbed.*
- *The site has a High Sensitivity from an Animal Species Theme Perspective due to the presence of four fauna species of conservation concern.*
- *The site has a Medium-Low Sensitivity from a Plant Species Theme Perspective. No species of conservation concern was recorded, but two protected tree species and six provincially protected plant species were recorded.*

The desktop survey indicates that:

- *The project area overlaps the Northern Upper Karoo and Upper Gariep Alluvial vegetation units. The conservation status of both units is Least Concern.*
- *Most of the project area is classified as CBA2. The section next to the Orange River is a CBA1 and then there are very small sections which is classified as Other.*
- *The Orange River is a NFEPA river and sections of its banks are NFEPA wetlands. There are also some pans in the area.*
- *There are several NWM5 wetlands in the project area, some are associated with the Orange River and some are pans.*
- *The project area is not located in or close to an Important Bird Area.*
- *The study area is not found in a strategic water source area, but it is located 13km south-east of the Southern Ghaap Plateau strategic water source area.*

The project areas can be divided into the following vegetation / land use units:

8. *Senegalia mellifera - Lycium cinereum karoo*
9. *Vachellia karroo - Ziziphus mucronata riparian zone*
10. *Pan*
11. *Rocky outcrop*
12. *Area disturbed by mining*
13. *Agricultural crops*
14. *Buildings.*

Two protected tree species were recorded, namely Boscia albitrunca and Vachellia erioloba. Six provincially protected plant species were recorded, namely Boscia albitrunca, Boscia foetida, Gymnosporia buxifolia, Jamesbrittenia atropurpurea, Jamesbrittenia aurantiaca and Oxalis lawsonii.

Four fauna species of conservation concern are present at the project area, namely Ludwig's Bustard (Endangered), Blue Crane (Near Threatened), Spotted-necked Otter (Near Threatened) and the Secretary Bird (Vulnerable),

Nine declared invader plant species were recorded.

The sensitivity analysis indicated that sensitivity varies from low to medium-high.

Potential impacts were described and rated and mitigation measures were discussed. Impacts include habitat destruction and fragmentation, loss of fauna, soil erosion, pollution and spread of declared invader plant species. Before mitigation some impacts had a medium rating (Loss of fauna and the spread and establishment of alien invasive species), but after mitigation all impacts were low.

If mitigation measures, as discussed in Section 5, are strictly adhered to, the development can be supported from a biodiversity point of view.

➢ Potential impact on palaeontological, heritage and cultural resources:

Cultural Heritage Impact Assessment

A Cultural Heritage Impact Assessment was conducted by Francois P Coetzee. The report is available under **Appendix 12**. Please see the findings in the table below:

A total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1). The lower-level bridge was probable used from the early 20th century and was replaced with the bridge that is currently in use.

As a result the following recommendations and mitigation measures are proposed:

- *A buffer zone of 50 metres should be maintained*

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective, that the proposed prospecting activities may proceed.

Nature: Historical bridge (Site 1)		
	Without mitigation	**With mitigation**
Operational (Mining) Phase		
Probability	Definite (5)	Very Improbable (1)
Duration	Permanent (5)	Short term (2)
Extent	Limited to the site (1)	Limited to the site (1)
Magnitude	Very High (10)	Minor (2)
Significance of Impact	**80 (High)**	**5 (Low)**
Status (positive or negative)	Negative	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	None
Cumulative impacts and indirect impacts	Mining activities result in extensive heavy vehicle traffic, extraction of deposits, movements of heavy machinery which culminate in vibrations and dust.	
Can impacts be mitigated?	Yes, a 50 metres buffer zone	

Table 8: Significance of the impact

Also, please note:
Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

9. Management Measures

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

9.1 Objectives

- *Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.*

- *The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities*

The following shall apply:

- *Known sites should be clearly marked in order that they can be avoided during construction activities.*
- *The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.*
- *Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;*
- *All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;*
- *Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and*
- *Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).*

9.2 Control

In order to achieve this, the following should be in place:

- *A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.*
- *Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.*

In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

Palaeontological Desktop Assessment

A Palaeontological Desktop Assessment was conducted by Elize Butler from Banzai Environmental (Pty) Ltd. The report is available under **Appendix 12**. Please see the findings in the table below:

The proposed development is underlain by Quaternary sands, Tertiary to Quaternary calcretes, with a small portion in the south underlain by the Allanridge Formation (Ventersdorp Supergroup). Updated geology indicates that the development is mainly underlain by the Kalahari Group with a small portion in the south underlain by the Allanridge Formation (Platberg Group, Ventersdorp Supergroup). According to the South African Heritage Resources Information System, the Palaeontological Sensitivity of the Quaternary calcretes are High (orange), the Quaternary sands has a Moderate Palaeontological Sensitivity while that of the Allanridge Formation is Low.

It is therefore considered that the proposed prospecting will not lead to detrimental impacts on the palaeontological heritage of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO or site manager in charge of these developments. Fossil discoveries ought to be protected and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that suitable mitigation (recording and collection) can be carried out

It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

- Potential social impacts:

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks.

- Potential impacts on land use:

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

If water uses under section 21 a-k of the NWA are triggered for the proposed prospecting right, a Water Use Licence Application (WULA) are needed and must be lodged with the department of Water & Sanitation (DWS).

- Potential negative impacts:

(noise, dust, soil degradation, storm water, traffic, health and safety) associated with the operation of the facility are expected to be of low-medium impact, of medium terms and site specific. These can be mitigated or negated through the implementation of practical and appropriate mitigation measures.

- Positive impacts:

The mining of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) will have socio-economic benefit to the area.

All possible negative impacts and risks that have been identified in this report can be effectively mitigated and managed by implementing the migratory measures as set out in the Environmental Management Programme (EMPr) attached in Part B. It is therefore recommended that the environmental authorisation for the prospecting right be granted.

(i) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred [site] development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and

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

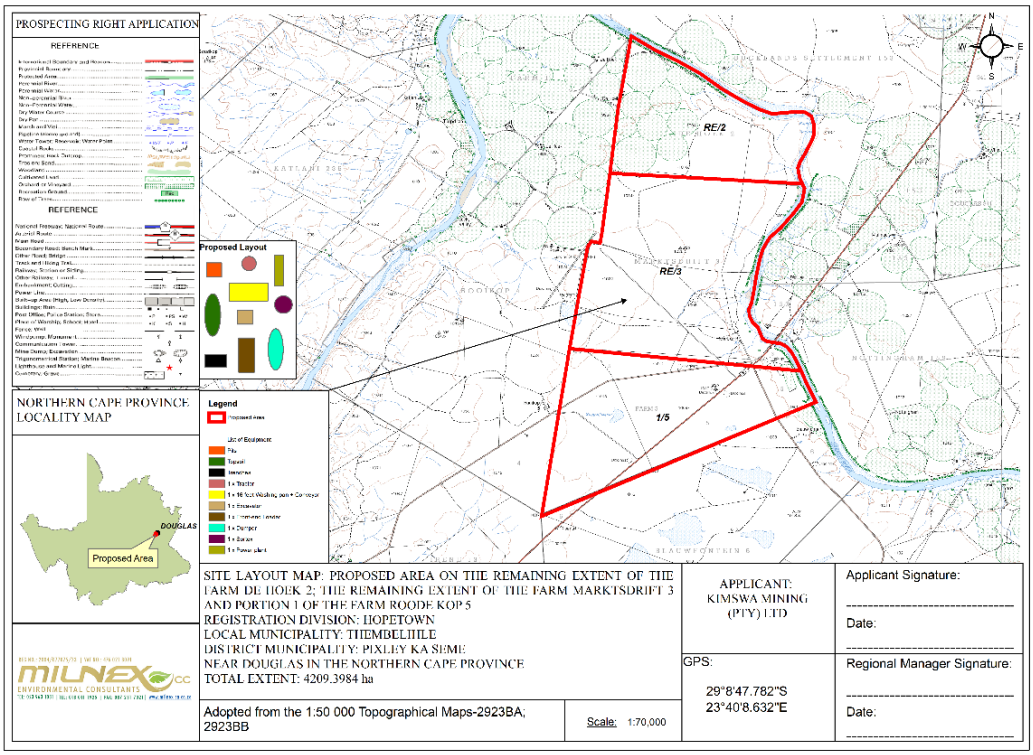


Figure 23: Site Plan

Refer to Site layout Map attached in **Appendix 4**.

On the proposed area there are wetlands that should be avoided.

SPECIALIST STUDY

A Wetland Delineation and Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

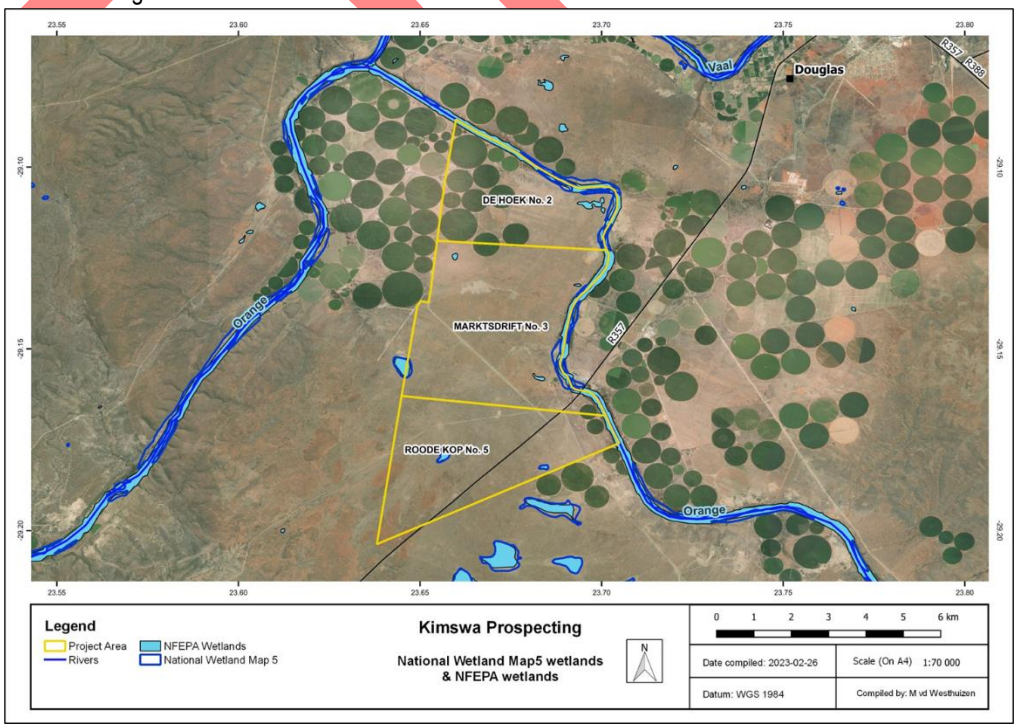


Figure 24: National Freshwater Ecosystem Priority Areas (NFEPA) wetlands and rivers

(ii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

There is regional socio economic benefits due to the Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) being prospected in the Northern Cape province and greater knowledge is gained on the mineralogy of South Africa. All possible negative impacts and risks that have been identified in this report can be effectively mitigated and managed by implementing the mitigation measures as set out in the Environmental Management Programme (EMPr) attached in Part B. Significant adverse social environmental impacts are anticipated.

M. PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

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

Management objectives include:

- Ensure that the prospecting activity does not cause pollution to the environment or harm to persons.
- Minimise production of waste.
- All prospecting activities must be conducted in a manner that minimises noise impact, litter, environmental degradation and health hazards i.e. injuries.
- The mine must be kept neat and tidy during waste handling to prevent unsightliness and accidents.

Expected outcomes include:

- Minimum impacts on the environment as a result of Diamonds Alluvial, Diamonds General, Diamonds in Kimberlite, Diamonds, Stone Aggregate: Gravel prospecting.
- Compliance with legislative requirements.
- Mine is neat and tidy and well managed.

N. FINAL PROPOSED ALTERNATIVES.

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

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity near Douglas on the Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province. The proposed area is preferred due to the sites possible underlying Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA). Therefore, there will be no other alternative (i.e. to facilitate the movement of machinery, equipment, infrastructure).

O. ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION.

(Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;)

- The operational activities and relevant rehabilitation of disturbed areas should be monitored against the improved EMPr and all other relevant environmental legislation.
- A copy of the EMP should be made available onsite at all times.
- Implementation of the proposed mitigation measures set out in the EMPr.

P. DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE.

(Which relate to the assessment and mitigation measures proposed)

The uncertainties in results are mostly related to the availability of information, time available to gather the relevant information as well as the sometimes subjective nature of the assessment methodology. In terms of addressing the key issues the EAP is satisfied that there are no major gaps in knowledge and that the report provide sufficient information to conduct the significance rating and provide the environmental authority with sufficient information to make an informed decision.

Q. REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

(**and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;)**

Reasons why the activity should be authorized or not.

Based on the outcomes of other diamond mines in the area, the possibility to encounter further Diamond Reserves were identified.

The proposed prospecting area is targeted as, historically, several alluvial diamond occurrences are known in the area, and a number of these have been exploited in the past. There are also various alluvial diamond operations within the vicinity of the exploration area.

The option of not approving the activities will result in a significant loss to valuable diamond deposits being exploited and all economic benefits will be lost.

Conditions that must be included in the authorisation

- The operational activities and relevant rehabilitation of disturbed areas should be monitored against the improved EMPr and all other relevant environmental legislation.
- A copy of the EMP should be made available onsite at all times.
- Implementation of the proposed mitigation measures set out in the EMPr.

The EMPr should be binding on all managers and contractors operating/utilizing the site.
The applicant shall familiarize himself with the content of this document and the attached specialist studies and the requirements/conditions thereof.

R. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED.

For a minimum of 5 years.

S. AN UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP IN RELATION TO:

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Environmental Impact Assessment report and the Environmental Management Programme report.

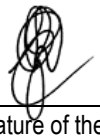
I, Lizanne Esterhuizen, herewith confirms

A. the correctness of the information provided in the reports ☒

B. the inclusion of comments and inputs from stakeholders and I&APs ; ☒

C. the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

D. the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒



Signature of the environmental assessment practitioner:

Milnex CC

Name of company:

06/03/2023

Date:

T. FINANCIAL PROVISION

(where applicable, details of any financial provision[s] for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;)

XXXXX

Concurrent Rehabilitation

Concurrent backfilling will take place in order to rehabilitate. Please see the explanation below how concurrent rehabilitation is carried out:

Topsoil will be removed from trench no.1, where after it will be stored separately on the proposed area. Stored topsoil will be kept separate from overburden. Stored topsoil will be adequately protected from being eroded or blown away.

The exposed diamondiferous gravel of trench no.1 and no.2 will then be removed. The diamondiferous gravel will be sorted by means of a screen and all material larger than for example 100mm will be separated from the rest. This material will be used in the backfilling stage. Screened material for example smaller than 100mm will be fed into a wet rotary screen and then directly onto the washing pans.

As prospecting activities progress from trench no.2 towards the following trench no.3, backfilling and rehabilitation of trench no.1 will commence. The coarse gravel sifted at the screen, tailings from the pans and fine concrete will be transported back into open trench no.1. During this process of backfilling, variation in the dumping sequence of different sized materials will be followed to ensure better compaction and stability of the reclaimed gravel. This will ensure that voids surrounding the coarse gravel will be filled up with finer sediments. Compaction will be achieved through heavy vehicles during backfilling stage. This prospecting sequence will be utilised for the final rehabilitation of the last actively prospected trench.

Since concurrent backfilling will take place in order to rehabilitate, the total area to be disturbed per year will be less than the above calculation. Because of the aforementioned the total area to disturbed is divided by two. Following the aforementioned sequence will ensure that the maximum area to be disturbed by prospecting activities at any given time, is only approximately **0.5ha**

Calculations

PITS		
Timeframe: 24 months (month 7 - 30)		
24 months / 12 months =	2 years in total to dig pits	
Number of pits per year according to the timeframe		
1st year (12 month) =	125 pits	
2nd year (12 month) =	125 pits	
Disturbance for each year according to timeframes		
Area to be disturbed 1st year (12 months)	125 pits x (4m x 4m) / 10 000 =	0.02ha disturbed
Area to be disturbed 2nd year (12 months)	125 pits x (4m x 4m) / 10 000 =	0.2ha disturbed
Total disturbance for 24 months	250 pits x (4m x 4m) / 10 000 =	0.4ha disturbed

TRENCHES:	
Timeframe: 24 months (month 31 - 54)	
Concurrent backfilling will take place in order to rehabilitate trenches:	
The area to be disturbed for 1 trench	1 trench x (40m x 50m) / 10 000 = 0.2ha
3 trenches will be worked on at any given time: • 2 trenches will be open to remove gravel • 1 trench will be backfilled and rehabilitated	0.2ha x 2 trenches = 0.4ha 0.2ha / 2 = 0.1ha
The area to be disturbed at any given time	0.4ha + 0.1ha = 0.5ha
After the trench is backfilled and rehabilitated only then will another trench be opened.	
Total	0.5ha

A. Explain how the aforesaid amount was derived.

The closure cost estimate provided above is aligned with the National Environmental Management Act: Regulations: Financial Provisioning for Mitigation and Rehabilitation of Environmental Damage Caused by Reconnaissance, Prospecting, Exploration, Mining or Production Operations. The amount was calculated by Milnex CC.

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

Financial Guarantee

The financial guarantee for the rehabilitation for land disturbed by **Kimswa Mining (Pty) Ltd** will be submitted

Rehabilitation Fund

Kimswa Mining (Pty) Ltd will also make provision for rehabilitation during closure by establishing a rehabilitation trust.

U. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY.

(i) Any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and

None of the methodologies approved for the scoping report were deviated

(ii) Motivation for the deviation.

Not applicable

V. ANY SPECIFIC INFORMATION THAT MAY BE REQUIRED BY THE COMPETENT AUTHORITY; AND

No specific information requirements have been detailed by the Competent Authority.

W. COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

Read with Section 24 (3) (A) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA Report must include the:

ii. **Impact on the socio-economic conditions of any directly affected person. (**Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The prospecting Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) prospecting may impact directly on any socio-economic aspects. Indirect socio-economic benefits are expected to be associated with the creation of employment.

According to the map below (**Figure 20** and **Figure 21**), the proposed area is largely natural, water bodies, cultivation and Urban Build up. The natural vegetation according to the land use map consists mostly of Grassland, Low shrubland, Thicket/Dense bush and Woodland/Open Bush. The map also shows there are mines.

From google earth (**Figure 22**) the area looks mostly natural, there are some central pivot irrigation systems for the cultivation of crops and areas disturbed by mining activities.

iii. Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(*i*)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

Cultural and heritage aspects

A Cultural Heritage Impact Assessment and Palaeontological Desktop Assessment was conducted. Please see below:

Cultural Heritage Impact Assessment

A Cultural Heritage Impact Assessment was conducted by Francois P Coetzee. The report is available under **Appendix 12**. Please see the findings in the table below:

A total of one heritage site were recorded during the survey which is the previous bridge over the Orange River (Site 1). The lower-level bridge was probable used from the early 20th century and was replaced with the bridge that is currently in use.

As a result the following recommendations and mitigation measures are proposed:

- *A buffer zone of 50 metres should be maintained*

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective, that the proposed prospecting activities may proceed.

Nature: Historical bridge (Site 1)		
	Without mitigation	**With mitigation**
Operational (Mining) Phase		
Probability	Definite (5)	Very Improbable (1)
Duration	Permanent (5)	Short term (2)
Extent	Limited to the site (1)	Limited to the site (1)
Magnitude	Very High (10)	Minor (2)
Significance of Impact	**80 (High)**	**5 (Low)**
Status (positive or negative)	Negative	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	None
Cumulative impacts and indirect impacts	Mining activities result in extensive heavy vehicle traffic, extraction of deposits, movements of heavy machinery which culminate in vibrations and dust.	
Can impacts be mitigated?	Yes, a 50 metres buffer zone	

Table 8: Significance of the impact

Also, please note:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

9. Management Measures

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

9.1 Objectives

- *Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.*
- *The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities*

The following shall apply:

- *Known sites should be clearly marked in order that they can be avoided during construction activities.*
- *The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.*
- *Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;*
- *All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;*
- *Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and*
- *Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).*

9.2 Control

In order to achieve this, the following should be in place:

- *A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.*
- *Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.*
- *In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.*

Palaeontological Desktop Assessment

A Palaeontological Desktop Assessment was conducted by Elize Butler from Banzai Environmental (Pty) Ltd. The report is available under **Appendix 12**. Please see the findings in the table below:

The proposed development is underlain by Quaternary sands, Tertiary to Quaternary calcretes, with a small portion in the south underlain by the Allanridge Formation (Ventersdorp Supergroup). Updated geology indicates that the development is mainly underlain by the Kalahari Group with a small portion in the south underlain by the Allanridge Formation (Platberg Group, Ventersdorp Supergroup). According to the South African Heritage Resources Information System, the Palaeontological Sensitivity of the Quaternary calcretes are High (orange), the Quaternary sands has a Moderate Palaeontological Sensitivity while that of the Allanridge Formation is Low.

It is therefore considered that the proposed prospecting will not lead to detrimental impacts on the palaeontological heritage of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO or site manager in charge of these developments. Fossil discoveries ought to be protected and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that suitable mitigation (recording and collection) can be carried out

It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

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

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

The Remaining Extent of the farm De Hoek 2, the Remaining Extent of the farm Marktsdrift 3, Portion 1 of the farm Roode Kop 5, Registration Division: Hopetown, Northern Cape province is preferred due to the sites underlying geology and the possible diamond bearing gravel as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people). The specific site has been chosen for its possible mineral resources thus making an alternative site selection null and void.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

An EMPr must comply with section 24N of the Act and include—

A. DETAILS OF–

(i) the EAP who prepared the EMPr; and
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;

Name of Practitioner	Qualifications	Contact details
Lizanne Esterhuizen	Honours Degree in Environmental Science (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No. : (053) 963 2009 e-mail address: lizanne@milnex-sa.co.za
Christiaan Baron	Master's Degree in Environmental Management (M.ENV.MAN) (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No.: (053) 963 2009 e-mail address: christiaan@milnex-sa.co.za
Andile Grant Nxumalo	Honours Degree in Environmental Science (refer to **Appendix 1**)	Tel No.: (018) 011 1925 Fax No. : (053) 963 2009 e-mail address: andile.grant@milnex-sa.co.za

It is hereby confirmed that the requirements for the provision of the details and expertise of the EAP are contained in Part A, section 1(a) as required. The Curriculum Vitae for the responsible EAP is contained in **Appendix 2**.

B. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

(a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;)

It is hereby confirmed that the requirements to describe the aspects of the activity that are required by the EMP is already included in Part A, section 1(h).

C. OMPOSITE MAP

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

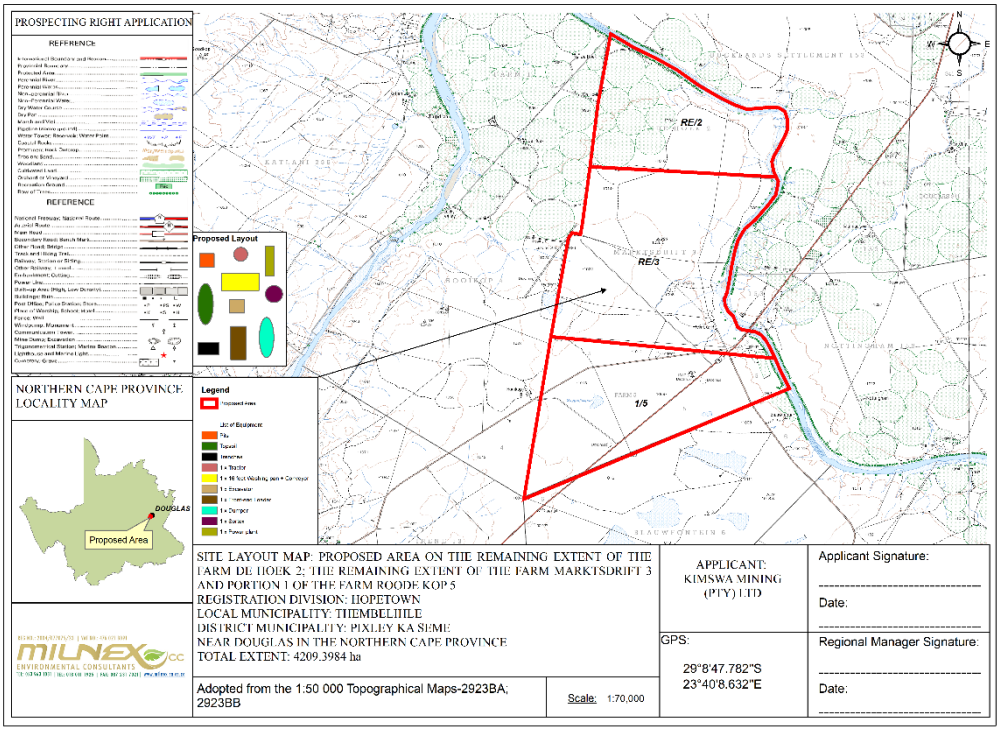


Figure 25: Site Plan (Refer to Site layout Map attached in **Appendix 4**)

On the proposed area there are wetlands that should be avoided.

SPECIALIST STUDY

A Wetland Delineation and Assessment was conducted by Mari van der Westhuizen. The report is available under **Appendix 12**. Please see the findings in the table below:

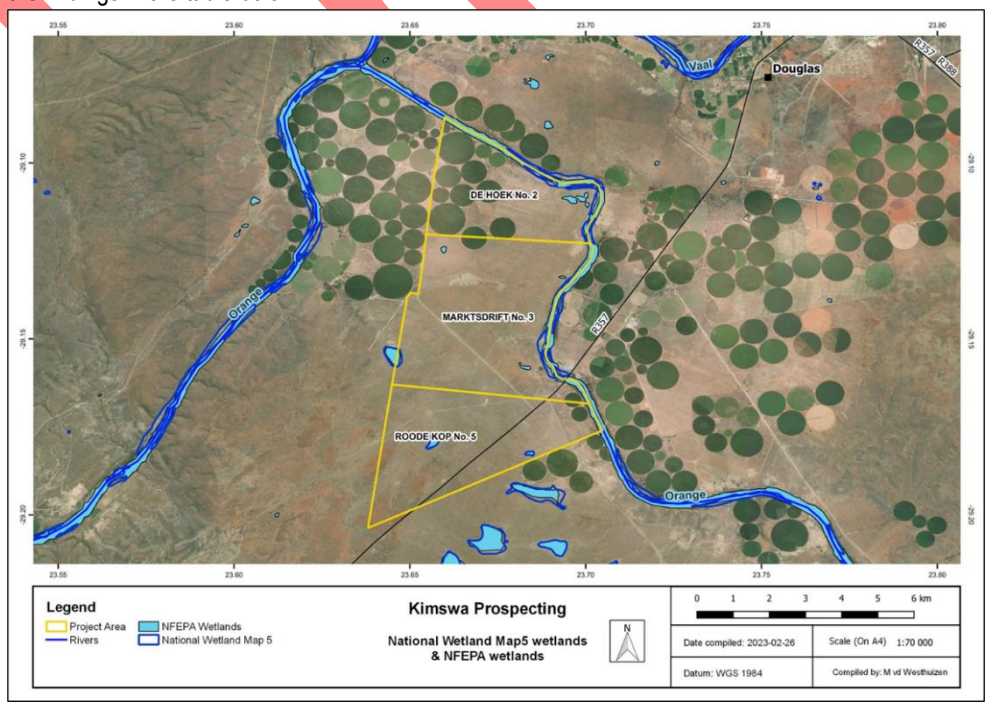


Figure 26: National Freshwater Ecosystem Priority Areas (NFEPA) wetlands and rivers

D. A DESCRIPTION OF THE IMPACT MANAGEMENT [OBJECTIVES] OUTCOMES, INCLUDING MANAGEMENT STATEMENTS, IDENTIFYING THE IMPACTS AND RISKS THAT NEED TO BE AVOIDED, MANAGED AND MITIGATED AS IDENTIFIED THROUGH THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR ALL PHASES OF THE DEVELOPMENT INCLUDING—

i) **Determination of closure objectives.** (ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

Closure objectives for the alluvial diamond mine will aim to ensure that the residual post-closure impacts be minimized and be acceptable to relevant parties. To achieve these closure objectives, the following will be implemented:

- All prospecting related infrastructure, foundations and concrete areas will be decommissioned, removed from the site and appropriately disposed of. Reclaimable structures such as metal, electrical installations or equipment will be sold for re-use or as scrap.

- All disturbed areas within the site not already vegetated will be re-vegetated with appropriate indigenous, ecologically adapted species appropriate to the area and the final land use as soon as possible after operation ceases. Progress of vegetation growth/establishment, stability and drainage/erosion will be monitored and, in the event of adverse trends being identified, corrective measures will be implemented.

- Vegetation monitoring will consider, inter alia, the establishment of perennial ground cover and infestation by alien invasive plant species. The encroachment of indigenous vegetation into the area will be used as an indication of a stable, self-sustaining vegetation cover with little risk of retrogressing to a situation where are and water pollution may occur.

- Final landforms must be resilient to perturbation and also be self-sustaining to obviate/limit further/ongoing interventions and maintenance by **Kimswa Mining (Pty) Ltd.** The remaining impacts be of an acceptable nature with minimal deterioration over time.
- The final outcome of the mine site rehabilitation would be productive systems, where required sustaining either cattle or wildlife.
- Environmental and human quality of life, including health and safety requirements in general, would not be compromised; and
- Closure is achieved in an efficient and cost-effective manner as possible and with minimum socioeconomic changes.

E. A DESCRIPTION AND IDENTIFICATION OF IMPACT MANAGEMENT OUTCOMES REQUIRED FOR THE ASPECTS CONTEMPLATED IN PARAGRAPH (D);]

The above goal is underpinned by more specific objectives listed below.

1. Upfront planning/development

To provide overall guidance and direction to closure planning and/or the implementation of progressive closure measures over the remaining over the prospecting life.

2. Physical stability

To ensure that surface infrastructure and prospecting residue and/or disturbances that are present at processing plant decommissioning will be removed and/or stabilised in a manner that these will not compromise post-closure land use and be sustainable long-term landforms.

- Closure, removal and disposal of all surface infrastructure that has no beneficial post-closure use.
- Shaping and vegetating the remaining earth embankments, trenches, etc. to stabilise slopes and integrate with surrounding topography.

3. **Environmental quality**

To ensure that local environmental quality is not adversely affected by possible physical effects arising from prospecting operations and the prospecting site after closure. This will be achieved by:

- Avoiding and/or limiting the following during prospecting operations which could result in adverse effects that could not be readily addressed and/or mitigated at mine closure.
  - Dust fall-out areas surrounding the prospecting site.
  - Wash-off and/or mobilisation of chemically contaminated soils and sediments from the prospecting site that could have long term adverse effects on local aquatic health and/or other water uses.
  - Possible shallow groundwater contamination adversely affecting the quality of the local water resource and its beneficial use.
- Limiting the potential for dust generation on the rehabilitated prospecting site that could cause nuisance and/or health effects to surrounding landowners;
- Limiting the possible adverse water quality and quantity effects arising from the rehabilitated prospecting site to ensure that long term beneficial use of local resources is not compromised;
- Conducting soil clean-up/remediation to ensure that the planned land use could be implemented and maintained;

4. **Health and safety**

To limit the possible health and safety treats due to terrain hazards to humans and animals utilizing the rehabilitated prospecting site after closure by:

- Demonstrating through upfront soil testing that any resultant inorganic and organic pollution present on the site is acceptable;
- Removal of potential contaminants such as hydrocarbons and chemicals off site;
- Shaping of embankments and trenches to safe slopes and reintegrating of these into surrounding topography.
- Ensuring that the environmental quality as reflected above is achieved.

5. **Land capability / land use**

To ensure that the required land capability to achieve and support the planned land use can be achieved over the prospecting site by:

- Clean-up and reclamation of contaminated soil areas in order not to compromise the above land use planning earmarked for implementation;
- To ensure that the overall rehabilitated prospecting site is free draining
- Transferring prospecting related surface infrastructure to third parties for beneficial use after closure.

6. **Aesthetic quality**

To ensure that the rehabilitated prospecting site will display, at a minimum, an acceptable aesthetic appearance that would not compromise the planned land use by leaving behind:

- A prospecting area that is properly cleared-up with no fugitive/scattered waste piles
- Rehabilitated prospecting area that is free draining and disturbed areas that are suitably vegetated.
- Rehabilitated prospecting residues that are suitably landscaped, blending with the surrounding environment as far as possible.
- Shaped and rehabilitated terrace and hard stand areas, roughly emulating the local natural surface topography.

7. **Landscape viability**

To create a landscape that is self-sustaining and over time will evolve/converge to the desired ecosystem structure, function and composition by:

- Conducing surface profiling, with associated material movement optimisation, to obtain a landscape resembling the natural landscapes to support the succession trajectory towards a climax ecological system.
- Establishing woody patches and create “rough and loose” areas for pioneer specie establishment around the respective patches.
- Establishing pioneer species as follows:
- Collected and prepared seeds for broad casting;
- Seedlings grown on on-site nursery;
- Cuttings collected from surrounding veld areas;
- Conducting rehabilitation monitoring and corrective action as required.

8. **Biodiversity**

To encourage, where appropriate, the re-establishment of native vegetation on the rehabilitated mine site such the terrestrial biodiversity is largely re-instated over time, by:

- Stabilising disturbed areas to prevent erosion in the short- to medium term until a suitable vegetation cover has established; and
- Establishing viable self-sustaining vegetation communities of local fauna, as far as possible.

F. A DESCRIPTION OF PROPOSED IMPACT MANAGEMENT ACTIONS, IDENTIFYING THE MANNER IN WHICH THE IMPACT MANAGEMENT [OBJECTIVES AND] OUTCOMES CONTEMPLATED IN PARAGRAPH (D) [AND (E)] WILL BE ACHIEVED, AND MUST, WHERE APPLICABLE, INCLUDE ACTIONS TO —

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 & Closure Plan is attached as **Appendix 10.**

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

XXXXX

Concurrent Rehabilitation

Concurrent backfilling will take place in order to rehabilitate. Please see the explanation below how concurrent rehabilitation is carried out:

Topsoil will be removed from trench no.1, where after it will be stored separately on the proposed area. Stored topsoil will be kept separate from overburden. Stored topsoil will be adequately protected from being eroded or blown away.

The exposed diamondiferous gravel of trench no.1 and no.2 will then be removed. The diamondiferous gravel will be sorted by means of a screen and all material larger than for example 100mm will be separated from the rest. This material will be used in the backfilling stage. Screened material for example smaller than 100mm will be fed into a wet rotary screen and then directly onto the washing pans.

As prospecting activities progress from trench no.2 towards the following trench no.3, backfilling and rehabilitation of trench no.1 will commence. The coarse gravel sifted at the screen, tailings from the pans and fine concrete will be transported back into open trench no.1. During this process of backfilling, variation in the dumping sequence of different sized materials will be followed to ensure better compaction and stability of the reclaimed gravel. This will ensure that voids surrounding the coarse gravel will be filled up with finer sediments. Compaction will be achieved through heavy vehicles during backfilling stage. This prospecting sequence will be utilised for the final rehabilitation of the last actively prospected trench.

Since concurrent backfilling will take place in order to rehabilitate, the total area to be disturbed per year will be less than the above calculation. Because of the aforementioned the total area to disturbed is divided by two. Following the aforementioned sequence will ensure that the maximum area to be disturbed by prospecting activities at any given time, is only approximately **0.5ha**

Calculations

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Total disturbance for 24 months	250 pits x (4m x 4m) / 10 000 =	0.4ha disturbed

TRENCHES:	
Timeframe: 24 months (month 31 - 54)	
Concurrent backfilling will take place in order to rehabilitate trenches:	
The area to be disturbed for 1 trench	1 trench x (40m x 50m) / 10 000 = 0.2ha
3 trenches will be worked on at any given time: • 2 trenches will be open to remove gravel • 1 trench will be backfilled and rehabilitated	0.2ha x 2 trenches = 0.4ha 0.2ha / 2 = 0.1ha
The area to be disturbed at any given time	0.4ha + 0.1ha = 0.5ha
After the trench is backfilled and rehabilitated only then will another trench be opened.	
Total	0.5ha

a. Confirm that the financial provision will be provided as determined.

Financial Guarantee

The financial guarantee for the rehabilitation for land disturbed **Kimswa Mining (Pty) Ltd** will be submitted

Rehabilitation Fund

Kimswa Mining (Pty) Ltd will also make provision for rehabilitation during closure by establishing a rehabilitation trust.

IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

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

ACTIVITIES **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **E.g. For mining**,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	**PHASE** (of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).	**SIZE AND SCALE of disturbance** (volumes, tonnages and hectares or m²)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity Or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Clearance of vegetation	Pitting and trenching phase- (construction and operation phase)	4209.3984 Ha - **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each Concurrent backfilling will take place in order to rehabilitate.	1) Site clearing must take place in a phased manner, as and when required. 2) Areas which are not to be prospected on within two months must not be cleared to reduce erosion risks. 3) The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4) Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5) The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.	Compliance with Duty of Care as detailed within NEMA	Duration of operations on the prospecting activities.

Construction of roads	Pitting and trenching phase (construction and operation phase)	+- 500m	1) Planning of access routes to the site for construction/prospecting purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a “NO ENTRY for prospecting vehicles" sign. 2) Construction routes and required access roads must be clearly defined. 3) Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 4) Soils compacted by construction/prospecting activities shall be deep ripped to loosen compacted layers and re-graded to even running levels. 5) The contractor must ensure that damage caused by related traffic to the gravel access road off the N8 is repaired continuously. The costs associated with the repair must be borne by the contractor; 6) Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport the gravel are fitted with tarpaulins or covers; 7) All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.	Compliance with Duty of Care as detailed within NEMA	Duration of operations on the prospecting activities.
Prospecting Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) – Soils and geology	Pitting and trenching phase (construction and operation phase)	4209.3984 Ha - **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each Concurrent backfilling will take place in	1) The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil (If topsoil exists), and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2) Care must be taken not to mix topsoil and subsoil during stripping. 3) The topsoil must be conserved on site in and around the pit/trench area.	Compliance with Duty of Care as detailed within NEMA	Duration of operations on the mine

		order to rehabilitate.	4) Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 5) If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms, trenches or low brick walls around their bases. 6) Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 7) Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage/leakage occurs should be attained and given to the project manager. 8) The impact on the geology will be permanent. There is no mitigation measure.		
Prospecting Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) – excavations	Pitting and trenching phase (construction and operation phase)	4209.3984 Ha - **Pits:** 250 pits, with dimensions of 4m x 4m x 5m each. **Trenches**: 80 trenches with dimensions of 40m x 50m x 5m each Concurrent backfilling will take place in order to rehabilitate.	1) The prospecting activities must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. 2) Mine, pans, workshops and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed in to the system. 3) Truck traffic should be routed away from noise sensitive areas, where possible. 4) Noise levels must be kept within acceptable limits. 5) Noisy operations should be combined so that they occur where possible at the same time. 6) Mine workers to wear necessary ear protection gear. 7) Noisy activities to take place during allocated hours. 8) Noise from labourers must be controlled. 9) Noise suppression measures must be applied to all equipment. Equipment must be kept in good working order and where	Compliance with Duty of Care as detailed within NEMA	Duration of operations on the prospecting area

			appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from the site. 10) The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11) Implementation of enclosure and cladding of processing plants. 12) Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.		

IMPACT MANAGEMENT OUTCOMES

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

ACTIVITY (whether listed or not listed). **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**.	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated **(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)**	**MITIGATION TYPE** **(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)** **E.g.** • **Modify through alternative method.** • **Control through noise control** • **Control through management and monitoring** • **Remedy through rehabilitation..**	**STANDARD TO BE ACHIEVED** **(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.**
Clearance of vegetation	Loss or fragmentation of habitats	Fauna & flora	Pitting and trenching phase (construction and operation phase)	**Existing vegetation** 1) Vegetation removal must be limited to the prospecting area. 2) Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 3) No vegetation to be used for firewood. 4) Exotic and invasive plant species should not be allowed to establish, if the development is approved. **Rehabilitation** 5) All damaged areas shall be rehabilitated upon completion of the contract. 6) Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 7) All natural areas impacted during construction/prospecting must be rehabilitated with locally indigenous grasses typical of the representative botanical unit.	Minimisation of impacts to acceptable limits

				8) Rehabilitation must take place in a phased approach as soon as possible. 9) Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 10) Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 11) Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. **Demarcation of prospecting area** 12) All plants not interfering with prospecting operations shall be left undisturbed clearly marked and indicated on the site plan. 13) The prospecting area must be well demarcated and no construction/prospecting activities must be allowed outside of this demarcated footprint. 14) Vegetation removal must be phased in order to reduce impact of construction/prospecting. 15) Site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 16) Strict and regular auditing of the prospecting process to ensure containment of the prospecting and laydown areas. 17) Soils must be kept free of petrochemical solutions that may be kept on site during construction/prospecting. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. **Utilisation of resources** 18) Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO. **Exotic vegetation** 19) Alien vegetation on the site will need to be controlled. 20) The Contractor should be responsible for implementing a programme of weed control (particularly in areas where soil	

				has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 21) The spread of exotic species occurring throughout the site should be controlled. 22) Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys. 23) Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish **Herbicides** 24) Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. 25) The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation. **Fauna** 26) Rehabilitation to be undertaken as soon as possible after the prospecting activities have been completed. 27) No trapping or snaring to fauna on the construction/prospecting site should be allowed. 28) No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development.	

Prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) – excavations	Loss of topsoil	Soil	Pitting and trenching phase (construction and operation phase)	1) The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2) Care must be taken not to mix topsoil and subsoil during stripping. 3) The topsoil must be conserved on site in and around the pit/trench area. 4) Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 5) If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 6) Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 7) Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage/leakage occurs should be attained and given to the project manager. Establish an effective record keeping system for each area where soil is disturbed for prospecting purposes. These records should be included in environmental performance reports, and should include all the records below. • Record the GPS coordinates of each area. • Record the date of topsoil stripping.	Minimisation of impacts to acceptable limits

				• Record the GPS coordinates of where the topsoil is stockpiled. • Record the date of cessation prospecting activities at the particular site. • Photograph the area on cessation of prospecting activities. • Record date and depth of re-spreading of topsoil. • Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.	
	Erosion	Soil Air Water	Pitting and trenching phase (construction and operation phase)	1) An effective system of run-off control should be implemented, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. 2) Periodical site inspection should be included in environmental performance reporting that inspects the effectiveness of the run-off control system and specifically records the occurrence of any erosion on site or downstream. 3) Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 4) The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 5) Other erosion control measures that can be implemented are as follows: ○ Brush packing with cleared vegetation ○ Mulch or chip packing ○ Planting of vegetation ○ Hydroseeding/hand sowing 6) Sensitive areas need to be identified prior to construction/prospecting so that the necessary precautions can be implemented. 7) All erosion control mechanisms need to be regularly maintained. 8) Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 9) Retention of vegetation where possible to avoid soil erosion.	Minimisation of impacts to acceptable limits

				10) Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 11) Re-vegetation of disturbed surfaces should occur immediately after construction/prospecting activities are completed. This should be done through seeding with indigenous grasses. 12) No impediment to the natural water flow other than approved erosion control works is permitted. 13) To prevent stormwater damage, the increase in stormwater run-off resulting from construction/prospecting activities must be estimated and the drainage system assessed accordingly. 14) Stockpiles not used in three (3) months after stripping must be seeded or backfilled to prevent dust and erosion.	
	Air Pollution	Air	Pitting and trenching phase (construction and operation phase)	**Dust control** 1) Wheel washing and damping down of un-surfaced and un-vegetated areas. 2) Retention of vegetation where possible will reduce dust travel. 3) Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4) Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust. 5) The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6) A speed limit of 30km/h must not be exceeded on site. 7) Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8) Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. **Odour control** 9) Regular servicing of vehicles in order to limit gaseous emissions. 10) Regular servicing of onsite toilets to avoid potential odours.	Minimisation of impacts to acceptable limits

				Rehabilitation 11) The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. **Fire prevention** 12) No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 13) The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.	
	Noise		Pitting and trenching phase (construction and operation phase)	1) The prospecting activities must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. 2) Mine, crushers, workshops and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed in to the system. 3) Truck traffic should be routed away from noise sensitive areas, where possible. 4) Noise levels must be kept within acceptable limits. 5) Noisy operations should be combined so that they occur where possible at the same time. 6) Mine workers to wear necessary ear protection gear. 7) Noisy activities to take place during allocated hours. 8) Noise from labourers must be controlled. 9) Noise suppression measures must be applied to all equipment. Equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from the site.	Minimisation of impacts to acceptable limits

				10) The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11) Implementation of enclosure and cladding of processing plants. 12) Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.	
	Impact on potential cultural and heritage artefacts	Heritage	Pitting and trenching phase (construction and operation phase)	1) Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 2) Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts/ fossils are uncovered in the affected area. 3) The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical, archaeological or palaeontological finds to the ECO so that appropriate action can be taken. 4) Known sites should be clearly marked in order that they can be avoided. The work force should also be informed that fenced-off areas are no-go areas. 5) The ECO must also survey for heritage and palaeontological artefacts during ground breaking and digging or drilling. He/she should familiarise themselves with formations and its fossils or a palaeontologist should be appointed during the digging and excavation phase of the development. 6) All digging, excavating, drilling or blasting activities must be stopped if heritage and/or palaeontological artefacts are uncovered and a specialist should be called in to determine proper management, mitigation, excavation and/or collecting measures. 7) Any discovered artefacts or fossils shall not be removed under any circumstances. Any destruction of a site can only be	Minimisation of impacts to acceptable limits

				allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from SAHRA should the proposed site affect any world heritage/palaeontology sites or if any heritage/palaeontology sites are to be destroyed or altered. 8) Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1). 9) Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**". If such resources are found during the mining or development activities, they shall not be disturbed without a permit from the relevant heritage resource Authority, which means that before such sites are disturbed by development it is incumbent on the developer to ensure that a heritage impact assessment is done and the Provincial Heritage Resources Authority and SAHRA must be contacted immediately and work must stop. If anything of Archaeological and/or paleontological significance is found during the construction and operational phase of the mine the following applies: • NHRA 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (021 462 5402) must be	

				alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • NHRA 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • NHRA 38(4)e – The following conditions apply with regards to the appointment of specialists: i) If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carry out by a paleontologist. **Chance Find Procedure** • If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find. • The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or	

				site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. • A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates. • Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found. • Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary. • The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find. • In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site. • Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.	

Waste management		Pollution	Pitting and trenching phase (construction and operation phase)	**Litter management** 1) Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2) The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3) Good housekeeping practices should be implemented to regularly maintain the litter and rubble situation on the construction site. 4) If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5) Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 6) Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7) All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8) Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. 9) A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10) Under no circumstances may solid waste be burnt on site. 11) All waste must be removed promptly to ensure that it does not attract vermin or produce odours. **Hazardous waste** 12) All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of offsite at a licensed landfill site, where practical. Incineration may be used where relevant.	Minimisation of impacts to acceptable limits

				13) Contaminants to be stored safely to avoid spillage. 14) Machinery must be properly maintained to keep oil leaks in check. 15) All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated. **Sanitation** 16) The Contractor shall install mobile chemical toilets on the site. 17) Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. 18) Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. 19) Toilets should be no closer than 50m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer. 20) Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. 21) The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant. 22) Potable water must be provided for all construction staff. **Remedial actions** 23) Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 24) Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 25) The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil.	

				26) If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 27) If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 28) Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 29) Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.	
Water Use and Quality	Water pollution	Water	Pitting and trenching phase (construction and operation phase)	**Water Use** 1) Develop a sustainable water supply management plan to minimise the impact to natural systems by managing water use, avoiding depletion of aquifers and minimising impacts to water users. 2) Water must be reused, recycled or treated where possible. **Water Quality** 3) The quality and quantity of effluent streams discharged to the environment including stormwater should be managed and treated to meet applicable effluent discharge guidelines. 4) Discharge to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria outside a scientifically established mixing zone. 5) Efficient oil and grease traps or sumps should be installed and maintained at refueling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans. **Stormwater** 6) The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants.	

				7) Silt fences should be used to prevent any soil entering the stormwater drains. 8) Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 9) Promote a water saving mind set with construction/prospecting workers in order to Contractor ensure less water wastage. 10) Hazardous substances must be stored at least 40m from any water bodies on site to avoid pollution. 11) The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase. 12) Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 13) There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 14) If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the storm water system or nearby streams, rivers or erosion channels or dongas. The cut-off trenches and silt fences will be installed where necessary as to control runoff storm water by attenuating it and control the movement of sediment on the premises. These structures will be monitored on a regular basis. It is suggested that it be monitored on a weekly basis during the rainy season, and after possible rain events during the dry season. If these practices is found to be insufficient for the control of storm water and sedimentation, other alternatives should immediately be investigated and implemented. **Groundwater resource protection**	

				15) Process solution storage ponds and other impoundments designed to hold non fresh water or non-treated process effluents should be lined and be equipped with sufficient wells to enable monitoring of water levels and quality. 16) Prevent dirty water runoff from leaving the general mining area; 17) Compact the base of dirty areas, like the workshops and oil and diesel storage areas to minimise infiltration of poor-quality water to the underlying aquifers; 18) Enough supply of absorbent fibre should be kept at the site to contain accidental spills; 19) Contain dirty water in return water dams and re-use dirty water for dust suppression and make up water in the plant; 20) Proper storm water management should be implemented. Berms should also be constructed to ensure separation of clean water and dirty water areas; 21) A detailed mine closure plan should be prepared during the operational phase, including a risk assessment, water resource impact prediction etc. as stipulated in the DWS Best Practice Guidelines. The implementation of the mine closure plan, and the application for the closure certificate can be conducted during the decommissioned phase. **Sanitation** 22) Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 23) The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. **Concrete mixing** 24) Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth. **Public areas** 25) Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed	

				refuse bins which should be removed from site on a regular basis. 26) The Contractor should take steps to ensure that littering by construction/prospecting workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. **27)** No washing or servicing of vehicles on site. **Infrastructure** 28) Infrastructure should adhere to the GN704 of the South African National Water Act (36 of 1998) and not be located within the 1:100- year Return Period flood line. This is essential for the safety of human life as well as for the protection of infrastructure from flood inundation and destruction.	

IMPACT MANAGEMENT ACTIONS

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

ACTIVITY Whether listed or not listed. **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**.	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)**	**MITIGATION TYPE** **(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)** **E.g.** • **Modify through alternative method.** • **Control through noise control** • **Control through management and monitoring** **Remedy through rehabilitation..**	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Clearance of vegetation	Loss or fragmentation of habitats	**Existing vegetation** 1. Vegetation removal must be limited to the prospecting site. 2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 3. No vegetation to be used for firewood. 4. Exotic and invasive plant species should not be allowed to establish, if the development is approved. **Rehabilitation** 5. All damaged areas shall be rehabilitated upon completion of the contract.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		6. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 7. All natural areas impacted during construction/prospecting must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. 8. Rehabilitation must take place in a phased approach as soon as possible. 9. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 10. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 11. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. **Demarcation of prospecting area** 12. All plants not interfering with prospecting operations shall be left undisturbed clearly marked and indicated on the site plan. 13. The prospecting area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 14. Vegetation removal must be phased in order to reduce impact of construction/prospecting. 15. Site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 16. Strict and regular auditing of the prospecting process to ensure containment of the prospecting and laydown areas. 17. Soils must be kept free of petrochemical solutions that may be kept on site during construction/prospecting. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.		

		Utilisation of resources 18. Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO. **Exotic vegetation** 19. Alien vegetation on the site will need to be controlled. 20. The Contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 21. The spread of exotic species occurring throughout the site should be controlled. 22. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys. 23. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. **Herbicides** 24. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.		

		25. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation. **Fauna** 26. Rehabilitation to be undertaken as soon as possible after prospecting has been completed. 27. No trapping or snaring to fauna on the construction/prospecting site should be allowed. 28. No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development.		
Prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) – excavations	Loss of topsoil	1) The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction/prospecting and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2) Care must be taken not to mix topsoil and subsoil during stripping. 3) The topsoil must be conserved on site in and around the pit/trench area. 4) Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 5) If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 6) Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		7) Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage/leakage occurs should be attained and given to the project manager. Establish an effective record keeping system for each area where soil is disturbed for prospecting purposes. These records should be included in environmental performance reports, and should include all the records below. • Record the GPS coordinates of each area. • Record the date of topsoil stripping. • Record the GPS coordinates of where the topsoil is stockpiled. • Record the date of cessation prospecting activities at the particular site. • Photograph the area on cessation of prospecting activities. • Record date and depth of re-spreading of topsoil. • Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.		
	Erosion	1. An effective system of run-off control should be implemented, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. 2. Periodical site inspection should be included in environmental performance reporting that inspects the effectiveness of the run-off control system and specifically records the occurrence of any erosion on site or downstream. 3. Wind screening and stormwater control should be undertaken to prevent soil loss from the site.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		4. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 5. Other erosion control measures that can be implemented are as follows: ○ Brush packing with cleared vegetation ○ Mulch or chip packing ○ Planting of vegetation ○ Hydroseeding/hand sowing 6. Sensitive areas need to be identified prior to construction/prospecting so that the necessary precautions can be implemented. 7. All erosion control mechanisms need to be regularly maintained. 8. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 9. Retention of vegetation where possible to avoid soil erosion. 10. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 11. Re-vegetation of disturbed surfaces should occur immediately after construction/prospecting activities are completed. This should be done through seeding with indigenous grasses. 12. No impediment to the natural water flow other than approved erosion control works is permitted. 13. To prevent stormwater damage, the increase in stormwater run-off resulting from construction/prospecting activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings. 14. Stockpiles not used in three (3) months after stripping must be seeded/backfilled to prevent dust and erosion.		

	Air Pollution	**Dust control** 1) Wheel washing and damping down of un-surfaced and un-vegetated areas. 2) Retention of vegetation where possible will reduce dust travel. 3) Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4) Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust. 5) The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6) A speed limit of 30km/h must not be exceeded on site. 7) Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8) Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. **Odour control** 9) Regular servicing of vehicles in order to limit gaseous emissions. 10) Regular servicing of onsite toilets to avoid potential odours. **Rehabilitation** 11) The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. **Fire prevention** 12) No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		13) The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.		
	Noise	1) The prospecting activities must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. 2) Pans, power plants, crushers, workshops and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed in to the system. 3) Truck traffic should be routed away from noise sensitive areas, where possible. 4) Noise levels must be kept within acceptable limits. 5) Noisy operations should be combined so that they occur where possible at the same time. 6) Mine workers to wear necessary ear protection gear. 7) Noisy activities to take place during allocated hours. 8) Noise from labourers must be controlled. 9) Noise suppression measures must be applied to all equipment. Equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from the site. 10) The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11) Implementation of enclosure and cladding of processing plants.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		12) Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.		
	Impact on potential cultural and heritage artefacts	1) Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 2) Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts/ fossils are uncovered in the affected area. 3) The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical, archaeological or palaeontological finds to the ECO so that appropriate action can be taken. 4) Known sites should be clearly marked in order that they can be avoided. The work force should also be informed that fenced-off areas are no-go areas. 5) The ECO must also survey for heritage and palaeontological artefacts during ground breaking and digging or drilling. He/she should familiarise themselves with formations and its fossils or a palaeontologist should be appointed during the digging and excavation phase of the development. 6) All digging, excavating, drilling or blasting activities must be stopped if heritage and/or palaeontological artefacts are uncovered and a specialist should be called in to determine proper management, mitigation, excavation and/or collecting measures. 7) Any discovered artefacts or fossils shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from SAHRA should the proposed site affect any world heritage/palaeontology sites or if any heritage/palaeontology sites are to be destroyed or altered.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		8) Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1). 9) Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**". If such resources are found during the mining or development activities, they shall not be disturbed without a permit from the relevant heritage resource Authority, which means that before such sites are disturbed by development it is incumbent on the developer to ensure that a heritage impact assessment is done and the Provincial Heritage Resources Authority and SAHRA must be contacted immediately and work must stop. If anything of Archaeological and/or paleontological significance is found during the construction and operational phase of the mine the following applies: • NHRA 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the		

		NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • NHRA 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • NHRA 38(4)e – The following conditions apply with regards to the appointment of specialists: i) If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carry out by a paleontologist. **Chance Find Procedure** • If a chance find is made the person responsible for the find must immediately stop working and all work that		

		could impact that finding must cease in the immediate vicinity of the find. • The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. • A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates. • Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found. • Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary. • The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.		

		• In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site. • Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.		
Waste Management		**Litter management** 1) Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction/prospecting site. 2) The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3) Good housekeeping practices should be implemented to regularly maintain the litter and rubble situation on the construction/prospecting site. 4) If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5) Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 6) Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7) All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8) Where a registered waste site is not available close to the construction/prospecting site, the Contractor shall provide a method statement with regard to waste management.	Duration of operation	The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA.

		9) A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10) Under no circumstances may solid waste be burnt on site. 11) All waste must be removed promptly to ensure that it does not attract vermin or produce odours. **Hazardous waste** 12) All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of offsite at a licensed landfill site, where practical. Incineration may be used where relevant. 13) Contaminants to be stored safely to avoid spillage. 14) Machinery must be properly maintained to keep oil leaks in check. 15) All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction/prospecting and any spills shall immediately be cleaned up and all affected areas rehabilitated. **Sanitation** 16) The Contractor shall install mobile chemical toilets on the site. 17) Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. 18) Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. 19) Toilets should be no closer than 50m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer. 20) Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility.		

		21) The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant. 22) Potable water must be provided for all construction staff. **Remedial actions** 23) Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 24) Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 25) The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. 26) If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 27) If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 28) Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 29) Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal.		
Water Use and Quality	Water pollution	**Water Use** 1) Develop a sustainable water supply management plan to minimise the impact to natural systems by managing water use, avoiding depletion of aquifers and minimising impacts to water users. 2) Water must be reused, recycled or treated where possible.		

		Water Quality 3) The quality and quantity of effluent streams discharged to the environment including stormwater should be managed and treated to meet applicable effluent discharge guidelines. 4) Discharge to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria outside a scientifically established mixing zone. 5) Efficient oil and grease traps or sumps should be installed and maintained at refueling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans. **Stormwater** 6) The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants. 7) Silt fences should be used to prevent any soil entering the stormwater drains. 8) Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 9) Promote a water saving mind set with construction/prospecting workers in order to Contractor ensure less water wastage. 10) New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 11) Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution. 12) The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase.		

		13) Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 14) There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 15) If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the storm water system or nearby streams, rivers or erosion channels or dongas. **Groundwater resource protection** 16) Process solution storage ponds and other impoundments designed to hold non fresh water or un-treated process effluents should be lined and be equipped with sufficient wells to enable monitoring of water levels and quality. 17) Prevent dirty water runoff from leaving the general mining area; 18) Compact the base of dirty areas, like the workshops and oil and diesel storage areas to minimise infiltration of poor-quality water to the underlying aquifers; 19) Enough supply of absorbent fibre should be kept at the site to contain accidental spills; 20) Contain dirty water in return water dams and re-use dirty water for dust suppression and make up water in the plant; 21) Proper storm water management should be implemented. Berms should also be constructed to ensure separation of clean water and dirty water areas; 22) A detailed mine closure plan should be prepared during the operational phase, including a risk assessment, water resource impact prediction etc. as stipulated in		

		the DWS Best Practice Guidelines. The implementation of the mine closure plan, and the application for the closure certificate can be conducted during the decommissioned phase **Sanitation** 23) Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 24) The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. **Concrete mixing** 25) Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth. **Public areas** 26) Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 27) The Contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 28) No washing or servicing of vehicles on site. **Infrastructure** 29) Infrastructure should adhere to the GN704 of the South African National Water Act (36 of 1998) and not be located within the 1:100- year Return Period flood line. This is essential for the safety of human life as well as for the protection of infrastructure from flood inundation and destruction.		

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

G. MONITORING OF IMPACT MANAGEMENT ACTIONS

H. MONITORING AND REPORTING FREQUENCY

I. RESPONSIBLE PERSONS

J. TIME PERIOD FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS

K. MECHANISM FOR MONITORING COMPLIANCE

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Clearance of vegetation	Loss or fragmentation of habitats	• Conduct regular internal audits • Conduct regular external audits	• Environmental Manager • Suitable qualified environmental auditor	Monitoring should be undertaken for duration of operations. Internal audits should be undertaken at least every 6 months. External audits should be undertaken by a suitably qualified auditor on an annual basis. Reports should be made available to the competent authority if required.
Prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) – excavations	Loss of topsoil Erosion Air Pollution Noise Impact on potential cultural, heritage artefacts and fossils	• Conduct regular internal audits • Conduct regular external audits	• Environmental Manager • Suitable qualified environmental auditor	Monitoring should be undertaken for duration of operations. Internal audits should be undertaken at least every 6 months. External audits should be undertaken by a suitably qualified auditor on an annual basis. Reports should be made available to the competent authority if required.
Waste management	Pollution	• Conduct regular internal audits • Conduct regular external audits	• Environmental Manager • Suitable qualified environmental auditor	Monitoring should be undertaken for duration of operations. Internal audits should be undertaken at least every 6 months. External audits should be undertaken by a suitably qualified auditor on an annual basis. Reports should be made available to the competent authority if required.
Water Use and Quality	Water pollution	• Conduct regular internal audits • Conduct regular external audits	• Environmental Manager • Suitable qualified environmental auditor	Monitoring should be undertaken for duration of operations. Internal audits should be undertaken at least every 6 months. External audits should be undertaken by a suitably qualified auditor on an annual basis. Reports should be made available to the competent authority if required.

L. A PROGRAM FOR REPORTING ON COMPLIANCE, TAKING INTO ACCOUNT THE REQUIREMENTS AS BY THE REGULATIONS;

External audits should be undertaken by a suitably qualified auditor on an annual basis. Reports should be made available to the Competent Authority if required.

M. AN ENVIRONMENTAL AWARENESS PLAN DESCRIBING THE MANNER IN WHICH—

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

Kimswa Mining (Pty) Ltd will implement an Environmental Awareness Plan which will include various mechanisms for informing employees of environmental risks resulting from their work, including:

- Induction training for full –time staff and contractors;
- In-house training sessions to be held with relevant employees;
- On the job training regarding environmental issues
- Training and skills development

The above measures will be implemented through an Environmental Communication Strategy to be implemented.

See the attached **Appendix 11** for the Awareness plan

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

Kimswa Mining (Pty) Ltd will implement an incident reporting and reporting procedure in order to identify risks timeously and implement actions to avoid or minimise environmental impacts.

N. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY (Among others, Confirm that the financial provision will be reviewed annually).

No specific information requirements have been detailed by the Competent Authority.

END OF THE REPORT