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# ENVIRONMENTAL IMPACT ASSESSMENT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR:

**The proposed Prospecting Right application for the prospecting of Diamonds (Alluvial, General & in Kimberlite), combined with a Waste Licence Application, near Groblershoop on a certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province.**

| | |
|---|---|
| **NAME OF APPLICANT** | **Johan Smit** |
| **PREPARED BY** | **Milnex CC** |
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| **FAX NO** | 087 231 7021 |
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| **SAMRAD REF NUMBER:** | **NC30/5/1/1/2/12359PR** |

## DISCLAIMER

This report has been compiled by Milnex CC, using information provided by **Johan Smit** the client as well as third parties, which information has been presumed to be correct. While Milnex CC have made every endeavour to supply accurate information, and exercised all care, skill and diligence in the drafting of this report, errors and omissions may occur. Accordingly, Milnex CC does not warrant the accuracy or completeness of the materials in this report. Milnex CC does not accept any liability for any loss or damage which may directly or indirectly result from any advice, opinion, information, representation or omission, whether negligent or otherwise, contained in this report. Milnex CC does not accept any liability for any loss or damage, whether direct, indirect or consequential, arising out of circumstances beyond the control of Milnex CC, including the use and interpretation of this report by the client, its officials or their representatives or agents. This document contains information proprietary to Milnex CC and as such should be treated as confidential unless specifically identified as a public document by law. Milnex CC owns all copyright and all other intellectual property rights in this report. The document may not be copied, reproduced in whole or in part, or used for any manner without prior written consent from Milnex CC. Copyright is specifically reserved in terms of the Copyright Act 98 of 1987 including amendments thereto. By viewing this disclaimer and by accepting this document, you acknowledge that you have read and accepted these Terms of Use and undertake to keep the information contained herein confidential and not to do any act or allow any act which is in breach of these Terms of Use.

**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**

3. 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<br>Fax No. : (053) 963 2009<br>e-mail address: lizanne@milnex-sa.co.za |
| Percy Sehaole Pr.Sci.Nat | Master's Degree in Environmental Science (refer to **Appendix 1**) | Tel No.: (018) 011 1925<br>Fax No. : (053) 963 2009<br>e-mail address: percy@milnex-sa.co.za |
| Danie Labuschagne | Master's Degree in Environmental Management and Geography (refer to **Appendix 1**) | Tel No.: (018) 011 1925<br>Fax No. : (053) 963 2009<br>e-mail address: danie@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 **Johan Smit** as the independent environmental consultant to undertake the Scoping and EIA process for a Prospecting Right application for the prospecting of Diamonds (Alluvial, General & in Kimberlite), combined with a Waste Licence Application, near Groblershoop on a certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province. The property is located approximately 37km North of Groblershoop in the Northern Cape Province.

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.

Danie Labuschagne, Percy Sehaole & Lizanne Esterhuizen 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) A certain portion of the remaining extent of the farm Zonderhuis 402<br>Registration division: Kenhardt<br>Title deed: T4289/2005<br><br>2) Certain portion of the remaining extent of the farm Onder Plaats 401<br>Registration division: Kenhardt<br>Title deed: T4304/2005<br><br>3) Certain portion of the remaining extent of portion 1 of the farm Namakwari 656<br>Registration division: Kenhardt<br>Title deed: T2299/2017<br><br>4) Certain portion of portion 6 (portion of portion 4) of the farm Namakwari 656<br>Registration division: Gordonia<br>Title deed: T2585/2010<br><br>5) Certain portion of portion 7 (portion of portion 4) of the farm Namakwari 656<br>Registration division: Gordonia<br>Title deed: T2299/2017<br><br>6) Certain portion of portion 9 (portion of portion 4) of the farm Namakwari 656<br>Registration division: Gordonia<br>Title deed: T2299/2017 |
| **Application area (Ha)** | 8854.1269 hectares |
| **District Municipality** | ZF Mgcawu District Municipality |
| **Local Municipality** | Dawid Kruiper Local Municipality<br>!Kheis Local Municipality |
| **Magisterial district:** | Kenhardt & Gordonia |
| **Distance and direction from nearest town** | The property is located approximately 37km North of Groblershoop in the Northern Cape Province. |
| **21 digit Surveyor General Code for each farm portion** | 1) C02800000000040200000<br>2) C02800000000040100000<br>3) C02800000000065600000<br>4) C02800000000065600006<br>5) C02800000000065600007<br>6) C02800000000065600009 |
| **Minerals Applied for** | Diamonds (Alluvial, General & in Kimberlite) |

**iii. Farm co-ordinates**

| Farm |
|---|
| 1) A certain portion of the remaining extent of the farm Zonderhuis 402 |
| 2) Certain portion of the remaining extent of the farm Onder Plaats 401 |
| 3) Certain portion of the remaining extent of portion 1 of the farm Namakwari 656 |
| 4) Certain portion of portion 6 (portion of portion 4) of the farm Namakwari 656 |
| 5) Certain portion of portion 7 (portion of portion 4) of the farm Namakwari 656 |
| 6) Certain portion of portion 9 (portion of portion 4) of the farm Namakwari 656 |

| Longitude | Latitude |
|---|---|
| 21° 47' 19.307"" E | 28° 25' 8.643"" S |
| 21° 51' 46.055"" E | 28° 32' 24.360"" S |

| | |
|---|---|
| 21° 48' 52.681"" E | 28° 36' 7.404"" S |
| 21° 48' 39.287"" E | 28° 34' 16.421"" S |
| 21° 47' 46.992"" E | 28° 33' 7.866"" S |
| 21° 47' 24.578"" E | 28° 33' 22.582"" S |
| 21° 47' 14.354"" E | 28° 32' 58.918"" S |
| 21° 47' 9.622"" E | 28° 32' 56.227"" S |
| 21° 47' 24.800"" E | 28° 32' 40.181"" S |
| 21° 46' 55.413"" E | 28° 32' 0.098"" S |
| 21° 47' 29.618"" E | 28° 30' 40.169"" S |
| 21° 47' 12.935"" E | 28° 30' 17.139"" S |
| 21° 46' 20.875"" E | 28° 30' 17.396"" S |
| 21° 45' 46.582"" E | 28° 30' 52.734"" S |
| 21° 45' 19.563"" E | 28° 30' 13.512"" S |

## 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.

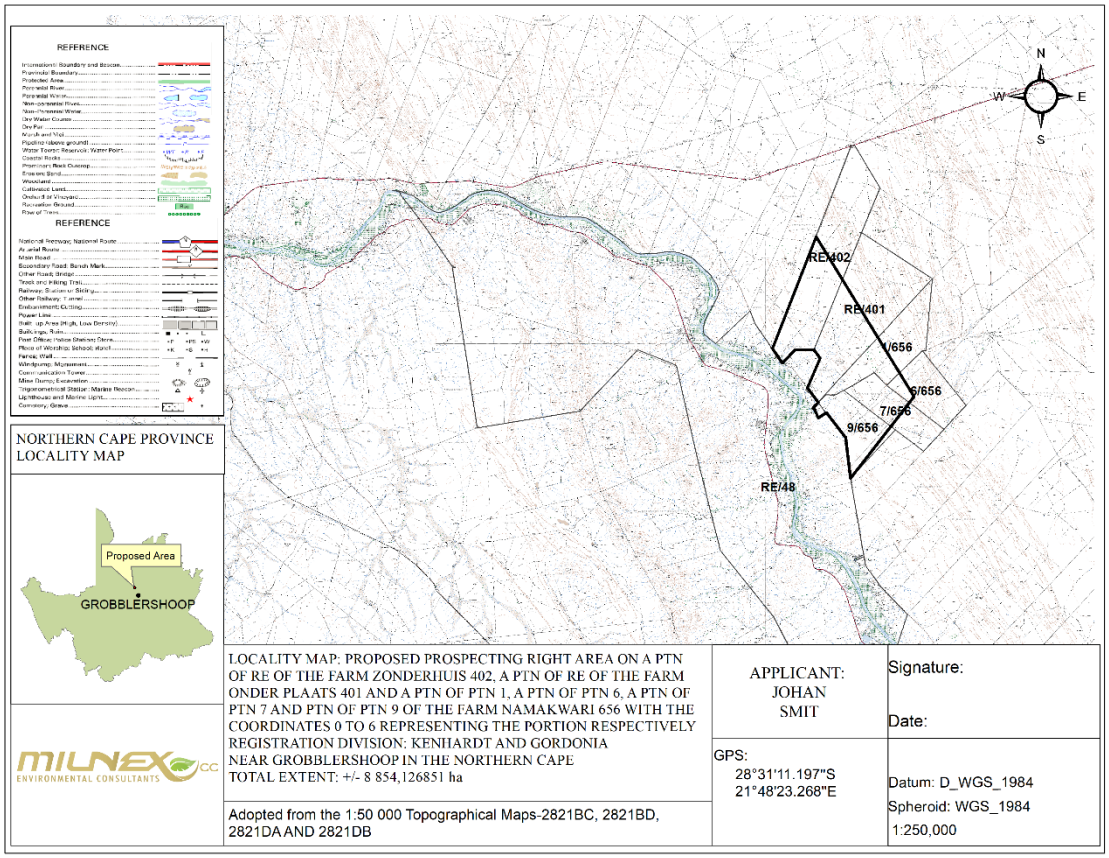


**Figure 1:** Locality Map

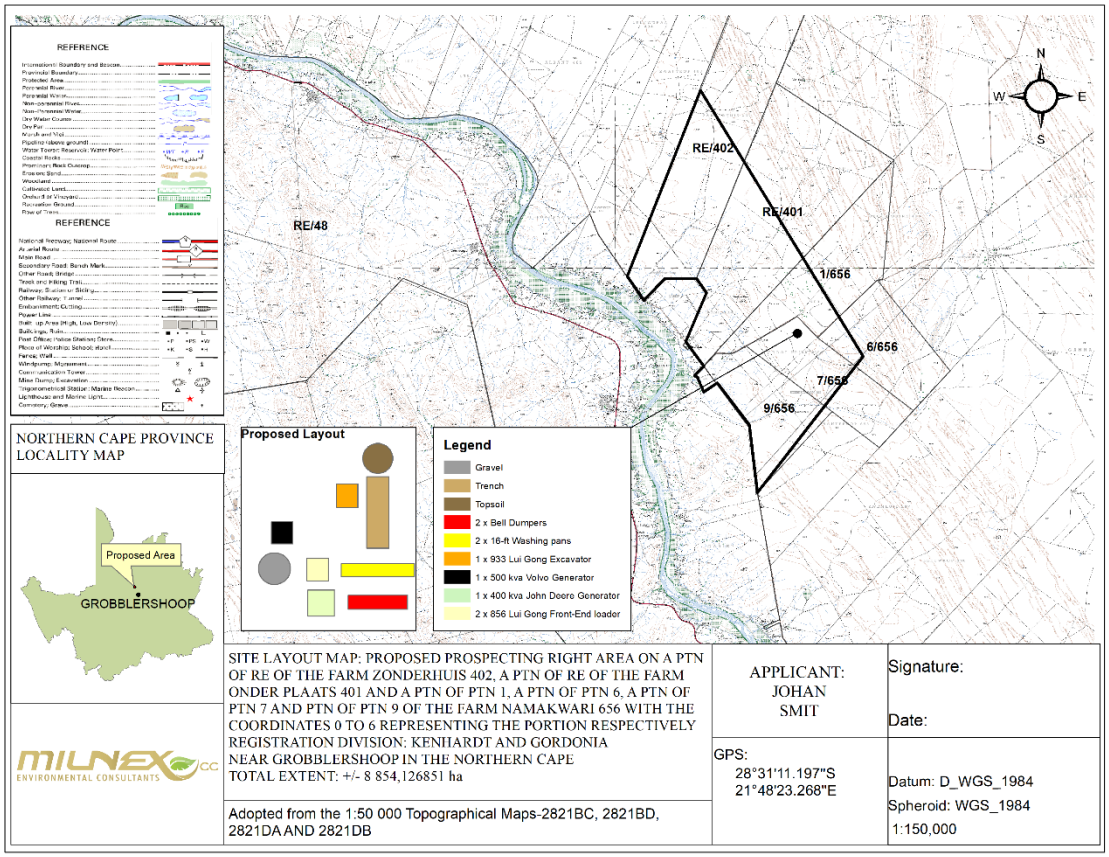


**Figure 2**: Site Plan

## 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 GNR 325, Activity 15:"**The clearance of an area of 20 hectares or more, of indigenous vegetation."<br><br>**2)** **Listing Notice GNR 325, Activity 19**: "The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—<br>a associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource or<br>b [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;<br><br>**3)** **Listing Notice GNR 327, Activity 20:** "Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—<br><br>a associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or [including activities for which an exemption has been |

| | |
|---|---|
| | issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]<br>b (the primary processing of a petroleum resource including winning, extraction, classifying, concentrating or water removal; –<br><br>Prospecting right with bulk samples for the mining of **Diamonds (Alluvial, General & in Kimberlite)** including associated infrastructure, structure and earthworks.<br><br>**4) NEM:WA 59 of 2008**<br>**Residue stockpiles or residue deposits**<br>**Category A: (15)** The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a prospecting right or mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). |

| **NAME OF ACTIVITY**<br><br>**(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc**<br>**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**<br>**Ha or m²** | **LISTED ACTIVITY**<br><br>(Mark with an **X** where applicable or affected). | **APPLICABLE LISTING NOTICE**<br><br>***(GNR 324, GNR 325 or GNR 326)*** | **WASTE MANAGEMENT AUTHORISATION**<br><br>(Indicate whether an authorisation is required in terms of the Waste Management Act)<br>**(Mark with an X)** |
|---|---|---|---|---|
| **Prospecting:**<br>**BULK SAMPLING:**<br>8854.1269 Ha – 3m x 2m x 4m (100 pits),<br>30m x 30m x 5m (35 trenches)<br><br>**Listing Notice GNR 325, Activity 19**:<br>"The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—<br>(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource [,]; or<br>(b) [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing | 8854.1269 Ha Total hectares to be disturbed | X | Listing Notice GNR 325, Activity 19: | - |
| **Clearance of indigenous vegetation:**<br>**BULK SAMPLING:**<br>8854.1269 Ha – 3m x 2m x 4m (100 pits),<br>30m x 30m x 5m (35 trenches)<br><br>**Listing Notice GNR 325, Activity 15:**<br>"The clearance of an area of 20 hectares or more, of indigenous vegetation." – Random indigenous vegetation clearance over a 8854.1269 hectares area. | 8854.1269 Ha Total hectares to be disturbed Concurrent backfilling will take place in order to rehabilitate. | X | Listing Notice GNR 325, Activity 15 | - |
| **Prospecting Right:**<br>**BULK SAMPLING:**<br>8854.1269 Ha – 3m x 2m x 4m (100 pits),<br>30m x 30m x 5m (35 trenches)<br><br>**2 x 16 feet washing pan** with 207 900 tons to be washed, conveyors, screens, etc. | 8854.1269 Ha Total hectares to be disturbed | X | Listing Notice GNR 327, Activity 20: | |

| | | | | |
|---|---|---|---|---|
| **Listing Notice GNR 327, Activity 20:** "Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—<br>(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]<br>(b) the primary processing of a petroleum resource including winning, extraction, classifying, concentrating or water removal | | | | |
| **Residue stockpiles or residue deposits:** The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a prospecting right or mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). | | | **NEM:WA 59 of 2008**<br><br>**Category A:** (15) | |

## 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

**Johan Smit** has embarked on a process for applying for a Prospecting Right application for the prospecting of Diamonds (Alluvial, General & in Kimberlite), combined with a Waste Licence Application, near Groblershoop on a certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province. This proposed area is preferred due to the site's possible mineral resources. **Johan Smit** requires a prospecting right in terms of NEMA and the Mineral and Petroleum Resources Development Act to mine Diamonds (Alluvial, General & in Kimberlite) within Dawid Kruiper Local Municipality and !Kheis Local Municipality, Northern Cape Province (refer to a locality map attached in **Appendix 3**).

**DESCRIPTION OF PLANNED NON-INVASIVE ACTIVITIES:**

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

**PHASE 1: Site Visit**

The applicant will appoint Pierre de Jager 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 that has been received in relation to the geology of the area.

**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 5: Consolidation & Interpretation**

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, Pierre de Jager, 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.

**DESCRIPTION OF PLANNED INVASIVE ACTIVITIES:**
**(These activities result in land disturbances e.g. sampling, drilling, bulk sampling, etc)**

**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 Pierre de Jager, 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 100 pits will be dug (it may be less depending on the results) at an extent of 3m (length) x 2m (breath) x 4m (depth).

- (100 pits / 24 months) x 12 months = 50 pits dug per year
- Total area to be disturbed per year = 50 pits x (3m x 2m) / 10 000 = **0.03 Ha disturbed per year**
- Total area disturbed for 24 months = 100 pits x (3m x 2m) / 10 000 = 0.06 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 207 900 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 30m long x 30m wide. It is estimated that the bulk samples will be 5 m 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.

Calculations

It is planned that 35 trenches will be dug (it may be less depending on the results) at an extent of 30m (length) x 30m (breath) x 5m (depth).

- (35 trenches / 24 months) x 12 months = 17.5 trenches dug per year
- Total area to be disturbed per year = 17.5 trenches x (30m x 30m) / 10 000 = **1.58 Ha disturbed per year**
- Total area disturbed for 24 months = 35 trenches x (30m x 30m) / 10 000 = 3.15 Ha disturbed

**Portable Water Supply**

Additional water requirements related to the portable water supply for employees and workers will be supplied.

**Water uses:**

In case that any of the water uses under section 21 a-k of the NWA are triggered, a Water Use Licence Application (WULA) will need to 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 2 x 16 feet washing pans will be used, the amount of water for the pans will be 34 000 L/hour from which 30% is re-used.

**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. Less than $30m^3$ of dangerous goods will be stored and handled on site.

**Prospecting activities and phases**

Please find the Prospecting Work Programme attached as **Appendix 8**.

**List of equipment**

| List of equipment | |
|---|---|
| 1 x 400 Kva John Deere Generator<br>1 x 500 Kva Volvo Generator<br>1 x 933 Lui Gong Excavators | 2 x 856 Lui Gong Front End Loaders<br>2 x 16ft Washing pans<br>2 x Bell Dumper |

B. **Policy and Legislative Context**

| **APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT** (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process); | **REFERENCE WHERE APPLIED** |
|---|---|
| The Constitution of South Africa (Act No. 108 of 1996) | - |
| The National Environmental Management Act (Act No. 107 of 1998) | S24(1) of NEMA<br>S28(1) of NEMA |
| The National Water Act (Act No. 36 of 1998) | S21 (a)(b) of NWA |
| The National Water Act (Act No. 36 of 1998) GN704 – Regulation on use of water for mining and related activities aimed at the protection of water resources. | |
| Management: Air Quality Act (Act No. 39 of 2004) | S21 |
| The National Heritage Resources Act (Act No. 25 of 1999) | - |
| Conservation of Agricultural Resources Act (Act No. 85 of 1983) | - |
| Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) | - |
| National Infrastructure Plan | - |
| National Forests Acts, Act 84 of 1998 | Chap 3 (Part 1) 1998<br>S12(1)<br>S15(1) |
| National Veld & Forest Fires Act (Act 101 of 1998) | |
| Mine, Health and Safety Act 29 of 1996 | |
| National Environmental Management: Waste Act 59 of 2008 | |
| National Environmental Management: Biodiversity Act 10 of 2004 | |
| ZF Mgcawu District Municipality Integrated Development Plan (IDP) | - |
| Dawid Kruiper Local Municipality Integrated Development Plan (IDP) | - |
| !Kheis Local Municipality Integrated Development Plan (IDP) | |

**Policy and Legislative Context**

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT<br>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process | REFERENCE WHERE APPLIED | HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.<br><br>(E.g. In terms of the National Water Act a Water Use License has/ has not been applied for) |
|---|---|---|
| **The Constitution of South Africa (Act No. 108 of 1996)** | | 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 states that "everyone has the right to (a) 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. |
| **The National Environmental Management Act (Act No. 107 of 1998)** | S24(1) of NEMA<br>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.<br><br>The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 982, 983, 984, and 985 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. This EIA was triggered by activity 21, 24(ii) and 27 listed in Regulation R983, which requires a 'basic assessment process.' |
| **The National Water Act (Act No. 36 of 1998)** | S21 | 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 |

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| | | 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.<br><br>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. |
| **Management: Air Quality Act (Act No. 39 of 2004)** | S21 | 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.<br><br>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. |
| **The National Heritage Resources Act (Act No. 25 of 1999)** | | The Act aims to introduce an integrated and interactive system for the management of the heritage resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.<br><br>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act |

| | | |
|---|---|---|
| | | to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. |
| **Conservation of Agricultural Resources Act (Act No. 85 of 1983)** | | The objective 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.<br><br>Consent may be required from the Department of Agriculture in order to confirm that the proposed development is not located on high potential agricultural land. |
| **Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)** | | 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.<br><br>A mining permit application has been lodge with the Department of Mineral Resources |
| **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.<br><br>Government will over the three years from 2013/14 invest R827 billion in building and upgrading existing infrastructure.<br><br>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.<br><br>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. |
| **National Forest Act 84 of 1998** | | 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).<br><br>**Prohibition on destruction of trees in natural forests**<br><br>(1) No person may - |

| | | |
|---|---|---|
| | | (a) cut, disturb, damage or destroy any indigenous tree in a natural forest; or<br><br>(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-<br><br>(i) a licence issued under subsection (4) or section 23; or<br><br>(ii) an exemption from the provisions of this subsection published by the Minister in the *Gazette* on the advice of the Council. |
| **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. |

**E. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES.**

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

Mining has played a vital role in the economy of South Africa for over 100 years. In 2015 the mining industry contributed R286 billion towards South African Gross Domestic Product (GDP) representing 7.1% of overall GDP. Mining is a significant contributor to employment in the nation, with 457 698 individuals directly employed by the sector in 2015. This represents just over 3% of all employed nationally. Diamond mining has 17 885 direct employees.

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).

Prospecting rights, mining rights and mining permit have been applied for in the vicinity of the proposed area, around Windsorton. 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.

It has the world's largest reserves of manganese and platinum group metals (PGMs), according to the US Geological Survey, and among the largest reserves of gold, diamonds, chromite ore and vanadium.

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.

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

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

**Location of the site**

The location of the site is preferred due to the presence of shallow diamond. Access will be obtained from a gravel road off the N10 or N14.

**Preferred activity**

The prospecting of Diamonds (Alluvial, General & in Kimberlite) is one of the preferred activity for the site. The shallow diamond deposits make the site ideal for alluvial diamond mining. The mine will provide significantly more job opportunities than what is providing currently.

The predominant land uses identified on the day of the site visit consists mainly of commercial agricultural crop production to the west of the study site, along the Orange River (**Figure 14**). The study site and its surrounding areas on the east, north and south are largely natural with Low Shrubland dominating.

## G. A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE, 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, General & in Kimberlite) been deposited on the proposed area and therefore the applicant would like to commence with their prospecting activities.

Land capability is the combination of soil suitability and climate factors. The site and surroundings have a land capability classification, on the 8 category scale, of Class 7 & Class 8.

Refer to Land capability map attached as **Appendix 5 & figure 3 below.**

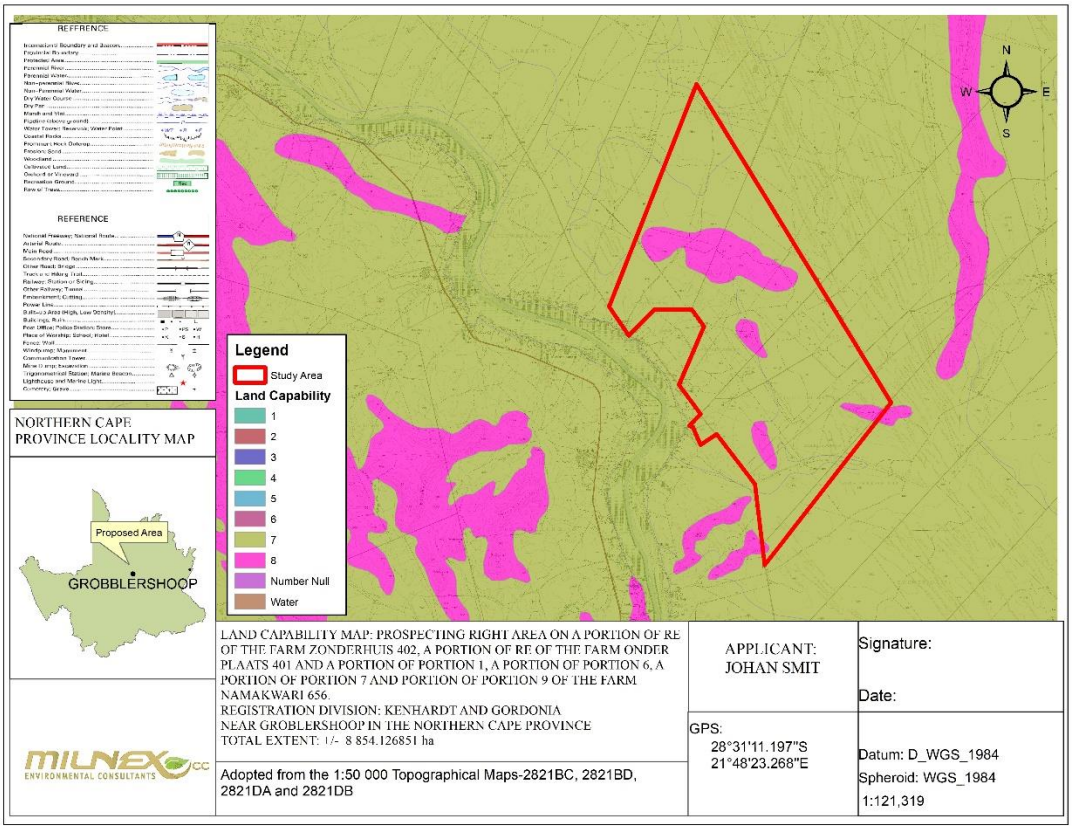


**Figure 3**: Land capability

- **Activity alternatives**

The environmental impact assessment process also needs to consider if the development of a diamonds (Alluvial, General & in Kimberlite) mine would be the most appropriate land use for the particular site.

Prospecting of other commodities – From the surface and desktop assessment there are no indications that there are other commodities to be mined on the site, except diamonds (Alluvial, General & in Kimberlite).

If the proposed prospecting right is not granted the proposed area will still be used for livestock / game grazing.

The predominant land uses identified on the day of the site visit consists mainly of commercial agricultural crop production to the west of the study site, along the Orange River (**Figure 14**). The study site and its surrounding areas on the east, north and south are largely natural with Low Shrubland dominating.

From google earth images the following is visible: farmsteads, small area disturbed by digging and kraals. FM Safaris is on the proposed site and Namakwari Safaris is close to the proposed site.

FM Safaris is a member of the following associations: Safari Club International, Professional Hunter Association of South Africa, Northern Cape Hunters' Association, Wildlife Ranching South Africa, South African Gun Association and Kalahari Hunters Association

- **Design and layout alternatives**

Design alternatives were considered throughout the planning and design phase (i.e. where is the diamond bearing gravel located?). In this regard discussions on the design were held between the EAP and the developer. The layout follows the limitations of the site and aspects such as, roads, site offices and workshop area as well as fencing– refer **Appendix 3**.

- **Operational alternatives**

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

The activities will commence with a site investigation and desktop studies, which will comprise of non-invasive techniques. This manner of survey will ensure that the applicant can clearly delineate areas which are suitable for further investigation and no unnecessary surface disturbance will be undertaken.

Based on the outcome of the desktop studies and site investigation, 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 wash the gravel. It will be washed by a 10-18 feet washing pan to determine diamond proceeds per 100 tons of gravel.

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 exist. 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 and will continue to be used for livestock grazing and other farming activities.

**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 mining 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**.

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.

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.

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.<br>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.

**Advertisement and Notices**

**Newspaper advertisement**

The advertisement was placed in English in the local newspaper **(Gemsbok)** to notifying 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. Proof of advert are attached in **Appendix 6.**

**Site notices**

Site notices were placed (as anticipated on the coordinates below) on site & nearby areas 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**.

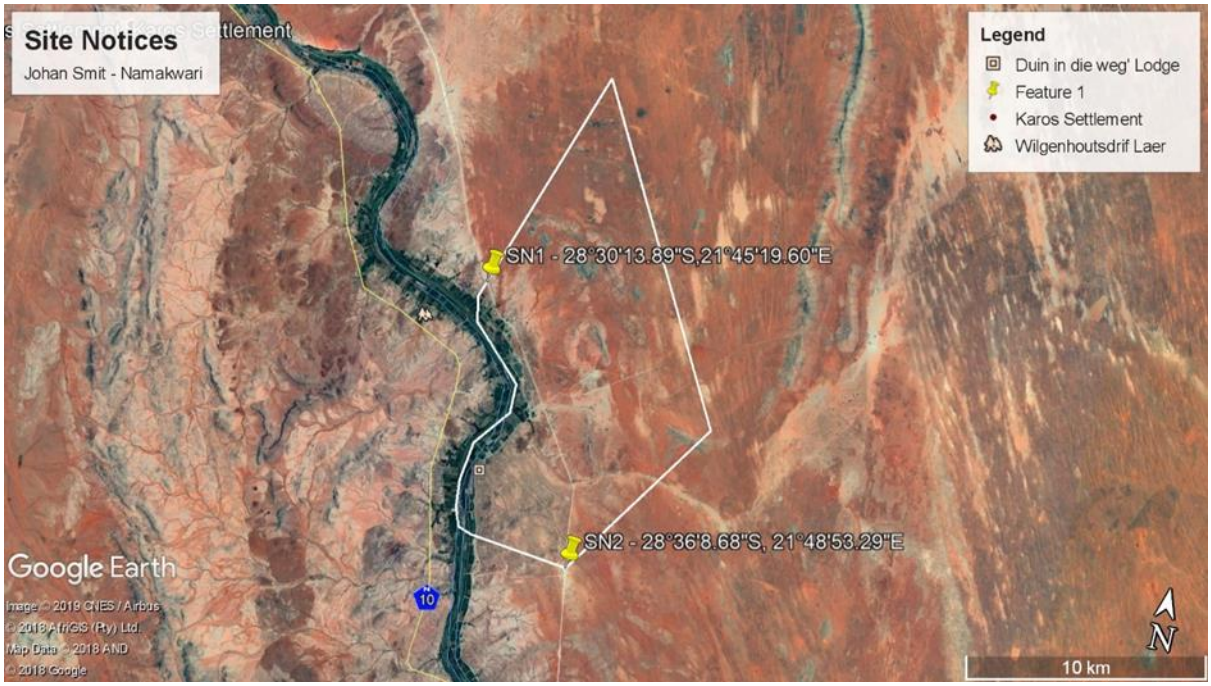


**Figure 4**: Site notices

**Direct notification and circulation of Scoping Report to identified I&APs**

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 **7 May 2019** and were requested to submit comments by **7 June 2019.** 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:

**Direct notification of surrounding landowners and occupiers**

Written notices and the availability of the Scoping Report are also provided to all surrounding landowners and occupiers on **7 May 2019** The surrounding landowners were given the opportunity to raise comments by **7 June 2019**. For a list of surrounding landowners see **Appendix 6**.

| Stakeholders | Landowners | Surrounding Landowner |
|---|---|---|
| Northern Cape Department of Environmental Affairs and Nature Conservation (DENC) | National Government of The Republic of South Africa:<br>Department of Rural Development and Land Reform:<br><br>Me. Cynthia Nkoane | FM Safaris Pty Ltd |
| DMR Department of Mineral Resources, Northern Cape. (DMR) | FM Safaris Pty Ltd | Jacobus Coenraad Liebenberg |
| The Department of Water & Sanitation (DWS) | Arlo Investment Holdings Pty Ltd | Familie Nel Eiendomme CC |
| NC Department of Agriculture, Forestry and Fisheries (DAFF) | Tirisano Trust | Arlo Inestment Holdings Pty Ltd |
| Northern Cape Department of Agriculture, Land Reform & Rural Development | | Swemkuil Boerdery Pty Ltd |
| Department of Roads and Public Works (DRPW) | | South African National Roads Agency Ltd |

| | | |
|---|---|---|
| Northern Cape Department of Rural Development & Land Reform | | |
| Municipal Manager at the ZF Mgcawu District Municipality | | |
| WESSA (National Office) | | |
| Municipal Manager at the !Kheis Local Municipality | | |
| Local Councilor at the !Kheis Local Municipality | | |
| Municipal Manager at the Dawid Kruiper Local Municipality | | |
| Local Councilor at the Dawid Kruiper Local Municipality | | |

## 2. Consultation

The Public Meeting is scheduled for **21 May 2019** at 15:30pm–16:30pm in Grootdrink on the N10 at the Gariep turn-off, approximately 43km from Groblershoop in the Northern Cape. The coordinates and directions of the public meeting follows below.

Coordinates

28°33'51.92"S

21°45'1.88"E

Directions to Public Meeting

- The public meeting will be held in Grootdrink on the N10 at the Gariep turn-off, approximately 43km from Groblershoop in the Northern Cape.


**Figure 5:** Directions to the public meeting

The public meeting is an opportunity to share information regarding the proposed development and provide I&APs with an opportunity to raise any issues and provide comments. The following key stakeholders and surrounding land owners were also directly informed of the public meeting via registered post **7 May 2019**:

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

| Stakeholders | Landowners | Surrounding Landowner |
|---|---|---|
| Northern Cape Department of Environmental Affairs and Nature Conservation (DENC) | National Government of The Republic of South Africa:<br>Department of Rural Development and Land Reform:<br><br>Me. Cynthia Nkoane | FM Safaris Pty Ltd |
| DMR Department of Mineral Resources, Northern Cape. (DMR) | FM Safaris Pty Ltd | Jacobus Coenraad Liebenberg |
| The Department of Water & Sanitation (DWS) | Arlo Investment Holdings Pty Ltd | Familie Nel Eiendomme CC |
| NC Department of Agriculture, Forestry and Fisheries (DAFF) | Tirisano Trust | Arlo Inestment Holdings Pty Ltd |
| Northern Cape Department of Agriculture, Land Reform & Rural Development | | Swemkuil Boerdery Pty Ltd |
| Department of Roads and Public Works (DRPW) | | South African National Roads Agency Ltd |
| Northern Cape Department of Rural Development & Land Reform | | |
| Municipal Manager at the ZF Mgcawu District Municipality | | |
| WESSA (National Office) | | |
| Municipal Manager at the !Kheis Local Municipality | | |
| Local Councilor at the !Kheis Local Municipality | | |
| Municipal Manager at the Dawid Kruiper Local Municipality | | |
| Local Councilor at the Dawid Kruiper Local Municipality | | |

**Public Meeting**

**NB:** The interested and affected parties were given an opportunity to register via site notice, press advert and letters.

A public meeting was scheduled for 21 May 2019 at 15:30pm–16:30pm in Grootdrink on the N10 at the Gariep turn-off, approximately 43km from Groblershoop in the Northern Cape.

On the way to the public meeting Mr. Mandi Sibanyoni from Milnex CC had a car accident. A chevron from a truck's trailer fell off and hit the Milnex CC vehicle where two wheels got badly damaged. This resulted in the car being stranded and him not being able to attend the public meeting. Please see **Appendix 6** for the Affidavit with photos.

On the day of the public meeting, Milnex CC received no phone calls, emails or any communication from I&APs who might have waited at the public meeting location.

**Direct notification and circulation of EIR & EMPr to identified 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 **31 July 2019** and were requested to submit comments by **2 September 2019**. 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:

| Stakeholders | Landowners | Surrounding Landowner |
|---|---|---|
| Northern Cape Department of Environmental Affairs and Nature Conservation (DENC) | FM Safaris Pty Ltd | FM Safaris Pty Ltd |
| DMR Department of Mineral Resources, Northern Cape. (DMR) | Arlo Investment Holdings Pty Ltd: Max Kurt Loots (Active director) | Jacobus Coenraad Liebenberg |
| The Department of Water & Sanitation (DWS) | Tirisano Trust | Familie Nel Eiendomme CC |
| NC Department of Agriculture, Forestry and Fisheries (DAFF) | | Arlo Inestment Holdings Pty Ltd |
| Northern Cape Department of Agriculture, Land Reform & Rural Development | | Swemkuil Boerdery Pty Ltd |
| Department of Roads and Public Works (DRPW) | | Helena van der Westhuizen |
| Northern Cape Department of Rural Development & Land Reform | | National Government of The Republic of South Africa: Department of Rural Development and Land Reform:<br><br>Me. Cynthia Nkoane |
| Municipal Manager at the ZF Mgcawu District Municipality | | South African National Roads Agency Ltd |
| WESSA (National Office) | | |
| South African National Roads Agency Ltd | | |
| Municipal Manager at the !Kheis Local Municipality | | |
| Local Councilor at the !Kheis Local Municipality | | |
| Municipal Manager at the Dawid Kruiper Local Municipality | | |
| Local Councilor at the Dawid Kruiper Local Municipality | | |

**<u>Second direct notification and circulation of EIR & EMPr to identified I&APs and inform them of the second public meeting.</u>**

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 **29 October 2019** and were requested to submit comments by **28 November 2019**. 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 the landowners, stakeholders and surrounding landowners mentioned in the table above.

***Second Public Meeting scheduled***

The Public Meeting is scheduled for **21 November 2019** at **14:00–15:00**. The Public meeting will be held in Grootdrink on the N10 at the Gariep turn-off, approximately 43km from Groblershoop in the Northern Cape. The coordinates and directions of the public meeting follows below.

Coordinates

28°33'51.92"S

21°45'1.88"E

Directions to Public Meeting

- The public meeting will be held in Grootdrink on the N10 at the Gariep turn-off, approximately 43km from Groblershoop in the Northern Cape.

**Public Meeting**

Please note that the stakeholders & interested and affected parties were informed about the proposed project with the use of press advertisement and registered letters.

Milnex representatives Ms. Lizanne Esterhuizen and the applicant attended the meeting however no I&AP attended the meeting.

Attached as **Appendix 6** is the attendance register for the meeting.

**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.

All comments will be included in the amended EIR&EMPr to be submitted at DMR.

**iii. SUMMARY OF ISSUES RAISED BY I&APS**

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

**All comment will be included in the final EIR&EMPr**

| Interested and Affected Parties<br><br>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** | | | |
| **Landowner** | | | | |
| **Zonderhuis RE/402**<br>**Onder Plaats RE/401** | FM Safaris Pty Ltd | Email received 25/11/2019 and states the following:<br><br>*I'm emailing you on behalf of FM Safaris (Farms; Onderplaats, Zonderhuis).*<br><br>*We have received notice of application for prospecting rights and environmental impact assessments on FM Safaris which includes the Farms Onderplaats and Zonderhuis.*<br><br>*I had a telephone conversation with someone that told me the diamond mine on Namakwari will maybe reopen and that this will have no Impact on FM Safaris.*<br><br>*Can you guys please confirm what the plan/situation is and if FM Safaris will be affected in any way?*<br><br>*We need all the necessary information soon possible.*<br><br>*Waiting to hear from you.* | Email sent 03/12/2019 with Draft EIR Report and Request for comments letter attached, states the following:<br><br>*With reference to yesterday's telephonic conversation between yourself and Mr. Werner Broodryk from our office.*<br><br>*Please find attached the draft Environmental Impact Assessment & Environmental Management Programme document (EIR&EMPr) and the comments and response form in the letter.*<br><br>*We invite you to send us comments on or before the 7th of January 2020.* | |
| **Namakwari 1/656; 9/656 & 7/656;** | Arlo Investment Holdings Pty Ltd | | | |
| **Namakwari 6/656** | Tirisano Trust | | | |

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| **Surrounding Landowners** | | | | |
| **Zwartkop RE/403** | FM Safaris Pty Ltd | | | |
| **Onder Plaats 5/401** | Jacobus Coenraad Liebenberg | | | |
| **Onder Plaats 3/401** | Familie Nel Eiendomme CC | | | |
| **Namakwari 10/656** | Arlo Inestment Holdings Pty Ltd | | | |
| **Zwemkuil RE/397** | Swemkuil Boerdery Pty Ltd | | | |
| **Zonderhuis 2/402** | South African National Roads Agency Ltd | | | |
| Boegoebergnedersetting RE/48 | National Government of The Republic of South Africa:<br>Department of Rural Development and Land Reform:<br><br>Me. Cynthia Nkoane | | | |
| **Namakwari 5/656** | Tirisano Trust | | | |
| The Municipality in which jurisdiction the development is located | | | | |
| Dawid Kruiper Local Municipality | Municipal Manager:<br>Mr Elias Ntoba | | | |
| !Kheis Local Municipality | Municipal Manager<br>Mr TF Leeuw (Acting) | | | |
| Municipal councilor of the ward in which the site is located | | | | |
| Dawid Kruiper Local Municipality | Ward 9 Councillor | | | |
| !Kheis Local Municipality | Ward 2 Councillor | | | |

| **Organs of state having jurisdiction** | | | | |
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| Northern Cape Department of Environmental Affairs and Nature Conservation (DENC) | Mrs. Doreen Werth | | | |
| DMR Department of Mineral Resources, Northern Cape. (DMR) | To whom it may concern | | Proof of submitting letter dated 26/08/2019 to amend EA application with amended EA application attached on 28/08/2019.<br><br>The amendment was to exclude a certain portion of the Remaining Extent of the farm Boegoeberg Nedersetting 48 from the application. | |
| | Tumelo Sedupane | Letter dated 28/08/2019 states the application has been accepted.<br><br><u>Comment 2</u><br>a) Notify and consult with the landowner, lawful occupier and any I&AP and include the result of the consultation in the environmental report.<br>b) Lodge an application in terms of National Water Act. No.36 of 1998 with the Department of Water Affairs with immediate effect. | | |
| | Kgaudi Shapo | Email received on 02/09/2019 with letter attached dated 12/07/2019. The letter states the following:<br><br>The FSR and plan of study for EIA received by the Department on the 6th of March 2018 refer.<br><br><u>Comment 3</u><br>In addition, the following must be done:<br>a) Geo-hydrological Impact Assessment study<br>b) Wetland study (on salt Pan)<br>c) Final recommendation of SAHRA<br>d) Fauna and Flora study<br>e) Details of the future land use for the site and infrastructure after decommissioning.<br>f) Should a Water Use License be required, proof of application for a license needs to be submitted.<br>g) Possible impacts and effects of the development of the Vaal River must be assessed. | Email sent 12/09/2019 states the following:<br><br>*With reference to the acceptance of the final Scoping Report letter dated 12/07/2019 received on the 02/09/2019, please see email below.*<br><br>*Please note that you mention the Vaal River in your comments, however, the proposed area is near the Orange River. There is also mention that we need to conduct a wetland study on the salt pan. May you please indicate where is the salt pan on the proposed area, as there was no salt pan identified in the final Scoping Report.*<br><br>*The final EIR&EMPr needs to be submitted to DMR on the 28th of September 2019. However we only received the above mentioned letter with comments via email from the DMR on the 2nd of September 2019. As a* | |

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| | | h) Information on services required on the site, e.g. sewage refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained?<br>i) A construction and operational phase EMP to include mitigation and monitoring measures.<br><br><u>Comment 4</u><br>Please ensure that surrounding communities are given the opportunity to participate on the public participation process and the draft EIR is provided to the community representative for commenting purpose.<br><br><u>Comment 5</u><br>Please ensure that comments from all relevant stakeholders are submitted to the department with the EIAR. This include but is not limited to PHRA and/or SAHRA, Provincial Environmental Department, DAFF, DWS, the local municipality, Local community structures (e.g. Traditional Leaders, Ward Councillor's SANCO, CPA). Proof of correspondence wit the various stakeholders must be included in the EIAR. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments should be submitted to the Department.<br><br><u>Comments 6</u><br>In case where you will also use the proof of correspondence of the registered postage, please include the results of the postage which shows when and who collected the mail.<br><br><u>Comment 9</u><br>Should an application for EA be subjected to any permits or authorisations in terms of the provisions of any SEMAs, proof of such application will be required. | *result, we will not be able to complete the requested specialist studies before the 28th of September 2019.*<br><br>*We suggest that our timeframe be extended by 52day (we lost 52 days from the date the acceptance letter was signed to the day the letter was received) in order to submit the final EIR&EMPr, since the above mentioned issue happened through no fault of our own. We believe that this extension cannot be seen as a formal timeframe extension request.*<br><br>*Please note that the final EIR&EMPr will therefore be submitted on the 19th of November 2019.*<br><br>*We hope you find the above in order.* | |
| | | Email received on 13/09/2019 stats the following:<br><br>*As you indicated that you proposed area is near the Orange River then Possible impacts and effects of the development on the commercial agriculture crop production to the west and Orange River must be assessed. However, the Wetland study can be ignored if the is no wetlands in you proposed area.* | Email sent 16/09/2019 states:<br><br>*Thank you for your response.* | |

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| | | *For the issue of extension to submit EIR/EMPR you must submit on the 19th November 2019.* | | |
| | Reabetswe Molefe | Email received 20/09/2019 with acceptance letter attached dated 18/09/2019. The letter states the following:<br><br><u>Comment 2</u><br>a) Notify and consult with the landowner, lawful occupier and any I&AP and include the result of the consultation in the environmental report.<br>b) Lodge an application in terms of National Water Act. No.36 of 1998 with the Department of Water Affairs with immediate effect. | | |
| | Kgaudi Shapo | | Email sent 14/10/2019 with letter attached requesting for timeframes extension attached.<br><br>The letter states the following:<br><br>*We herewith request an extension in the timeframes until 10th of January 2020 for submitting the final Environmental Impact Assessment Report and Environmental Management Programme (EIR&EMPr) on the Prospecting Right application for NC30/5/1/1/2/12359PR, which is due on the 19th of November 2019.* | |
| | | | Email sent 22/10/2019 follows up on email sent on the 14th of October 2019. Attached to the email is the request for timeframe extension letter. | |
| The Department of Water & Sanitation (DWS) | Mr. G. van Dyk | | | |
| NC Department of Agriculture, Forestry and Fisheries (DAFF) | To whom it may concern | | | |
| | Chief forester Mrs J. Mans | | | |
| | Mr. Harm Vorster | | | |
| Department of Roads and Public Works (DRPW) | **HOD: Ms. Ruth Palm**<br>Mr Tshiamo Pitso | | | |

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| Northern Cape Department of Rural Development & Land Reform, | | Fax received on 19/05/2019 with the Milnex CC comments and response form attached which states that the properties are not owned by the DRDLR. There are therefore no inputs/comments. | | |
| | Nqabisa Mkalipi | | Email sent 29/05/2019 is proof of land claims consultation. | |
| | | Email received 04/07/2019 with letter attached dated 05/06/2019 states the following:<br><br>Department confirms that as at the date of this letter no land claims appear on our database in respect of the Property. This includes the database for claims lodged by 31 December 1998 and those lodged between 1 July 2014 and 27 July 2016 in terms of the Restitution of Land Rights Amendment Act, 2014 | Email sent 03/07/2019 follows up on the enquiry. | |
| **Other–** | | | | |
| ZF Mgcawu District Municipality | Municipal Manager:<br>Mr Gilbert Lategan<br>(Acting Municipal Manager and Director: Planning and Development) | | | |
| WESSA (National Office) | To whom it may concern | | | |
| I&AP | South African National Roads Agency Ltd | | | |
| I&AP | Amanda Coetzee | Email received 08/08/2019 ask that the map be emailed as telephonically discussed. | Email sent 08/08/2019 with requested map attached. | |
| South Africa Heritage Resources Agency (SAHRA) | SAHRA website | | Documents uploaded onto the SAHRA website for comments. | |

## iv. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

**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.

**Protected species**

It is noted that protected tree species under the National Forests Act No. 84 of 1998 are listed in Table 4.9. In terms of a part of section 51(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.

In cases where the trees will need to be cut, disturbed, damaged or destroyed or possessed, collected, removed, transported, exported, purchased, sold or donated a flora permit will be applied for.

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

**Geology and Soils**

**Kheis Terrane** (**MIe –** Metabasalt, felsic lava, Greenschist, conglomerate & ferruginous schist)

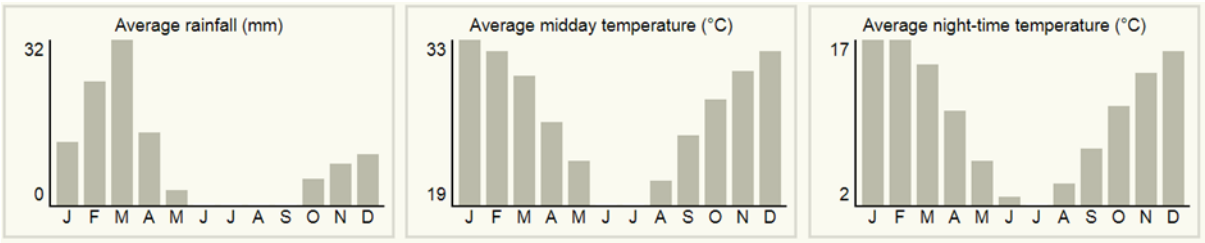
Classification
The Leerkrans Formation of the Wilgenhoutsdrif Group is a succession of highly sheared metasedimentary and metavolcanic rocks separating the western margin of the Archean Kaapvaal Craton from the polydeformed and highly metamorphosed Proterozoic Namaqua Sector of the Namaqua-Natal Province. Highly chloritised and epidotised metabasalts from the Lower Basalt are typically flow-banded, massive, vesicular or amygdaloidal, and have primitive tholeiitic, MORB-like geochemical characteristics.

The Upper Basalt and Mixed Zone of the Leerkrans Formation are comprised of basaltic lavas showing similar geochemical features to the Lower Basalt. The metavolcanic rocks of the Leerkrans Formation overlap in age with the oldest units of the ~1.3 to ~1.23 Ga Areachap Group, the polydeformed and highly metamorphosed remnants of a volcanic arc that separates the western margin of the Kaapvaal Craton from the Namaqua Sector. The Leerkrans Formation likely represents the remnants of a related back-arc basin to the volcanic arc which was accreted onto the western margin of the craton

**Land capability and agricultural potential**

- Climate and water availability

Groblershoop normally receives about 108mm of rain per year, with most rainfall occuring mainly during autumn. The chart below (lower left) shows the average rainfall values for Groblershoop per month. It receives the lowest rainfall (0mm) in June and the highest (32mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Groblershoop range from 19°C in June to 33°C in January. The region is the coldest during July when the mercury drops to 2°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures (SAExplorer, 2017).




**Description of the socio-economic environment**

- Socio-economic conditions

*Dawid Kruiper Local Municipality*

This information was sourced from Statistics South Africa Regional office in Upington. The statistics indicates that population Dawid Kruiper Municipality's 107 162 in 2016. This reflects an overall population growth of 1.82% between 2011 up to 2016. The unemployment rate decreases significantly from 34% in 2001 to 22.1% in 2011.and there was a huge decline in the youth unemployment rate too from 42.3% in 2001 to 29% in 2011 but the youth unemployment rate is still very high in comparison with the overall unemployment rate of the municipality. Although about 44.7% of the Dawid Kruiper population are between 14 and 35 years old, youths remains relatively marginalised. All municipal services except sewerage increased since 2001 with electricity for lighting increased from 91.1% in 2011 to 94% in 2016 within the Khara Hais area and 69 % within the Mier Area, respectively.

The Municipality's economy is rather centred on the trade and retail sector, due to its strong tourism sector, leaving the local economy fairly vulnerable for any significant changes in this industry. It is, therefore, important that the Municipality seeks to further diversify its economy into other sectors. Furthermore, the manufacturing sector of the municipality is one of the lowest performing sectors of the local economy. This sector has the potential to generate significant growth for the region, and Dawid Kruiper Municipality is experiencing a lack of manufacturing activities. As a result much in the municipality has to be sourced from outside of the municipal boundaries, resulting in money flowing out of the local economy.

Agricultural activities take up portions of land abutting the Orange River in the Municipality. The Agricultural sector is important to the local economy and therefore represents an emerging strength for the Municipality, which creates further opportunities for expansion, as well as the development of linkages with other sectors of the economy, creating further opportunities for job creation. The White Paper on Agriculture (1995) highlights the fact that existing and emerging farmers and agri-businesses in the area should be supported, and the Northern Cape's AAPSS and PGDS state that new technologies should be investigated where applicable to maximise production outputs.

In terms of economic indicators, the Municipality also enjoys comparative advantages in all of the economic sectors, except mining, compared to the District. The Municipality should therefore capitalise on these advantages to further strengthen its position in the District. Furthermore, the fastest growing sectors in the Municipality were those of the agriculture, electricity and water, and mining sectors. The current growth occurring in these sectors should be exploited to ensure the creation of new job opportunities for local people.

*!Kheis Local Municipality*

**Population:** !Kheis Municipality has a total population of approximately 16 637 according to the community survey by the census of 2011. !Kheis Local Municipality is divided into four wards, as well as surrounding farms. According to the 2011 community survey census, the racial distribution of the population in !Kheis were; 1144 Black Africans, 14 200 Coloured, 901 White and 167 Indian.

**Economy:** Agriculture is the economic sector. The commercial farms' concentration is on the vineyards, while the emerging farmers concentrate on sheep and goat farming. Provincial Government and Landbank are involved to capacitate these farms in sustainable farming and bookkeeping practices. Agriculture is marketed local, national and internationally. Grapes, cotton, corn, wheat, tomatoes, peanuts, musk melons and pumpkins and cultivated under irrigation from the Orange River. Major development

projects planned within the municipal area are poised to continue to have positive impact on its economy over the next 10 to 15 years. Despite the positive outlook the Municipality is still faced with high levels of unemployment and poverty, little or on diversification in the economy and a declining resource base.

**Challenges:** Social Services have a full-fledged office running in the area and services are also provided by an NGO, Child and Family Care. Two Social Workers is currently not sufficient enough for a large area which needs to be serviced. Teenage pregnancy, alcohol abuse and HIV/AIDS have become a serious social issue. Measures need to be put in place to curb the increased incidence of these issues.

General social problems included:

- Statutory work with Juvenile offenders
- Marriage problems
- Counselling of molested children
- Parental guidance groups for foster parents
- Family violence – Vulnerable Groups (women, children and old age) abuse
- Removal of children
- Therapy, e.g. Spelling therapy
- Counselling for raped women

The communities are far from each other and without proper transport and a vehicle; proper social services can thus not be rendered.

**Ecological habitat and landscape features**

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

*The proposed site for prospecting falls within two recognised Biomes, namely the Nama-Karoo and the Savanna (Mucina & Rutherford 2006). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic and physical features, and processes at a regional scale. The study sites overlap with four (4) different vegetation types (Figure 5). Table 9 below provides an overview of the vegetation types associated with the study site. The western boundary of the study site is adjacent to the Upper Gariep Alluvial Vegetation, which is classed Vulnerable, however it does not overlap.*

See **Appendix 7** & Figure 6 for the Ecological desktop study done.

See **Appendix 12** for the vegetation map

***Table 9:*** *Vegetation types and their ecological importance*

| Vegetation Type | Biome | Bioregion | Conservation Status | Endemic Species |
|---|---|---|---|---|
| Bushmanland Arid Grassland (NKb 3) | Nama-Karoo | Bushmanland | Least Concern<br>21% Target<br>0.4% Protected | Biogeographically Important Taxon: (Bushmanland endemic)<br>• *Tridentea dwequensis*<br><br>Endemic Taxa:<br>• *Dinteranthus pole-evansii*<br>• *Larryleachia dinteri*<br>• *L. marlothii*<br>• *Ruschia kenhardtensis*<br>• *Lotononis oligocephala*<br>• *Nemesia maxii* |
| Lower Gariep Broken Veld (NKb 1) | Nama-Karoo | Bushmanland | Least Concern<br>21% Target<br>3.9% Protected | Endemic Taxon:<br>• *Ruschia pungens* |
| Kalahari Karroid Shrubland (NKb 5) | Nama-Karoo | Bushmanland | Least Concern<br>21% Target<br>0.1% Protected | Biogeographically Important Taxon:<br>(Southwestern distribution limit)<br>• *Dinebra retroflexa* |
| Gordonia Duneveld (SVkd 1) | Savanna | Kalahari Duneveld | Least Concern<br>16% Target<br>14.2% Protected | Biogeographically Important Taxa:<br>(Kalahari endemics):<br>• *Acacia haematoxylon (d)*<br>• *Stipagrostis amabilis (d)*<br>• *Anthephora argentea*<br>• *Megaloprotachne albescens*<br>• *Helichrysum Arenicola*<br>• *Kohautia ramosissima*<br>• *Neuradopsis austro-africana* |

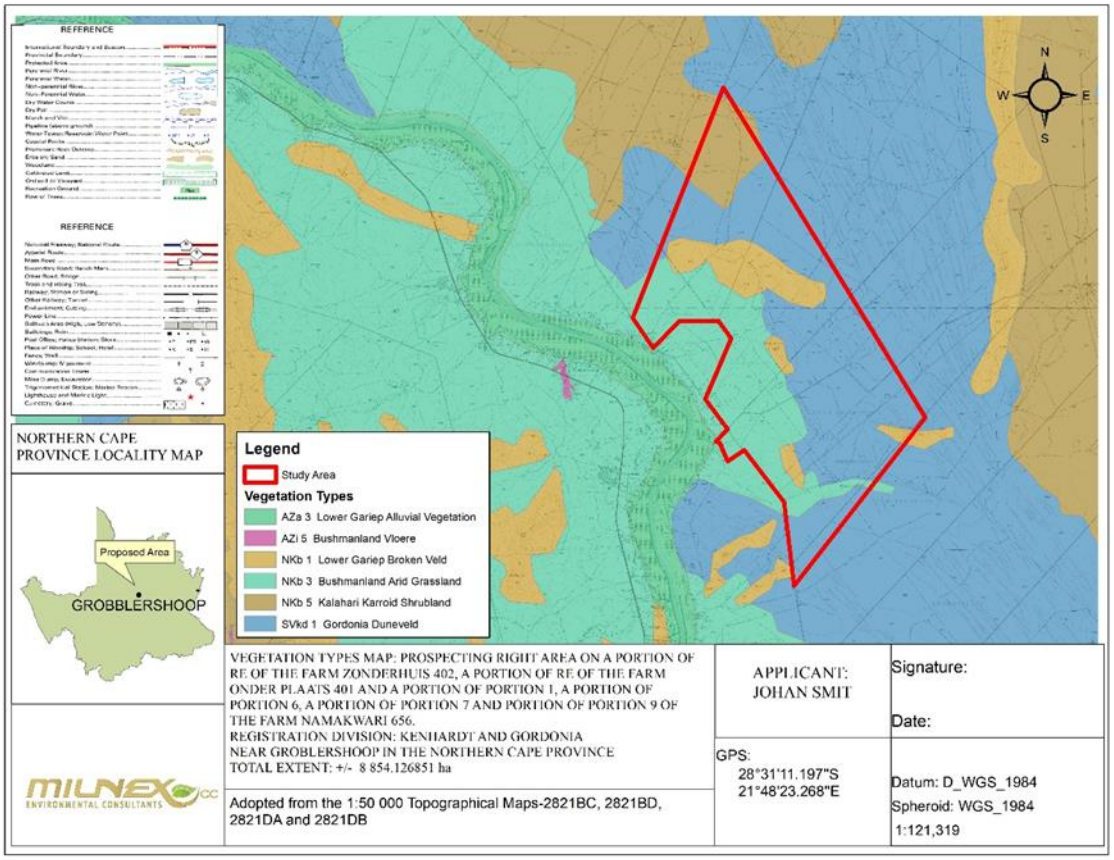
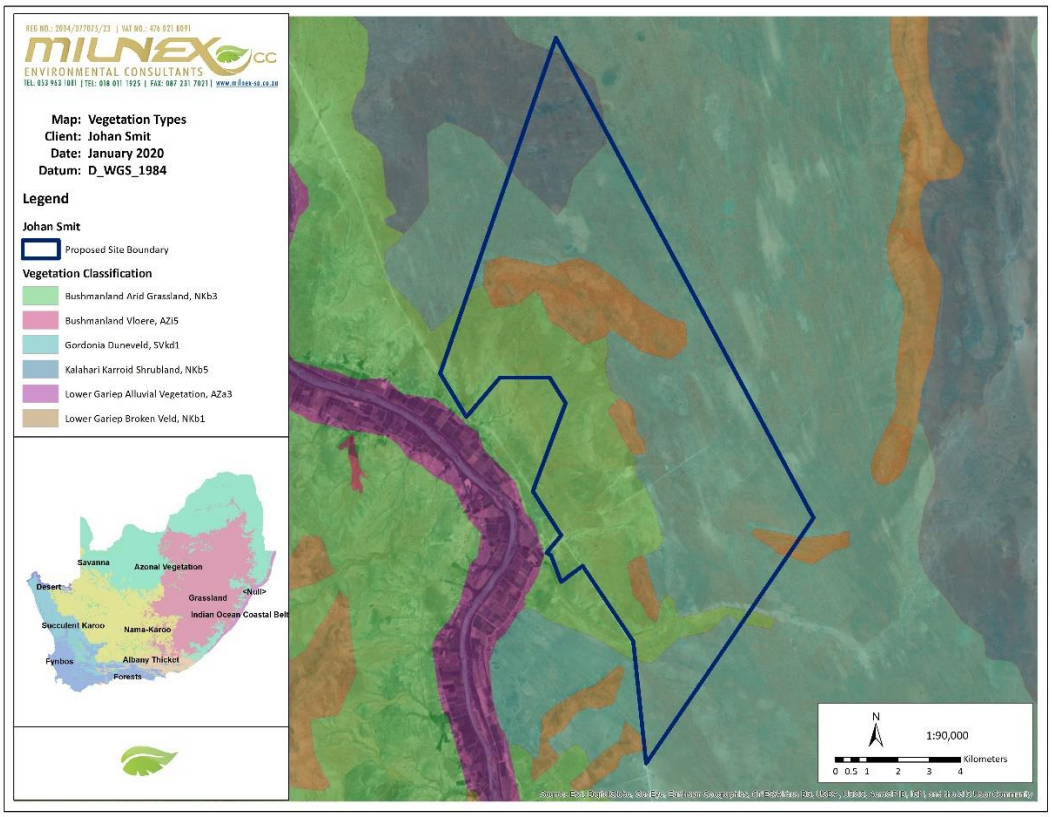



**Figure 6**: Vegetation types associated with the study site (Mucina & Rutherford 2006/2018).




Specialist map: Vegetation Types associated with the study site. (Please see **Appendix 12**)

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

*During the Desktop study, a list of potential flora and fauna species occurring in the area were compiled and included in this section of the document for the affected quarter degree grid cells, however, it does not mean that these do occur on-site.*

### *4.1 Floral Assessment*

*The field survey conducted in December 2019, took place before the rain season and conditions on site were extremely dry. Therefore, species identification was limited, and reliance was made on previous vegetation assessments in the adjacent area as well as desktop knowledge of the floral species occurring in the general area (Table 13). A list of flora observed on site was compiled and their protection status indicated where relevant (Table 14). If a species is a known Alien and Invasive Species, this was also indicated.*

#### *4.1.1 Desktop Terrestrial Vegetation*

*According to Mucina & Rutherford (2006), four (4) vegetation types are present on the study site namely the Bushmanland Arid Grassland (NKb 3) vegetation, Gordonia Duneveld (SVkd 1), Lower Gariep Broken Veld (NKb 1) and Kalahari Karroid Shrubland (NKb 5). The expected species to occur within each vegetation type is listed in Table 13*

**Table 13:** Flora species expected to occur according to Mucina and Rutherford (2006)

| Bushmanland Arid Grassland (NKb 3) | Gordonia Duneveld (SVkd 1) | Lower Gariep Broken Veld (NKb 1) | Kalahari Karroid Shrubland (NKb 5) |
|---|---|---|---|
| Important Taxa ([W]Western and [E]Eastern regions of the unit only)<br><br>**Graminoids:** *Aristida adscensionis* (d), *A. congesta* (d), *Enneapogon desvauxii* (d), *Eragrostis nindensis* (d), *Schmidtia kalahariensis* (d), *Stipagrostis ciliata* (d), *S. obtusa* (d), *Cenchrus ciliaris*, *Enneapogon scaber*, *Eragrostis annulata*[E], *E. porosa*[E], *E. procumbens*, *Panicum lanipes*[E], *Setaria verticillata*[E], *Sporobolus nervosus*, *Stipagrostis brevifolia*[W], *S. uniplumis*, *Tragus berteronianus*, *T. racemosus*[E].<br><br>**Small Trees:** *Acacia mellifera* subsp. *detinens*[E], *Boscia foetida* subsp. *foetida*.<br><br>**Tall Shrubs:** *Lycium cinereum* (d), *Rhigozum trichotomum* (d), *Cadaba aphylla*, *Parkinsonia africana*.<br><br>**Low Shrubs:** *Aptosimum spinescens* (d), *Hermannia spinosa* (d), *Pentzia spinescens* (d), *Aizoon asbestinum*[E], *A. schellenbergii*[E], *Aptosimum elongatum*, *A. lineare*[E], *A. marlothii*[E], *Barleria rigida*, *Berkheya annectens*, *Blepharis mitrata*, *Eriocephalus ambiguus*, *E. spinescens*, *Limeum aethiopicum*, *Lophiocarpus poly-* | Important Taxa<br><br>**Small Tree:** *Acacia mellifera* subsp. *detinens* (d)<br><br>**Tall Shrubs:** *Grewia flava* (d), *Rhigozum trichotomum* (d). Low Shrubs: *Aptosimum albomarginatum*, *Monechma incanum*, *Requienia sphaerosperma*.<br><br>**Succulent Shrubs:** *Lycium bosciifolium*, *L. pumilum*, *Talinum caffrum*.<br><br>**Graminoids:** *Schmidtia kalahariensis* (d), *Brachiaria glomerata*, *Bulbostylis hispidula*, *Centropodia glauca*, *Eragrostis lehmanniana*, *Stipagrostis ciliata*, *S. obtusa*, *S. uniplumis*.<br><br>**Herbs:** *Hermbstaedtia fleckii* (d), *Acanthosicyos naudinianus*, *Hermannia tomentosa*, *Limeum arenicolum*, *L. argute-carinatum*, *Oxygonum dregeanum* subsp. *canescens* var. *canescens*, *Sericorema remotiflora*, *Sesamum triphyllum*, *Tribulus zeyheri*.<br><br>Biogeographically Important Taxa<br>(Kalahari endemics) | Important Taxa ([W]Western or [E]Eastern part of this unit only)<br><br>**Succulent Trees:** *Aloe dichotoma* var. *dichotoma*.<br><br>**Small Trees:** *Acacia mellifera* subsp. *detinens* (d), *Commiphora gracilifrondosa*[W], *Ficus cordata*, *Pappea capensis*[W], *Rhus populifolia*[W], *Ziziphus mucronata* subsp. *mucronata*.<br><br>**Tall Shrubs:** *Rhigozum trichotomum* (d), *Adenolobus garipensis*[W], *Antherothamnus pearsonii*[W], *Cadaba aphylla*, *Caesalpinia bracteata*, *Ehretia rigida* subsp. *rigida*, *Nymania capensis*, *Rhigozum obovatum*[E], *Rhus burchellii*.<br><br>**Epiphytic Semiparasitic Shrub:** *Tapinanthus oleifolius*.<br><br>**Succulent Shrubs:** *Ceraria namaquensis*, *Cryptolepis decidua*[W], *Euphorbia avasmontana*, *E. gregaria*[W], *Kleinia longiflora*, *Lycium bosciifolium*, *Zygophyllum dregeanum*.<br><br>**Woody Succulent Climber:** *Sarcostemma viminale* | Important Taxa<br><br>**Small Trees:** *Acacia mellifera* subsp. *detinens* (d), *Parkinsonia africana* (d), *Boscia foetida* subsp. *foetida*.<br><br>**Tall Shrub:** *Rhigozum trichotomum* (d).<br><br>**Epiphytic Semiparasitic Shrub:** *Tapinanthus oleifolius*.<br><br>**Low Shrubs:** *Hermannia spinosa* (d), *Limeum aethiopicum* (d), *Phaeoptilum spinosum* (d), *Aizoon schellenbergii*, *Aptosimum albomarginatum*, *A. lineare*, *A. marlothii*, *A. spinescens*, *Barleria rigida*, *Hermannia modesta*, *Indigofera heterotricha*, *Leucosphaera bainesii*, *Monechma genistifolium* subsp. *genistifolium*, *Phyllanthus maderaspatensis*, *Polygala seminuda*, *Ptycholobium biflorum* subsp. *biflorum*, *Sericocoma avolans*, *Solanum capense*, *Tephrosia dregeana*.<br><br>**Herbs:** *Dicoma capensis* (d), *Chamaesyce inaequilatera* (d), *Amaranthus praetermissus*, *Barleria lichtensteiniana*, *Chamaesyce glanduligera*. *Chascanum garipense*, |

| | | | |
|---|---|---|---|
| *stachyus, Monechma incanum, M. spartioides, Pentzia pinnatisecta, Phaeoptilum spinosum*[E], *Polygala seminuda, Pteronia leucoclada, P. mucronata, P. sordida, Rosenia humilis, Senecio niveus, Sericocoma avolans, Solanum capense, Talinum arnotii*[E], *Tetragonia arbuscula, Zygophyllum microphyllum.*<br><br>**Succulent Shrubs:** *Kleinia longiflora, Lycium bosciifolium, Salsola tuberculata, S. glabrescens.*<br><br>**Herbs:**<br>*Acanthopsis hoffmannseggiana, Aizoon canariense, Amaranthus praetermissus, Barleria lichtensteiniana*[E], *Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lotononis platycarpa, Sesamum capense, Tribulus pterophorus, T. terrestris, Vahlia capensis.*<br><br>**Succulent Herbs:**<br>*Gisekia pharnacioides*[E], *Psilocaulon coriarium, Trianthema parvifolia.*<br><br>**Geophytic Herb:** *Moraea venenata.*<br><br>**<u>Biogeographically Important Taxon</u>**<br><u>(Bushmanland endemic)</u><br>**Succulent Herb:**<br>*Tridentea dwequensis.* | **Tall Shrub:**<br>*Acacia haematoxylon* (d).<br><br>**Graminoids:**<br>*Stipagrostis amabilis* (d), *Anthephora argentea, Megaloprotachne albescens.*<br><br>**Herbs:**<br>*Helichrysum arenicola, Kohautia ramosissima, Neuradopsis austro-africana* | **Low Shrubs:** *Blepharis mitrata* (d), *Aizoon schellenbergii, Aptosimum albomarginatum, A. lineare, A. marlothii, Barleria rigida, Berkheya spinosissima* subsp. *namaensis, Dyerophytum africanum, Hermannia spinosa, H. vestita, Hibiscus elliottiae, Indigofera heterotricha, Limeum aethiopicum, Lophiocarpus polystachyus, Monechma spartioides, Phaeoptilum spinosum, Phyllanthus maderaspatensis, Polygala seminuda, Ptycholobium biflorum* subsp. *biflorum, Sericocoma avolans, Solanum capense, Stachys burchelliana, Talinum arnotii, Tetragonia arbuscula, Zygophyllum rigidum.*<br><br>**Semiparasitic Shrub:**<br>*Thesium lineatum.*<br><br>**Graminoids:** *Aristida adscensionis* (d), *Enneapogon desvauxii* (d), *E. scaber* (d), *Eragrostis nindensis* (d), *Stipagrostis obtusa* (d), *S. uniplumis* (d), *Aristida congesta, A. engleri, Cenchrus ciliaris, Digitaria eriantha, Enneapogon cenchroides, Eragrostis annulata, E. lehmanniana, E. porosa, Schmidtia kalahariensis, Setaria verticillata, Sporobolus fimbriatus*[E], *Stipagrostis anomala, S. ciliata, Tragus berteronianus, Triraphis ramosissima*[W]. | *Cleome angustifolia* subsp. *diandra, Cucumis africanus, Geigeria ornativa, Hermannia abrotanoides, Indigastrum argyraeum, Indigofera alternans, I. auricoma, Kohautia cynanchica, Limeum argute-carinatum, Mollugo cerviana, Monsonia umbellata, Sesamum capense, Tribulus cristatus, T. pterophorus, T. terrestris.*<br><br>**Succulent Herbs:** *Gisekia africana, G. pharnacioides, Trianthema parvifolia.*<br><br>**Graminoids:** *Aristida adscensionis* (d), *Enneapogon desvauxii* (d), *E. scaber* (d), *Stipagrostis obtusa* (d), *Aristida congesta, Enneapogon cenchroides, Eragrostis annulata, E. homomalla, E. porosa, Schmidtia kalahariensis, Stipagrostis anomala, S. ciliata, S. hochstetteriana, S. uniplumis, Tragus berteronianus, T. racemosus.*<br><br>**<u>Biogeographically Important Taxon</u>**<br>(Southwestern distribution limit)<br>**Graminoid:**<br>*Dinebra retroflexa.* |

| | | | |
|---|---|---|---|
| **Endemic Taxa**<br>**Succulent Shrubs:** *Dinteranthus pole-evansii, Larryleachia dinteri, L. marlothii, Ruschia kenhardtensis.*<br><br>**Herbs:** *Lotononis oligocephala, Nemesia maxii.* | | **Herbs:** *Forsskaolea candida* (d), *Acanthopsis hoffmannseggiana, Barleria lichtensteiniana, Chamaesyce glanduligera, Chascanum garipense, Cleome angustifolia* subsp. *diandra, Codon royenii, Dicoma capensis, Garuleum schinzii*[E], *Rogeria longiflora, Sesamum capense, Tribulus zeyheri, Trichodesma africanum.*<br><br>**Succulent Herbs:** *Orbea lutea* subsp. *lutea, Stapelia flavopurpurea.*<br><br>**Endemic Taxon**<br>**Succulent Shrub**: *Ruschia pungens.* | |

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12):

### *4.1.2 Plant species observed on site*

*During the site assessment, the area was in extreme drought, therefore species identification was limited. It is recommended that a follow-up study be conducted after the rain season to effectively establish a species list for the area. The vegetation that could be identified at the time of the site visit is listed in Table 14 below.*

***Table 14:** Dominant plant species observed on the study site.*

| Terrestrial Communities | | |
|---|---|---|
| **Trees / Shrubs** | **Grasses / Reeds / Bulrushes** | **Forbs** |
| *Asparagus glaucus* | *Aristida congesta* | - |
| *[P]Boscia albitrunca* | *Cynodon dactylon* | |
| *Boscia foetida* | *Hyparrhenia hirta* | |
| **Prosopis glandulosa* | *Themeda triandra* | |
| *Searsia lancea* | | |
| *Vachellia karroo* | | |
| *Vachellia tortilis* | | |
| *[P]Vachellia erioloba* | | |
| **Riparian and Wetland System** | | |
| **Trees / Shrubs** | **Grasses / Reeds / Bulrushes** | **Forbs** |
| *Diospyros lycioides* | *Chloris virgata* | **Atriplex semibaccata* |
| *Lycium hirsutum* | *Cyperus margaritaceus* | **Bidens bipinnata* |
| **Prosopis glandulosa* | *Cyperus longus* | **Chenopodium album* |
| *Searsia lancea* | *Cyperus bellus* | **Conyza bonariensis* |
| **Salix babylonica* | **Cyperus sexangularis* | **Datura ferox* |
| *Salix mucronata* | *Cynodon dactylon* | **Salsola kali* |
| *Vachellia karroo* | *Enneapogon cenchroides* | **Schkuhria pinnata* |
| *Ziziphus mucronata* | *Eragrostis echinochloidea* | *Senecio hastatus* |
| *Olea africana* | *Eragrostis lehmanniana* | **Tagetes minuta* |
| | *Hyparrhenia hirta* | **Xanthium strumarium* |
| | **Paspalum dilatatum* | |
| | *Phragmites australis* | |
| | *Setaria sphacelata* | |
| | *Sporobolus fimbriatus* | |
| | *Tragus koelerioides* | |
| | *Schoenoplectus muricinux* | |
| | *Scirpoides inanis* | |

[P] - Protected Species

* - Alien and Invasive Species

**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 Endangered Lower Gariep Alluvial vegetation occurs along the western boundary of the study site (**Figure 7**).

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

*The Endangered classed Lower Gariep Alluvial Vegetation Ecosystem was identified adjacent to the study site on the western boundary (Figure 6). The Lower Gariep Alluvial Ecosystem is described by the National List of Threatened Terrestrial Ecosystems (2011) as being "Endangered". The conservation target for the area is 31% and only approximately 5.8% is statutorily conserved. The vegetation type is relatively impacted (Mucina & Rutherford, 2006).*

**Protected Areas**

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

*Formally protected areas are protected either by national or provincial legislation. Based on the SANBI (2010) Protected Areas Map (**Figure 6 of specialist study**) and the Northern Cape Biodiversity Sector Plan (2016), the study site does not overlap with any formally Protected Area. Therefore, the location of the study site is not expected to have an impact on any formally protected areas.*

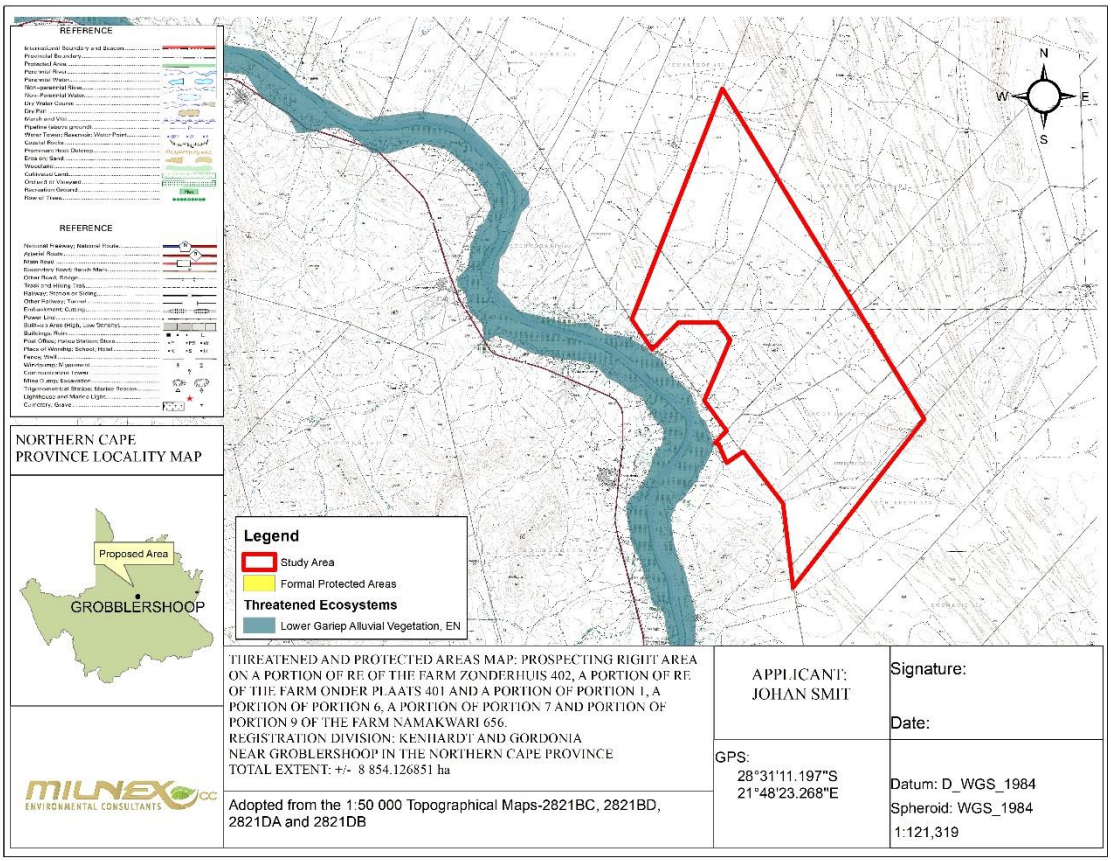
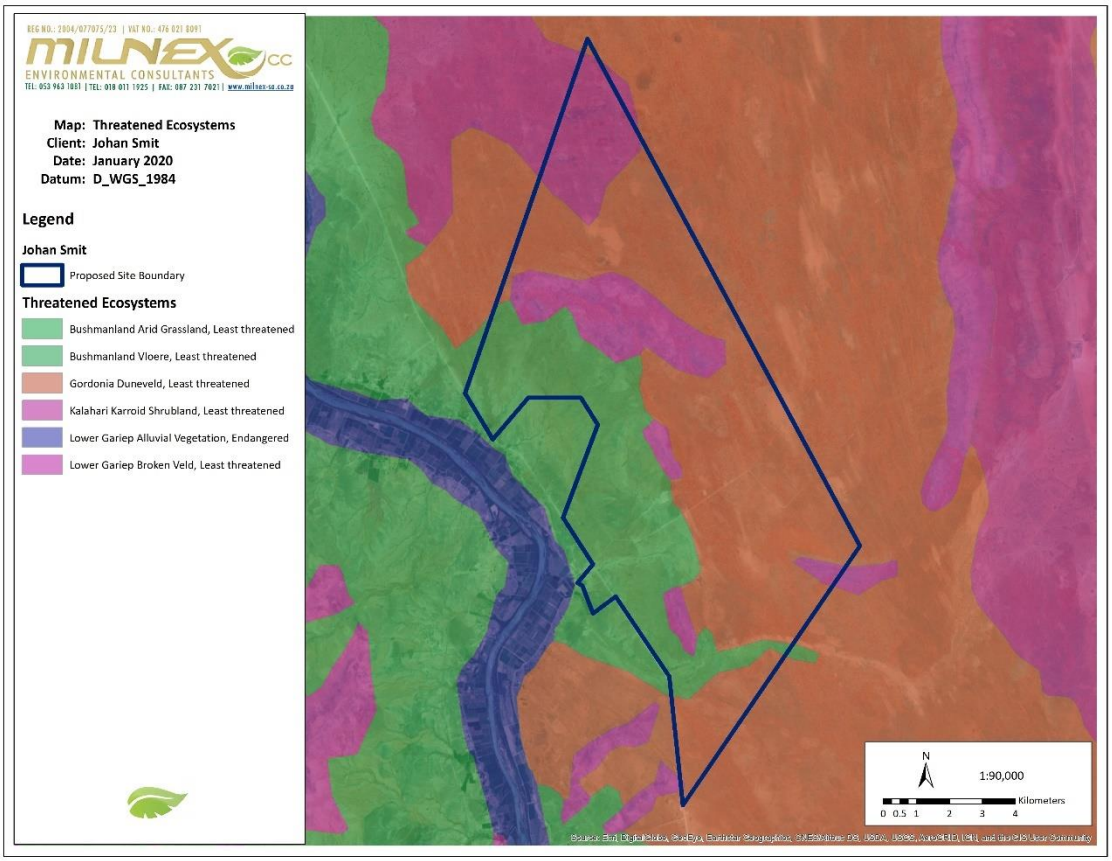



**Figure 7**: Protected areas and Threatened Ecosystems near the study area.




Specialist map: *Figure 6: Threatened Ecosystems associated with the study site and surrounds.* (Please see **Appendix 12**)

## 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 8**), most of the study site overlaps with CBA2s and other Natural Areas. Small sections of CBA1 are visible on the western boundary of the study site.

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *Based on the desktop information (Figure 7 of specialist study), most of the study site overlaps with CBA2 and other Natural Area. The western boundary where the Orange River passes the study site is classed as CBA1.*

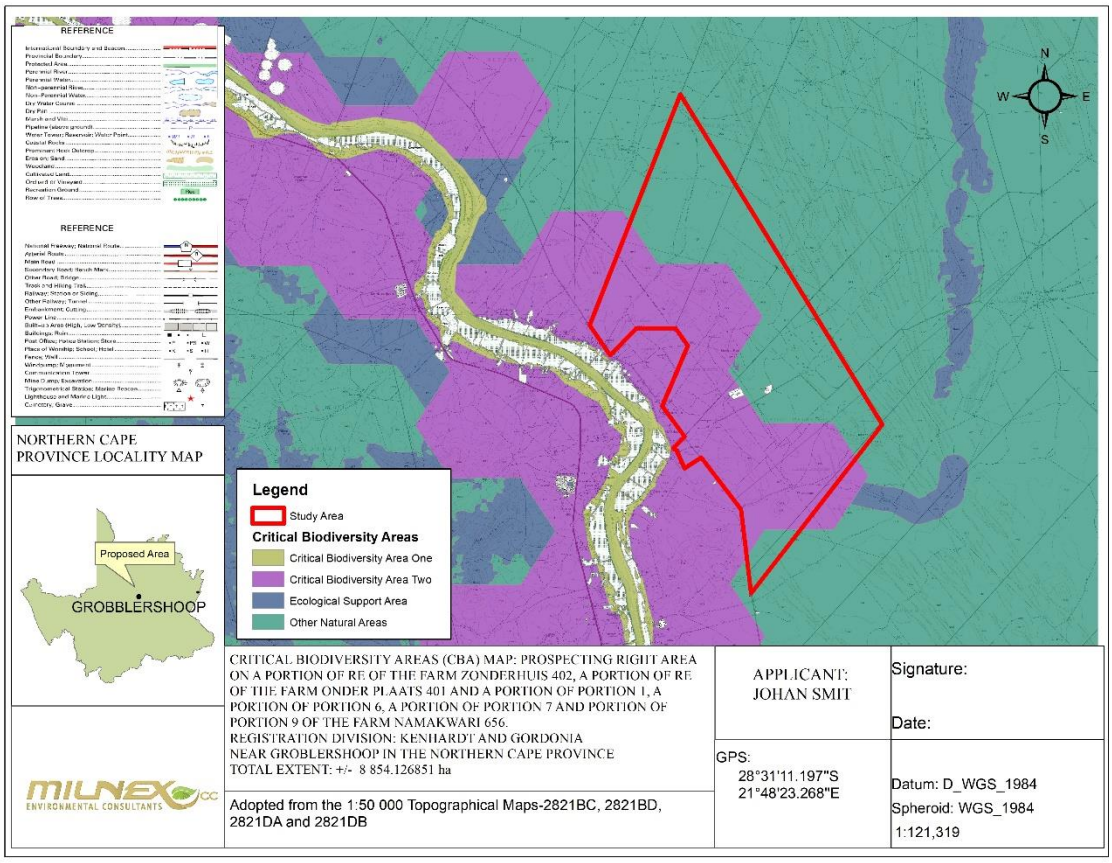
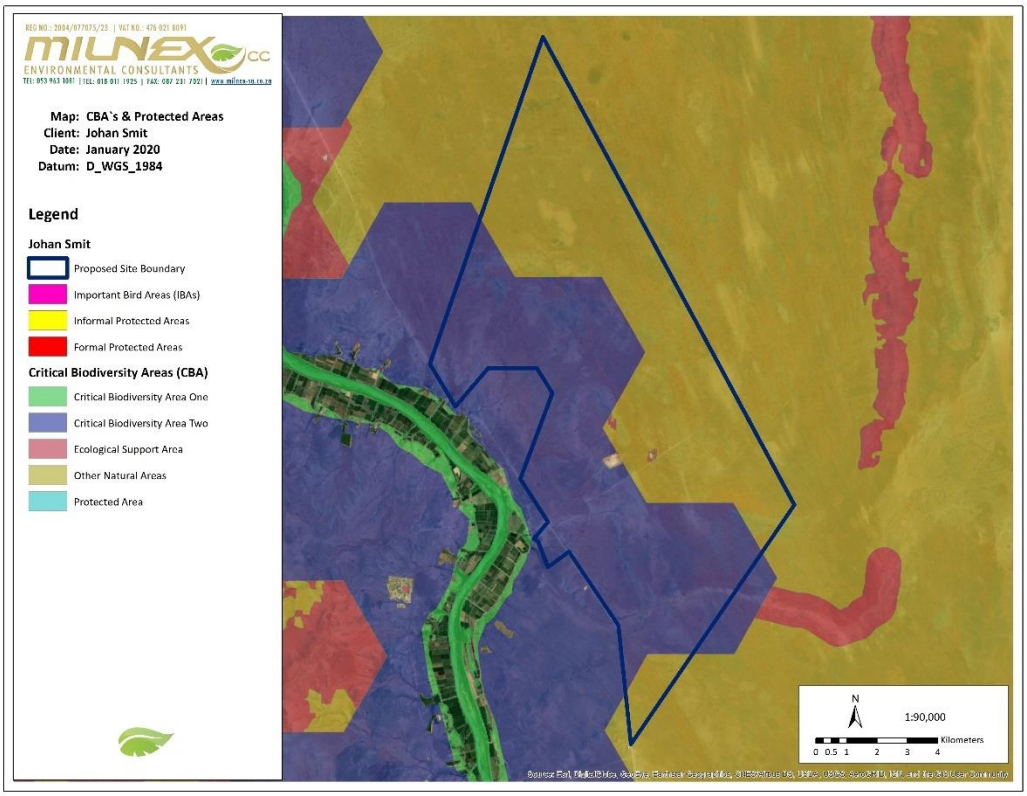



**Figure 8:** Critical Biodiversity Areas (CBAs) associated with the study site.




Specialist map: *Figure 7: The Critical Biodiversity Areas associated with the study site according to the Northern Cape Critical Biodiversity Area Database (2016).* (Please see **Appendix 12**)

**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 1:** 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)<br>• 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.<br>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<br>• Critical Biodiversity Areas (or equivalent areas) from provincial spatial biodiversity plans<br>• River and wetland Freshwater Ecosystem Priority Areas (FEPAs) and a 1km buffer around these FEPAs<br>• 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.<br>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.<br>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.<br>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.<br>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)<br>• Transfrontier Conservation Areas (remaining areas outside of formally proclaimed protected areas)<br>• Other identified priorities from provincial spatial biodiversity plans<br>• High water yield areas<br>• Coastal Protection Zone<br>• Estuarine functional zone<br><br>*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.<br><br>An EIA should include an assessment of optimum, sustainable land use for an area and will determine the significance of the impact on biodiversity.<br><br>Mining options may be limited in these areas, and limitations for mining projects are possible.<br><br>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<br>• Vulnerable ecosystems<br>• Focus areas for protected area expansion (land-based and offshore protection) | **Moderate Risk for Mining** | These areas are of moderate biodiversity value.<br><br>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.<br><br>Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations. |

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *Based on Figure 8 (Specialist study), west of the boundary of the study site overlaps with Category B, Highest Risk for Mining and Category C, High Risk for Mining. The unnamed tributary traversing the study site overlaps with Category B, Highest Risk for Mining and therefore has highest biodiversity importance. Rigorous evaluation of the biodiversity content of applications is required, as well as the application of the mitigation hierarchy to reduce impacts on biodiversity in these areas. Therefore, the general area has highest biodiversity importance.*

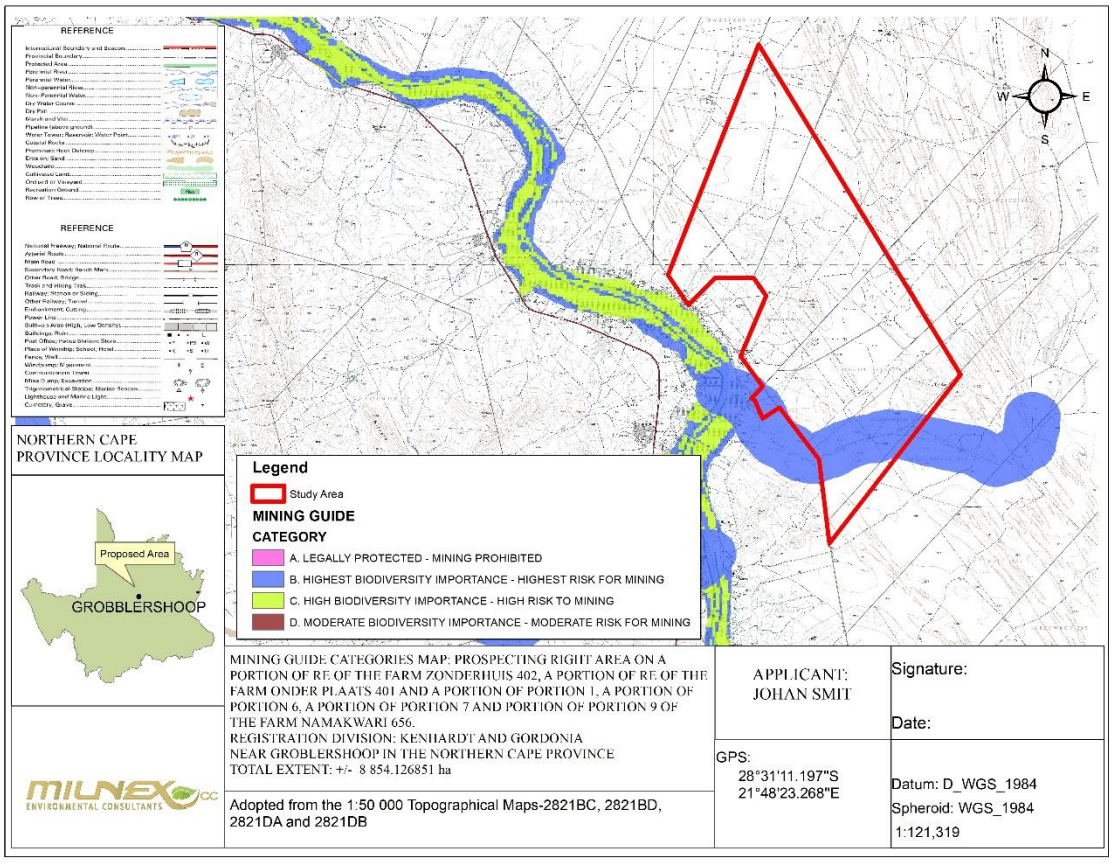
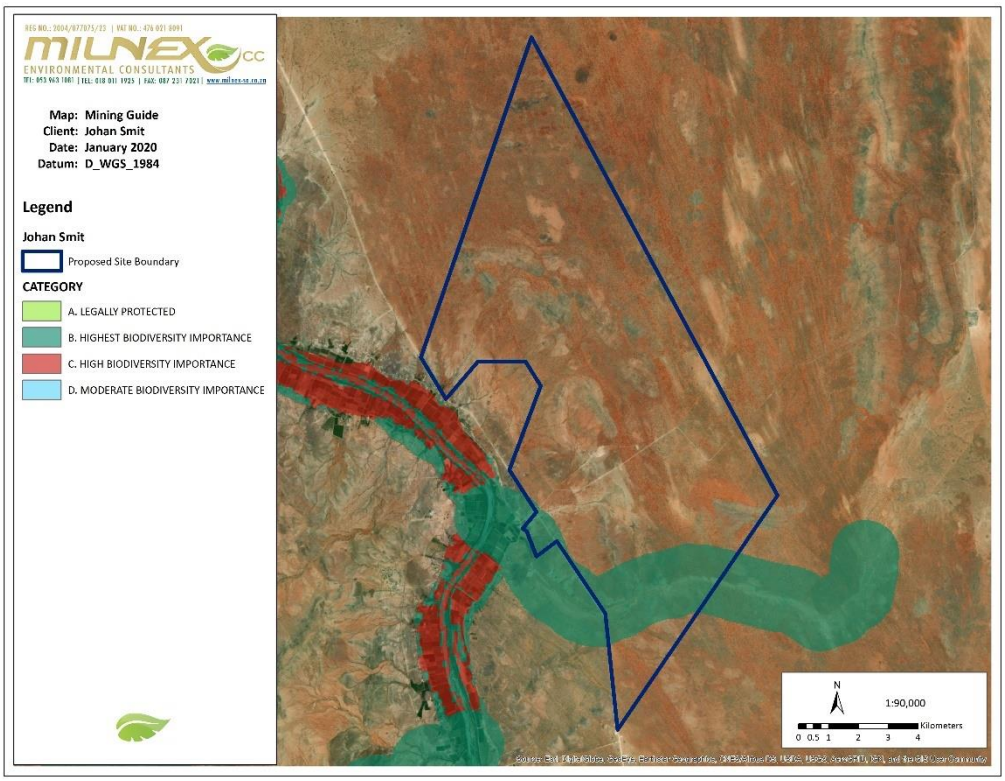



**Figure 9:** Biodiversity priority areas, in accordance with the Mining of Biodiversity Guidelines, associated with the study site.




Specialist map: *Figure 8: The study site according to the Mining and Biodiversity Guidelines (2013).* (Please see **Appendix 12**)

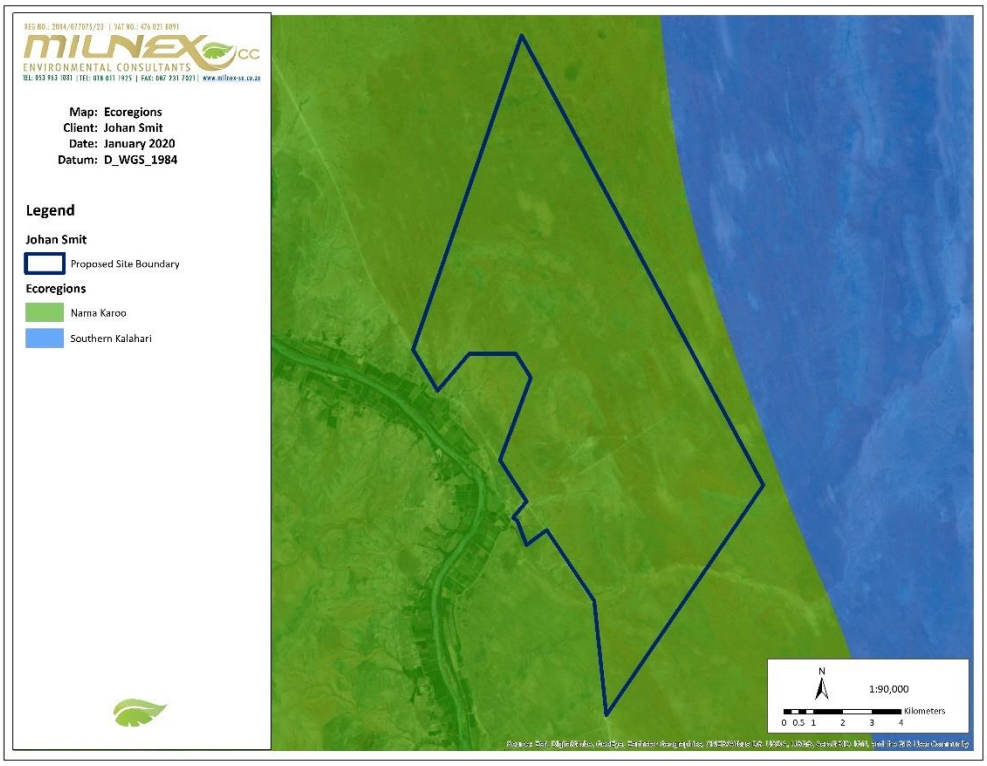
## Ecoregion Characteristics

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

*The study site falls within the Nama Karoo Ecoregion according to the delineation provided by Dallas (2005) (Figure 10 of specialist study). Ecological regions (Ecoregions) are regions within which there is relative similarity in the mosaic of ecosystems and ecosystem components (biotic and abiotic, aquatic and terrestrial) (Kleynhans et al. 2005). The topography of the Nama Karoo Ecoregion is diverse, however dominated by plains with a moderate to high relief and lowlands, hills and mountains with moderate to high relief. Perennial rivers that traverse this region are the Riet and Orange. Rivers draining extensive parts of the region, such as the Hartbees, are seasonal. The drainage density is generally low, but medium to high in some parts.*

***Table 11**: Attributes of the Nama Karoo (26) Ecoregion (Kleynhans et al. 2005)*

| Ecoregion Characteristics | |
|---|---|
| Dominant primary terrain morphology | Plains Moderate Relief;<br>Lowlands; Hills and Mountains; Moderate and High Relief; |
| Dominant primary vegetation types | Bushmanland Nama Karoo |
| Altitude (m a.m.s.l) | 300-1700, 1700-1900 (limited) |
| MAP (mm) | 0 to 500 |
| Coefficient of Variation (% of MAP) | 30 to >40 |
| Rainfall concentration index | 15 to >65 |
| Rainfall seasonality | Late to very late summer to Winter |
| Mean annual temp. (°C) | 12 to 20 |
| Winter temperature (July) | 10 to 22 |
| Summer temperature (Feb) | 26 to >32 |
| Median annual simulated runoff | <5 to 60 |




Specialist map: *Figure 10: Ecoregions associated with the study area.* (Please see **Appendix 12**)

## Surface Hydrology and Aquatic Classification

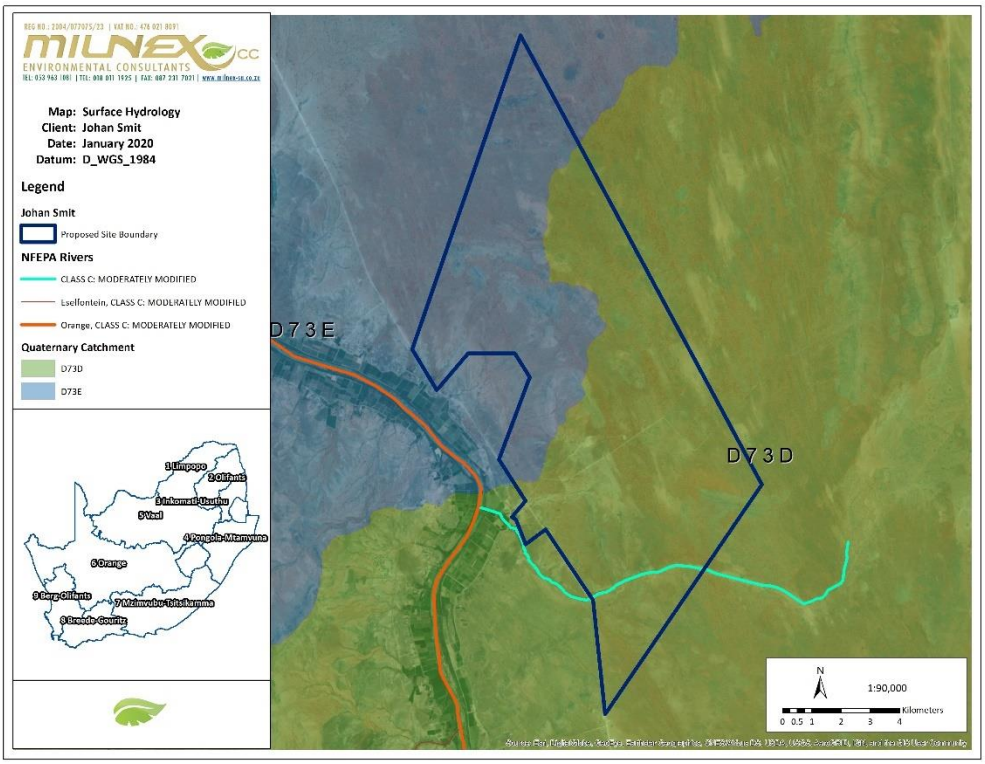
According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

***Quaternary Catchments and Associated Watercourses***

*The study site mainly falls within the D73D Quaternary Catchment, with a small portion of the northern region falling within D73E (Figure 11 of specialist study), and forms part of the Orange Water Management Area (WMA) (DWS 2016). The Orange river passes the study site in the West, which is classed as Moderately Modified.*

*Table 12: Summary of the Aquatic Classification*

| Ecological Status of the Sub-Quaternary Reach (SQR) (DWS, 2014) | |
|---|---|
| Sub-Quaternary Reach (SQR) | D73D-03158 Orange |
| Length of SQR | 14.26 km |
| PES Category | D – Largely Modified |
| Mean Ecological Importance (EI) Class | Moderate |
| Mean Ecological Sensitivity (ES) Class | High |
| Stream Order | 6.0 |
| Default Ecological Category (EC) | B |
| **National Freshwater Ecosystem Priority Area (NFEPA) (2011) Database** | |
| NFEPA Rivers | Yes, Orange |
| FEPA Code | 2 |
| NFEPA Wetlands | None. |
| **River Classification** | |
| Strahler Stream Order of Rivers | 6th Order |
| Riparian Area Classification | Perennial |




Specialist map: *Figure 11: The Orange River is situated in Quaternary Catchment D73D and D73E, and forms part of the Orange Water Management Area.* (Please see **Appendix 12**)

## 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 10** illustrates all wetland types associated with the study site.

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *Figure 12 (specialist study) illustrates all NFEPA wetland types associated with the study site. According to the NFEPA classification, the Orange river is classed as a Floodplain Wetland in the vicinity of the study site. The wetland vegetation is classified as Kalahari Duneveld and Nama Karoo Bushmanland.*

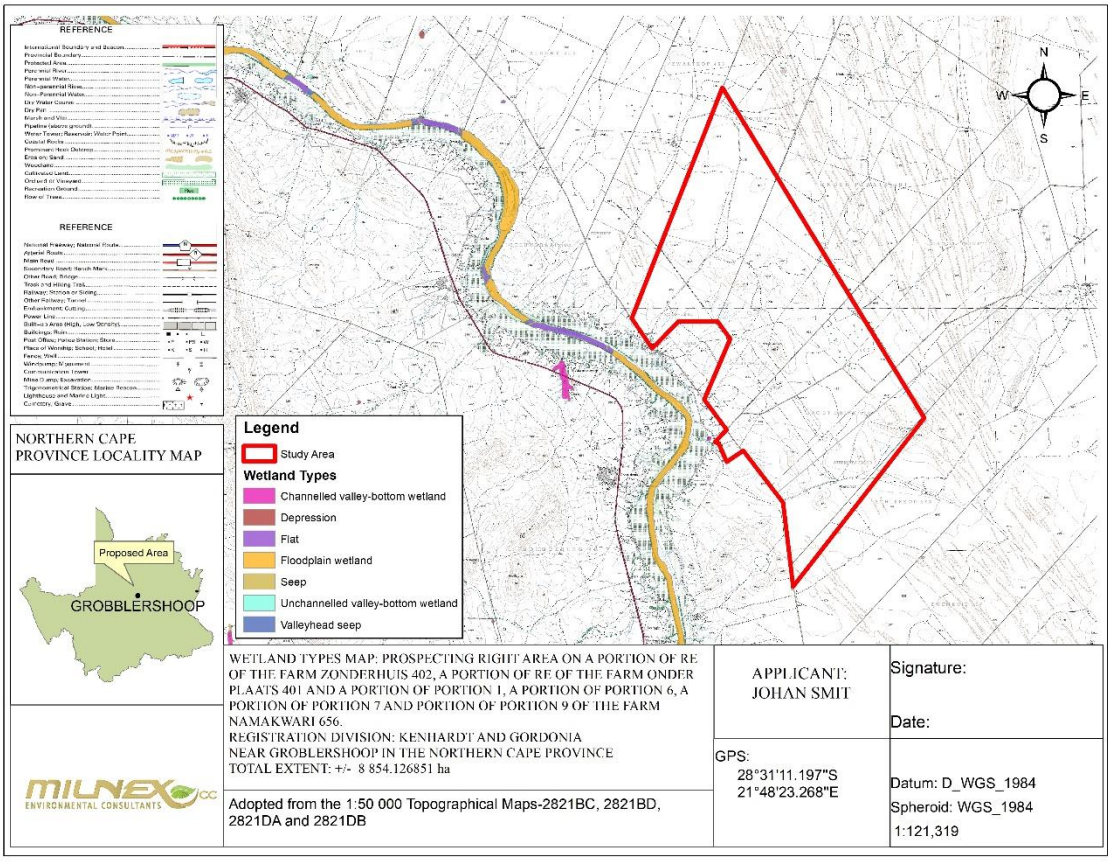



**Figure 10:** Wetland types located within or near the study site.

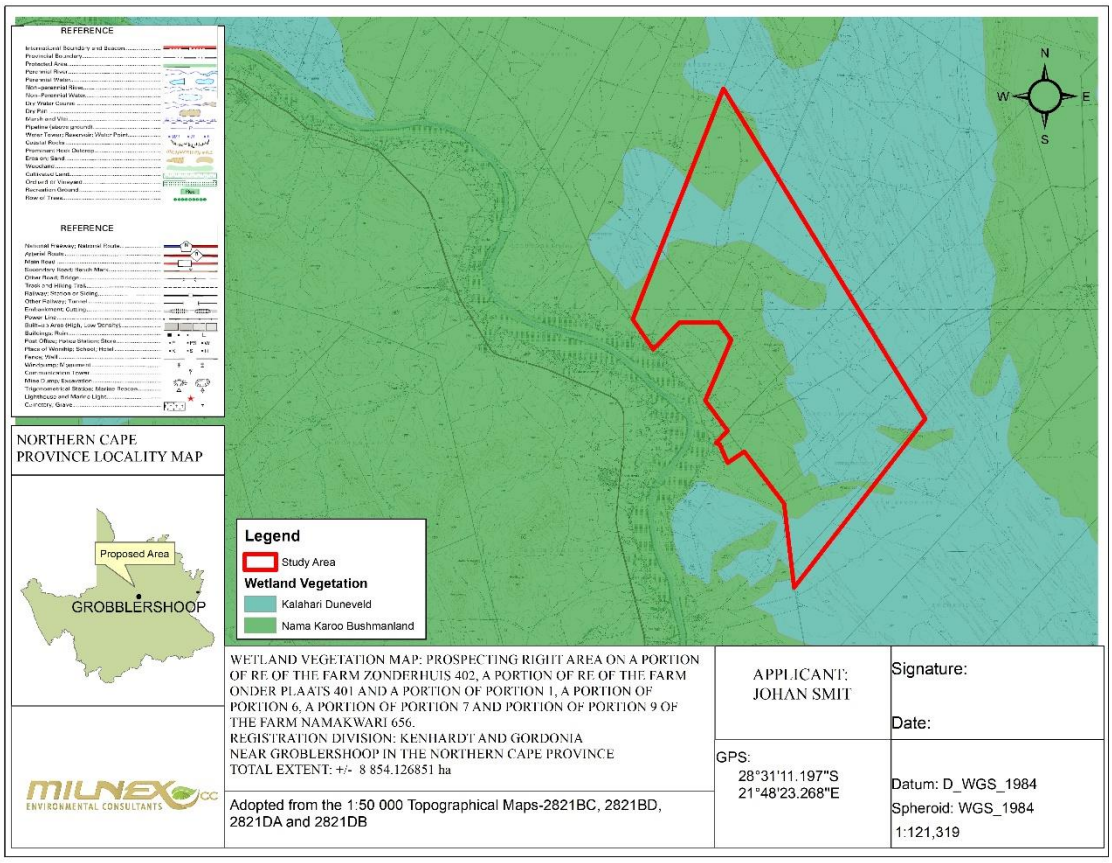
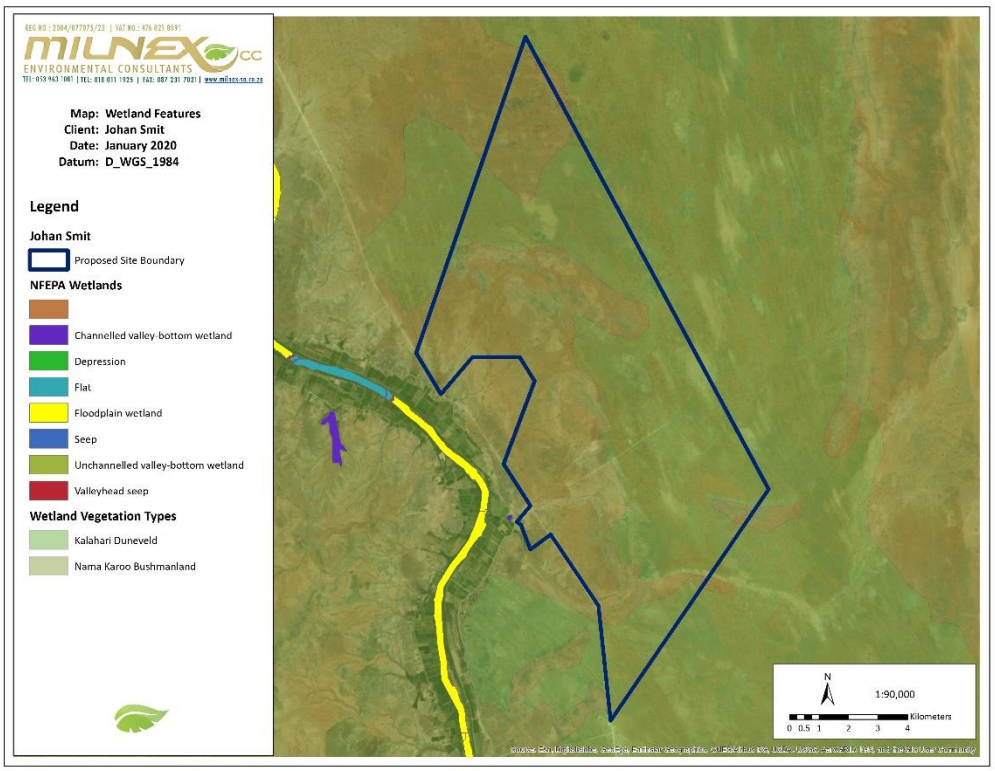



**Figure 11:** The study site is situated within the Kalahari Duneveld and the Nama Karoo Bushmanland wetland vegetation type.




Specialist map: *Figure 12: NFEPA Wetland classification of the study area and surrounding environment.* (Please see **Appendix 12)**

## River Ecosystem

According to **Figure 12**, the status of the Orange River traversing the boundary of the study site to the west, is classed Moderately Modified (Class C), as well as the unnamed tributary traversing the site in the southern regions of the site.

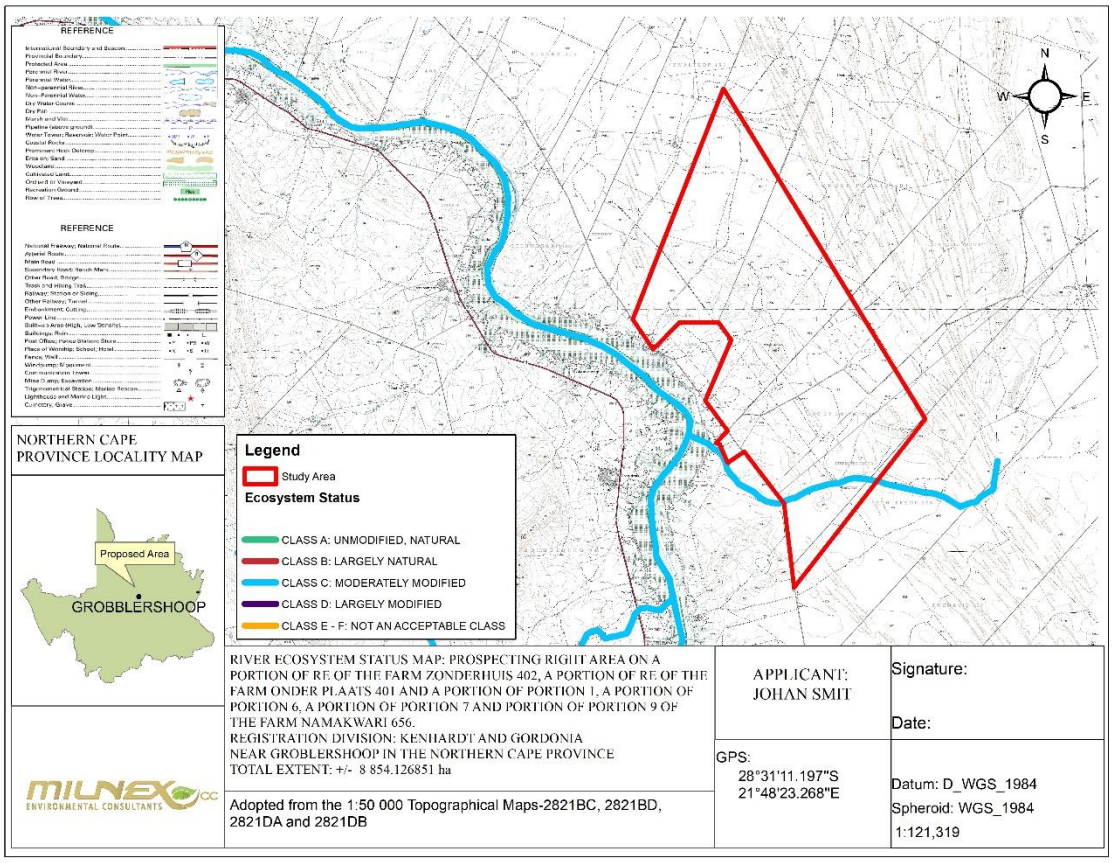



**Figure 12:** Ecosystem status of the rivers occurring in close proximity to the study site.

## 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 13**).

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): No Important Bird and Biodiversity Areas (IBAs) were identified within the vicinity of the study site (Birdlife 2019);

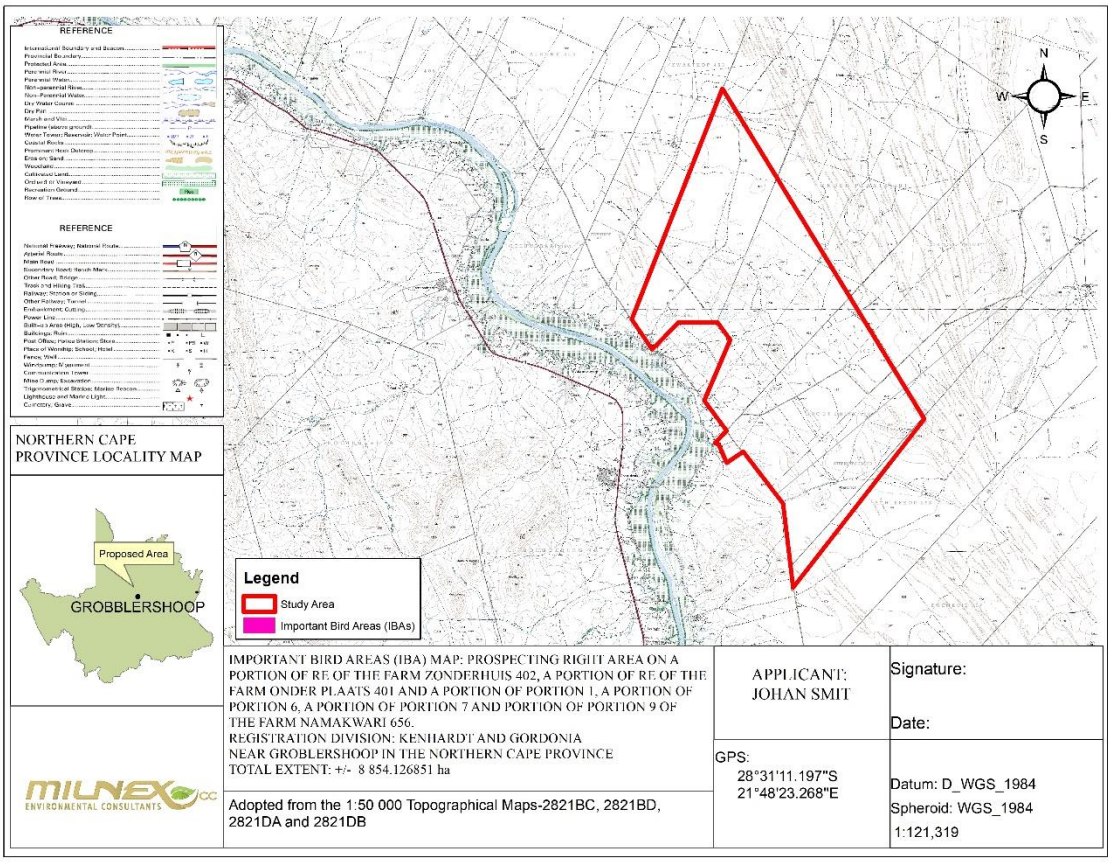



**Figure 13:** Important Bird and Biodiversity Areas associated with the study site.

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**):

***Riparian Habitat Description and System Characterisation***

*One Perennial Riparian area (the Orange River), one non-perennial, unnamed tributary, and several ephemeral drainage areas were recorded on the study site. The Orange River is classed as a Perennial River, which has continual surface water flow. Some sections of the site are natural, especially in areas where game farming takes place. Grazing pastures were observed, along with small scale mining practices, abstracting water from the Orange River. Numerous ephemeral drainage lines were identified and receive and retain enough water to support riparian characteristics throughout the year. The watercourse features identified during the site visit can be divided into three Hydrogeomorphic Units (HGM units) (**Table 18**).*

***Table 18:** Characterisation of the riparian features of the study area*

| Feature | Level 1: System | Level 2: Regional Setting | Level 3: Landscape Unit | Level 4: Hydrogeomorphic (HGM) Unit |
|---|---|---|---|---|
| Orange River | Inland System: An aquatic ecosystem with no existing connection to the ocean. | Ecoregion: Nama Karoo<br>NFEPA WetVeg Group: Nama Karoo Bushmanland and Kalahari Duneveld | Plain | River: Lowland river with active channel & riparian zone |
| Unnamed Tributary | | Ecoregion: Nama Karoo | Plain | Stream: Lowland river with active channel & |

| | | | | |
|---|---|---|---|---|
| | | **NFEPA WetVeg Group:** Nama Karoo Bushmanland and Kalahari Duneveld | | riparian zone |
| **Ephemeral Drainage Lines** | | **Ecoregion:** Nama Karoo<br><br>**NFEPA WetVeg Group:** Nama Karoo Bushmanland and Kalahari Duneveld | **Low hill slopes** | **Drainage Line:** Lowland river with active channel & riparian zone |

***Watercourse Integrity and Functional Assessment***

*The Quick Habitat Integrity (QHI) Assessment and Riparian Vegetation Response Assessment Index (VEGRAI) scores calculated for the Orange River and surrounding area is summarised in **Table 19** and **Table 20** overleaf. The watercourses were grouped on account of the similar surrounding vegetation and impacts, and their scores calculated accordingly. The QHI score obtained for the watercourses are as follow:*

- *Perennial Orange River: C - Moderately Modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.*
- *Ephemeral Unnamed Tributary: C - Moderately Modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.*
- *Ephemeral Drainage Lines: B - Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.*

*The VEGRAI score calculated for the riparian areas on the study site, were as follow:*

- *Perennial Orange River: D – Largely Modified, indicating that a large loss of natural habitat, biota and basic ecosystem functions has occurred.*
- *Ephemeral Unnamed Tributary and Drainage Lines: C/D – Moderately Modified to Largely Modified. Some modifications have occurred. Large loss of natural habitat, biota and basic ecosystem functions has occurred.*

***Riparian Delineation and Buffer Zone Determination***

*The study site is located directly west of a section of the perennial riparian Orange River. An unnamed tributary traverses the site in the south. Numerous ephemeral drainage features were also identified within the surrounding area of the study site. First (1st), second (2nd), third (3rd) and fourth (4th) order streams were lumped as ephemeral drainage lines*

*Calculated buffer zones were based on Low-risk mining operations for the watercourse, and were calculated as follows (**Figure 15, 16 and 17**):*

- *Perennial Orange River: 100 m (Operational Phase)*
- *Ephemeral Unnamed Tributary and 5th Order Streams: 100 m (Operational Phase)*
- *Ephemeral Drainage Lines: 35 m (Operational Phase)*

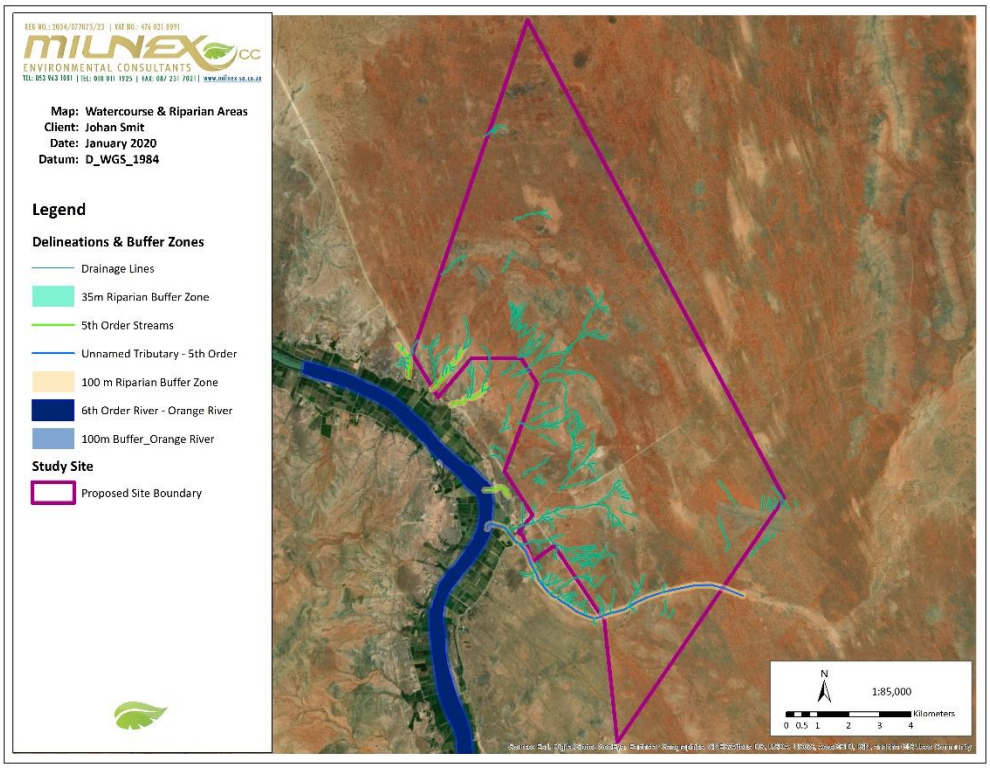
*The buffer zone identified in this report serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind.* ***However, the proposed prospecting will possibly take place within the watercourses and therefore the buffer zones will then not be implemented.***

Summary of Results

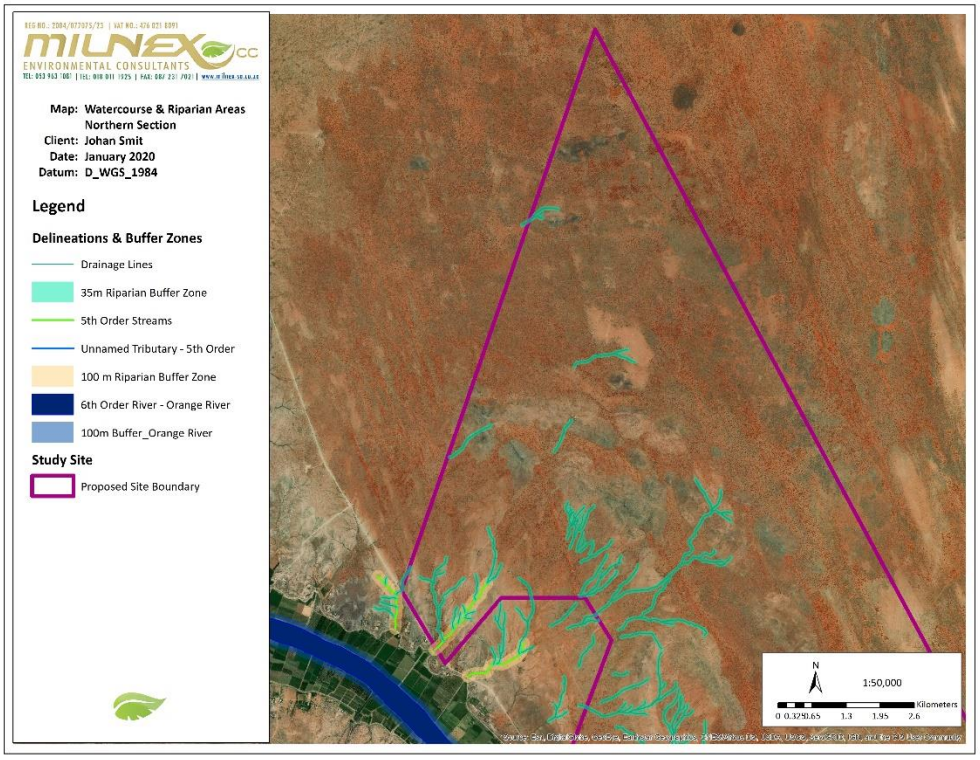
The results recorded for the watercourses potentially affected by the prospecting operations are summarised in **Table 22** below.

**Table 22:** Summary of the results

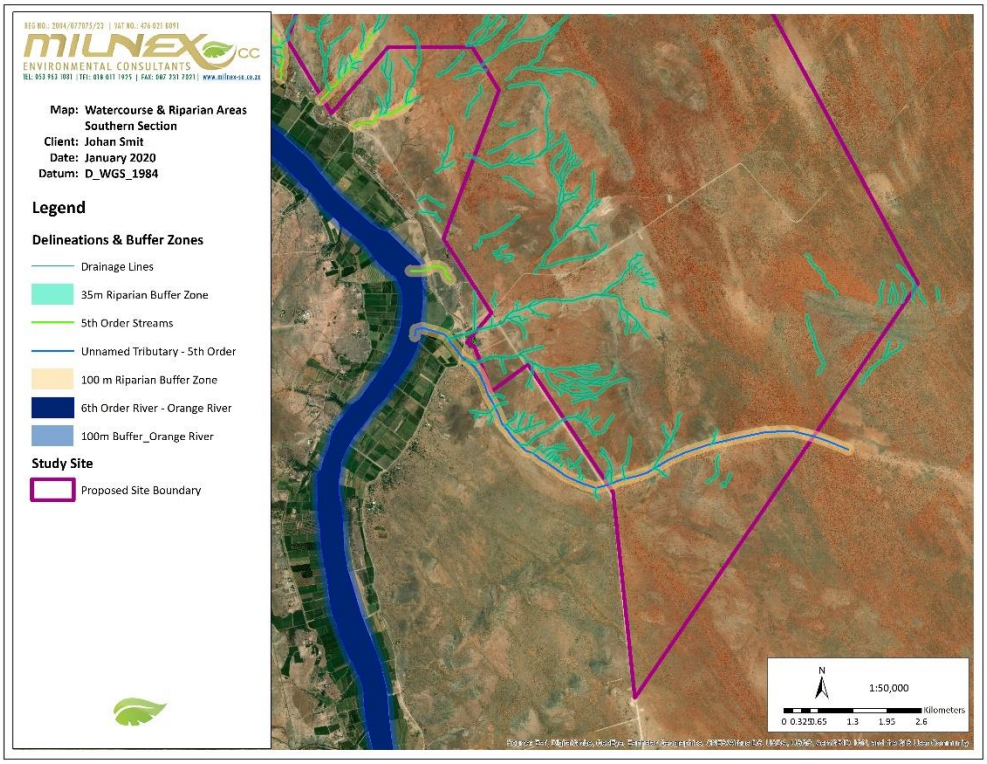
| Classification | Scientific Buffer | QHI | VEGRAI | REC |
|---|---|---|---|---|
| Perennial Orange River | 100 m | C | D | D |
| Ephemeral Unnamed Tributary | 100 m | C | C/D | C |
| Ephemeral Drainage Lines | 35 m | B | C/D | C |




Specialist map: *Figure 12: Figure 15: Watercourse Assessment and Riparian Delineation of the resources associated with the study site.* (Please see **Appendix 12**)




Specialist map: Figure 12: *Figure 16: Watercourse Assessment and Riparian Delineation of the resources associated with the study site – Northern section of the site.* (Please see **Appendix 12**)




Specialist map: Figure 12: *Figure 17: Watercourse Assessment and Riparian Delineation of the resources associated with the study site – Southern section of the site.* (Please see **Appendix 12**)

**Faunal Assessment**

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12):**

**Avifauna**

*A complete list of potential avifaunal species occurring in the relevant degree cells is listed in **Appendix A**. None of the species are listed or protected under the Threatened and Protected Species list (ToPS, 2013) which is enforceable under the National Environmental Management: Biodiversity Act, 2004. However, FM Safaris forms part of the application area and the following protected species, not listed in Appendix A, have been reported on the site:*

- *Khori Bustard (Ardeotis kori)*
- *Ludwig`s Bustard (Neotis ludwigii)*
- *Martial Eagle (Polemaetus bellicosus)*

**Mammals**

***Table 15** below lists all the mammal species possibly occurring on the proposed site according to the Animal Demography Unit (2019) alongside the designated statuses of those species in the South African Red list of Mammals (2012) and the Threatened or Protected Species (ToPS) List (NEMBA, 10 of 2004). Several species possibly occurring on site are protected under NEMBA (See species in bold). At the time of the site survey only African Ground Squirrel were observed on site. FM Safaris is a Game Ranch which allows the hunting of several introduced mammal species with the relevant permits necessary. Several species not listed in **Table 15** have been reported on the site, these include:*

- *Cape Fox (Vulpes chama)*
- *Caracal (Caracal caracal)*
- *Small Spotted Genet (Genetta genetta) – Protected*
- *Several exotic bovine species*

*Although not listed in the Table below, there is a possibility of the Critically Endangered Riverine Rabbit (Bunolagus monticularis) occurring on site, as this species inhabits dense riparian growth along the seasonal rivers in the Nama-Karoo shrubland (Skinner & Chimimba 2005).*

***Table 15:** List of Mammals Possibly Occurring on Site (ADU, 2019)*

| Family | Scientific Name | Common Name | Red List Category | ToPS |
|---|---|---|---|---|
| Bathyergidae | *Cryptomys hottentotus* | Southern African Mole-rat | Least Concern (2016) | |
| Bovidae | *Aepyceros melampus* | Impala | Least Concern | |
| Bovidae | *Alcelaphus buselaphus caama* | Red Hartebeest | Least Concern (2008) | |
| Bovidae | *Antidorcas marsupialis* | Springbok | Least Concern (2016) | |
| **Bovidae** | ***Connochaetes gnou*** | **Black Wildebeest** | **Least Concern (2016)** | **Protected** |
| Bovidae | *Connochaetes taurinus* | Blue Wildebeest | Least Concern (ver 3.1, 2017) | |
| Bovidae | *Connochaetes taurinus taurinus* | | Least Concern (2016) | |
| Bovidae | *Damaliscus pygargus phillipsi* | Blesbok | Least Concern (2016) | |
| Bovidae | *Oryx gazella* | Gemsbok | Least Concern (2016) | |
| Bovidae | *Sylvicapra grimmia* | Bush Duiker | Least Concern (2016) | |
| Canidae | *Otocyon megalotis* | Bat-eared Fox | Least Concern (2016) | |
| Cercopithecidae | *Chlorocebus pygerythrus* | Vervet Monkey | Least Concern (2016) | |
| **Erinaceidae** | ***Atelerix frontalis*** | **Southern African Hedgehog** | **Near Threatened (2016)** | **Protected** |
| Felidae | *Felis catus* | Domestic Cat | Introduced | |
| **Felidae** | ***Felis nigripes*** | **Black-footed Cat** | **Vulnerable (2016)** | **Protected** |
| **Felidae** | ***Panthera leo*** | **Lion** | **Least Concern (2016)** | **Protected** |
| **Felidae** | ***Panthera pardus*** | **Leopard** | **Vulnerable (2016)** | **Protected** |
| Herpestidae | *Cynictis penicillata* | Yellow Mongoose | Least Concern (2016) | |
| Herpestidae | *Herpestes pulverulentus* | Cape Gray Mongoose | Least Concern (2016) | |
| Herpestidae | *Suricata suricatta* | Meerkat | Least Concern (2016) | |
| Hyaenidae | *Proteles cristata* | Aardwolf | Least Concern (2016) | |
| Hystricidae | *Hystrix africaeaustralis* | Cape Porcupine | Least Concern | |
| Leporidae | *Lepus capensis* | Cape Hare | Least Concern | |
| Leporidae | *Lepus saxatilis* | Scrub Hare | Least Concern | |
| Macroscelididae | *Elephantulus intufi* | Bushveld Elephant Shrew | Least Concern (2016) | |
| Macroscelididae | *Macroscelides proboscideus* | Short-eared Elephant Shrew | Least Concern (2016) | |
| **Manidae** | ***Smutsia temminckii*** | **Ground Pangolin** | **Vulnerable (2016)** | **Protected** |

| | | | | |
|---|---|---|---|---|
| Molossidae | *Tadarida aegyptiaca* | Egyptian Free-tailed Bat | Least Concern (2016) | |
| Muridae | *Aethomys namaquensis* | Namaqua Rock Mouse | Least Concern | |
| Muridae | *Desmodillus auricularis* | Cape Short-tailed Gerbil | Least Concern (2016) | |
| Muridae | *Gerbilliscus sp.* | Gerbils | | |
| Muridae | *Gerbilliscus brantsii* | Highveld Gerbil | Least Concern (2016) | |
| Muridae | *Gerbilliscus paeba* | Paeba Hairy-footed Gerbil | Least Concern (2016) | |
| Muridae | *Gerbilliscus vallinus* | Brush-tailed Hairy-footed Gerbil | Least Concern (2016) | |
| Muridae | *Mastomys coucha* | Southern African Mastomys | Least Concern (2016) | |
| Muridae | *Otomys unisulcatus* | Karoo Bush Rat | Least Concern (2016) | |
| Muridae | *Rhabdomys pumilio* | Xeric Four-striped Grass Rat | Least Concern (2016) | |
| Mustelidae | *Ictonyx striatus* | Striped Polecat | Least Concern (2016) | |
| **Mustelidae** | ***Mellivora capensis*** | **Honey Badger** | **Least Concern (2016)** | **Protected** |
| Nesomyidae | *Malacothrix typica* | Large-eared African Desert Mouse | Least Concern (2016) | |
| Orycteropodidae | *Orycteropus afer* | Aardvark | Least Concern (2016) | |
| Pedetidae | *Pedetes capensis* | South African Spring Hare | Least Concern (2016) | |
| Procaviidae | *Procavia capensis* | Cape Rock Hyrax | Least Concern (2016) | |
| Sciuridae | *Xerus inauris* | South African Ground Squirrel | Least Concern | |
| Soricidae | *Crocidura cyanea* | Reddish-gray Musk Shrew | Least Concern (2016) | |
| Vespertilionidae | *Neoromicia capensis* | Cape Serotine | Least Concern (2016) | |

**Herpetofauna**

*The local occurrences of reptiles and amphibians (collectively known as Herpetofauna) are closely dependent on broadly defined habitat types, terrestrial, arboreal (tree-living), rupiculous (rock dwelling) and wetland-associated vegetation cover.* ***Table 16*** *lists all species of Amphibian and* ***Table 17*** *list all species of Reptile which could possibly occur on the study site. All Amphibian species are of Least Concern (LC), and no Red Listed or protected reptile species are known to occur on site.*

***Table 16:*** *List of Amphibians possibly occurring on site (ADU, 2019; IUCN, 2019).*

| Family | Scientific Name | Common Name | Red List Category | ToPS |
|---|---|---|---|---|
| Bufonidae | *Sclerophrys capensis* | Raucous Toad | Least Concern | - |
| Bufonidae | *Sclerophrys gutturalis* | Guttural Toad | Least Concern | - |
| Bufonidae | *Sclerophrys poweri* | Power's Toad | Least Concern | - |
| Hyperoliidae | *Kassina senegalensis* | Bubbling Kassina | Least Concern | - |
| Pipidae | *Xenopus laevis* | Common Platanna | Least Concern | - |
| Pyxicephalidae | *Amietia delalandii* | Delalande's River Frog | Least Concern (2017) | - |
| Pyxicephalidae | *Amietia fuscigula* | Cape River Frog | Least Concern (2017) | - |
| Pyxicephalidae | *Cacosternum boettgeri* | Common Caco | Least Concern (2013) | - |
| Pyxicephalidae | *Tomopterna sp.* | - | - | - |
| Pyxicephalidae | *Tomopterna cryptotis* | Tremelo Sand Frog | Least Concern | - |

**Table 17:** List of Reptiles possibly occurring on site (ADU, 2019; IUCN, 2019).

| Family | Scientific Name | Common Name | Red List Category |
|---|---|---|---|
| Agamidae | *Agama aculeata aculeata* | Common Ground Agama | Least Concern (SARCA 2014) |
| Agamidae | *Agama anchietae* | Anchieta's Agama | Least Concern (SARCA 2014) |
| Agamidae | *Agama atra* | Southern Rock Agama | Least Concern (SARCA 2014) |
| Colubridae | *Dasypeltis scabra* | Rhombic Egg-eater | Least Concern (SARCA 2014) |
| Colubridae | *Philothamnus semivariegatus* | Spotted Bush Snake | Least Concern (SARCA 2014) |
| Colubridae | *Telescopus beetzii* | Beetz's Tiger Snake | Least Concern (SARCA 2014) |
| Cordylidae | *Karusasaurus polyzonus* | Karoo Girdled Lizard | Least Concern (SARCA 2014) |
| Elapidae | *Naja nigricincta woodi* | Black Spitting Cobra | Least Concern (SARCA 2014) |
| Elapidae | *Naja nivea* | Cape Cobra | Least Concern (SARCA 2014) |
| Gekkonidae | *Chondrodactylus sp.* | - | - |
| Gekkonidae | *Chondrodactylus angulifer angulifer* | Common Giant Ground Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Chondrodactylus bibronii* | Bibron's Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Lygodactylus bradfieldi* | Bradfield's Dwarf Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Pachydactylus capensis* | Cape Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Pachydactylus latirostris* | Quartz Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Pachydactylus purcelli* | Purcell's Gecko | Least Concern (SARCA 2014) |

| | | | |
|---|---|---|---|
| Gekkonidae | *Pachydactylus rugosus* | Common Rough Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Pachydactylus wahlbergii furcifer* | Striped Ground Gecko | Least Concern (SARCA 2014) |
| Gekkonidae | *Ptenopus garrulus maculatus* | Spotted Barking Gecko | Least Concern (SARCA 2014) |
| Gerrhosauridae | *Cordylosaurus subtessellatus* | Dwarf Plated Lizard | Least Concern (SARCA 2014) |
| Lacertidae | *Heliobolus lugubris* | Bushveld Lizard | Least Concern (SARCA 2014) |
| Lacertidae | *Nucras tessellata* | Western Sandveld Lizard | Least Concern (SARCA 2014) |
| Lacertidae | *Pedioplanis inornata* | Plain Sand Lizard | Least Concern (SARCA 2014) |
| Lacertidae | *Pedioplanis lineoocellata lineoocellata* | Spotted Sand Lizard | Least Concern (SARCA 2014) |
| Lacertidae | *Pedioplanis namaquensis* | Namaqua Sand Lizard | Least Concern (SARCA 2014) |
| Lamprophiidae | *Boaedon capensis* | Brown House Snake | Least Concern (SARCA 2014) |
| Lamprophiidae | *Lycophidion capense capense* | Cape Wolf Snake | Least Concern (SARCA 2014) |
| Lamprophiidae | *Prosymna bivittata* | Two-striped Shovel-snout | Least Concern (SARCA 2014) |
| Lamprophiidae | *Prosymna sundevallii* | Sundevall's Shovel-snout | Least Concern (SARCA 2014) |
| Lamprophiidae | *Psammophis sp.* | - | - |
| Lamprophiidae | *Psammophis notostictus* | Karoo Sand Snake | Least Concern (SARCA 2014) |
| Lamprophiidae | *Psammophis trinasalis* | Fork-marked Sand Snake | Least Concern (SARCA 2014) |
| Lamprophiidae | *Pseudaspis cana* | Mole Snake | Least Concern (SARCA 2014) |
| Lamprophiidae | *Xenocalamus bicolor bicolor* | Bicoloured Quill-snouted Snake | Least Concern (SARCA 2014) |
| Scincidae | *Acontias kgalagadi kgalagadi* | Striped Blind Legless Skink | Least Concern (SARCA 2014) |
| Scincidae | *Acontias lineatus* | Striped Dwarf Legless Skink | Least Concern (SARCA 2014) |
| Scincidae | *Trachylepis occidentalis* | Western Three-striped Skink | Least Concern (SARCA 2014) |
| Scincidae | *Trachylepis sparsa* | Karasburg Tree Skink | Least Concern (SARCA 2014) |
| Scincidae | *Trachylepis spilogaster* | Kalahari Tree Skink | Least Concern (SARCA 2014) |
| Scincidae | *Trachylepis sulcata sulcata* | Western Rock Skink | Least Concern (SARCA 2014) |
| Scincidae | *Trachylepis variegata* | Variegated Skink | Least Concern (SARCA 2014) |
| Testudinidae | *Psammobates oculifer* | Serrated Tent Tortoise | Least Concern (SARCA 2014) |
| Testudinidae | *Psammobates tentorius verroxii* | Verrox's Tent Tortoise | - |
| Testudinidae | *Stigmochelys pardalis* | Leopard Tortoise | Least Concern (SARCA 2014) |
| Typhlopidae | *Rhinotyphlops lalandei* | Delalande's Beaked Blind Snake | Least Concern (SARCA 2014) |

| | | | |
|---|---|---|---|
| Varanidae | *Varanus albigularis albigularis* | Rock Monitor | Least Concern (SARCA 2014) |
| Varanidae | *Varanus niloticus* | Water Monitor | Least Concern (SARCA 2014) |
| Viperidae | *Bitis arietans arietans* | Puff Adder | Least Concern (SARCA 2014) |

- Cultural and heritage aspects

**Heritage**

According to the Phase 1 Cultural Heritage Impact Assessment conducted by J A van Schalkwyk (D Litt et Phil), during the physical survey, the following sites, features and objects of cultural significance were identified in the study area:

**7.1 Stone Age**

| | |
|---|---|
| NHRA Category | Archaeological resources - Section 35 |

- **Change finds:**

Stone Age lithics are found only as low-density surface scatters, which is confirmed by similar findings in the larger region by other researchers (Dreyer 2014, 2015; Morris 2014, 2018; van der Walt 2015; van Schalkwyk 2018).

Stone Age artefacts, mostly dating to the Middle Stone Age occur in small numbers in parts of the study area. Even on the pebble plains closer to the river, where source material is readily available, the density of artefacts is less than 1/2m2, diminishing to 1/10m2 on the ridges and outcrops to nothing in the sandy regions. The tools are mostly made from banded iron stone (jaspelite), although some quartzite and hardened shale flakes were also noted. Cores, flakes and tools are found. The tools are very rough and informal and only a few that can be described as typical, i.e. blades and scrapers, were identified.

- The low density of the lithic scatters is, on archaeological grounds, viewed to be of low sensitivity and require no further action.

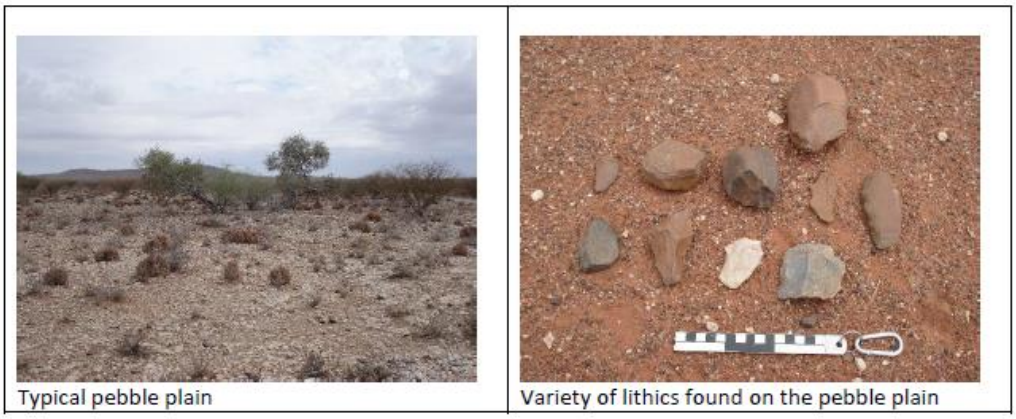



Figure 10. The type of area where lithics are found and some examples

**7.2 Iron Age**

- No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

**7.3 Historic period**

| | |
|---|---|
| NHRA Category | Structures older than 60 years - Section 34 |

- 7.3.1: Old farmstead (S 28,56526; E 21,83176) – referred to on the map as Sterkstroom.

Consists of a main house and some outbuildings. All is now in ruins. The main house can be classified as a Karoo style structure, typical of what is found all over the countryside as well is in many towns.

o Due to the state of conservation and the fact that these structures do not show any interesting or unique architectural features, they ares viewed to have little significance and no further action is required (also see Morris 2014)

Figure 11. The Sterkstroom farmstead

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

**Palaeontology**

According to the Palaeontological Desktop Assessment conducted by Elize Butler, the study area is underlain by the Gordonia Formation of the Kalahari Group, Tertiary Calcrete as well as the Zonderhuis and Leerkrans Formations of the Wilgenhoutsdrif Group, Areachap Group of the Namaqua-Natal Province (Figure 3). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Gordonia Formation of the Kalahari Group and Tertiary calcrete are low while the Palaeontological Sensitivity of the Zonderhuis and Leerkrans Formations are insignificant (Almond and Pether 2008, SAHRIS website).

The Cenozoic Kalahari Group is the most widespread body of terrestrial sediments in southern Africa. The Cenozoic sands and calcretes of the Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006). The youngest formation of the Kalahari group is the Gordonia Formation which is generally termed Kalahari sand and comprises of red aeolian sands that covers most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters. Quaternary alluvium, aolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980).

Partridge *et al*., (2006) describes numerous types of superficial deposits of Late Caenozoic (Miocene to Pliocene to Recent) age throughout the Karoo Basin. Sands and gravel in the development footprint has a possible fluvial origin. The fossil assemblages of the Kalahari are generally very low in diversity and occur over a wide range and thus the palaeontological diversity of this Group is low (SAHRIS website). 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 remains have been uncovered where the depositional settings in the past were wetter.

Almond and Pether 2008 allocated a low significance to the Kalahari Group because fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. In the past palaeontologists did not focus on Cenozoic superficial deposits although they sometimes comprise of significant fossil biotas. However, Groenewald and Groenewald (2014) allocated a

high palaeontological sensitivity to the Cenozoic aged terrestrial organisms which are important indicators of palaeo-environmental conditions.

**Namaqua-Natal Metamorphic Province**

The development footprint is underlain by the Mid Proterozoic (Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province. The Namaqua-Natal Province is primarily highly metamorphosed sediments and volcanic rocks (e.g. gneisses, schists, quartzites, amphibolites) plus major granitic and gabbroic (norite) intrusions, are dated between 2050 and 1000 Ma (million years ago).

The Wilgenhoutsdrif Group is a volcanogenic group. The basal (mostly sedimentary) unit of this group is the Zonderhuis Formation is overlain by the mainly volcanogenic Leerkrans Formation. The base is badly exposed which workers interpreted as thrust or as a depositional unconformity. The Zonderhuis Formation comprise of a light purple quartzite and is approximately 300 thick which is overlain by grey, brown and greenish schist and phyllite which is interbedded by quartzites form sharp contacts. Ferruginous quartzite, siderite dolomite and argillaceous limestone also occur in places. Ferruginous chert (black to red) forms ridges and is present in association with greenstones.

The Leerkrans Formation consists of cyclical repetitions of clastic sedimentary and volcanic rocks. Rhyolite is overlain by a greenstone unit in which lapilli calcite-filled amygdales and pillows are preserved. Metabasic intrusions occur in sill-like bodies, while immature sediments overlie the volcanic rocks.

The Proterozoic granite-gneiss basement rocks of the Namaqua-Natal Metamorphic Province do not contain any fossils because they are igneous in origin or too highly metamorphosed (Almond & Pether 2008), and their palaeontological sensitivity is correspondingly low (Almond & Pether 2008, Almond 2008).

**(b) Description of the current land uses.**

The predominant land uses identified on the day of the site visit consists mainly of commercial agricultural crop production to the west of the study site, along the Orange River (**Figure 14**). The study site and its surrounding areas on the east, north and south are largely natural with Low Shrubland dominating.

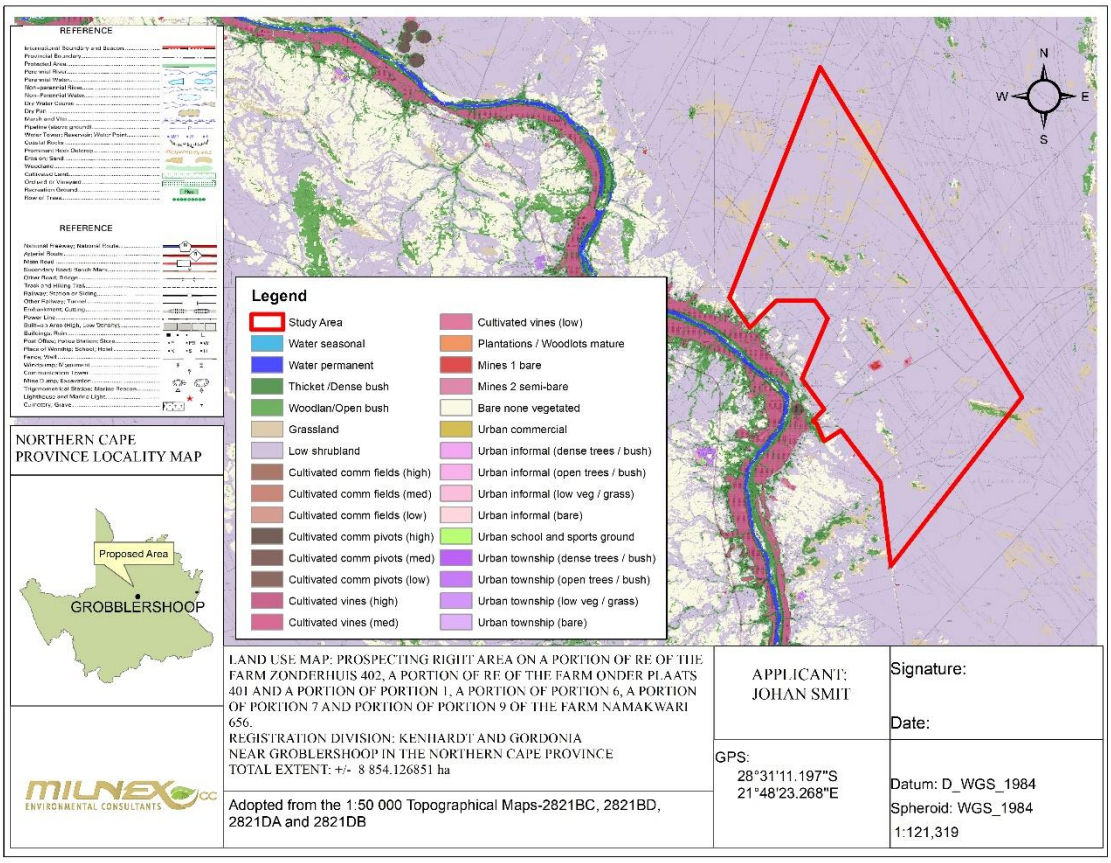
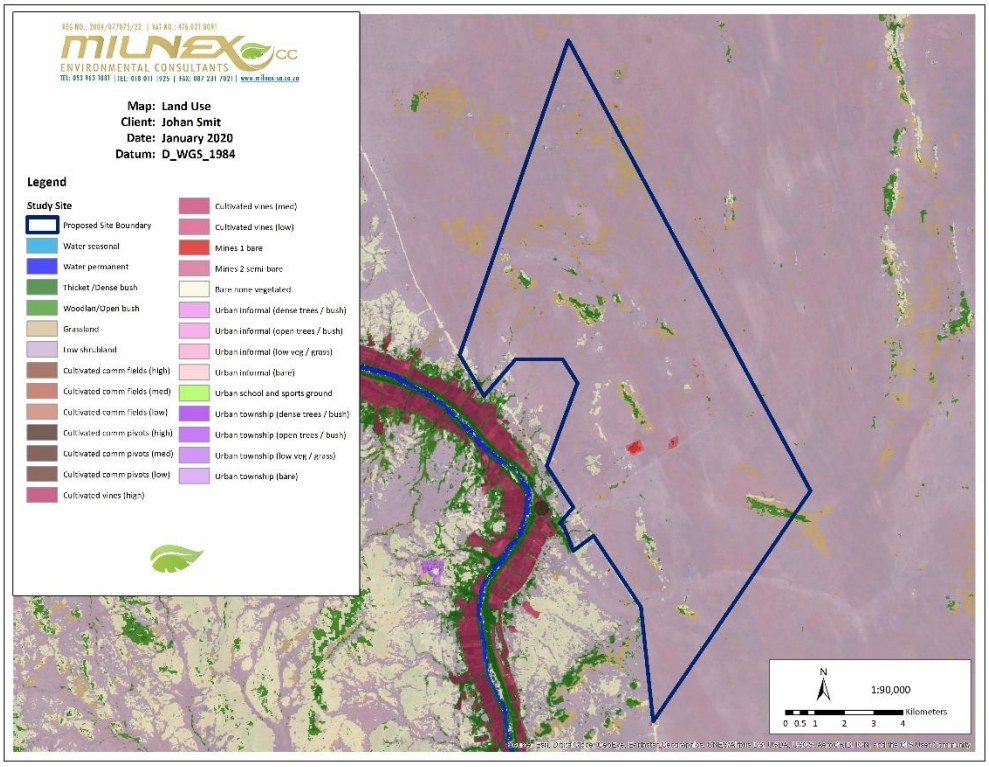



**Figure 14:** Current Land Use associated with the study site and surrounding areas.

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *The study site is situated along the Orange River and several ephemeral drainage lines occurring on site, including an unnamed tributary in the south (Figure 4 of the specialist study). Some of the arable land is used for crop production under pivot irrigation along the Orange River. The natural veld is dominated by low shrubland and grassland. Game farming takes place on site, along with cattle farming and small-scale mining activities.*




Specialist map: *Figure 4: Current Land Use associated with the study site and surrounding areas.* (Please see **Appendix 12**)

## v. IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

**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 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:

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *The study sites overlap with four (4) different vegetation types, namely Bushmanland Arid Grassland (NKb 3), Lower Gariep Broken Veld (NKb 1), Kalahari Karroid Shrubland (NKb 5) and Gordonia Duneveld (SVkd 1). All are classed as Least Concern (Mucina & Rutherford, 2006/2018); According to the Northern Cape Biodiversity Sector Plan (2016), most of the study site is classified as other Natural Areas, with some sections of classed as Critical Biodiversity Area 2, which are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services;*

| **Loss or fragmentation of indigenous natural fauna and flora** | **Pre-mitigation impact rating** | **Post mitigation impact rating** |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Site (1) | Site (1) |
| Probability | Definite (4) | Definite (4) |
| Duration | Medium term (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Significant loss of resource (3) | Marginal loss of resource (2) |
| Cumulative impact | Medium cumulative impacts (3), | |
| **Significance** | **Negative Medium (45)** | **Negative low (28)** |
| Can impacts be mitigated? | If the development is approved, contractors must ensure that no mammalian species are disturbed, trapped, hunted or killed. If the development is approved, every effort should be made to confine the footprint to the blocks allocated for the development and have the least possible edge effects on the surrounding area. The EMPr also provides numerous mitigation measures – refer to section (f) of the EMPr.<br><br>The potential impacts associated with damage to and loss of farmland should be effectively mitigated. The aspects that should be covered include:<br>• The site should be fenced off prior to commencement of construction activities; | |

| | |
|---|---|
| | • The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be confined to the fenced off area and minimised where possible;<br>• An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;<br>• All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;<br>• The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. Specifications for the rehabilitation are provided throughout the EMPr – section (f) of the EMPr.<br>• The implementation of the Rehabilitation Programme should be monitored by the ECO. |

- Loss or fragmentation of habitats –

According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *Numerous ephemeral drainage lines were identified and receive and retain enough water to support riparian characteristics throughout the year.*

However according to the Watercourse Integrity and Functional Assessment in the Ecological Impact Assessment Report: *the Ephemeral Unnamed Tributary falls within category C - Moderately Modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged and the Ephemeral Drainage Lines falls within category B - Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.* According to the VEGRAI score calculated for the riparian areas on the study site, in the Ecological Impact Assessment Report::*the Ephemeral Unnamed Tributary and Drainage Lines: falls within category C/D – Moderately Modified to Largely Modified. Some modifications have occurred. Large loss of natural habitat, biota and basic ecosystem functions has occurred.*

| Loss or fragmentation of habitats | 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 (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Marginal loss of resource (2) | Marginal loss of resource (2) |
| Cumulative impact | Medium cumulative impacts (3). | |
| **Significance** | **Negative Medium (30)** | **Negative Medium (30)** |
| Can impacts be mitigated? | Exotic and invasive plant species should not be allowed to establish, if the development is approved. Where exotic and invasive plant species are found at the site continuous eradication should take place. If the development is approved, every effort should be made to confine the footprint to the blocks allocated for development – section (f) of the EMPr also provides numerous mitigation measures related to fauna and flora. | |

- 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. This will result in grazing and cultivation potential being lost.

| Loss of topsoil | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Geographical extent | Site (1) | Site (1) |
| Probability | Probable (3) | Unlikely (1) |
| Duration | Long term (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Significant (3) | Marginal (2) |
| Cumulative impact | Medium cumulative impact (3). | |
| **Significance** | **Negative Medium (42)** | **Negative low (22)** |
| Can impacts be mitigated? | The following mitigation or management measures are provided:<br>• 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.<br>• Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them.<br>• Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land.<br>• During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.<br>• Erosion must be controlled where necessary on top soiled areas.<br><br>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.<br>• Record the GPS coordinates of each area.<br>• Record the date of topsoil stripping.<br>• Record the GPS coordinates of where the topsoil is stockpiled.<br>• Record the date of cessation of constructional (or operational) activities at the particular site.<br>• Photograph the area on cessation of constructional activities.<br>• Record date and depth of re-spreading of topsoil.<br>• Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.<br><br>Section (f) of the EMPr also provide mitigation measures related to topsoil management. | |

- Soil erosion – 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. This will result in grazing and cultivation potential being lost.

| Soil erosion | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Geographical extent | Site (1) | Site (1) |
| Probability | Probable (3) | Unlikely (1) |
| Duration | Long term (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Significant (3) | Marginal (2) |
| Cumulative impact | Medium cumulative impact (3). | |
| **Significance** | **Negative Medium (42)** | **Negative low (22)** |
| Can impacts be mitigated? | The following mitigation or management measures are provided: Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.<br><br>Include periodical site inspection in environmental performance reporting that inspects the effectiveness of the run-off control system and specifically records the occurrence any erosion on site or downstream – refer to section (f) of the EMPr. | |

- 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 may be significant since there is a game farm on the proposed area and the noise may have a negative effect on the game as well as hunting on the game farm.

| Temporary noise disturbance | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local (2) | Local (2) |
| Probability | Definite (4) | Probable (3) |
| Duration | Short term (1) | Short term (1) |
| Magnitude | High (3) | High (3) |
| 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 medium cumulative effects (3). | |
| **Significance** | **Negative medium (39)** | **Negative medium (36)** |
| 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 will have to be provided, in the form of portable/VIP toilets. No pit latrines, French drain systems or soak away systems shall be allowed.

| Generation of waste | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local/district (2) | Local/district (2) |
| Probability | Definite (4) | Definite (4) |
| Duration | Short term (1) | Short term (1) |

| | | |
|---|---|---|
| Magnitude | High (3) | Low (1) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Marginal loss of resource (2) | No loss of resource (1) |
| Cumulative impact | Medium cumulative impact (3) - 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 medium (42)** | **Negative low (13)** |
| 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 objects –

**Heritage objects**

According to the Phase 1 Cultural Heritage Impact Assessment conducted by J A van Schalkwyk (D Litt et Phil), during the physical survey, the following sites, features and objects of cultural significance were identified in the study area:

- 7.1 Change finds Stone Age artefacts:

Stone Age artefacts, mostly dating to the Middle Stone Age occur in small numbers in parts of the study area. Even on the pebble plains closer to the river, where source material is readily available, the density of artefacts is less than 1/2m2, diminishing to 1/10m2 on the ridges and outcrops to nothing in the sandy regions. The tools are mostly made from banded iron stone (jaspelite), although some quartzite and hardened shale flakes were also noted. Cores, flakes and tools are found. The tools are very rough and informal and only a few that can be described as typical, i.e. blades and scrapers, were identified.

- 7.3.1: Old farmstead – referred to on the map as Sterkstroom.

Consists of a main house and some outbuildings. All is now in ruins. The main house can be classified as a Karoo style structure, typical of what is found all over the countryside as well is in many towns.

According to the Phase 1 Cultural Heritage Impact Assessment the Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development and its significance is calculated and presented below:

| **IDENTIFIED HERITAGE RESOURCE: Chance find archaeological material – 7.1** | | | | | |
|---|---|---|---|---|---|
| **Nature:** Chance find Stone Age material: These features are rated to have low significance due to their low numbers as well as the fact that the area has already extensively been disturbed due to be surface material. | | | | | |
| | | | Without mitigation | | With mitigation |
| Extent | | | Local area | | Local area |
| Duration | | | Permanent | | Permanent |
| Intensity | | | Minor | | Minor |
| Probability | | | Improbable | | Improbable |
| Significance | | | Low (20) | | Low (20) |
| Status (positive or negative) | | | Negative | | Neutral |
| Reversibility | | | Non-reversible | | Non-reversible |
| Irreplaceable loss of resources? | | | Yes | | No |
| Can impacts be mitigated | | | Yes | | |
| Mitigation: Avoidance of site | | | | | |
| Cumulative impact: Limited loss of similar features in the larger landscape. | | | | | |
| **Site No.** | **Site type** | **NHRA category** | **Field rating** | **Impact rating: Before/After mitigation** | **Proposed mitigation (Refer to definitions in Section 12.3)** |
| 7.1 | Chance find Stone Age tools | Section 35 | Low significance Grade 4-C | 20<br>20 | (5) No further action required. |

| IDENTIFIED HERITAGE RESOURCE: Sterkstroom farmstead – 7.3.1 | | | | | |
|---|---|---|---|---|---|
| **Nature:** These features are rated to have low significance due to ruined status and lack of outstanding built qualities. | | | | | |
| | | | Without mitigation | With mitigation | |
| Extent | | | Local area | Local area | |
| Duration | | | Permanent | Permanent | |
| Intensity | | | Minor | Minor | |
| Probability | | | Improbable | Improbable | |
| Significance | | | Low (20) | Low (20) | |
| Status (positive or negative) | | | Negative | Neutral | |
| Reversibility | | | Non-reversible | Non-reversible | |
| Irreplaceable loss of resources? | | | Yes | No | |
| Can impacts be mitigated | | | Yes | | |
| Mitigation: Avoidance of site | | | | | |
| Cumulative impact: Limited loss of similar features in the larger landscape. | | | | | |
| **Site No.** | **Site type** | **NHRA category** | **Field rating** | **Impact rating: Before/After mitigation** | **Proposed mitigation (Refer to definitions in Section 12.3)** |
| 7.3.1 | Farmstead | Section 35 | Low significance Grade 4-C | 20<br>20 | (5) No further action required. |

**Palaeontology objects**

According to the Palaeontological Desktop Assessment conducted by Elize Butler, the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be informed immediately. These discoveries ought to be secured (preferably in situ) and the ECO/site manager ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist.

The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

| Impacts on heritage objects | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local (2) | Local (2) |
| Probability | Unlikely (1) | Unlikely (1) |
| Duration | Permanent (4) | Permanent (4) |
| Magnitude | Medium (2) | Low (1) |
| Reversibility | Irreversible (4) | Partly reversible (2) |
| Irreplaceable loss of resources | Complete loss of resource (4) | 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 medium (34)** | **Negative low (13)** |
| 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. | |

***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 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 a gravel road off the N10 or N14. While the volume of traffic along this road is medium, 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 is will add significantly to the current traffic load on the road. The impact on the gravel road off the N10 or N14 is therefore likely to be medium.

| Increase in vehicle traffic | 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 | Short term (1) | Short term (1) |
| Magnitude | High (3) | 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 medium impacts (36)** | **Negative low (20)** |
| Can impacts be mitigated? | The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:<br>• The contractor must ensure that damage caused by construction on the gravel road off the N10 or N14 is repaired. The costs associated with the repair must be borne by the contractor;<br>• 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;<br>• 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.<br>Also refer section (f) of the EMPr. For mitigation measures related to traffic. | |

- Risk to safety, livestock and farm infrastructure - The presence on and movement of workers on and off the site poses a potential safety threat to local famer's 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 farm workers on the site.

| Risk to safety, livestock and farm infrastructure | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |

| | | |
|---|---|---|
| Extent | Local (2) | Local (2) |
| Probability | Definite (4) | Possible (2) |
| Duration | Medium term (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Completely reversible (1) |
| Irreplaceable loss of resources | Significant loss of resource (3) | Marginal resource (2) |
| Cumulative impact | Low cumulative effects (2), provided losses are compensated for. | |
| **Significance** | **Negative medium (45)** | **Negative low (22)** |
| Can impacts be mitigated? | Key mitigation measures include:<br>• **Johan Smit** 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;<br>• 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;<br>• Contractors appointed by **Johan Smit** 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;<br>• **Johan Smit** 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);<br>• The Environmental Management Programme (EMPr) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;<br>• Contractors appointed **Johan Smit** 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.<br>• Contractors appointed by **Johan Smit** must ensure that construction workers who are found guilty of trespassing, stealing livestock 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;<br>• 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, 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 construction phase.

| Increased risk of veld fires | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Region (3) | Local (2) |
| Probability | Probable (3) | Possible (2) |
| Duration | Medium term (2) | Short term (1) |
| Magnitude | Very High (4) | Low (1) |
| Reversibility | Completely reversible (1) | Completely reversible (1) |
| Irreplaceable loss of resources | Significant loss of resource (3) | No loss of resource (1) |
| Cumulative impact | Negligible cumulative effects (1), provided losses are compensated for. | |
| **Significance** | **Negative high (52)** | **Negative low (8)** |
| Can impacts be mitigated? | The mitigation measures include:<br>• A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase;<br>• Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;<br>• 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;<br>• Contractor to provide adequate firefighting equipment on-site, including a fire fighting vehicle;<br>• Contractor to provide fire-fighting training to selected construction staff;<br>• No construction staff, with the exception of security staff, to be accommodated on site over night;<br>• 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.

| Soil erosion | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |

| | | |
|---|---|---|
| Extent | Local/Regional (2) | Local/Regional (2) |
| Probability | Definite (4) | Unlikely (1) |
| Duration | Long term (3) | Long term (3) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| 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 air and water resources in the study area in terms of pollution. | |
| **Significance** | **Negative High (51)** | **Negative Low (26)** |
| Can impacts be mitigated? | Yes, to avoid soil erosion it will be a good practice to not remove all the vegetation at once but to only clear the area as it becomes necessary and to implement concurrent rehabilitation.<br><br>Also refer to section (f) of the EMPr. | |

- Change in land-use – The use of the area for the operation of the prospecting activity will result in the area not being used for livestock / game grazing dependent on where the prospecting activities will occur. According to the Watercourse Delineation and Ecological Impact Assessment Report (please see **Appendix 12**): *The dominant land use in the area is crop farming and water abstraction from the Orange River. Some housing and several access roads are present on the study site, including fenced off areas used for game farming. FM Safaris is also situated on site and specialises in game farming. Old diamond diggings were observed. Some roads and fences were observed traversing the drainage lines on site*. Prospecting area needs to be fenced off.

| Change in land use | 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 | Long term (3) | Long term (3) |
| Magnitude | High (3) | High (3) |
| Reversibility | Barely reversible (3) | Partly reversible (2) |
| Irreplaceable loss of resources | Significant loss of resource (3) | Marginal loss of resource (2) |
| Cumulative impact | Medium cumulative impacts (3). | |
| **Significance** | **Negative high (51)** | **Negative medium (45)** |
| 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.<br><br>Also refer to section (f) of the EMPr. | |

- Generation of alternative land use income – Income generated through the diamond 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

| Increase in storm water runoff | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local (2) | Local (2) |
| Probability | Probable (3) | Unlikely (1) |
| Duration | Long term (3) | Medium term (3) |
| Magnitude | High (3) | Low (1) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| 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 cumulative impacts on the wider area. | |
| **Significance** | **Negative medium (48)** | **Negative low (13)** |
| 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<br><br>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.<br><br>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.<br><br>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 2 x 16 feet washing pans will be used, the amount of water for the pans will be 34 000 L/hour from which 30% is re-used.

| Increased consumption of water | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Region (3) | Region (3) |
| Probability | Definite (4) | Definite (4) |
| Duration | Long term (3) | Long term (3) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Irreversible (4) | Irreversible (4) |
| Irreplaceable loss of resources | Significant loss of resources (3) | Marginal loss of resources (2) |

| | | |
|---|---|---|
| Cumulative impact | High cumulative impacts (4) - An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water. | |
| **Significance** | **Negative medium (63)** | **Negative medium (40)** |
| 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 the site and removed on a weekly basis by a contractor.

| Generation of waste | 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 | Long term (3) | Long term (3) |
| Magnitude | Medium (2) | Low (1) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Marginal loss of resource (1) | No loss of resource (1) |
| Cumulative impact | Medium cumulative impact (3) - An additional demand for landfill space could result in significant cumulative impacts with regards to the availability of landfill space. | |
| **Significance** | **Negative medium (30)** | **Negative low (15)** |
| 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) | Local (2) |
| Probability | Possible (2) | Unlikely (1) |
| Duration | Long term (3) | Short term (1) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | Marginal loss of resource (2) | Marginal loss of resource (2) |
| Cumulative impact | The impact would result in negligible to no cumulative effects (1) | |
| **Significance** | **Negative medium (36)** | **Negative low (18)** |
| 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 3-5 years. Sources of noise are likely to include vehicles, the use of machinery such as backactors, rotary pans and people working on the site. The noise impact may be significant since there is a game farm on the proposed area and the noise may have a negative effect on the game as well as hunting on the game farm.

| Temporary noise disturbance | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local (2) | Local (2) |
| Probability | Definite (4) | Probable (3) |
| Duration | Short term (1) | Short term (1) |
| Magnitude | Medium (2) | Medium (2) |
| 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 medium cumulative effects (3). | |
| **Significance** | **Negative low (26)** | **Negative low (24)** |
| 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 diamond on the areas sense of place with mitigation is likely to be medium to high. FM Safaris is on the proposed site and Namakwari Safaris is close to the proposed site. The prospecting activities may have negative impacts on the tourist facilities on and near the proposed area.

| Potential impacts on tourism | 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 | Medium term (2) | Medium term (2) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Completely reversible (1) | Completely reversible (1) |
| Irreplaceable loss of resources | N/A | N/A |
| Cumulative impact | Medium cumulative impact (3) | |
| **Significance** | **Negativemedium (33)** | **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. | |

## 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 natural state.

| Rehabilitation of the physical environment | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Positive | Positive |
| Extent | Local (2) | Local (2) |
| Probability | Definite (4) | Definite (4) |

| | | |
|---|---|---|
| Duration | Long term (3) | Long term (3) |
| Magnitude | High (3) | High (3) |
| 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 (30)** | **Positive medium (30)** |
| Can impacts be mitigated? | No mitigation measures required. | |

- Loss of employment - Given the relatively large number of people employed during the operational phase, the decommissioning of the facility has the potential to have a negative social impact on the local community.

| Loss of employment | Pre-mitigation impact rating | Post mitigation impact rating |
|---|---|---|
| Status (positive or negative) | Negative | Negative |
| Extent | Local (2) | Local (2) |
| Probability | Possible (2) | Probable (3) |
| Duration | Medium term (2) | Short term (1) |
| Magnitude | High (3) | Medium (2) |
| Reversibility | Partly reversible (2) | Partly reversible (2) |
| Irreplaceable loss of resources | No loss of resource (1) | No loss of resource (1) |
| Cumulative impact | The impact would result in negligible to no cumulative effects (1) | |
| **Significance** | **Negative medium (30)** | **Negative low (20)** |
| Can impacts be mitigated? | The following mitigation measures are recommended:<br>• All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;<br>• **Johan Smit** 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.

## vi. 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:<br><br>(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.<br><br>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. THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED.**

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

- Increased ambient noise levels resulting from geophysic surveys site fly-overs and increased traffic movement during all prospecting phases.
- Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on environmental resources utilized by communities, landowners and other stakeholders.
- Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on ecosystem functioning.
- Increased vehicle activity with in the area resulting in the possible destruction and disturbance of fauna and flora.
- Poor access control to farms which may impact on cattle movement, breeding and grazing practices.
- Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime.
- Potential visual impacts caused by prospecting activities.
- Prospecting will be undertaken by specialist sub - contractors and it is not anticipated that employment opportunities for local and / or regional communities will result from the prospecting activities.

**viii. THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK.**

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

No adverse environmental or social impacts 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.

**ix. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED.**

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. The proposed area; a certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province, is preferred due to the sites underlying diamond bearing gravel, therefore there will be no other alternative (i.e. to facilitate the movement of machinery, equipment, infrastructure).

**x. STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE. (Provide a statement motivating the final site layout that is proposed)**

Design alternatives were considered throughout the planning and design phase (i.e. where is the rock bed located?). In this regard discussions on the design were held between the EAP and the developer. The layout follows the limitations of the site and aspects such as, roads, site offices and workshop area as well as fencing.

## H. FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY.

**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 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 | ✕ | | | According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12): Numerous ephemeral drainage lines were identified on the proposed area. |
| II. A conservation or open space area | | ✕ | | According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12): the study site does not overlap with any formally Protected Area |
| III. An area that is of cultural importance | | ✕ | | According to the Phase 1 Cultural Heritage Impact Assessment conducted by J A van Schalkwyk (D Litt et Phil), from a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below. |
| IV. Site of geological significance | | ✕ | | According to the Palaeontological Desktop Assessment conducted by Elize Butler, the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. |
| V. Areas of outstanding natural beauty | | ✕ | | |
| VI. Highly productive agricultural land | | ✕ | | According to the Baseline Ecological Desktop Assessment (Appendix 7) the study site and its surrounding areas on the east, north and south are largely natural with Low Shrubland dominating. |
| VII. Floodplain | | ✕ | | |
| VIII. Indigenous forest | | ✕ | | |
| IX. Grass land | ✕ | | | According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12): four (4) vegetation types are present on the study site namely the Bushmanland Arid Grassland (NKb 3) vegetation, Gordonia Duneveld (SVkd 1), Lower Gariep Broken Veld (NKb 1) and Kalahari Karroid Shrubland (NKb 5). |

| | | | | |
|---|---|---|---|---|
| X. Bird nesting sites | | | ✕ | According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12): No Important Bird and Biodiversity Areas (IBAs) were identified within the vicinity of the study site (Birdlife 2019); |
| XI. Red data species | | | ✕ | |
| XII. Tourist resort | ✕ | | | FM Safaris is on the proposed site and Namakwari Safaris is close to the proposed site. |
| **2. Will the project potentially result in potential?** | | | | |
| I. Removal of people | | ✕ | | None. |
| II. Visual Impacts | ✕ | | | The visual impact will be managed, but there are tourist facilities on the proposed area. |
| III. Noise pollution | ✕ | | | The noise impact may be significant since there are tourist facilities on the proposed area. |
| IV. Construction of an access road | | ✕ | | None. Access will be obtained from a gravel road off the N10 or N14. |
| 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. | | ✕ | | Approximately 15 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. | ✕ | | | 2 x 16 feet washing pan which utilise approximately 34 000 L per hour each from which 30% is re-used. |
| VIII. Job creation | ✕ | | | Approximately 15 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 prospecting will be cleared. The prospecting will be phased and the topsoil stockpiled separately. Concurrent rehabilitation will take place. Erosion control measures must be implemented. |
| 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 is near the proposed portions. |
| II. A conservation or open space area | | ✕ | | None |
| III. An area that is of cultural importance | | | ✕ | |
| IV. A site of geological significance | | | ✕ | |
| V. An area of outstanding natural beauty | | | ✕ | |

| | | | | |
|---|---|---|---|---|
| VI. Highly productive agricultural land | ✕ | | | On the western side of the site, along the Orange River there are central pivot irrigation systems and farmlands. |
| VII. A tourist resort | ✕ | | | FM Safaris is on the proposed site. Namakwari Safaris and Duin-in-die-Weg Guest Farm are close to the proposed site. |
| 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.

**I. AN ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK**

| 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 GNR 325, Activity 15:"The clearance of an area of 20 hectares or more, of indigenous vegetation."* | Site clearing and preparation<br>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.<br>• Loss of sensitive species.<br>• Loss or fragmentation of habitats. | | - | L | Yes | - |
| | | | Air | • Air pollution due to the increase of traffic of construction vehicles. | | - | M | Yes | - |
| | | | Soil | • Soil degradation, including erosion.<br>• Loss of topsoil.<br>• 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.<br>• 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.<br>• Pollution of water sources due to soil erosion.<br>• Destruction of watercourses (pans/dams/streams). | - | | S | Yes | - |
| | | SOCIAL/ECONOMIC ENVIRONMENT | Local unemployment rate | • Job creation.<br>• Business opportunities.<br>• 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.<br>• Road safety.<br>• 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, rotary pans, dumper trucks and people working on the site. | | - | L | Yes | - |
| | | | Tourism industry | • Tourism facility in close proximity to the site the construction activities will not have a major impact on tourism in the area. | | - | L | Yes | - |
| | | | Heritage- and Palaeontological resources | • Removal or destruction of archaeological and/or paleontological sites.<br>• Removal or destruction of buildings, structures, places and equipment of cultural significance.<br>• Removal or destruction of graves, cemeteries and burial grounds. | - | - | S | Yes | - |
| *Listing Notice GNR 325, Activity 15:"The clearance of an area of 20 hectares or more, of indigenous vegetation."* | Site clearing and preparation<br>Areas earmarked for prospecting will need to be cleared, topsoil will be stockpiled separately.<br>This will inevitably result in the removal of indigenous vegetation located on the site. | BIOPHYSICAL ENVIRONMENT | Fauna & Flora | • Loss or fragmentation of indigenous natural vegetation.<br>• Loss of sensitive species.<br>• Loss or fragmentation of habitats. | | - | L | Yes | - |
| | | | Air quality | • Air pollution due to the increase of traffic. | | - | M | Yes | - |
| | | | Soil | • Soil degradation, including erosion.<br>• Disturbance of soils and existing land use (soil compaction).<br>• Loss of agricultural potential (medium significance relative to agricultural potential of the site). | - | | M | Yes | - |
| | | | Geology | • It is not foreseen that the removal of indigenous vegetation will impact on the geology or vice versa. | N/A | N/A | N/A | N/A | - |
| | | | Existing services infrastructure | • Generation of waste that need to be accommodated at a licensed landfill site.<br>• Generation of sewage that need to be accommodated by the local sewage plant. | - | | M | Yes | - |
| | | | Ground water | • Pollution due to construction vehicles. | - | | S | Yes | - |
| | | | Surface water | • Increase in storm water run-off.<br>• Pollution of water sources due to soil erosion.<br>• Destruction of watercourses (pans/dams/streams). | - | | M | Yes | - |
| | | SOCIAL/ECONOMIC ENVIRONMENT | Local unemployment rate | • Job creation.<br>• Skills development. | | + | S | N/A | - |
| | | | Visual landscape | • Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility. | | - | M | Yes | - |
| | | | Traffic volumes | • Increase in construction vehicles. | - | | S | Yes | - |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Health & Safety | • Air/dust pollution.<br>• Road safety. | | - | S | Yes | - |
| | | | Noise levels | • The generation of noise as a result of construction vehicles, and people working on the site. | | - | M | Yes | - |
| | | | Tourism industry | • Tourism facility in close proximity to the site the construction activities will not have a major impact on tourism in the area. | - | | L | Yes | - |
| | | | Heritage- and Palaeontological resources | • Removal or destruction of archaeological and/or paleontological sites.<br>• Removal or destruction of buildings, structures, places and equipment of cultural significance.<br>• Removal or destruction of graves, cemeteries and burial grounds. | - | | L | N/A | - |
| **OPERATIONAL PHASE** | | | | | | | | | |
| Listing Notice GNR 325, Activity 19: "The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resource4s Development Act (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)"<br><br>Listing Notice GNR 327, Activity 20: "Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—<br>(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]<br>(b) the primary processing of a petroleum resource including | The key components of the proposed project are described below:<br><br>• Supporting Infrastructure - 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.<br><br>• Roads – Access will be obtained from a gravel road off the N10 or N14, to the portions.<br><br>• Fencing - 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.<br>• Establishment and spread of declared weeds and alien invader plants (operations). | | - | L | Yes | - |
| | | | Air quality | • Air pollution due to the mining activity, crusher plant and transport of the gravel to the designated areas. | N/A | N/A | N/A | N/A | - |
| | | | Soil | • Soil degradation, including erosion.<br>• Disturbance of soils and existing land use (soil compaction).<br>• Loss of agricultural potential (medium significance relative to agricultural potential of the site). | - | | L | Yes | - |
| | | | Geology | • Collapsible soil.<br>• Seepage (shallow water table).<br>• Active soil (high soil heave).<br>• Erodible soil.<br>• The presence of undermined ground.<br>• Instability due to soluble rock.<br>• Steep slopes or areas of unstable natural slopes.<br>• Areas subject to seismic activity.<br>• Areas subject to flooding. | | - | S | Yes | - |
| | | | Existing services infrastructure | • Generation of waste that need to be accommodated at a licensed landfill site.<br>• Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant.<br>• Increased consumption of water. Approximately 34 000 L per hour | | - | 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.<br>• Destruction of watercourses (pans/dams/streams). | - | | L | Yes | - |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| winning, extraction, classifying, concentrating or water removal<br><br>**<u>NEM:WA 59 of 2008, Category A: (15),</u> Residue stockpiles or residue deposits:** The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a prospecting right or mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). | | | | • Leakage of hazardous materials. The machinery on site require oils and fuel to function. Leakage of these oils and fuels can contaminate water supplies. | | | | | |
| | | SOCIAL/ECONOMIC ENVIRONMENT | Local unemployment rate | • Job creation.<br>• Skills development. | | + | L | Yes | - |
| | | | Visual landscape | • The proposed portions are used for livestock / game grazing 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.<br>• Road safety. | | - | S | Yes | - |
| | | | Noise levels | • The proposed development will result in noise pollution during the operational phase. | | - | L | Yes | - |
| | | | Tourism industry | • Tourism facility in close proximity to the site the construction activities will not have a major impact on tourism in the area. | | - | L | Yes | - |
| | | | Heritage- and Palaeontological resources | • It is not foreseen that the proposed activity will impact on Heritage- and Palaeontological resources or vice versa. | - | | L | N/A | - |
| **DECOMMISSIONING PHASE** | | | | | | | | | |
| - | <u>Mine closure</u><br>During the mine closure the Mine and its associated infrastructure will be dismantled.<br><br><u>Rehabilitation of biophysical environment</u><br>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<br>• 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.<br>• Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant.<br>• Increase in construction vehicles. | - | | S | Yes | - |
| | | | Ground water | • Pollution due to construction vehicles. | - | | S | Yes | - |
| | | | Surface water | • Increase in storm water run-off.<br>• Pollution of water sources due to soil erosion.<br>• Destruction of watercourses (pans/dams/streams). | - | | 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.<br>• Road safety. | - | | | Yes | - |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | • 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. | | | | | |
| | | | 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 | • Tourism facility in close proximity to the site the decommissioning activities will not have a major impact on tourism in the area. | | - | M | Yes | - |
| | | | Heritage- and Palaeontological resources | • It is not foreseen that the decommissioning phase will impact on any heritage resources. | - | | L | | - |

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

## J. SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

| LIST OF STUDIES UNDERTAKEN | RECOMMENDATIONS OF SPECIALIST REPORTS | SPECIALIST RECOMMENDATIONS 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. |
|---|---|---|---|
| **Phase 1 Cultural Heritage Impact Assessment,** conducted by J A van Schalkwyk | <u>Conclusions and Recommendations</u><br>This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.<br><br>The cultural landscape qualities of the region are made up of a pre-colonial element consisting of Stone Age and a much later colonial (farmer) component, which eventually gave rise to an urban component which manifest in a number of small towns and an intensive farming industry.<br><br><u>Identified sites</u><br>During the physical survey, the following sites, features or objects of cultural significance were identified.<br><br>• 7.1 Change finds Stone Age artefacts:<br><br>Stone Age artefacts, mostly dating to the Middle Stone Age occur in small numbers in parts of the study area. Even on the pebble plains closer to the river, where source material is readily available, the density of artefacts is less than 1/2m$^2$, diminishing to 1/10m$^2$ on the ridges and outcrops to nothing in the sandy regions. The tools are mostly made from banded iron stone (jaspelite), although some quartzite and hardened shale flakes were also noted. Cores, flakes and tools are found. The tools are very rough and informal and only a few that can be described as typical, i.e. blades and scrapers, were identified. | **X** | p101-103, 117-119 |

- 7.3.1: Old farmstead – referred to on the map as Sterkstroom.

Consists of a main house and some outbuildings. All is now in ruins. The main house can be classified as a Karoo style structure, typical of what is found all over the countryside as well is in many towns.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

| IDENTIFIED HERITAGE RESOURCE: Chance find archaeological material – 7.1 | | | | | |
|---|---|---|---|---|---|
| **Site No.** | **Site type** | **NHRA category** | **Field rating** | **Impact rating: Before/After mitigation** | **Proposed mitigation (Refer to definitions in Section 12.3)** |
| 7.1 | Chance find Stone Age tools | Section 35 | Low significance Grade 4-C | 20<br>20 | (5) No further action required. |

| IDENTIFIED HERITAGE RESOURCE: Sterkstroom farmstead – 7.3.1 | | | | | |
|---|---|---|---|---|---|
| **Site No.** | **Site type** | **NHRA category** | **Field rating** | **Impact rating: Before/After mitigation** | **Proposed mitigation (Refer to definitions in Section 12.3)** |
| 7.3.1 | Farmstead | Section 36 | Low significance Grade 4-C | 20<br>20 | (5) No further action required. |

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report. For this proposed project, the assessment has determined that no sites, features or objects of heritage significance occur in the study area. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

| | | | |
|---|---|---|---|
| | • The Palaeontological Sensitivity Map (SAHRIS) indicate that most of the region has a moderate sensitivity of fossil remains to be found and therefore a desktop study is required.<br>• Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. | | |
| **Baseline Hydrogeological Investigation** compiled by Marietjie Kruger from Milnex CC. | <u>Conclusion and Recommendations</u><br>Based on the findings of this investigation, the following conclusions were made:<br>• The study area is located on farm portions Zonderhuis 402, Onder Plaats 401 and Namakwari 656, located south east of Upington in the Northern Cape Province;<br>• Eighteen (18) boreholes (BB-BH1 – BH18) were located on the remaining extent of Boegoebergnedersetting 48 during the hydrocensus conducted on the 4th December 2019. Eight (8) boreholes were located on the farm Namakwari 656, while one borehole was located on Onder Plaats 401 (OP-BH1) and Zonderhuis 402 (ZH-BH1), respectively;<br>• Groundwater levels measured in assessible boreholes ranged between 3.93 and 25.88mbgl.;<br>• Groundwater samples were collected from NK-BH1, OP-BH1 and ZH-BH1 and submitted to an accredited laboratory for inorganic analysis. Nitrate detected in NKBH1 exceeded the SANS standard;<br>• Water are proposed to be abstracted from the Orange River for the use at the mining operations. Based on the laboratory analysis, no major constituents of concern were identified;<br>• In terms of the prescribed classification procedure, the soil sample classify as Type 3 waste, based on the solid concentrations of arsenic and barium;<br>• Based on the groundwater level map as well as on-site observations, no groundwater inflow is expected to occur within the mine excavations.<br><br><u>Recommendations</u><br>The following recommendations are made based on the findings of this investigation:<br>• Based on the nitrate concentration detected in NK-BH1, consumption is not recommended;<br>• Given the low likelihood for the tailings material to impact on the groundwater, it is recommended that motivation is provided for a Type 4 Classification; | **X** | |

| | | | |
|---|---|---|---|
| | • Groundwater Monitoring should be undertaken in accordance with SANS and DWS requirements in line with the recommended schedule. Three (3) boreholes are recommended to be monitored; and<br>• An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. The monitoring network should be updated annually, and this report should be submitted annually. | | |
| **Watercourse Delineation and Ecological Impact Assessment Report** compiled by Liezl Landman a Terrestrial and Aquatic Ecologist from Milnex CC | <u>Results of the Desktop Assessment:</u><br>• According to the National Threatened Ecosystem database (2011), the study site does not overlap with any threatened ecosystems, however it is adjacent to the Lower Gariep Alluvial Vegetation Ecosystem, an Endangered classed ecosystem;<br>• According to the Northern Cape Biodiversity Sector Plan (2016), most of the study site is classified as other Natural Areas, with some sections of classed as Critical Biodiversity Area 2, which are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services;<br>• No Important Bird and Biodiversity Areas (IBAs) were identified within the vicinity of the study site (Birdlife 2019);<br>• The study sites overlap with four (4) different vegetation types, namely Bushmanland Arid Grassland (NKb 3), Lower Gariep Broken Veld (NKb 1), Kalahari Karroid Shrubland (NKb 5) and Gordonia Duneveld (SVkd 1). All are classed as Least Concern (Mucina & Rutherford, 2006/2018);<br>• The unnamed tributary traversing the study site overlaps with Category B, Highest Risk for Mining and therefore has highest biodiversity importance according to the Mining and Biodiversity Guideline (2013);<br>• The study site falls within the Nama Karoo Ecoregion and Quaternary Catchment D73D; and<br>• According to the National Freshwater Ecosystem Priority Areas Database (NFEPA, 2011), the Orange river is classed as a Floodplain Wetland.<br><br><u>Results of the Fauna and Flora Species Desktop Analysis and Field Survey:</u><br>• Witgat (*Boscia albitrunca*) and Camel Thorn Tree (*Vachellia erioloba*), both Protected Tree species of South Africa, was recorded on site.<br>• Several Alien and Invasive Vegetation Species were recorded on site and within the riparian boundaries of the Orange River and drainage lines. | **X** | |

- Three species of avifauna potentially occurring on site, is listed and protected under the Threatened and Protected Species list (ToPS, 2013) which is enforceable under the National Environmental Management: Biodiversity Act, 2004, namely Ludwig`s Bustard (*Neotis ludwigii*), Khori Bustard (*Ardeotis kori*)and Martial Eagle (*Polemaetus bellicosus*).
- Several mammal species possibly occurring on site are protected under NEMBA. Although not listed in the species list, there is a possibility of the Critically Endangered Riverine Rabbit (*Bunolagus monticularis*) occurring on site.
- All Amphibian species are of Least Concern (LC).
- No Red Listed or protected reptile species are known to occur on site.

Results of the Wetland Assessment:

Following the results of the site assessment, one Perennial Riparian area (the Orange River), one non-perennial, unnamed tributary and several ephemeral drainage areas were recorded on the study site. The Orange River is classed as a Perennial River, which has continual surface water flow. The identified ephemeral tributary and ephemeral drainage lines receive and retain enough water to support riparian characteristics throughout the year.

The ecological integrity of the Orange River system and the unnamed tributary are inferred as Moderately Modified, where a loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged. The Ephemeral Drainage Lines are classed as Largely Natural with few modifications. The loss of ecological integrity within the riparian zone may be attributed to irrigations practices along the Orange River and the subsequent influx of alien and invasive species. The results are summarised in the table below:

| Classification | Scientific Buffer | QHI | VEGRAI | REC |
|---|---|---|---|---|
| Perennial Orange River | 100 m | C | D | D |
| Ephemeral Unnamed Tributary | 100 m | C | C/D | C |
| Ephemeral Drainage Lines | 35 m | B | C/D | C |

The proposed prospecting will most likely take place within the watercourses and therefore the buffer zones will possibly not be implemented. Various potential impacts are associated with the proposed prospecting activities and are discussed in the impact assessment scores derived according to the amended EIA Regulations (2017).

| | | | |
|---|---|---|---|
| | <table><tr><td>**Northern Cape Critical Biodiversity Areas (2016)**</td><td>**Critical Biodiversity Area Two (CBA2)**<br>Some sections of the study site fall within a CBA2. CBAs are areas that are irreplaceable for meeting biodiversity targets. There are no other options for conserving the ecosystems, species or ecological processes in these areas.</td></tr><tr><td>**Mining and Biodiversity Guidelines (2013)**</td><td>The unnamed tributary traversing the study site overlaps with Category B, Highest Risk for Mining and therefore has highest biodiversity importance.</td></tr><tr><td>**NEMA Impact Assessment**</td><td>Most of the impacts associated with the proposed prospecting range from Medium-Low to High prior to mitigation taking place. With mitigation fully implemented, the significance of most impacts can be reduced to Very Low, Low, Medium-Low or Medium-High.</td></tr><tr><td>**DWS Risk Assessment**</td><td>All aspects of the proposed prospecting activities fall within the Medium risk category.</td></tr><tr><td>**Mitigation Measures**</td><td>Refer to Section 6.4</td></tr><tr><td>**Does the Specialist support the Application?**</td><td>Yes</td></tr></table><br>It is imperative that an effective management plan is implemented to ensure that all mitigation measures discussed in the report are adhered to. Therefore, the proposed prospecting operations can be considered from an ecological conservation point of view. It is, however, essential that all mitigation measures provided in this report as well as general good practice, are strictly adhered to. During the construction, operational and rehabilitation phases all recommendations made and concerns raised in this document should be taken into consideration. A good closure and rehabilitation plan should be in place to rehabilitate the habitat for faunal and floral species and active alien and invasive vegetation removal should take place in accordance with an Alien Invasive Vegetation Management Plan. | | |
| **Palaeontological Desktop Assessment** compiled by Elize Butler from Banzai Environmental (Pty) Ltd. | <u>FINDINGS AND RECOMMENDATIONS</u><br>The study area is underlain by the Gordonia Formation of the Kalahari Group, Tertiary Calcrete as well as the Zonderhuis and Leerkrans Formations of the Wilgenhoutsdrif Group, Areachap Group of the Namaqua-Natal Province. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Gordonia Formation of the Kalahari Group and Tertiary calcrete are low while the Palaeontological Sensitivity of the Zonderhuis and Leerkrans Formations are insignificant (Almond and Pether 2008, SAHRIS website).<br><br>It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, | **X** | Page 67,68, 76, 87, 104, 138, 140 and 164 |

| | | | |
|---|---|---|---|
| | the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.<br><br>If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be informed immediately. These discoveries ought to be secured (preferably in situ) and the ECO/site manager ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist.<br><br>The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. | | |

## K. ENVIRONMENTAL IMPACT STATEMENT

**A.** 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:
  According to the Watercourse Delineation and Ecological Impact Assessment Report (please see Appendix 12): The proposed prospecting operations can be considered from an ecological conservation point of view. It is, however, essential that all mitigation measures provided in this report as well as general good practice, are strictly adhered to.

  FM Safaris is on the proposed site and Namakwari Safaris is close to the proposed site. The prospecting activities may have negative impacts on the tourist facilities on and near the proposed area.

- Potential impact on heritage resources: According to the Phase 1 Cultural Heritage Impact Assessment conducted by J A van Schalkwyk (D Litt et Phil), from a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

  Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

- Potential impact on palaeontological finds. According to the Palaeontological Desktop Assessment conducted by Elize Butler, the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

  If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be informed immediately. These discoveries ought to be secured (preferably in situ) and the ECO/site manager ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist.

  The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

- Potential in groundwater amounts:

  According to the Baseline Hydrogeological Investigation conducted by Milnex CC:

  - The study area is located on farm portions Zonderhuis 402, Onder Plaats 401 and Namakwari 656, located south east of Upington in the Northern Cape Province;
  - Eighteen (18) boreholes (BB-BH1 – BH18) were located on the remaining extent of Boegoebergnedersetting 48 during the hydrocensus conducted on the 4th December 2019. Eight (8) boreholes were located on the farm Namakwari 656, while one borehole was located on Onder Plaats 401 (OP-BH1) and Zonderhuis 402 (ZH-BH1), respectively;
  - Groundwater levels measured in assessible boreholes ranged between 3.93 and 25.88mbgl.;
  - Groundwater samples were collected from NK-BH1, OP-BH1 and ZH-BH1 and submitted to an accredited laboratory for inorganic analysis. Nitrate detected in NKBH1 exceeded the SANS standard;
  - Water are proposed to be abstracted from the Orange River for the use at the mining operations. Based on the laboratory analysis, no major constituents of concern were identified;
  - In terms of the prescribed classification procedure, the soil sample classify as Type 3 waste, based on the solid concentrations of arsenic and barium;

- Based on the groundwater level map as well as on-site observations, no groundwater inflow is expected to occur within the mine excavations.

- Potential impacts on land use: The farms are currently utilised for livestock / game grazing. The activity which will be subject to concurrent rehabilitation may have significant impact on the land use and might change the sense of place of the area.

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

  FM Safaris is on the proposed site and Namakwari Safaris is close to the proposed site. The prospecting activities may have negative impacts on the tourist facilities on and near the proposed area.

- Positive impacts: The mining of Diamonds (Alluvial, General & in Kimberlite) will have socio-economic benefit in some areas and negative impacts in others.

  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.

**B. Final Site Map**

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

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

**C. Summary of the positive and negative implications and risks of the proposed activity and identified alternatives**

There are regional socio economic benefits due to the Diamonds (Alluvial, General & in Kimberlite) 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. No significantly adverse social or environmental impacts are anticipated.

## L. 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 alluvial diamond prospecting.
- Compliance with legislative requirements.
- Mine is neat and tidy and well managed.

**M. FINAL PROPOSED ALTERNATIVES.**

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

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. The proposed area near Groblershoop on a certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province, is preferred due to the sites underlying Diamonds (Alluvial, General & in Kimberlite) bearing gravel, therefore there will be no other alternative (i.e. to facilitate the movement of machinery, equipment, infrastructure).

**N. ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION.**

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

- The 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.

**O. 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 and that there are no major gaps in knowledge and that specialist studies were conducted. Thus, there are specialist reports to provide sufficient information to conduct the significance rating and provide the environmental authority with sufficient information to make an informed decision.

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

**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 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.

However, approving the prospecting activities may have a negative effect on tourist facilities in the area.

## Q. 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.

**Period for which the Environmental Authorisation is required.**

For a minimum of 5 years.

## R. UNDERTAKING

**Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the 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 (EAP) herewith confirms

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

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

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

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

Signature of the environmental assessment practitioner:

Milnex CC – Environmental Consultants

Name of company:

05-03-2020

Date:

## S. FINANCIAL PROVISION

**State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.**

XXXXX

It is planned that 100 pits will be dug (it may be less depending on the results) at an extent of 3m (length) x 2m (breath) x 4m (depth).

- (100 pits / 24 months) x 12 months = 50 pits dug per year
- Total area to be disturbed per year = 50 pits x (3m x 2m) / 10 000 = 0.03 Ha disturbed per year
- Total area disturbed for 24 months = 100 pits x (3m x 2m) / 10 000 = 0.06 Ha disturbed

It is planned that 35 trenches will be dug (it may be less depending on the results) at an extent of 30m (length) x 30m (breath) x 5m (depth).

- (35 trenches / 24 months) x 12 months = 17.5 trenches dug per year
- Total area to be disturbed per year = 17.5 trenches x (30m x 30m) / 10 000 = 1.58 Ha disturbed per year
- Total area disturbed for 24 months = 35 trenches x (30m x 30m) / 10 000 = 3.15 Ha disturbed

The total area to be disturbed in one year is 0.03 + 1.58 Ha = 1.61ha

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. Please see calculation below:

1.61ha / 2 = 0.805ha.

**A. Explain how the aforesaid amount was derived.**

The closure cost estimate provided above is aligned with the Guideline Document for the Evaluation of Quantum of Closure related Financial Provision Provided by a Mine, by the DMR (January, 2005). 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 **Johan Smit** will be submitted

**Rehabilitation Fund**

**Johan Smit** will also make provision for rehabilitation during closure by establishing a rehabilitation trust.

## T. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY.

### A. Deviations from the methodology used in determining the significance of potential environmental impacts and risks.

None of the methodologies approved for the scoping report were deviated

### B. Motivation for the deviation.

Not applicable

## U. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

## V. COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) READ WITH SECTION 24 (3) (A) AND (7) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998). THE EIA REPORT MUST INCLUDE THE:

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

   The diamonds alluvial prospecting will not impact directly on any socio-economic aspects. Indirect socio-economic benefits are expected to be associated with the creation of employment.

2. **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).

   According to the Phase 1 Cultural Heritage Impact Assessment conducted by J A van Schalkwyk (D Litt et Phil):

   Identified sites
   During the physical survey, the following sites, features or objects of cultural significance were identified.

   - 7.1 Change finds Stone Age artefacts:

   Stone Age artefacts, mostly dating to the Middle Stone Age occur in small numbers in parts of the study area. Even on the pebble plains closer to the river, where source material is readily available, the density of artefacts is less than 1/2m$^2$, diminishing to 1/10m$^2$ on the ridges and outcrops to nothing in the sandy regions. The tools are mostly made from banded iron stone (jaspelite), although some quartzite and hardened shale flakes were also noted. Cores, flakes and tools are found. The tools are very rough and informal and only a few that can be described as typical, i.e. blades and scrapers, were identified.

   - 7.3.1: Old farmstead – referred to on the map as Sterkstroom.

   Consists of a main house and some outbuildings. All is now in ruins. The main house can be classified as a Karoo style structure, typical of what is found all over the countryside as well is in many towns.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

**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)**.

A certain portion of the Remaining Extent of the farm Zonderhuis 402, a certain portion of the Remaining Extent of the farm Onder Plaats 401, a certain portion of the Remaining Extent of Portion 1, a certain portion of Portion 6 (portion of portion 4), a certain portion of Portion 7 (portion of portion 4) and certain portion of Portion 9 (portion of portion 4) of the farm Namakwari 656, Registration Division: Gordonia and Kenhardt, Northern Cape Province, is preferred due to the sites underlying geology and the shallowness of the diamond bearing gravel to the surface 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 mineral resources thus making an alternative site selection null and void.

**PART B**
**ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

## 1) ENVIRONMENTAL MANAGEMENT PROGRAMME

| Name of Practitioner | Qualifications | Contact details |
|---|---|---|
| Lizanne Esterhuizen | Honours Degree in Environmental Science (refer to Appendix 1) | Tel No.: (018) 011 1925<br>Fax No. : (053) 963 2009<br>e-mail address: lizanne@milnex-sa.co.za |
| Percy Sehaole Pr.Sci.Nat | Master's Degree in Environmental Science (refer to Appendix 1) | Tel No.: (018) 011 1925<br>Fax No. : (053) 963 2009<br>e-mail address: percy@milnex-sa.co.za |
| Danie Labuschagne | Master's Degree in Environmental Management and Geography (refer to Appendix 1) | Tel No.: (018) 011 1925<br>Fax No. : (053) 963 2009<br>e-mail address: danie@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 1 and 2**.

**B. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY** (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

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. COMPOSITE MAP**

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

Refer to Locality Map, attached as in **Appendix 4**.

**D. DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS**

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

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 **Johan Smit.** 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.

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.

9. **Groundwater**

- **Recommendations according to the Baseline Hydrogeological Investigation:**
  - Based on the nitrate concentration detected in NK-BH1, consumption is not recommended;
  - Given the low likelihood for the tailings material to impact on the groundwater, it is recommended that motivation is provided for a Type 4 Classification;
  - Groundwater Monitoring should be undertaken in accordance with SANS and DWS requirements in line with the recommended schedule. Three (3) boreholes are recommended to be monitored (Please see specialist study, **Appendix 12,** for boreholes); and
  - An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. The monitoring network should be updated annually, and this report should be submitted annually.

**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 8.**

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

**XXXXX**

It is planned that 100 pits will be dug (it may be less depending on the results) at an extent of 3m (length) x 2m (breath) x 4m (depth).

- (100 pits / 24 months) x 12 months = 50 pits dug per year

- Total area to be disturbed per year = 50 pits x (3m x 2m) / 10 000 = 0.03 Ha disturbed per year
- Total area disturbed for 24 months = 100 pits x (3m x 2m) / 10 000 = 0.06 Ha disturbed

It is planned that 35 trenches will be dug (it may be less depending on the results) at an extent of 30m (length) x 30m (breath) x 5m (depth).

- (35 trenches / 24 months) x 12 months = 17.5 trenches dug per year
- Total area to be disturbed per year = 17.5 trenches x (30m x 30m) / 10 000 = 1.58 Ha disturbed per year
- Total area disturbed for 24 months = 35 trenches x (30m x 30m) / 10 000 = 3.15 Ha disturbed

The total area to be disturbed in one year is 0.03 + 1.58 Ha = 1.61ha

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. Please see calculation below:

1.61ha / 2 = 0.805ha.

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

**Financial Guarantee**

The financial guarantee for the rehabilitation for land disturbed **Johan Smit** will be submitted

**Rehabilitation Fund**

**Johan Smit** will also make provision for rehabilitation during closure by establishing a rehabilitation trust.

## E. IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

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

| **ACTIVITIES**<br><br>**(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc**<br><br>**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**<br><br>(of operation in which activity will take place.<br><br>State;<br>Planning and design,<br>Pre-Construction' Construction,<br>Operational,<br>Rehabilitation,<br>Closure, Post closure). | **SIZE AND SCALE of disturbance**<br>(volumes, tonnages and hectares or m²) | **MITIGATION MEASURES**<br><br>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants) | **COMPLIANCE WITH STANDARDS**<br><br>(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**<br><br>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.<br>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..<br>Upon cessation of the individual activity<br>Or.<br>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) | 8854.1269 Ha – 3m x 2m x 4m (100 pits), 30m x 30m x 5m (35 trenches) | 1. Site clearing must take place in a phased manner, as and when required.<br>2. Areas which are not to be prospected on within two months must not be cleared to reduce erosion risks.<br>3. The area to be cleared must be clearly demarcated and this footprint strictly maintained.<br>4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site.<br>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- | +- 500m | 1. Planning of access routes to the site for construction/prospecting purposes shall be done in conjunction with the Contractor and | Compliance with Duty of Care as detailed within NEMA | Duration of operations on the prospecting activities. |

| | | | | | |
|---|---|---|---|---|---|
| | (construction and operation phase) | | 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.<br>2. Construction routes and required access roads must be clearly defined.<br>3. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance.<br>4. Soils compacted by construction / prospecting activities shall be deep ripped to loosen compacted layers and re-graded to even running levels.<br>5. The contractor must ensure that damage caused by related traffic to the gravel access road off the N10 or N14 is repaired continuously. The costs associated with the repair must be borne by the contractor;<br>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;<br>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. | | |
| Prospecting of Diamonds (Alluvial, General & in Kimberlite) – Soils and geology | Pitting and trenching phase- (construction and operation phase) | 8854.1269 Ha – 3m x 2m x 4m (100 pits), 30m x 30m x 5m (35 trenches) | 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 | Compliance with Duty of Care as detailed within NEMA | Duration of operations on the mine |

| | | | | | |
|---|---|---|---|---|---|
| | | | 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.<br>2. Care must be taken not to mix topsoil and subsoil during stripping.<br>3. The topsoil must be conserved on site in and around the pit/trench area.<br>4. Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order.<br>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.<br>6. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.<br>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.<br>8. The impact on the geology will be permanent. There is no mitigation measure. | | |

| | | | | | |
|---|---|---|---|---|---|
| Prospecting (Alluvial, General & in Kimberlite) – excavations | Pitting and trenching phase- (construction and operation phase) | 8854.1269 Ha – 3m x 2m x 4m (100 pits), 30m x 30m x 5m (35 trenches) | 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.<br>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.<br>3. Truck traffic should be routed away from noise sensitive areas, where possible.<br>4. Noise levels must be kept within acceptable limits.<br>5. Noisy operations should be combined so that they occur where possible at the same time.<br>6. Mine workers to wear necessary ear protection gear.<br>7. Noisy activities to take place during allocated hours.<br>8. Noise from labourers must be controlled.<br>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.<br>10. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where | Compliance with Duty of Care as detailed within NEMA | Duration of operations on the prospecting area |

| | | | | | |
|---|---|---|---|---|---|
| | | | possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport.<br>11. Implementation of enclosure and cladding of processing plants.<br>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. | | |
| **Watercourse Delineation and Ecological Impact Assessment Report: Impact and Mitigation measures** | | | | | |
| Alteration of the flow regime of the watercourse | Construction, Operational & Decommissioning: | 8854.1269 Ha – 3m x 2m x 4m (100 pits), | • Any activities that take place within 32 meters of a wetland or watercourse or the 1:100 year flood lines will require authorisation in terms of the relevant regulations of NEMA, however as far as possible infrastructure should be placed outside of buffer lines.<br>• Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas.<br>• Where construction occurs in the demarcated watercourse and buffer areas, additional precautions should be implemented to minimise watercourse loss.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• A sensitivity map has been developed for the study area, indicating the drainage lines and riparian systems, and their relevant buffer zones. It is recommended that this sensitivity map be considered during all phases of the development and with special mentioning of the planning of infrastructure, in order to aid in the conservation of and minimise impact on the riparian and aquatic habitat and resources within the study site.<br>• Any areas where bank failure is observed, due to the prospecting impacts, should be immediately repaired.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• Operational phase activities should not take place within watercourses or buffer zones.<br>• The duration of impacts on the drainage line should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised. | | |

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| | | | • Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• All rehabilitation activities should occur in the dry season.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction. | | |
| Changing the physical structure within a water resource (habitat) | Construction, Operational & Decommissioning: | 30m x 30m x 5m (35 trenches) | • Other than approved and authorized structures, no other development or maintenance infrastructure is allowed within the delineated watercourse and riparian areas or their associated buffer zones.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• All maintenance within watercourses must be restricted to the dry season.<br>• Maintenance activities should not impact on rehabilitated or naturally vegetated areas.<br>• Rehabilitation should limit fragmentation and isolation of sections of the non-perennial drainage line systems. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels.<br>• All rehabilitation activities should occur in the dry season. | | |
| Alteration of the amount of sediment entering the water resource and associated change in turbidity | Construction, Operational & Decommissioning: | 8854.1269 Ha – 3m x 2m x 4m (100 pits), | • Buffer zones should be maintained, in order to minimise sedimentation of the downstream areas.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • Erosion control measures, such as berms, must be implemented to manage runoff from roads to prevent erosion and pollution.<br>• Silt screens should be used where necessary.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels.<br>• All rehabilitation activities should occur in the dry season.<br>• The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised;<br>• Maintain flood capacity, particularly in areas with significant flood hazards. | | |
| Alteration of water quality | Construction, Operational & Decommissioning: | 30m x 30m x 5m (35 trenches) | • All vehicles must be regularly inspected for leaks.<br>• Re-fuelling must take place on a sealed surface area to prevent hydrocarbon pollution.<br>• All spills should be cleaned up immediately and disposed of.<br>• Spill kits should be readily available and easily accessible throughout the site.<br>• All chemicals must be stored safely on site, outside the buffer areas and surrounded by bunds. Chemical storage containers must be regularly inspected for early leak detection. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • Littering must be prevented by effective site management and the provision of bins.<br>• Provision of adequate sanitation facilities located outside of the delineated buffer zones.<br>• An emergency spill procedure should be developed and implemented.<br>• No stockpiling should take place within a watercourse.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Stockpiles must be located away from river channels and drainage lines.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed riverbanks. | | |
| Loss of terrestrial habitat | Construction, Operational & Decommissioning: | 8854.1269 Ha – 3m x 2m x 4m (100 pits), | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation.<br>• It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area) and preventing movement of workers into natural areas.<br>• The duration of the prospecting should be minimized to as short term as possible, in order to reduce the period of disturbance on fauna and flora.<br>• Areas of indigenous vegetation should under no circumstances be fragmented or | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | disturbed for used as an area for dumping of waste.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• All staff and visitors to the site must undergo an induction process and must be made aware of the sensitive nature of the environment and floral species which occur there.<br>• The area must be re-vegetated with plant and grass species which are endemic to the exact vegetation types.<br>• Rehabilitation measures that are implemented must be continually monitored for a minimum period of four years to ensure that proper succession has occurred and that there is no erosion occurring.<br>• An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | | |
| Loss of Aquatic Biota | Construction, Operational & Decommissioning: | 30m x 30m x 5m (35 trenches) | • Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• Refer to Mitigation Measures regarding water quality and sedimentation as listed above. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |
| Loss of Terrestrial Fauna | Construction, Operational & Decommissioning: | 8854.1269 Ha – 3m x 2m x 4m (100 pits), | • 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. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.<br>• 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.<br>• Fencing should be erected around the project area to prevent workers and members of the public from entering the surrounding environments. This fence should have small openings to allow wildlife to pass through.<br>• Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.<br>• 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 sensitive fauna that are inadvertently killed during earthmoving operations should be preserved as museum voucher specimens.<br>• No hunting, trapping or killing of fauna are allowed.<br>• Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance.<br>• General avoidance of snakes is the best policy if encountered. Snakes should not be | | |

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| | | | intentionally harmed or killed and allowed free movement away from the area.<br>• 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.<br>• Noise must be kept to an absolute minimum at night to minimise all possible disturbances to amphibian species and nocturnal mammals. | | |
| Loss of Terrestrial Flora | Construction, Operational & Decommissioning: | 30m x 30m x 5m (35 trenches) | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation as soon as possible. This will also reduce the likelihood of encroachment by alien invasive plant species.<br>• Protected trees and plants shall not be removed or damaged without prior approval, permits or licenses from the relevant authority, this is especially applicable to the Protected Witgat (Boscia albitrunca) and Camel Thorn Tree (Vachellia erioloba), which were present on site. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |
| Introduction and spread of alien vegetation | Construction, Operational & Decommissioning: | 8854.1269 Ha – 3m x 2m x 4m (100 pits), | • Proliferation of alien and invasive species is expected within any disturbed areas particularly as there are some alien and invasive species present within the study site. These species should be eradicated and controlled to prevent further spread beyond.<br>• An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | Compliance with Duty of Care as detailed within NEMA | Construction, Operational & Decommissioning: |

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| | | | • Footprint areas should be kept as small as possible when removing alien plant species.<br>• No vehicles should be allowed to drive through designated sensitive drainage lines and riparian areas during the eradication of alien and weed species.<br>• All alien vegetation in the riparian zone should be removed upon completion of prospecting activities and reseeded with indigenous grasses as specified by a suitably qualified specialist (ecologist). | | |

## IMPACT MANAGEMENT OUTCOMES

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

| **ACTIVITY**<br>(whether listed or not listed).<br><br>**(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**<br><br>**(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)** | **ASPECTS AFFECTED** | **PHASE**<br>In which impact is anticipated<br><br>**(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)** | **MITIGATION TYPE**<br><br>**(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)**<br><br>**E.g.**<br>• **Modify through alternative method.**<br>• **Control through noise control**<br>• **Control through management and monitoring**<br>• **Remedy through rehabilitation..** | **STANDARD TO BE ACHIEVED**<br><br>**(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.** |
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| Clearance of vegetation | Loss or fragmentation of habitats | Fauna & flora | Pitting and trenching phase-(construction and operation phase) | **Existing vegetation**<br>1. Vegetation removal must be limited to the prospecting area.<br>2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step.<br>3. No vegetation to be used for firewood.<br>4. Exotic and invasive plant species should not be allowed to establish, if the development is approved.<br><br>**Rehabilitation**<br>5. All damaged areas shall be rehabilitated upon completion of the contract. | Minimisation of impacts to acceptable limits |

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

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| | | | | construction/prospecting. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.<br><br>**Utilisation of resources**<br>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.<br><br>**Exotic vegetation**<br>19. Alien vegetation on the site will need to be controlled.<br>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.<br>21. The spread of exotic species occurring throughout the site should be controlled.<br><br>**Herbicides**<br>22. 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.<br>23. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation.<br>**Fauna** | |

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| | | | | 24. Rehabilitation to be undertaken as soon as possible after the prospecting activities have been completed.<br>25. No trapping or snaring to fauna on the construction/prospecting site should be allowed.<br>26. No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development. | |
| Prospecting (Alluvial, General & in Kimberlite) – 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.<br>2. Care must be taken not to mix topsoil and subsoil during stripping.<br>3. The topsoil must be conserved on site in and around the pit/trench area.<br>4. Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order.<br>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.<br>6. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.<br>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 | Minimisation of impacts to acceptable limits |

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| | | | | 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.<br><br>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.<br>• Record the GPS coordinates of each area.<br>• Record the date of topsoil stripping.<br>• Record the GPS coordinates of where the topsoil is stockpiled.<br>• Record the date of cessation prospecting activities at the particular site.<br>• Photograph the area on cessation of prospecting activities.<br>• Record date and depth of re-spreading of topsoil.<br>• 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<br>Air<br>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.<br>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.<br>3. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. | Minimisation of impacts to acceptable limits |

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| | | | | 4. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion.<br>5. Other erosion control measures that can be implemented are as follows:<br>o Brush packing with cleared vegetation<br>o Mulch or chip packing<br>o Planting of vegetation<br>o Hydroseeding/hand sowing<br>6. Sensitive areas need to be identified prior to construction/prospecting so that the necessary precautions can be implemented.<br>7. All erosion control mechanisms need to be regularly maintained.<br>8. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.<br>9. Retention of vegetation where possible to avoid soil erosion.<br>10. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.<br>11. Re-vegetation of disturbed surfaces should occur immediately after construction/prospecting activities are completed. This should be done through seeding with indigenous grasses.<br>12. No impediment to the natural water flow other than approved erosion control works is permitted.<br>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.<br>14. Stockpiles not used in three (3) months after stripping must be seeded or backfilled to prevent dust and erosion. | |

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| | Air Pollution | Air | Pitting and trenching phase-(construction and operation phase) | **Dust control**<br>1. Wheel washing and damping down of un-surfaced and un-vegetated areas.<br>2. Retention of vegetation where possible will reduce dust travel.<br>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.<br>4. Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust.<br>5. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities.<br>6. A speed limit of 30km/h must not be exceeded on site.<br>7. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor.<br>8. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled.<br><br>**Odour control**<br>9. Regular servicing of vehicles in order to limit gaseous emissions.<br>10. Regular servicing of onsite toilets to avoid potential odours.<br><br>**Rehabilitation**<br>11. The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.<br><br>**Fire prevention** | Minimisation of impacts to acceptable limits |

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| | | | | 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.<br>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.<br>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.<br>3. Truck traffic should be routed away from noise sensitive areas, where possible.<br>4. Noise levels must be kept within acceptable limits.<br>5. Noisy operations should be combined so that they occur where possible at the same time.<br>6. Mine workers to wear necessary ear protection gear.<br>7. Noisy activities to take place during allocated hours.<br>8. Noise from labourers must be controlled.<br>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 | Minimisation of impacts to acceptable limits |

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| | | | | remove the offending vehicle or machinery from the site.<br>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.<br>11. Implementation of enclosure and cladding of processing plants.<br>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-, heritage- and palaeontology artefacts | Heritage Palaeontology | 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.<br>2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area.<br>3. The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken.<br>4. Any discovered artefacts 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 the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.<br><br>The following shall apply according to the HIA specialist: | Minimisation of impacts to acceptable limits |

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| | | | | 5. Known sites should be clearly marked in order that they can be avoided during construction activities.<br>6. The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.<br>7. 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;<br>8. 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;<br>9. Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and<br>10. 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).<br><br>According to the HIA specialist the following must be in place:<br>11. 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.<br>12. 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. | |

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| | | | | 13. 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.<br><br>According to the Palaeontological Desktop Assessment the following must be in place:<br><br>14. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be informed immediately. These discoveries ought to be secured (preferably in situ) and the ECO/site manager ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist.<br>15. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. | |
| Waste management | | Pollution | Pitting and trenching phase-(construction and operation phase) | **Litter management**<br>1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.<br>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.<br>3. Good housekeeping practices should be implemented to regularly maintain the litter and rubble situation on the construction site. | Minimisation of impacts to acceptable limits |

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| | | | | 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.<br>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.<br>6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly.<br>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.<br>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.<br>9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant.<br>10. Under no circumstances may solid waste be burnt on site.<br>11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours.<br><br>**Hazardous waste**<br>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.<br>13. Contaminants to be stored safely to avoid spillage.<br>14. Machinery must be properly maintained to keep oil leaks in check. | |

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| | | | | 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.<br><br>**Sanitation**<br>16. The Contractor shall install mobile chemical toilets on the site.<br>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.<br>18. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly.<br>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.<br>20. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility.<br>21. The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant.<br>22. Potable water must be provided for all construction staff.<br><br>**Remedial actions**<br>23. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site.<br>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. | |

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| | | | | 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.<br>26. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material.<br>27. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure.<br>28. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use.<br>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**<br>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.<br>2. Water must be reused, recycled or treated where possible.<br><br>**Water Quality**<br>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.<br>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.<br>5. Efficient oil and grease traps or sumps should be installed and maintained at refueling facilities, | |

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| | | | | workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans.<br><br>**Stormwater**<br>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.<br>7. Silt fences should be used to prevent any soil entering the stormwater drains.<br>8. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.<br>9. Promote a water saving mind set with construction/prospecting workers in order to Contractor ensure less water wastage.<br>10. Hazardous substances must be stored at least 40m from any water bodies on site to avoid pollution.<br>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.<br>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.<br>13. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.<br>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 | |

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| | | | | storm water system or nearby streams, rivers or erosion channels or dongas.<br>15. 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.<br>16. 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.<br>17. If these practices is found to be insufficient for the control of storm water and sedimentation, other alternatives should immediately be investigated and implemented.<br><br>**Groundwater resource protection**<br>18. 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.<br><br>Recommendations according to the Baseline Hydrogeological Investigation:<br><br>19. Based on the nitrate concentration detected in NK-BH1, consumption is not recommended;<br>20. Given the low likelihood for the tailings material to impact on the groundwater, it is recommended that motivation is provided for a Type 4 Classification;<br>21. Groundwater Monitoring should be undertaken in accordance with SANS and DWS requirements in line with the recommended schedule. Three (3) boreholes are recommended to be monitored | |

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| | | | | (Please see specialist study, Appendix 12, for boreholes); and<br>22. An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. The monitoring network should be updated annually, and this report should be submitted annually.<br><br>**Sanitation**<br>23. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers).<br>24. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.<br><br>**Concrete mixing**<br>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.<br><br>**Public areas**<br>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.<br>27. 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.<br>**28.** No washing or servicing of vehicles on site. | |
| **Watercourse Delineation and Ecological Impact Assessment Report: Impact and Mitigation measures** | | | | | |
| Excavations, Pitting, Trenching, Rehabilitation | Alteration of the flow regime of the watercourse | watercourse | Construction, Operational & Decommissioning | • Any activities that take place within 32 meters of a wetland or watercourse or the 1:100 year flood lines will require authorisation in terms of the relevant regulations of | Minimisation of impacts to acceptable limits |

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| | | | | NEMA, however as far as possible infrastructure should be placed outside of buffer lines.<br>• Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas.<br>• Where construction occurs in the demarcated watercourse and buffer areas, additional precautions should be implemented to minimise watercourse loss.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks.<br>• Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• A sensitivity map has been developed for the study area, indicating the drainage lines and riparian systems, and their relevant buffer zones. It is recommended that this sensitivity map be considered during all phases of the development and with special mentioning of the planning of infrastructure, in order to aid in the conservation of and minimise impact on the riparian and aquatic habitat and resources within the study site.<br>• Any areas where bank failure is observed, due to the prospecting impacts, should be immediately repaired.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new | |

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| | | | | access routes resulting in an increased impact on the local environment.<br>• Operational phase activities should not take place within watercourses or buffer zones.<br>• The duration of impacts on the drainage line should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• All rehabilitation activities should occur in the dry season.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction. | |
| Excavations, Pitting, Trenching, Rehabilitation | Changing the physical structure within a water resource (habitat) | structure within a water resource (habitat) | Construction, Operational & Decommissioning | • Other than approved and authorized structures, no other development or maintenance infrastructure is allowed within the delineated watercourse and riparian areas or their associated buffer zones.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• All maintenance within watercourses must be restricted to the dry season.<br>• Maintenance activities should not impact on rehabilitated or naturally vegetated areas. | Minimisation of impacts to acceptable limits |

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| | | | | • Rehabilitation should limit fragmentation and isolation of sections of the non-perennial drainage line systems.<br>• The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels.<br>• All rehabilitation activities should occur in the dry season. | |
| Excavations, Pitting, Trenching, Rehabilitation | Alteration of the amount of sediment entering the water resource and associated change in turbidity | water resource and turbidity | Construction, Operational & Decommissioning | • Buffer zones should be maintained, in order to minimise sedimentation of the downstream areas.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• Erosion control measures, such as berms, must be implemented to manage runoff from roads to prevent erosion and pollution. | Minimisation of impacts to acceptable limits |

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| | | | | • Silt screens should be used where necessary.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels.<br>• All rehabilitation activities should occur in the dry season.<br>• The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised;<br>• Maintain flood capacity, particularly in areas with significant flood hazards. | |
| Excavations, Pitting, Trenching, Rehabilitation | Alteration of water quality | water quality | Construction, Operational & Decommissioning | • All vehicles must be regularly inspected for leaks.<br>• Re-fuelling must take place on a sealed surface area to prevent hydrocarbon pollution.<br>• All spills should be cleaned up immediately and disposed of.<br>• Spill kits should be readily available and easily accessible throughout the site.<br>• All chemicals must be stored safely on site, outside the buffer areas and surrounded by bunds. Chemical storage containers must be regularly inspected for early leak detection.<br>• Littering must be prevented by effective site management and the provision of bins.<br>• Provision of adequate sanitation facilities located outside of the delineated buffer zones.<br>• An emergency spill procedure should be developed and implemented.<br>• No stockpiling should take place within a watercourse. | Minimisation of impacts to acceptable limits |

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| | | | | • All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Stockpiles must be located away from river channels and drainage lines.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed riverbanks. | |
| Excavations, Pitting, Trenching, Rehabilitation | Loss of terrestrial habitat | terrestrial habitat | Construction, Operational & Decommissioning | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation.<br>• It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area) and preventing movement of workers into natural areas.<br>• The duration of the prospecting should be minimized to as short term as possible, in order to reduce the period of disturbance on fauna and flora.<br>• Areas of indigenous vegetation should under no circumstances be fragmented or disturbed for used as an area for dumping of waste.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• All staff and visitors to the site must undergo an induction process and must be made aware of the sensitive nature of the environment and floral species which occur there.<br>• The area must be re-vegetated with plant and grass species which are endemic to the exact vegetation types.<br>• Rehabilitation measures that are implemented must be continually monitored for a minimum period of four | Minimisation of impacts to acceptable limits |

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| | | | | years to ensure that proper succession has occurred and that there is no erosion occurring.<br>• An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | |
| Excavations, Pitting, Trenching, Rehabilitation | Loss of Aquatic Biota | Aquatic Biota | Construction, Operational & Decommissioning | • Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• Refer to Mitigation Measures regarding water quality and sedimentation as listed above. | Minimisation of impacts to acceptable limits |
| Excavations, Pitting, Trenching, Rehabilitation | Loss of Terrestrial Fauna | Terrestrial Fauna | Construction, Operational & Decommissioning | • 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.<br>• Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.<br>• 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.<br>• Fencing should be erected around the project area to prevent workers and members of the public from entering the surrounding environments. This fence should have small openings to allow wildlife to pass through.<br>• Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.<br>• 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 sensitive fauna that are | Minimisation of impacts to acceptable limits |

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| | | | | inadvertently killed during earthmoving operations should be preserved as museum voucher specimens.<br>• No hunting, trapping or killing of fauna are allowed.<br>• Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance.<br>• 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.<br>• 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.<br>• Noise must be kept to an absolute minimum at night to minimise all possible disturbances to amphibian species and nocturnal mammals. | |
| Excavations, Pitting, Trenching, Rehabilitation | Loss of Terrestrial Flora | Terrestrial Flora | Construction, Operational & Decommissioning | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation as soon as possible. This will also reduce the likelihood of encroachment by alien invasive plant species.<br>• Protected trees and plants shall not be removed or damaged without prior approval, permits or licenses from the relevant authority, this is especially applicable to the Protected Witgat (Boscia albitrunca) and Camel Thorn Tree (Vachellia erioloba), which were present on site. | Minimisation of impacts to acceptable limits |
| Excavations, Pitting, Trenching, Rehabilitation | Introduction and spread of alien vegetation | Indigenous flora | Construction, Operational & Decommissioning | • Proliferation of alien and invasive species is expected within any disturbed areas particularly as there are some alien and invasive species present within the study site. These species should be eradicated and controlled to prevent further spread beyond.<br>• An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | Minimisation of impacts to acceptable limits |

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| | | | | • Footprint areas should be kept as small as possible when removing alien plant species.<br>• No vehicles should be allowed to drive through designated sensitive drainage lines and riparian areas during the eradication of alien and weed species.<br>• All alien vegetation in the riparian zone should be removed upon completion of prospecting activities and reseeded with indigenous grasses as specified by a suitably qualified specialist (ecologist). | |

**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**<br>Whether listed or not listed.<br><br>**(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**<br><br>**(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc….etc…)** | **MITIGATION TYPE**<br><br>**(modify, remedy, control, or stop) through**<br>**(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)**<br><br>**E.g.**<br>• **Modify through alternative method.**<br>• **Control through noise control**<br>• **Control through management and monitoring** | **TIME PERIOD FOR IMPLEMENTATION**<br><br>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.<br>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..<br>Upon cessation of the individual activity<br>or. | **COMPLIANCE WITH STANDARDS**<br><br>(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) |
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| | | **Remedy through rehabilitation..** | Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be. | |
| Clearance of vegetation | Loss or fragmentation of habitats | **Existing vegetation**<br>1. Vegetation removal must be limited to the prospecting site.<br>2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step.<br>3. No vegetation to be used for firewood.<br>4. Exotic and invasive plant species should not be allowed to establish, if the development is approved.<br><br>**Rehabilitation**<br>5. All damaged areas shall be rehabilitated upon completion of the contract.<br>6. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.<br>7. All natural areas impacted during construction/prospecting must be rehabilitated with locally indigenous grasses typical of the representative botanical unit.<br>8. Rehabilitation must take place in a phased approach as soon as possible.<br>9. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding.<br>10. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.<br>11. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. | 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. |

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| | | **Demarcation of prospecting area**<br>12. All plants not interfering with prospecting operations shall be left undisturbed clearly marked and indicated on the site plan.<br>13. The prospecting area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint.<br>14. Vegetation removal must be phased in order to reduce impact of construction/prospecting.<br>15. Site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.<br>16. Strict and regular auditing of the prospecting process to ensure containment of the prospecting and laydown areas.<br>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.<br><br>**Utilisation of resources**<br>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.<br><br>**Exotic vegetation**<br>19. Alien vegetation on the site will need to be controlled.<br>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. | | |

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| | | 21. The spread of exotic species occurring throughout the site should be controlled.<br><br>**Herbicides**<br>22. 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.<br>23. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation.<br><br>**Fauna**<br>24. Rehabilitation to be undertaken as soon as possible after prospecting has been completed.<br>25. No trapping or snaring to fauna on the construction/prospecting site should be allowed.<br>26. No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development. | | |
| Prospecting of Diamonds (Alluvial, General & in Kimberlite) – 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.<br>2. Care must be taken not to mix topsoil and subsoil during stripping. | 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. |

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| | | 3. The topsoil must be conserved on site in and around the pit/trench area.<br>4. Subsoil and overburden in the prospecting area should be stockpiled separately to be returned for backfilling in the correct soil horizon order.<br>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.<br>6. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.<br>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.<br><br>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.<br>• Record the GPS coordinates of each area.<br>• Record the date of topsoil stripping.<br>• Record the GPS coordinates of where the topsoil is stockpiled.<br>• Record the date of cessation prospecting activities at the particular site.<br>• Photograph the area on cessation of prospecting activities.<br>• Record date and depth of re-spreading of topsoil. | | |

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| | | • 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.<br>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.<br>3. Wind screening and stormwater control should be undertaken to prevent soil loss from the site.<br>4. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion.<br>5. Other erosion control measures that can be implemented are as follows:<br>o Brush packing with cleared vegetation<br>o Mulch or chip packing<br>o Planting of vegetation<br>o Hydroseeding/hand sowing<br>6. Sensitive areas need to be identified prior to construction/prospecting so that the necessary precautions can be implemented.<br>7. All erosion control mechanisms need to be regularly maintained.<br>8. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.<br>9. Retention of vegetation where possible to avoid soil erosion. | 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. |

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| | | 10. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.<br>11. Re-vegetation of disturbed surfaces should occur immediately after construction/prospecting activities are completed. This should be done through seeding with indigenous grasses.<br>12. No impediment to the natural water flow other than approved erosion control works is permitted.<br>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.<br>14. Stockpiles not used in three (3) months after stripping must be seeded/backfilled to prevent dust and erosion. | | |
| | Air Pollution | **Dust control**<br>14. Wheel washing and damping down of un-surfaced and un-vegetated areas.<br>15. Retention of vegetation where possible will reduce dust travel.<br>16. Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas.<br>17. Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust.<br>18. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. | 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. |

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| | | 19. A speed limit of 30km/h must not be exceeded on site.<br>20. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor.<br>21. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled.<br><br>**Odour control**<br>22. Regular servicing of vehicles in order to limit gaseous emissions.<br>23. Regular servicing of onsite toilets to avoid potential odours.<br><br>**Rehabilitation**<br>24. The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.<br><br>**Fire prevention**<br>25. 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.<br>26. 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. | Duration of operation | The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with |

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| | | 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.<br>3. Truck traffic should be routed away from noise sensitive areas, where possible.<br>4. Noise levels must be kept within acceptable limits.<br>5. Noisy operations should be combined so that they occur where possible at the same time.<br>6. Mine workers to wear necessary ear protection gear.<br>7. Noisy activities to take place during allocated hours.<br>8. Noise from labourers must be controlled.<br>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.<br>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.<br>11. Implementation of enclosure and cladding of processing plants.<br>12. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a | | NEMA and Duty of Care as prescribed by NEMA. |

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| | | sign of the imminent mechanical failure of a machine. | | |
| | Impact on potential cultural-, heritage- and palaeontology 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.<br>2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area.<br>3. The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken.<br>4. Any discovered artefacts 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 the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.<br><br>The following shall apply according to the HIA specialist:<br><br>5. Known sites should be clearly marked in order that they can be avoided during construction activities.<br>6. The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.<br>7. 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;<br>8. 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 | 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. |

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| | | from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;<br>9. Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and<br>10. 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).<br><br>According to the HIA specialist the following must be in place:<br>11. 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.<br>12. 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.<br>13. 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.<br><br>According to the Palaeontological Desktop Assessment the following must be in place:<br><br>14. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be informed immediately. These | | |

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| | | discoveries ought to be secured (preferably in situ) and the ECO/site manager ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist.<br>15. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. | | |
| Waste Management | | **Litter management**<br>1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction/prospecting site.<br>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.<br>3. Good housekeeping practices should be implemented to regularly maintain the litter and rubble situation on the construction/prospecting site.<br>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.<br>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.<br>6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. | 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. |

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| | | 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.<br>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.<br>9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant.<br>10. Under no circumstances may solid waste be burnt on site.<br>11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours.<br><br>**Hazardous waste**<br>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.<br>13. Contaminants to be stored safely to avoid spillage.<br>14. Machinery must be properly maintained to keep oil leaks in check.<br>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.<br><br>**Sanitation**<br>16. The Contractor shall install mobile chemical toilets on the site.<br>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. | | |

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| | | 18. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly.<br>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.<br>20. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility.<br>21. The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant.<br>22. Potable water must be provided for all construction staff.<br><br>**Remedial actions**<br>23. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site.<br>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.<br>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.<br>26. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material.<br>27. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure.<br>28. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. | | |

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| | | 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**<br>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.<br>2. Water must be reused, recycled or treated where possible.<br><br>**Water Quality**<br>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.<br>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.<br>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.<br><br>**Stormwater**<br>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.<br>7. Silt fences should be used to prevent any soil entering the stormwater drains. | | |

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| | | 8. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.<br>9. Promote a water saving mind set with construction/prospecting workers in order to Contractor ensure less water wastage.<br>10. Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution.<br>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.<br>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.<br>13. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.<br>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.<br>15. 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.<br>16. 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. | | |

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| | | 17. If these practices is found to be insufficient for the control of storm water and sedimentation, other alternatives should immediately be investigated and implemented.<br><br>**Groundwater resource protection**<br>18. 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.<br><br>Recommendations according to the Baseline Hydrogeological Investigation:<br><br>19. Based on the nitrate concentration detected in NK-BH1, consumption is not recommended;<br>20. Given the low likelihood for the tailings material to impact on the groundwater, it is recommended that motivation is provided for a Type 4 Classification;<br>21. Groundwater Monitoring should be undertaken in accordance with SANS and DWS requirements in line with the recommended schedule. Three (3) boreholes are recommended to be monitored (Please see specialist study, Appendix 12, for boreholes); and<br>22. An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. The monitoring network should be updated annually, and this report should be submitted annually.<br><br>**Sanitation** | | |

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| | | 23. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers).<br>24. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.<br><br>**Concrete mixing**<br>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.<br><br>**Public areas**<br>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.<br>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.<br>28. No washing or servicing of vehicles on site. | | |
| **Watercourse Delineation and Ecological Impact Assessment Report: Impact and Mitigation measures** | | | | |
| **<u>Construction:</u>**<br>• Infrastructure development within watercourses<br>• Removal and disturbance of watercourse habitat and vegetation<br>• Habitat fragmentation<br>• Impoundments within the watercourse<br>• Lack of adequate rehabilitation resulting in colonization by invasive plants | Alteration of the flow regime of the watercourse | • Any activities that take place within 32 meters of a wetland or watercourse or the 1:100 year flood lines will require authorisation in terms of the relevant regulations of NEMA, however as far as possible infrastructure should be placed outside of buffer lines.<br>• Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas.<br>• Where construction occurs in the demarcated watercourse and buffer areas, additional precautions should be implemented to minimise watercourse loss.<br>• No stockpiling should take place within a watercourse or the calculated buffers. | 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. |

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| **Operational:**<br>• Excavation from the watercourses<br>• Clearing of vegetation<br>• Vehicles driving in and through watercourses<br><br>**Decommissioning:**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | | • All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks.<br>• Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• A sensitivity map has been developed for the study area, indicating the drainage lines and riparian systems, and their relevant buffer zones. It is recommended that this sensitivity map be considered during all phases of the development and with special mentioning of the planning of infrastructure, in order to aid in the conservation of and minimise impact on the riparian and aquatic habitat and resources within the study site.<br>• Any areas where bank failure is observed, due to the prospecting impacts, should be immediately repaired.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• Operational phase activities should not take place within watercourses or buffer zones.<br>• The duration of impacts on the drainage line should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | | |

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| | | • All rehabilitation activities should occur in the dry season.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction. | | |
| **Construction:**<br>• Infrastructure development within watercourses<br>• Loss of vegetation<br>• Flow alteration<br>• Erosion<br><br>**Operational:**<br>• Excavation from the watercourses leading to degraded river channels.<br>• Removal of substrate within drainage lines and streams<br>• Clearing of vegetation – vegetation loss<br>• Loss of biodiversity<br>• Alteration and/or loss of hydrological flow classes<br>• Vehicles driving in and through watercourses<br><br>**Decommissioning:**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | Changing the physical structure within a water resource (habitat) | • Other than approved and authorized structures, no other development or maintenance infrastructure is allowed within the delineated watercourse and riparian areas or their associated buffer zones.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• All maintenance within watercourses must be restricted to the dry season.<br>• Maintenance activities should not impact on rehabilitated or naturally vegetated areas.<br>• Rehabilitation should limit fragmentation and isolation of sections of the non-perennial drainage line systems.<br>• The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels. | 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. |

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| | | • All rehabilitation activities should occur in the dry season. | | |
| **Construction:**<br>• Vegetation clearance causing sedimentation<br>• Earthworks activities<br>• Disturbance of soil surface and runoff characteristics<br>• Erosion<br><br>**Operational:**<br>• Excavation from the watercourses leading to degraded river channels.<br>• Removal of substrate within drainage lines and streams<br>• Clearing of vegetation – vegetation loss<br>• Loss of biodiversity<br>• Alteration and/or loss of hydrological flow classes<br>• Vehicles driving in and through watercourses<br><br>**Decommissioning:**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | Alteration of the amount of sediment entering the water resource and associated change in turbidity | • Buffer zones should be maintained, in order to minimise sedimentation of the downstream areas.<br>• No stockpiling should take place within a watercourse or the calculated buffers.<br>• Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities.<br>• All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed stream banks.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• Erosion control measures, such as berms, must be implemented to manage runoff from roads to prevent erosion and pollution.<br>• Silt screens should be used where necessary.<br>• Rehabilitation of disturbed areas as a result of construction must be implemented immediately upon completion of construction.<br>• Rehabilitation must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger riparian systems at pre-mining levels.<br>• All rehabilitation activities should occur in the dry season. | 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. |

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| | | • The duration of impacts on the riverine and drainage line systems should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised;<br>• Maintain flood capacity, particularly in areas with significant flood hazards. | | |
| **Construction:**<br>• Runoff from road surfaces<br>• Discharge of sewage<br>• Discharge of solvents, chemicals and hydrocarbons<br><br>**Operational:**<br>• Maintenance of vehicles and machinery<br>• Runoff from road surfaces<br>• Discharge of sewage<br>• Discharge of solvents, chemicals and hydrocarbons<br>• Excavation from the watercourses and the release of nutrients and pollutants from disturbed soils<br>• Removal of substrate within drainage lines and streams<br><br>**Decommissioning:**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | Alteration of water quality | • All vehicles must be regularly inspected for leaks.<br>• Re-fuelling must take place on a sealed surface area to prevent hydrocarbon pollution.<br>• All spills should be cleaned up immediately and disposed of.<br>• Spill kits should be readily available and easily accessible throughout the site.<br>• All chemicals must be stored safely on site, outside the buffer areas and surrounded by bunds. Chemical storage containers must be regularly inspected for early leak detection.<br>• Littering must be prevented by effective site management and the provision of bins.<br>• Provision of adequate sanitation facilities located outside of the delineated buffer zones.<br>• An emergency spill procedure should be developed and implemented.<br>• No stockpiling should take place within a watercourse.<br>• All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>• Stockpiles must be located away from river channels and drainage lines.<br>• Erosion and sedimentation into channels must be minimised through the effective stabilisation and the re-vegetation of any disturbed riverbanks. | 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. |
| **Construction:**<br>• Clearing of vegetation – vegetation loss | Loss of terrestrial habitat | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation. | Duration of operation | The implementation of the recommended mitigation measures will result in the minimisation of |

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| **Operational:**<br>• Removal of substrate within watercourses<br>• Clearing of vegetation during prospecting operations<br><br>**Decommissioning:**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | | • It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area) and preventing movement of workers into natural areas.<br>• The duration of the prospecting should be minimized to as short term as possible, in order to reduce the period of disturbance on fauna and flora.<br>• Areas of indigenous vegetation should under no circumstances be fragmented or disturbed for used as an area for dumping of waste.<br>• As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.<br>• All staff and visitors to the site must undergo an induction process and must be made aware of the sensitive nature of the environment and floral species which occur there.<br>• The area must be re-vegetated with plant and grass species which are endemic to the exact vegetation types.<br>• Rehabilitation measures that are implemented must be continually monitored for a minimum period of four years to ensure that proper succession has occurred and that there is no erosion occurring.<br>• An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. | | impacts to acceptable standards, thereby ensuring compliance with NEMA and Duty of Care as prescribed by NEMA. |
| **Construction:**<br>• Runoff from road surfaces<br>• Sedimentation<br>• Discharge of sewage<br>• Discharge of solvents, chemicals and hydrocarbons | Loss of Aquatic Biota | • Bi-annual biomonitoring of aquatic macro-invertebrates and diatoms within the riverine systems is essential.<br>• Refer to Mitigation Measures regarding water quality and sedimentation as listed above. | Duration of operation | The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with |

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| **Operational:**<br>• Maintenance of vehicles and machinery<br>• Runoff from road surfaces<br>• Discharge of sewage<br>• Discharge of solvents, chemicals and hydrocarbons<br>• Excavation from the watercourses and the release of nutrients and pollutants from disturbed soils<br>• Removal of substrate within drainage lines and streams<br>• Sedimentation | | | | NEMA and Duty of Care as prescribed by NEMA. |
| **Construction and Operational:**<br>• Vegetation loss and disturbance – clearing of vegetation<br>• Excessive noise disturbances<br>• Illegal hunting<br>• Habitat fragmentation destruction<br>• Vehicles driving through natural vegetated areas | Loss of Terrestrial Fauna | • 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.<br>• Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.<br>• 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.<br>• Fencing should be erected around the project area to prevent workers and members of the public from entering the surrounding environments. This fence should have small openings to allow wildlife to pass through.<br>• Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering 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. |

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| | | • 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 sensitive fauna that are inadvertently killed during earthmoving operations should be preserved as museum voucher specimens.<br>• No hunting, trapping or killing of fauna are allowed.<br>• Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance.<br>• 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.<br>• 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.<br>• Noise must be kept to an absolute minimum at night to minimise all possible disturbances to amphibian species and nocturnal mammals. | | |
| **Construction and Operational:**<br>• Vegetation clearance<br>• Vehicles driving through natural vegetated areas<br>• Habitat fragmentation and destruction | Loss of Terrestrial Flora | • Areas that are stripped during construction and operation should be re-vegetated with indigenous vegetation as soon as possible. This will also reduce the likelihood of encroachment by alien invasive plant species.<br>• Protected trees and plants shall not be removed or damaged without prior approval, permits or licenses from the relevant authority, this is especially applicable to the Protected Witgat (Boscia albitrunca) and Camel Thorn Tree (Vachellia erioloba), which were present on 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. |
| **Construction:**<br>• Clearing of vegetation<br><br>**Operational:** | Introduction and spread of alien vegetation | • Proliferation of alien and invasive species is expected within any disturbed areas particularly as there are some alien and invasive species present within the study site. These species should be eradicated and controlled to prevent further spread beyond. | Duration of operation | The implementation of the recommended mitigation measures will result in the minimisation of impacts to acceptable standards, thereby ensuring compliance with |

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| • Removal of substrate within watercourses<br>• Clearing of vegetation during prospecting operations<br>• Vehicles driving in and through watercourses<br><br>**<u>Decommissioning:</u>**<br>• Damage to vegetated areas<br>• Ineffective rehabilitation measures<br>• Vehicles driving in and through watercourses | | • An alien invasive vegetation management plan should be developed and implemented.<br>• Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat.<br>• Footprint areas should be kept as small as possible when removing alien plant species.<br>• No vehicles should be allowed to drive through designated sensitive drainage lines and riparian areas during the eradication of alien and weed species.<br>• All alien vegetation in the riparian zone should be removed upon completion of prospecting activities and reseeded with indigenous grasses as specified by a suitably qualified specialist (ecologist). | | NEMA and Duty of Care as prescribed by NEMA. |

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

**F. Monitoring of Impact Management Actions**

**G. Monitoring and reporting frequency**

**H. Responsible persons**

**I. Time period for implementing impact management actions**

**J. Mechanism for monitoring compliance**

**K.**

| 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 |
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| Clearance of vegetation | Loss or fragmentation of habitats | • Conduct regular internal audits<br>• Conduct regular external audits | • Environmental Manager<br>• 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, General & in Kimberlite) – excavations | Loss of topsoil<br>Erosion<br>Air Pollution<br>Noise<br>Impact on potential cultural and heritage artefacts | • Conduct regular internal audits<br>• Conduct regular external audits | • Environmental Manager<br>• 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<br>• Conduct regular external audits | • Environmental Manager<br>• 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 |

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| | | | | 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<br>• Conduct regular external audits<br>• Groundwater Monitoring should be undertaken in accordance with SANS and DWS requirements in line with the recommended schedule. Three (3) boreholes are recommended to be monitored (Please see specialist study, **Appendix 12**, for boreholes); and<br>• An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. The monitoring network should be updated annually, and this report should be submitted annually. | • Environmental Manager<br>• 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. INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE ASSESSMENT REPORT.

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. ENVIRONMENTAL AWARENESS PLAN

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

**Johan Smit** 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 12** for the Awareness plan

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

**Johan Smit** 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************