



BLUELEAF
ENVIRONMENTAL

Terrestrial Biodiversity, Plant and Animal Species Assessment

Kroonstad North Prospecting, Free State Province.

Prepared for:

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DECLARATION OF INDEPENDENCE

I, Roy de Kock, as duly authorised representative of Blue Leaf Environmental (Pty) Ltd, hereby confirm my independence (as well as that of BlueLeaf) as a specialist and declare that neither I nor BlueLeaf have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which BlueLeaf Environmental (Pty) Ltd was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Specialist Assessment for the proposed new Kroonstad North Prospecting project in the Free State. I further declare that I am confident in the results of the studies undertaken and conclusions drawn because of it – as is described in this report.



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EXPERTISE

Roy has over 17 years' experience in environmental consulting and specialist services in South Africa. Various projects throughout Africa have also been undertaken. Projects include baseline studies, impact assessments and compliance auditing for various large-scale projects including numerous wind farms, roads (National and Provincial), and infrastructure development projects. Blue Leaf also offers a wide range of in-house specialities including but not limited to Ecological and Botanical assessments, Biodiversity studies, Plant and Animal Search and Rescue, Fauna and Flora permits, Aquatic Assessments, Agricultural and Soil Assessments and Environmental and Venomous animals training workshops.

Roy holds a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela University in Port Elizabeth. He is currently busy with his PhD (Doctorate degree) in Botany and Soil Science. He has over 17 years' experience in the environmental consulting focussing on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies.

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1. Introduction

BlueLeaf Environmental (Pty) Ltd (BlueLeaf) has been appointed by Enviroworks Consulting on behalf of Reef Exploration (Pty) Ltd, to undertake a Terrestrial Biodiversity, Plant and Animal Species Assessment as part of the Environmental Impact Assessment (EIA) process conducted by Enviroworks.

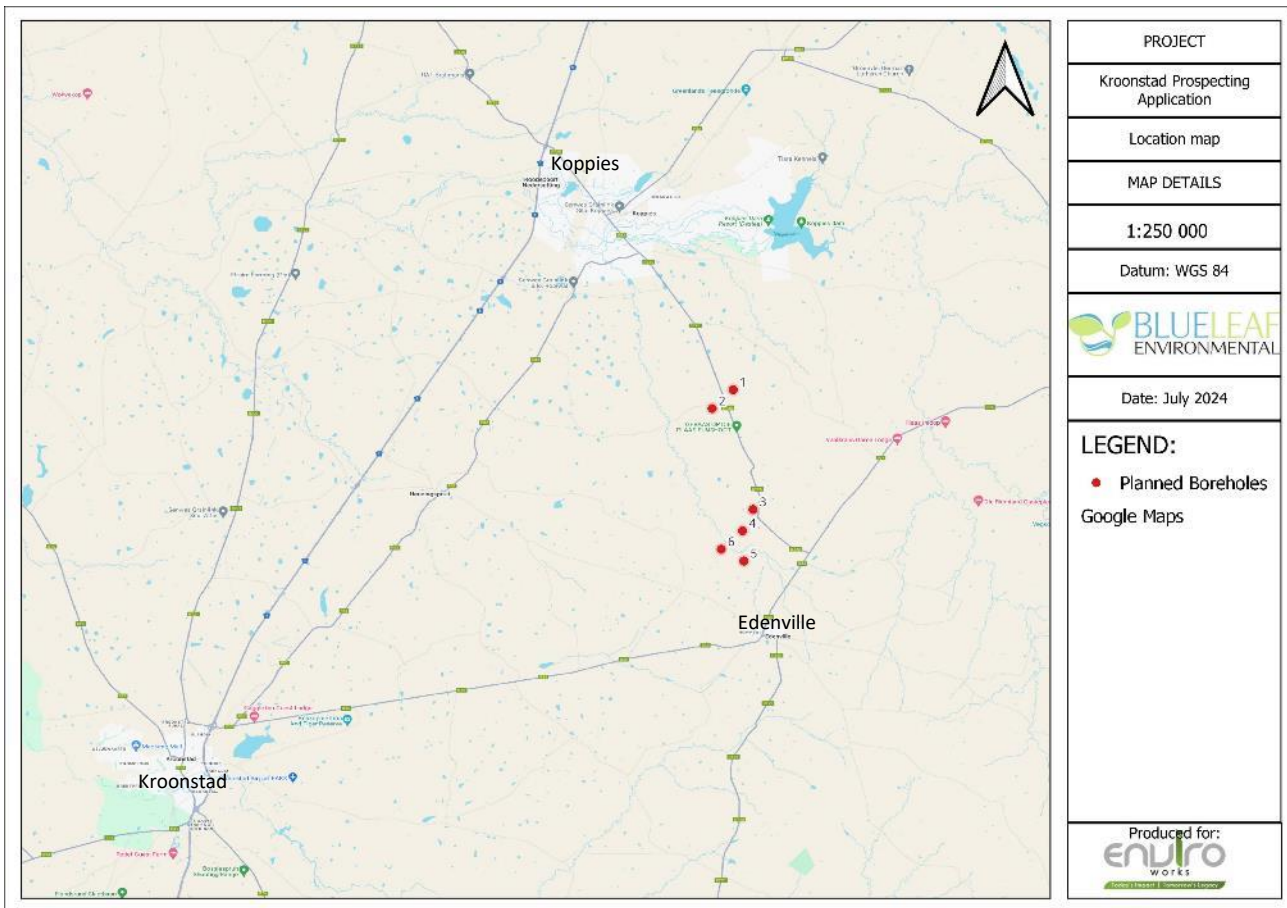


Figure 1.1: Location of the six prospecting borehole sites in the Free State province

According to the DFFE (Department of Forestry, Fisheries and the Environment) protocols, a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool. BlueLeaf Environmental (Pty) Ltd was appointed to conduct the Site Verification as well as the Terrestrial Biodiversity, Plant and Animal Species Assessment for the proposed new project.

1.1. Project description

The site is situated on various farms between Koppies and Edenville and located 45 km east of Kroonstad in the Free-State (Figure 1.2). Farming consists of a mix of maize crop farming, game farms, and cattle grazing.

The project involves invasive prospecting that will take the form of diamond drilling. This information will then be integrated into the geological model to further define the orebodies, which

when combined with the assay information will be utilized to define a resource. The minerals to be prospected for includes silver ore, gold ore, coal, cobalt, copper ore, diamonds (alluvial), iron ore, manganese ore, molybdenum ore, nickel ore, lead, Platinum Group Metals, Rare Earths, sulphur, uranium ore, tungsten ore, zinc ore.

Based on the initial geological model established, a diamond drilling programme, comprising of six boreholes will be undertaken. The drilling of the six boreholes will be to a depth of 700m. The extent of the area required for prospecting is 18 350,453 hectares (ha) in total.



Figure 1.2: Layout of the six proposed prospecting borehole sites

Drilling will be conducted in a competent and environmentally responsible manner including rehabilitation of the drill sites to their original site. Plastic lining will be placed underneath the rig motors to prevent oil seepage. It is noted that no drilling fluids other than water for dust suppression will be utilized in the case of diamond drilling. Environmental rehabilitation measures will be included in the contract with the drilling company and environmental rehabilitation costs will be included in the drilling costs.

The drilling process will be managed in a competent manner and will involve the following actions:

- Call for drill tenders.
- Review the registration, incorporation, employment equity and BEE of the drilling company.
- Confirm the good financial standing of the drilling company.

- Establishment of confidentiality agreements and management of conflicts of interest that the drilling company may have.
- Review the drilling company's approach to Mines, Health and Safety issues.
- Compile a preliminary analysis report.
- Select drilling company.
- Award of the drilling contract.
- Obtain permission to access the property.
- Submit information of planned drilling to Mines, Health and Safety at DMR.
- Forward special instructions to the drilling company regarding power, water, environmental, safety and security.
- Preliminary analysis report on notifications e.g. Eskom, Telkom, etc.
- Finalise the initial borehole positions.
- Plan access roads, crew accommodation and site security.
- Environmental assessment of drill sites.
- Preparation of drilling sites.
- Establish water source for drilling.
- Plan health and safety issues and establish a safe working code specific to the area.
- Perform the necessary risk assessments and Planned Task Observations (PTO).
- Monitor and control the drilling process.
- Ensure secure core storage and sampling facilities.
- Set QA/QC sampling procedures in place and insert proper reference material as samples.
- Undertake site rehabilitation.
- Take pictures before and after rehabilitation.
- Compile preliminary analysis report on the start date of the drilling program.
- Plan additional infill borehole sites.

A strict QA/QC program will be conducted by the internal Qualified Person (QP)/Exploration Manager:

- Quality of drilling program.
- Survey of borehole collars utilizing a GPS.
- Sample management (weighing, splitting, transport).
- Logging and mineralization/reef identification.
- Sampling procedures.
- Chain of custody of transport of samples to laboratory.
- Laboratories utilized.
- Quality control of standards, blanks and duplicates to ensure accurate assay methods and grades from laboratory.
- Applicable assay method utilized for style of mineralization.
- QA/QC on lab results including check assaying at an umpire laboratory.
- Database management.
- External audits by Qualified Persons.

1.2. Project description

The proposed six boreholes are located at the following coordinates:

Borehole #	Coordinates	
1.	27° 22.303'S	27° 38.648'E
2.	27° 23.151'S	27° 37.704'E
3.	27° 27.707'S	27° 39.543'E
4.	27° 28.672'S	27° 39.069'E
5.	27° 30.030'S	27° 39.129'E
6.	27° 29.502'S	27° 38.113'E

1.3. Legislative context

The following legislation is directly relevant when assessing the Terrestrial Biodiversity, Plant and Animal environment relating to the proposed Kroonstad North Prospecting project.

National Environmental Management Act (NEMA) (107 of 1998, as amended) and the Specialist Assessment Protocols (GNR 320 of 2020):

The National Web based Environmental Screening Tool (<https://screening.environment.gov.za/screeningtool/>) is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorization in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity.

The Screening Tool also provides site specific EIA process and review information, for example, the Screening Tool may identify if an industrial development zone, minimum information requirement, Environmental Management Framework or bio-regional plan applies to a specific area.

Further to this, the Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

Finally, the Screening Tool allows for the generating of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended whereby a Screening Report is required to accompany any application for Environmental Authorization and as such the tool has been developed in a manner that is user friendly and no specific software or specialized GIS skills are required to operate this system.

Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorization have been Gazetted (GN. R 320 of 20 March 2020). In terms of sections 24(5)(a), (h) and 44 of the National Environmental Management Act, 1998. These procedures prescribe general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring environmental authorization, as contained in the Schedule therein. When the requirements of a protocol apply,

the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as amended, (EIA Regulations), promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), are replaced by these requirements.

The contents of this specialist report comply with the legislated requirements as described in the following environmental theme and associated specialist assessment protocols as listed in the projects' Screening Tool Report:

- Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity.
- Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species.
- Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species.

The Species Environmental Assessment Guidelines published in 2022 were used for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols in this report.

National Environmental Management Act (NEMA) (107 of 1998, as amended) and the EIA regulations (as amended):

Although the Specialist Assessment Protocols (as listed above) supersede this legislative requirement, the contents of this specialist report still comply with the legislated requirements as described in Appendix 6 of the National Environmental Management Act (No 107 of 1998; NEMA) Regulations of 2014 and updated in 2017 (GN R. 326 of 2017).

1. Other national legislation

Other national legislation relevant to this project includes:

Title of legislation or guideline	Administering authority	Applicability to the project
National Environmental Management Act (NEMA) (Act No. 107 of 1998): Environmental Impact Assessment (EIA) Regulations, 2014, as amended	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	The activity triggers activities listed in NEMA EIA Regulations GN R. 320.
National Water Act, 1998 (Act No. 36 of 1998)	Department of Water and Sanitation (DWS)	Infrastructure may impact on existing surface water systems. This impact is only mentioned in this report (if relevant) and NOT discussed in detail.
National Environment Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004)	DESTEA	The proposed development must: <ul style="list-style-type: none"> – Conserve endangered ecosystems and protect and promote biodiversity. – Assess the impacts of the proposed development on endangered ecosystems. – No protected species may be removed or damaged without a permit.

Title of legislation or guideline	Administering authority	Applicability to the project
		– The proposed site must be cleared of alien vegetation using appropriate means.
National Forest Act (Act No. 84 of 1998)	Provincial Department of Forestry	Requires that a permit be obtained should any forests or protected trees be removed during the construction phase of the project.

Relevant Provincial and Municipal legislation includes:

Title of legislation or guideline	Administering authority	Applicability to the project
Free State Nature and Conservation Ordinance (No.8 of 1969)	DESTEA	Listing of protected plant and animal species. Permits are required for removal and relocating any of these listed species in the FS.
Free State Biodiversity Plan (FSBP; 2015)	DESTEA	Listing all terrestrial CBAs and ESAs within the study site.

1.4. Alternative

No site alternatives or layouts are proposed.

1.5. Public consultation

No consultation requirements were identified during the drafting of this specialist report. The findings of this report can be presented to stakeholders and I&APs as part of the Basic Assessment Public Participation Process (PPP).

No comments were received to date on this report.

1.6. Objectives

The objectives of the project are listed below. These objectives are based on the requirements of each specialist protocol as listed in the DFFE Screening Report:

- Describe both the existing area as well as the area prior to construction in terms of its current ecological characteristics and the general sensitivity of these components to change.
- Confirm if there are any outright fatal flaws to the establishment of the proposal at its current location from a biodiversity perspective.
- Map all existing areas to be directly affected by the proposals in terms of its current and previous biodiversity sensitivity (constraints).
- Map all 'No-Go' areas.
- Describe the likely scope, scale, and significance of impacts (positive and negative) on biodiversity components of the area associated with the construction of the proposals.
- Make recommendations on the scope of any mitigation measures that may be applied during construction to avoid/reduce the significance of the identified construction-related impacts.
- Describe the likely scope, scale, and significance of impacts (positive or negative) on the biodiversity components associated with the operation or use of the proposals.

- Make recommendations on the scope of any mitigation measures that may be applied to avoid/reduce the significance of the operations-related impacts. These mitigation measures could also be design recommendations as well as operational controls, monitoring programmes, management procedures and the like.
- It will be particularly important to identify any rehabilitation measures that can be reasonably applied on the completion of the construction works.
- Broadly comment on the cumulative ecological impacts (positive or negative) associated with the construction and/or operation of the proposals.

It should be noted that only datasets and base data relevant to the study area and affected environmental features are discussed below.

1.7. Assumptions and limitations

- The report is based on currently available information and, as a result, limited by the information provided by the Client.
- The report is limited by seasonality as the presented data will be based on a single site survey of plant and animal species conducted within a single season (mid-summer) of a single year (2024).

1.8. Project Area of Influence

The Project Area of Influence (PAOI) is defined according to important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities. The PAOI sets the minimum spatial extent of the study area, and the assessment will be focused within this area. The following site descriptors were used to delineate each PAOI (Figure 1.3):

PAOI	Area (ha)	Description	Probability of impact occurring
Primary PAOI	6 x (5m x 5m) boreholes = 150 m ²	The Primary PAOI includes all boreholes within the boundary of the development site. This is the area directly impacted by prospecting.	Definite
Secondary PAOI	6 x 85 ha buffer = (510 ha)	The secondary PAOI includes all areas within a 500 m buffer of the proposed prospecting sites. These areas are not directly impacted by the development unless temporary footprints like site camps, laydown areas and stockpiles are placed in them. Assessing this PAOI will not only result in identifying potential indirect and cumulative impacts but will also allow for micro-movement of infrastructure.	Likely
Tertiary PAOI	18 350 ha	The tertiary PAOI includes all farm portions where prospecting will occur on. These areas are not directly impacted by the development. Assessing this PAOI will result in identifying potential indirect and cumulative impacts.	Unlikely
Total PAOI	18 350 ha	The Primary, Secondary and Tertiary PAOI's are collectively referred to as the Total PAOI (or just the PAOI) or Study Site in this report and demarcate the extent of the study site that will be assessed.	Likely



Figure 1.3: Site map showing the PAOI's for Kroonstad North Prospecting

2. Approach and Methodology

The aim of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. To do so, the ecological sensitivity of the area is assessed as well as an identification of potential plant and animal Species of Conservation Concern (SCC) that may occur in habitats present in the area. The condition and sensitivity of the vegetation, habitat and connectivity, as well as the presence of plant and animal SCC will determine biodiversity sensitivities for the study site.

The study site was assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current biodiversity programmes and plans.

Further to the above, a site visit was conducted on 24th and 25th of May 2024. The site visit was conducted late autumn and therefore may have missed plant species that was not visible (not flowering or latent below ground during this time) or animal species that was not present on site. The site visit served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding terrestrial environment.

2.1. Plant species classification

To identify plant species that potentially occur naturally in the project area, firstly required an understanding of the broad botanical habitats in the area. These habitats were identified according to various ecological characteristics, including vegetation type (SANBI VegMap, 2018); the degree of transformation of the vegetation; geology and soil type, and topography.

The potential occurrence of plants that are considered Species of Conservation Concern (SCC) within the project area was identified through a detailed assessment of the site. Published literature and online resources that are continuously updated with new species observations were consulted to compile lists of plant, including:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina and Rutherford, 2006).
- National VegMap, 2018.
- iNaturalist online database (inaturalist.org).
- Plants of South Africa/New POSA online database (posa.sanbi.org).
- SANBI Red List of South African Plants online database.
- National Web-based Screening Tool (screening.environment.gov.za), and
- Global Biodiversity Information Facility online database (gbif.org).

Plant Species of Conservation Concern (SCC) were limited to endemic flora, and were defined to include:

- Red Data species identified using the IUCN Red List of Threatened Species.
- Red Data species identified using the Red List of South African Species. This includes all threatened species that are assessed according to the IUCN Red List Criteria as Critically Endangered, Endangered, Vulnerable, Near Threatened, Rare, Extremely Rare, or Data Deficient.

- Plants listed in terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (NEMBA) (Act No. 10 of 2004, as amended), and regulated by the Threatened or Protected Species (TOPS) Regulations, 2007. This includes threatened species that are Critically Endangered, Endangered, Vulnerable, and Protected.
- All tree species listed by the National Forestry Act (No 84 of 1984; NFA) as protected by law.

In addition to plant SCC, the following plants were also identified:

- Plants protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Plants listed in terms of the Free State Nature and Conservation Ordinance (FS NCO) (No. 8 of 1969).

The inclusion of plant species on CITES Appendices (I–III) and FS NCO Schedules (1–2) are not necessarily equivalent to the species' conservation status. Many common species are pragmatically included on these lists even though their conservation status may not be of demonstrated concern. A permit is however required for the removal of species that occur on CITES and FS NCO lists.

No sensitive plant species were identified by the Department of Forestry, Fisheries and the Environment's (DFFE) National Web-based Environmental Screening Tool.

The following criteria were evaluated during the site visit to assess habitat suitability for sensitive species:

1. Vegetation type and cover.
2. Geology and soil type.
3. Rock cover, and
4. Topography.

Sensitive habitats were identified as those habitats that are vulnerable to disturbances and supporting SCC in the project area.

On the 24th and 25th of May 2024 (late-autumn) a visit to the project area was conducted to:

1. Assess the micro-positioning for infrastructure.
2. Confirm the occurrence of sensitive vegetation habitats.
3. Note any occurrence of plant SCC and other indicator species occurrences, and
4. Assess the extent of current threats (not project related) on vegetation and plant SCC (e.g. evidence for direct exploitation, habitat transformation, etc.).

2.2. Animal species classification

The potential occurrence of fauna (amphibians, reptiles, mammals, birds, and butterflies) in the vicinity of the project area was determined according to the habitat characteristics of the area and the species' habitat requirements. Published literature and online resources that are continuously updated with new species observations were consulted to compile lists of fauna, including:

- Du Preez & Carruthers (2017), Frog Atlas of Southern Africa (FrogMap) for amphibians.
- Alexander & Marais (2007), Reptile Atlas of Southern Africa (ReptileMap1) for reptiles.
- Skinner & Chimimba (2005), Mammal Atlas of Southern Africa (MammalMap1) for mammals.
- Southern African Bird Atlas Project 2 (SABAP2) for birds (Harrison et al. 1997).
- Woodhall (2020), Atlas of African Lepidoptera (LepiMap1) for butterflies.
- iNaturalist
- Global Biodiversity Information Facility (GBIF)

Faunal Species of Conservation Concern (SCC) were defined to include:

- Fauna with their distribution ranges limited to the Eastern Cape Province.
- Red Data species identified using the IUCN Red List of Threatened Species.
- Red Data species identified using the Red List of South African Species. Includes all species that are assessed according to the IUCN Red List Criteria as Critically Endangered, Endangered, Vulnerable, Near Threatened, Rare, Extremely Rare, or Data Deficient. Listings were corroborated with data from the South African amphibian (Measey 2011), reptile (Bates et al. 2013), mammal (Child et al. 2016), bird (Taylor et al. 2015), and butterfly (Mecenero et al. 2020) conservation assessments.
- Species listed in terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (NEMBA) (Act 10 of 2004, as amended), and regulated by the Threatened or Protected Species (TOPS) Regulations, 2007. Includes species that are Critically Endangered, Endangered, Vulnerable, and Protected.

In addition to Faunal SCC, the assessment also identified:

- Species protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Species listed in terms of the Free State Nature Conservation Ordinance (FS NCO) (No 8 of 1969).

The inclusion of faunal species on CITES Appendices (I–III) and FS NCO Schedules (1–2) are not necessarily equivalent to the species' conservation status. Many common species are pragmatically included on these lists even though their conservation status may not be of demonstrated concern. A permit is required for the removal of species that occur on CITES and FS NCO lists.

Expected Faunal SCC with very low detection probabilities were assessed according to the following criteria:

1. Probability of occurrence in the project area (4 categories: confirmed [observed during the site visit], high, medium, and low),
2. Potential distribution within the project area, and
3. Current threats (not project related).

The following sensitive animal species were identified by the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia
Medium	Aves-Sagittarius serpentarius
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Sensitive species 15

Because the likelihood of detecting animal SCC during environmental authorisation assessments is extremely low (even with optimal search methods and during optimal seasonal sampling) a precautionary principle was applied in the following way when assessing habitat suitability for species in the project area:

- Potentially suitable habitat exists in proximity of known locations for the species, then the species is assigned a high probability of occurrence and assumed to be present.

The following criteria were evaluated during the site visit to assess habitat suitability for these species:

1. Vegetation type and cover,
2. Presence of host plants (in the case of butterflies),
3. Geology and soil type,
4. Rock cover,
5. Topography,
6. Habitat disturbance, and
7. Habitat connectivity.

2.3. Biodiversity classification

Critical Biodiversity Areas (CBAs) are features critical for the conservation of biodiversity and maintenance of ecosystem functioning and should remain in a natural state as far as possible. CBAs also include freshwater components.

To assist in the development of these CBAs, each planning unit was classified by C-Plan and Marxan based on a combination of factors including vegetation type, connectivity, habitat condition and presence of Red List Threatened species.

All features were grouped into the following CBA categories as listed in the Free State Biodiversity Plan (FSBP, 2015) Handbook:

Mapping Category	Critical Biodiversity Area Name
Protected areas (PA)	Protected Areas are areas that have been formally declared or recognized in terms of NEMPAA. This refers to “State owned” reserves, which includes National PAs managed by SANParks, Provincial PAs managed by Eastern Cape Parks and Tourism Agency, municipal reserves, Private Nature Reserves, and Protected Environments. Several municipal and provincial reserves have not been formally proclaimed under any legislation but are zoned accordingly in relevant Spatial Development Frameworks and are recognized as de facto Protected Areas.
Critical Biodiversity Area (CBA)	CBA’s are areas of high biodiversity value. They are categorised into two groups namely “CBA Irreplaceable” and “CBA Optimal”.

Mapping Category	Critical Biodiversity Area Name
	<p>CBA Irreplaceable: A site that is irreplaceable or near-irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the project area. Such sites are therefore critical, and they need to be maintained to ensure that features targets are achieved and that such features persist.</p> <p>CBA Optimal: A site that has been selected based on its complementarity for meeting biodiversity targets. CBA Optimal sites are therefore important, but their maintenance is not critical to ensure that features targets are achieved and that such features persist.</p>
Ecological Support Area (ESA)	ESAs play an important role in supporting the ecological functioning of a protected area or Critical Biodiversity Area, or in delivering ecosystem services. In most cases ESAs are currently in at least fair ecological condition and should remain in at least fair functioning condition. ESA's are categorized into two Categories namely ESA 1 (sites with minimal degradation) and ESA 2 (sites that have been degraded but not totally transformed)
Other areas	Other areas are areas of natural habitat not required to meet biodiversity targets for ecosystem types, species or ecological processes, i.e. natural areas not selected as CBA or ESA.
Degraded areas	Degraded areas are portions of land that are not in climax condition due to factors other than physical disturbance.

2.4. Vegetation mapping

Mucina and Rutherford (2010) developed the National Vegetation Map (VegMap). The latest update of the VegMap is dated 2018. This map describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa. The VegMap was used to identify vegetation types on site.

2.5. Protected areas

The National Environmental Management Protected Areas Act (NEMPAA) (Act No. 57 of 2003) was developed to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. Refer to section 4.8 for more detail on this matter.

The NEMBA Revised National of Ecosystems that are Threatened and in need of protection (G. NR. 2747 of 2022) contains a national list of threatened terrestrial ecosystems. Refer to section 4.8 for more detail.

2.6. Site ecological importance

The Screening Tool has identified species and ecosystem spatial triggers likely to indicate environmental sensitivity associated with a particular proposed development site, which in turn determined the necessity and requirements for conducting Specialist Assessments. The **Species Environmental Assessment Guideline (SANBI; 2022)** provided methodology for the identification of environmental sensitive areas within the PAOI.

Site Ecological Importance (SEI) is a function of the biodiversity importance (BI) of the identified receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]):

$$SEI = BI + RR$$

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor:

$$BI = CI + FI$$

Conservation Importance

CI is defined as ‘The importance of a site for supporting biodiversity features of conservation concern present, rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.’ These criteria are defined as follow:

- **IUCN threatened and Near Threatened species** (CR, EN, VU and NT). Where the global (IUCN) and national assessments (SANBI Red List) differ for the same taxon, the national evaluation of status should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category.
- **Rare species** are those included on South Africa’s National Red List as Rare or Critically Rare or Extremely Rare.
- **Range-restricted species** – the presence of terrestrial flora, vertebrate and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km² or less.
- **Globally significant populations of congregatory species** – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons.
- **Significant areas of threatened vegetation types** – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e. proportion) and how threatened (CR, EN, VU) the vegetation types are.
- **Natural processes** – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed during the site visit. CI is determined for each identified habitat/vegetation unit within the entire PAOI.

The following table was used to determine CI for each receptor:

Table 2.1: Conservation importance (CI) criteria.

CI	Criteria
Very high	➤ Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km ² .

CI	Criteria
	<ul style="list-style-type: none"> ➤ Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type. ➤ Globally significant populations of congregatory species (> 10% of global population).
High	<ul style="list-style-type: none"> ➤ Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². Include if there are less than 10 locations or < 10 000 mature individuals remaining. ➤ Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. ➤ Presence of Rare species. ➤ Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	<ul style="list-style-type: none"> ➤ Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) and which have more than 10 locations or more than 10 000 mature individuals. ➤ Any area of natural habitat of threatened ecosystem type with status of VU. ➤ Presence of range-restricted species. ➤ > 50% of receptor contains natural habitat with potential to support SCC.
Low	<ul style="list-style-type: none"> ➤ No confirmed or highly likely populations of SCC. ➤ No confirmed or highly likely populations of range-restricted species. ➤ < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	<ul style="list-style-type: none"> ➤ No confirmed and highly unlikely populations of SCC. ➤ No confirmed and highly unlikely populations of range-restricted species. ➤ No natural habitat remaining.

Functional Integrity

FI is defined as “A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.” These criteria are defined as follow:

Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological processes, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g. fossorial reptiles) in question.

Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat.

Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes. Ecological processes can be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area.

The following table was used to determine FI for each receptor:

Table 2.2: Functionality integrity (FI) criteria.

GI	Criteria
Very high	<ul style="list-style-type: none"> ➤ Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. ➤ High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. ➤ No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	<ul style="list-style-type: none"> ➤ Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. ➤ Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. ➤ Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	<ul style="list-style-type: none"> ➤ Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. ➤ Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. ➤ Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	<ul style="list-style-type: none"> ➤ Small (> 1 ha but < 5 ha) area. ➤ Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. ➤ Several minor and major current negative ecological impacts.
Very low	<ul style="list-style-type: none"> ➤ Very small (< 1 ha) area. ➤ No habitat connectivity except for flying species or flora with wind-dispersed seeds. ➤ Several major current negative ecological impacts.

Biodiversity Importance

Recalling that BI is a function of CI and the FI of a receptor. BI can be derived from the following matrix of CI and FI:

Table 2.3: Biodiversity importance (BI) matrix.

Biodiversity Integrity (BI)		Conservation Importance (CI)				
		Very high	High	Medium	Low	Very low
Functional integrity (FI)	Very high	Very high	Very High	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Receptor Resilience

RR is defined as “*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*”

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor and require justification. RR will be evaluated and justified for each evaluation based on the criteria below.

Table 2.4: Receptor resilience (RR) criteria.

RR	Criteria
Very high	➤ Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	➤ Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	➤ Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	➤ Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	➤ Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

After evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix in Figure 2.3.

SEI description

The SEI was described in the above manner for each impact receptor identified within the PAOI and mapped in Section 5 of this report. The guidelines below (Table 2.5) were used to interpret the SEI outcomes:

Table 2.5: Guidelines for interpreting SEI in the context of the proposed development activities

SEI	Interpretation in relation to proposed development activities
Very high	➤ Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	➤ Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	➤ Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
Low	➤ Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities
Very low	➤ Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required

2.7. Impact assessment

The impacts that may result from the planning and design phase, construction phase and operational phase of the proposed development were assessed according to several criteria to arrive at an overall significance rating. The criteria used were as follows (based on DEAT 2002 - Impact Significance, IEM Information Series 5; and DEAT 2006 - Assessment of Alternatives and Impacts in support of the EIA Regulations, IEM Guideline Series 5):

Table 2.6: Criteria used in determining significance ratings to potential impacts.

ASPECT	IMPACT RATING	
Status of the Impact	A statement of whether the impact is positive (a benefit), negative (a cost), or neutral	
Direct impact	Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.	
Indirect Impacts	Indirect impacts are not a direct result of the project but are often produced away from or because of a complex impact pathway related to the project.	
Cumulative Impacts	Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of the past, present, or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.	
Nature of the Impact	The evaluation of the nature is impact specific. Most negative impacts will remain negative, however, after mitigation, significance should reduce to: <ul style="list-style-type: none"> ➤ Positive ➤ Negative 	
Extent	A description of whether the impact would occur on a scale limited to within the study area (local), limited to within 5 km of the study area (area) on a regional scale. i.e. the Kouga Municipality & Eastern Cape (Region); or would occur on a national or international scale.	
	Local	1
	Area	2
	Regional	3
	National	4
International	5	
Duration	A prediction of whether the duration of the impact would be immediate and once-off (less than one month), more than once, but short term (less than one year), regular, medium term (1 to 5 years), long term (6 to 15 years), project life/permanent (> 15 years, with the impact ceasing after the operational life of the development or should be considered as permanent).	
	Immediate	1
	Short term	2
	Medium term	3
	Long term	4
Project life/permanent	5	

ASPECT	IMPACT RATING		
Intensity	<p>This provides an order of magnitude of whether or not the intensity (magnitude/size/frequency) of the impact would be negligible, low, medium, high or very high. This is based on the following aspects:</p> <ul style="list-style-type: none"> ➤ An assessment of the reversibility of the impact (permanent loss of resources, or impact is reversible after project life; ➤ Whether or not the aspect is controversial; ➤ An assessment of the irreplaceability of the resource loss cause by the activity (whether the project will destroy the resources which are easily replaceable, or the project will destroy the resources which are irreplaceable and cannot be replaced; ➤ The level of alteration to the natural system, processes or systems. 		
	Negligible	The impact does not affect physical, biophysical or socio-economic functions and processes.	1
	Low/potential harmful	The impact has limited impacts on physical, biophysical or socio-economic functions and processes.	2
	Medium/slightly harmful	The impact has an effect on physical, biophysical or socio-economic functions and processes, but in such a way that these processes can still continue to function albeit in a modified fashion.	3
	High/harmful	Where the physical, biophysical or socio-economic functions and processes are impacted on in such a way as to cause them to temporarily or permanently cease.	4
	Very high/disastrous	Where the physical, biophysical or socio-economic functions and processes are highly impacted on in such a way as to cause them to permanently cease.	5
Severity (extent + duration + intensity)			
Frequency	<p>This provides a description of any repetitive, continuous or time-linked characteristics of the impact: Once-off (occurring any time during construction or operation); intermittent (occurring from time to time, without specific periodicity); periodic (occurring at more or less regular intervals); continuous (without interruption).</p>		
	Once-off	Once	1
	Rare	1/5 to 1/10 years	2
	Frequent	Once a year	3
	Very frequent	Once a month	4
	Continuous	≥ once a day/per shift	5
Probability of occurrence	<p>A description of the chance that consequences of that selected level of severity could occur during the exposure.</p>		
	Highly unlikely	The probability of the impact occurring is highly unlikely due to its design or historic experience.	1
	Improbable	The probability of the impact occurring is low due to its design or historic experience.	2
	Probable	There is a distinct probability of the impact occurring.	3
	Almost certain	It is most likely that the impact will occur	4
	Definite	The impact will occur regardless of any prevention measures.	5
Incidence (frequency + probability)			

ASPECT	IMPACT RATING
Risk rating	<p>The risk rating is calculated based on input from the above assessments. The incidence of occurrence is calculated by adding the extent of the impact to the duration of the impact. The severity of the impact is calculated based on input from the extent of the impact, the duration and the intensity.</p> <p>Risk = Severity (extent + duration + intensity) x Incidence (frequency + probability)</p> <p>Significance: The significance of the risk based in the identified impacts has been expressed qualitatively as follows:</p> <ul style="list-style-type: none"> ➤ Low – the impact is of little importance/insignificant but may/may not require minimal management. ➤ Medium – the impact is important; management is required to reduce negative impacts to acceptable levels. ➤ High – the impact is of great importance, negative impacts could render development options or the entire project unacceptable if they cannot reduce to acceptable levels and/or if they are not balanced by significant positive impact, management of impacts is essential.

Based on a synthesis or combination of the information contained in the above-described criteria, and drawing on legal policies and guidelines as well as the status of the impacts and potential risks, the overall significance were determined as follows:

Table 2.7: Definition of significance ratings (positive and negative)

Significance	Description
Very high (VH) (150+)	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
High (H) (101-149)	An impact of high significance which could influence a decision about whether to proceed with the proposed project, regardless of available mitigation options.
Medium (M) (51-100)	If left unmanaged, an impact of medium-high significance could influence a decision about whether to proceed with a proposed project. An impact of Low-medium significance would have some effect during decision making about whether to proceed with a proposed project, however, mitigation for this type of impact is manageable.
Low (L) (25-50)	An impact of low significance would have little effect on decision making and only a small influence on project design or alternative motivation.
Very low (VL) (1-24)	An impact of very low significance is likely to contribute to positive decisions about whether to proceed with the project. It will have little effect and is unlikely to have an influence on project design or alternative motivation.
Negligible / zero impact	There will be no impact, or any impact identified can be viewed as negligible. This rating will be unlikely to have an influence on project design or alternative motivation.
Positive impact (+)	A positive impact is likely to result in a positive consequence/effect and is likely to contribute to positive decisions about whether to proceed with the project.

3. Site assessment

This chapter compares baseline information with field survey data collected. A site visit was conducted between the 24th and 25th of May 2024. Data collected during the site visit was then compared to existing literature on the site which included vegetation classifications and biodiversity programmes and plans.

3.1. Topography

The landscape within the project site is relatively flat with an incision running through the site where elevation decreases because of a perennial stream cutting through the landscape (Figure 3.1). Average elevations at the borehole sites are 1 470 m.a.s.l. (meters above sea level). The highest point of elevation is at borehole 1 (1 490 m.a.s.l) and lowest at various borehole points at 1 445 m.a.s.l.

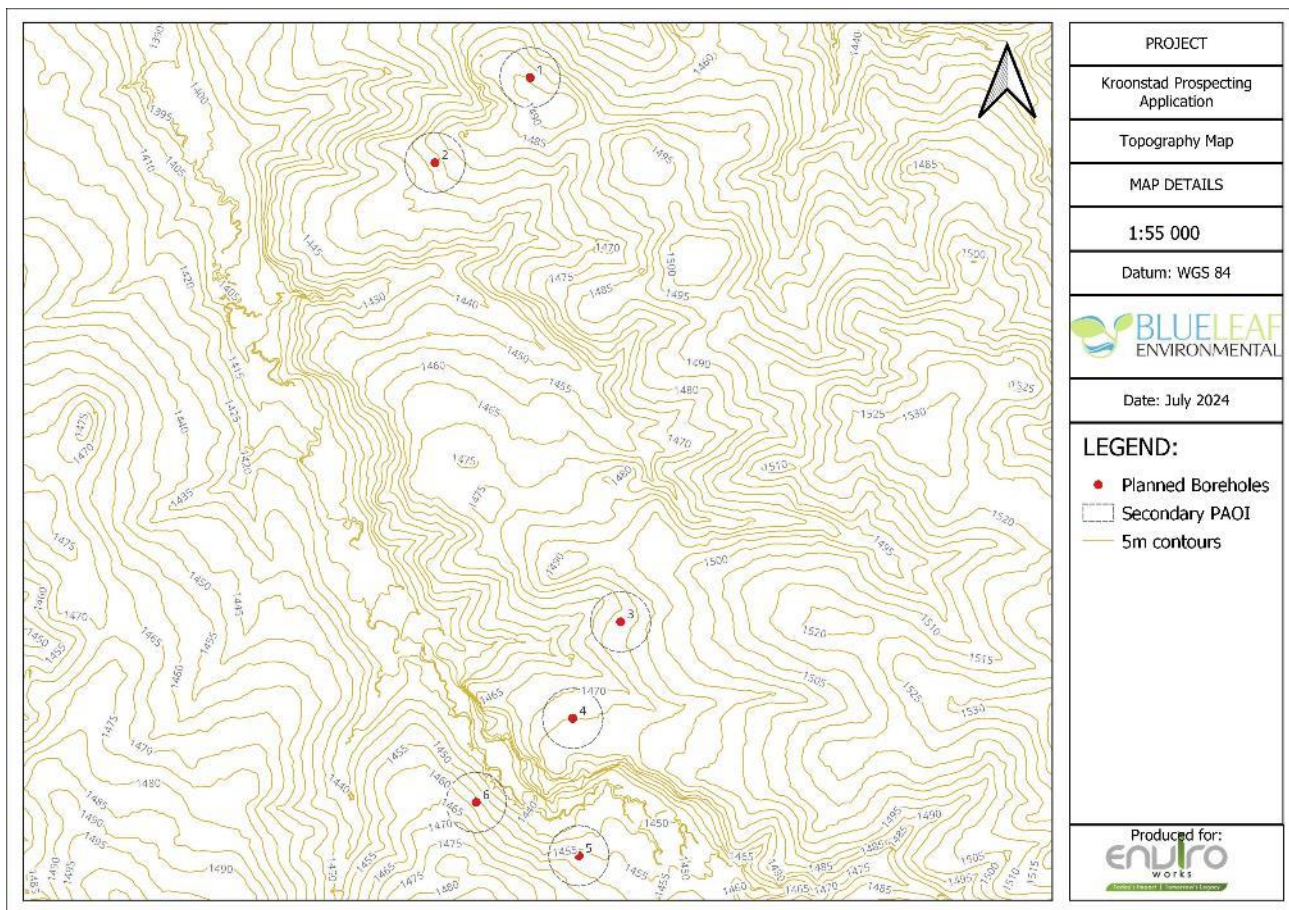


Figure 3.1: Topography of the proposed sites and surrounding areas.

3.2. Local climate

Data was obtained from en.climate-data.org for Kroonstad, the nearest town to the site with climate data. The temperature averages 17.4 °C, and the rainfall average is 615 mm. The month with the least amount of precipitation is July (7 mm) while December has the highest averages with a mean

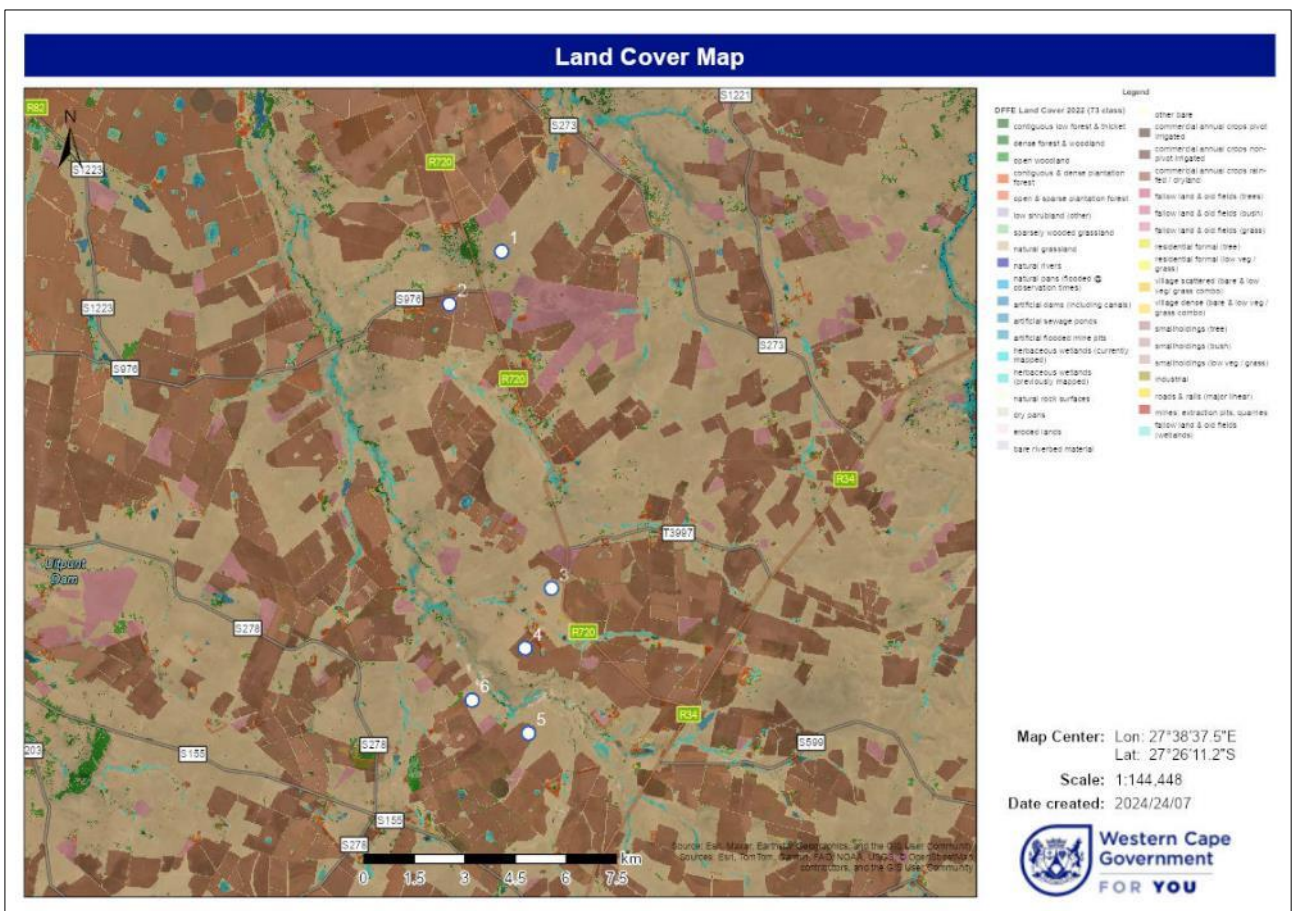
value of 107 mm. January boasts the highest average temperature, with a recorded maximum of 22.6 °C while July is the coldest time of the year with temperatures averaging at around 9.7 °C.

3.3. Geology and Soils

The geology of the borehole sites constitutes sedimentary mudstones and sandstone mainly of the Adelaide subgroup (Beaufort Group, Karoo Supergroup), as well as those of the Ecca Group (Karoo Supergroup found in the extreme northern section, giving rise to vertic, melanic and red soils (typical forms are Arcadia, Bonheim, Kroonstad, Valsrivier and Rensburg.

3.4. Land use

Current land use has been determined and the entire study area consists of grassland, barren land as well as cultivated land. The land is currently being used for cattle grazing, maize crop farming as well as game farming. No signs of alien vegetation can be observed on site with some vegetation been degraded due to grazing. Signs of high impact grazing is evident. Wetlands can be observed throughout the site.



Natural grassland found on site:	
	
Maizefields found on site:	Highly grazed areas have large shrubs of <i>Vachellia karroo</i> scattered in the grassland:
	

3.5. Vegetation

The site was first described according to available literature and databases. A site visit is then conducted to confirm and describe the vegetation as well as the condition of each vegetation unit.

3.5.1. Regional-scale vegetation mapping

The South African National Biodiversity Institute (SANBI) vegetation map (called the VegMap, 2018) lists the proposed six boreholes within a two vegetation types, namely Central Free-State Grassland (Gh 6; Figure 3.4). Below is a description of the vegetation type:

Central Free-State Grassland occurs in the Free State Province and marginally into Gauteng Province along a broad zone from around Sasolburg in the north to Dewetsdorp in the south. Other major settlements located within this unit include Kroonstad, Ventersburg, Steynsrus, Winburg, Lindley and Edenville.

Vegetation consists of undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and

trampled low-lying areas with heavy clayey soils are prone to *Vachellia karroo* encroachment. Important taxa include the following:

(d= dominant species)

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *Panicum coloratum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Agrostis lachnantha*, *Andropogon appendiculatus*, *Aristida bipartita*, *A. canescens*, *Cymbopogon pospischilii*, *Cynodon transvaalensis*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis lehmanniana*, *E. micrantha*, *E. obtusa*, *E. racemosa*, *E. trichophora*, *Heteropogon contortus*, *Microchloa caffra*, *Setaria incrassata*, *Sporobolus discosporus*.

Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Conyza pinnata*, *Crabbea acaulis*, *Geigeria aspera* var. *aspera*, *Hermannia depressa*, *Hibiscus pusillus*, *Pseudognaphalium luteo-album*, *Salvia stenophylla*, *Selago densiflora*, *Sonchus dregeanus*.

Geophytic Herbs: *Oxalis depressa*, *Raphionacme dyeri*.

Succulent Herb: *Tripteris aghillana* var. *integrifolia*.

Low Shrubs: *Felicia muricata* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *Melolobium candicans*, *Pentzia globosa*.

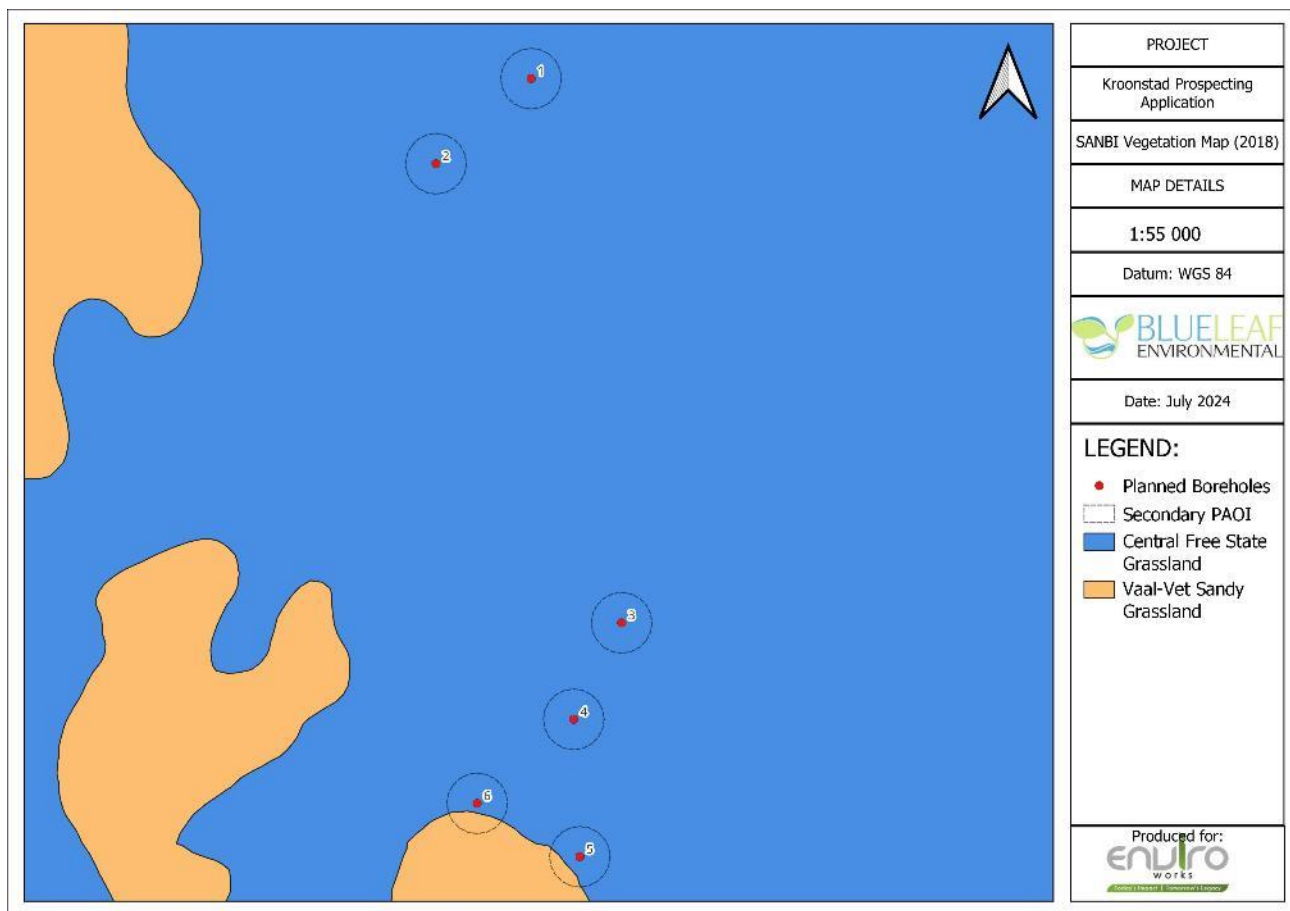


Figure 3.3: SANBI VegMap of the study area and surroundings.

SANBI classifies Central Free-State Grassland as **Least concerned** with a conservation target of 24%. Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by building of dams (Allemanskraal, Erfenis, Groothoek, Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede). No serious infestation by alien flora has been observed, but encroachment of dwarf karoo shrubs becomes a problem in the degraded southern parts of this vegetation unit. All borehole points are in this vegetation type.

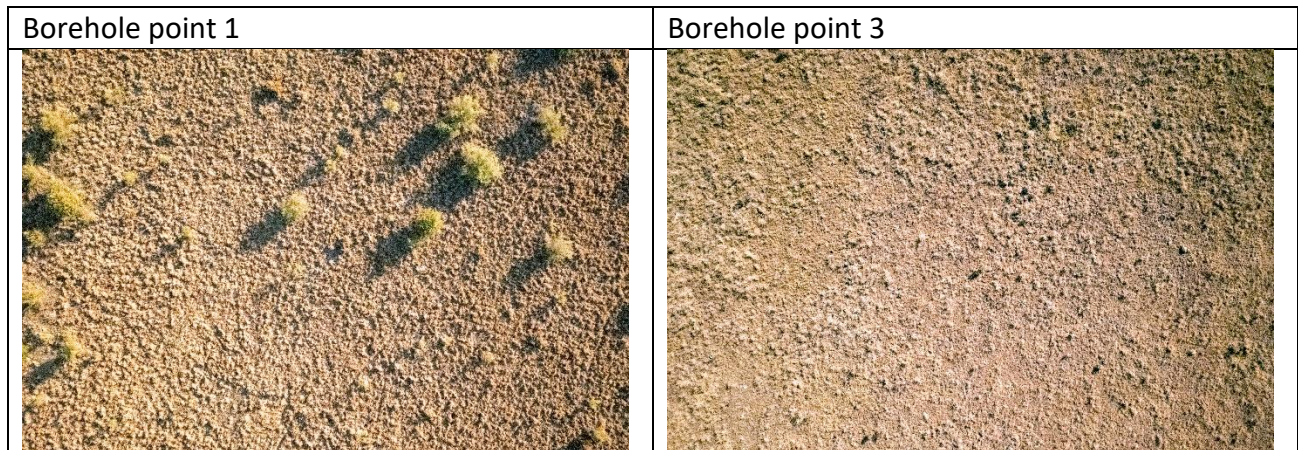
3.5.2. Fine-scale vegetation mapping

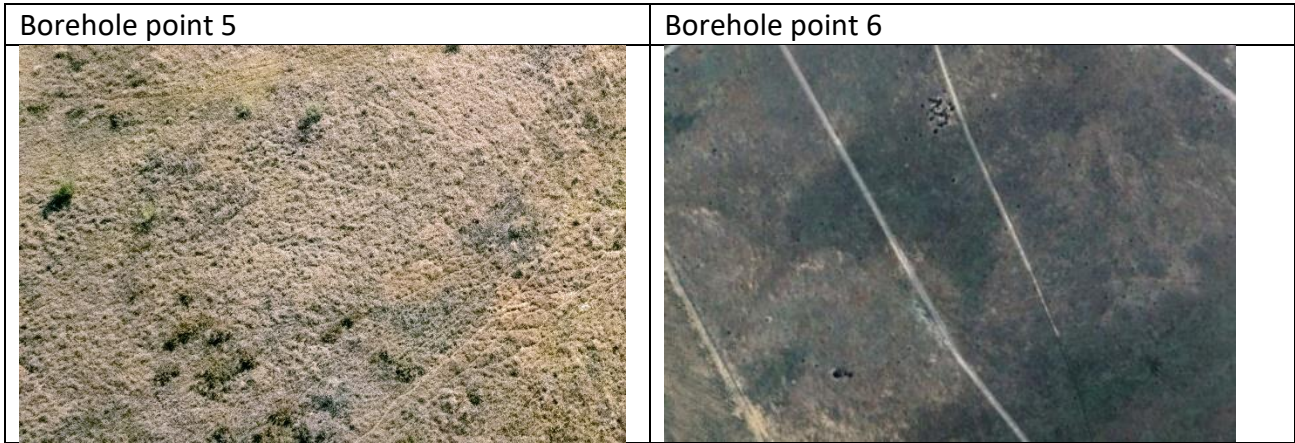
An area of 500 m (called the secondary PAOI) was demarcated around each prospecting borehole point and classified as a fine-scale vegetation unit based on vegetation cover and species types. The on-site investigation done on the 24th and 25th of May 2024 indicates that vegetation in various prospecting points is not pristine Central Free-State Grassland. The following fine-scaled vegetation units were identified:

1. Intact grassland (BH's 1,3,5 and 6)
2. Agricultural maize fields (BH's 2 and 4)

Intact grassland

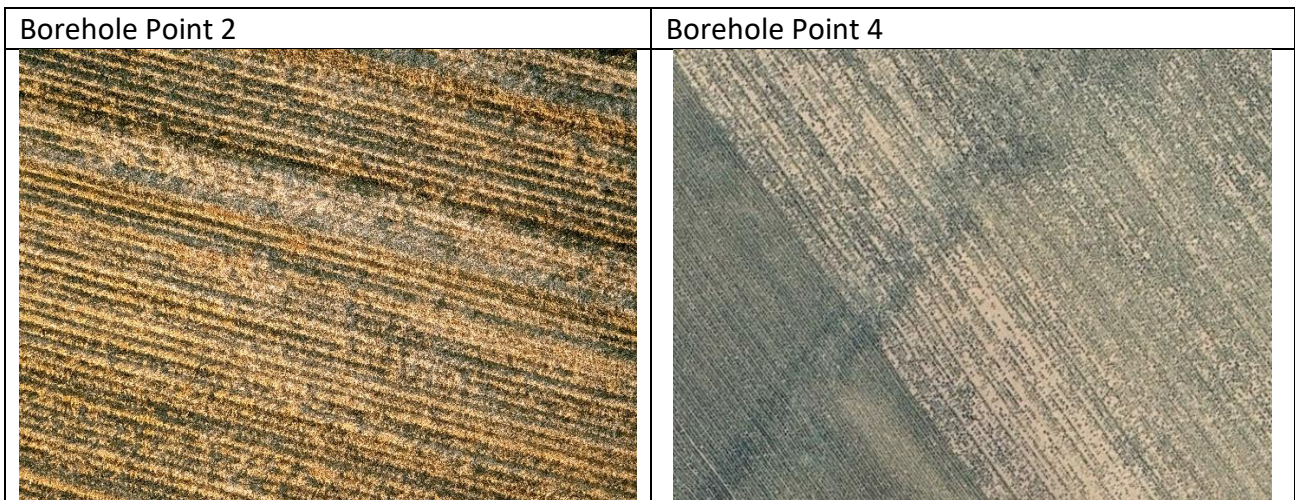
Prospecting boreholes 1,3,5 and 6 are all located on intact grassland areas. These areas consist of intact grassland with karoo shrubs, mostly *Vachellia karroo* interspersed in areas where high-level grazing has occurred. *Themeda triandra* is the dominant grass type but has been replaced by *Eragrostis* in fire prone and high grazing areas. No plant or animal SCC were observed.





Maize crop fields

These areas are completely transformed to agricultural croplands. The soils are regularly tilled, and vegetation consist of a monoculture of *Zea mays* (Maize). No natural vegetation or animal habitats remain. Boreholes 2 and 4 are located within transformed agricultural landscapes.












3.6. Plant species

A list of all plants that may potentially occur on site, including plants observed during the site visit, is provided in Appendix A. Species of Conservation Concern (SCC) listed in the Screening Report are also included regardless of being found on site or not. According to SANBI, the names of some of the species identified in the Screening Report may not appear in the Final BAR nor any of the specialist reports released into the public domain and are therefore just referred to as “Sensitive Species #”.

No plant SCC or plants not considered as SCC but still requiring permits for removal was identified on site. Of the 24 plants listed, only 15 occurred on site.


Below is a photo sequence of some of the plants observed on site:








<p><i>Vachellia karroo</i> (Sweet thorn)</p> 	<p><i>Seriphium plumosum</i> (Snakeweed)</p> 	<p><i>Paspalum distichum</i> (Dallis grass)</p> 	<p><i>Nidorella podocephala</i> (Conyza)</p> 
<p><i>Zea mays</i> (Maize/Corn)</p> 	<p><i>Eragrostis sp.</i> (Love grass)</p> 	<p><i>Datura stramonium</i> (Thorn apple)</p> 	<p><i>Bidens pilosa</i> (Black Jack)</p> 
<p><i>Asparagus laricusinus</i> (Clusterleaf)</p> 			

3.7. Animal species

The DFFE Screening Tool Report did not identify any sensitive animal species to occur on site. Although the site visit did not identify any animal species or trace thereof (prints, scat, nests, etc.) occurring on site, some species may still occur on site. These include reptiles and frogs.

Even though no animal Search & Rescue (S&R) will be required prior to commencement of construction, a staff member must be trained in venomous snake handling and removal. All construction plant, machines, offices, and excavations must be checked first thing daily during construction and all reptiles caught must be relocated to a safe area outside the footprint. No animals must be intentionally killed on site. Some of the snakes occurring in the area include:

Species name	Common name	Probability of occurring on site	Picture (from iNaturalist)
<i>Caucus rhombeatus</i>	Rhombic Night adder (Unomofuthwana)	Moderate	

Species name	Common name	Probability of occurring on site	Picture (from iNaturalist)
<i>Naja nivea</i>	Cape cobra	High	
<i>Bitis atropos</i>	Berg adder	Low	
<i>Hemachatus haemachatus</i>	Rinkhals (Iphimpi)	High	
<i>Atractapis bibronii</i>	Bribon's Stiletto Snake	Moderate	
<i>Dispholidus typus</i>	Boomslang	Moderate	
<i>Bitis arietans</i>	Puffadder (Irhamba)	High	
<i>Aspidelaps lubricus</i>	Coral Shield Cobra	Moderate	

The DFFE Screening Tool lists the following species as potentially occurring on site:

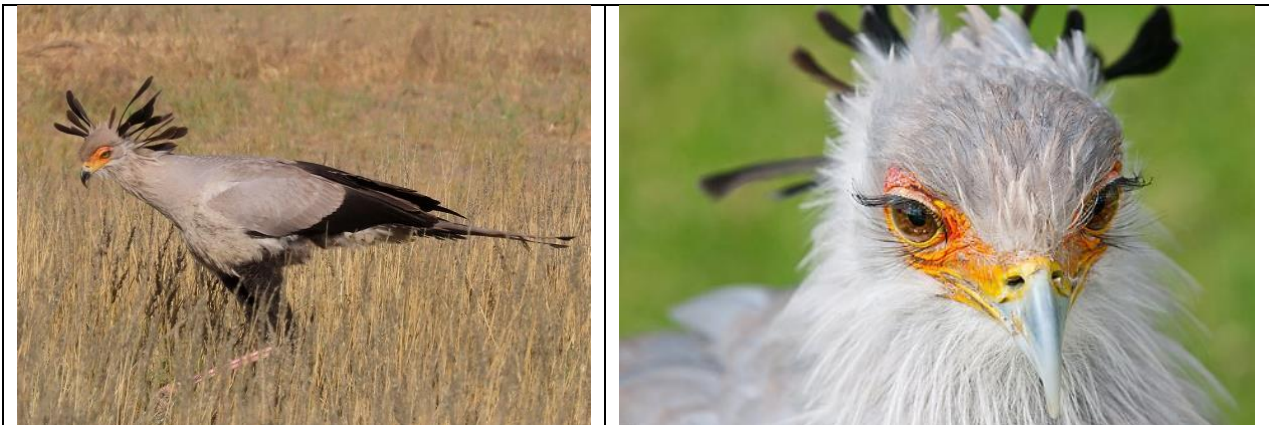
Birds:

1. *Hydroprogne caspia* (Caspian Tern)



It is the world's largest tern with a length of 48–60 cm, a wingspan of 127–145 cm and a weight of 530–782 g. Their breeding habitat is large lakes and ocean coasts. They feed mainly on fish, which they dive for, hovering high over the water and then plunging. They also occasionally eat large insects, the young and eggs of other birds and rodents. They may fly up to 60 km from the breeding colony to catch fish. Breeding is in spring and summer (December and January), with one to three pale blue-green eggs, with heavy brown spotting, being laid. They nest either together in colonies, or singly in mixed colonies of other tern. The nest is on the ground among gravel and sand, or sometimes on vegetation; incubation lasts for 26–28 days. The chicks are variable in plumage pattern, from pale creamy to darker grey-brown. Fledging occurs after 35–45 days. SANBI lists then as **VULNERABLE but with a low likelihood of occurrence**. They may feed on site or nearby.

2. *Sagittarius serpentarius* (Secretary bird)



The secretary bird is a large bird of prey that is endemic to Africa. It is mostly terrestrial, spending most of its time on the ground, and is usually found in the open grasslands and savanna of the sub-Saharan region where it strides about hunting for reptiles, small mammals, and insects, which it bludgeons with its powerful legs. It is a distinctive, tall, long-legged, crane-like raptor with unique quill-like plumes on its head and bright-red facial skin. In flight, the dark edge to the hind wing, diamond-shaped tail, and long spatulate tail feathers make it unmistakable.

Secretary birds are not migratory but are highly mobile. Young birds in particular undertake extensive and often rapid movements, primarily in arid areas. The density of breeding pairs varies Kemp (1994) reporting estimates of 70 km²/pair in Highveld grasslands due to the lack of suitable nesting trees. Habitat loss, driven by agriculture and urban development, is the primary threat to this species. SANBI lists then as **ENDANGERED but with a high likelihood of occurrence**.

Mammals:

1. *Ourebia ourebi ourebi* (oribi)



The oribi is a small antelope recorded from the northeastern to the southeastern parts of South Africa, as well as across the African continent up to the Sahel in North Africa and West Africa. There are 12 suggested extant subspecies of the oribi, while the 13th subspecies is considered extinct.

Only one subspecies, *O. ourebi ourebi*, is recorded in South Africa and it is considered an evolutionary significant unit, i.e. it has a distinct ancestry from the rest of the African populations. Therefore, conservation efforts to conserve its unique lineage are necessary. Although mostly recorded from protected areas, the habitats of the oribi in South Africa are largely fragmented due to human socio-economic activities including agriculture, forestry, settlement, infrastructure, as well as bushmeat for consumption and recreational hunting. The oribi largely inhabit both open and wooded grassland habitats and are mostly abundant in wetter areas.

They are water-independent and depend entirely on plant material for their water needs. They prefer heterogenous microhabitats with short grass for feeding and a mixture of both short and tall grass for feeding and hiding. SANBI lists them as **ENDANGERED but with a medium likelihood of occurrence**.

Reptiles

1. *Sensitive animal species # 15*

Some animal SCC are sensitive to illegal harvesting. Such species have had their names or redacted and are listed as sensitive using a unique number (# 15 in this case). As per the best practise guideline that accompanies the Animal and Plant Species Protocol for the screening tool, the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It is therefore only referred to as sensitive animal species # 15.

Animal Species # 15 are highly protected as they are limited to flat or sloping highveld grassland. They are limited to a small area covering three provinces. They live in self-excavated burrows, although they can be opportunistic and inhabit empty burrows. It is diurnal and insectivorous, although plant material may also be consumed. Habitats for this species do occur on site. SANBI lists them as **VULNERABLE with a medium likelihood of occurrence**.

3.8. Terrestrial Biodiversity

Terrestrial biodiversity is the variety of life forms found in a specific area. These life forms include a variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life. Below is a discussion of the factors influencing terrestrial biodiversity:

Ecological drivers

A driver is any natural or human-induced factor that directly or indirectly causes a change in an ecosystem. A direct driver unequivocally influences ecosystem processes. An indirect driver operates more diffusely, by altering one or more direct drivers. Below is a discussion of the identified ecological drivers on site and how the various new and road upgrades will impact biodiversity within the PAOI:

Ecological drivers	Biodiversity patterns
Fire	Grassland is a fire-prone ecosystem, hence fire is vital to the maintenance of both its structural and textural patterns. Fire is critical for maintaining the health of grassland ecosystems as it removes the dead and moribund plant material that shades out the next seasons growth; stimulates new growth which enhances primary productivity; releases nutrients and organic material back into the soil; and controls invasion of alien and indigenous woody plants which could cause a shift from grassland to Savanna or Woodland. Fire also increases the diversity of habitats within a landscape, for example recently burnt areas would be dominated by short grasses but areas that have not been burnt would be dominated by long grass. This mosaic of structurally differing habitats provides different habitats for different faunal species (SANBI, 2013).
Grazing	Grazing has a major influence on canopy structure in grass- lands as well as on species composition. The grass plant is well adapted to defoliation by grazing, fire or mowing: the basal meristems of grass leaves enable regrowth after defoliation and draw on carbohydrate reserves from the stem bases or rhizomes. Grazing is the removal of above-ground plant matter by animals, either indigenous or domestic. It acts as an important agent of disturbance, introducing habitat diversity into the system both spatially and over time. Grazing stimulates biomass production through the removal of dead or dying plant biomass that limits new growth and breaks up the soil surface due to hoof action which allows better infiltration of water and nutrients (especially from animal dung) (SANBI, 2013).

This report makes use of various spatial databases to define the terrestrial ecology of the area associated with the proposed bridge development. These include (but are not limited to):

1. Free State Biodiversity Plan (FSBP 2015).
2. SWSA’s
3. National Freshwater Ecosystem Priority Area (NFEPA).
4. Endangered ecosystems
5. Protected and NPAES areas

3.8.1. FSBP

None of the proposed prospecting borehole points will be in a CBA or ESA (Figure 3.4). Borehole points 5 and 6 is near CBA1 areas but will be avoided if the point does not change.

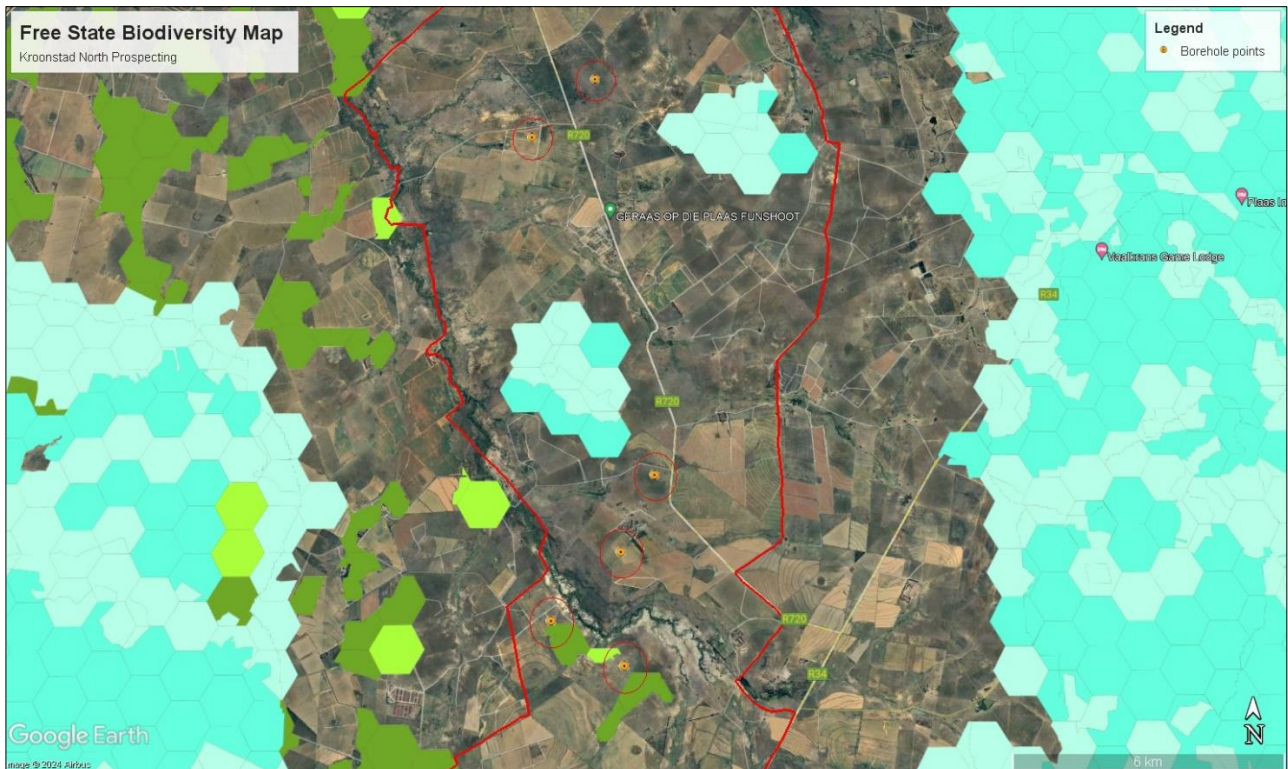


Figure 3.4: Free State Biodiversity Plan (2016) – CBA Map (Dark green = CBA1; Light green = CBA2; Dark blue ESA1; Light Blue = ESA2).

3.9. SWSA

Strategic Water Source Areas or SWSA’s are national ecological infrastructure assets that are essential for water security. These areas of high rainfall make up just 10% of the land area of South Africa, Lesotho and Eswatini but supply 50% of water to these countries. What happens within the boundaries of SWSAs has an impact on water quality and quantity for millions of people and for economic and agricultural activity downstream. A total of 20 SWSA’s were identified. SWSA can also be separated in surface water sources (SWSAsw) and groundwater sources (SWSAgw). Groundwater SWASs are areas which have a high groundwater recharge/availability and are classified as a nationally important resource. The proposed borehole sites are however not located within any SWSA and will therefore not have any impact on the existing quality and quantity (yield and capacity) of any SWSA’s.

3.9.1. FEPA Sub-catchments

The proposed new bridge is situated in upstream management catchment 7260. Upstream Management Areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas (FSAs). Upstream Management Areas do not include management areas for wetland FEPAs. Upstream management catchment 7260 is not classified as a sensitive sub-catchment of FSA.

3.10. Threatened ecosystems

None of the proposed prospecting borehole sites will be in a threatened ecosystem.

3.11. Protected areas

No protected areas were identified within the project site or within 1 km of the development. The prospecting borehole sites are not located within any NPAES Focus Area (Figure 3.5).

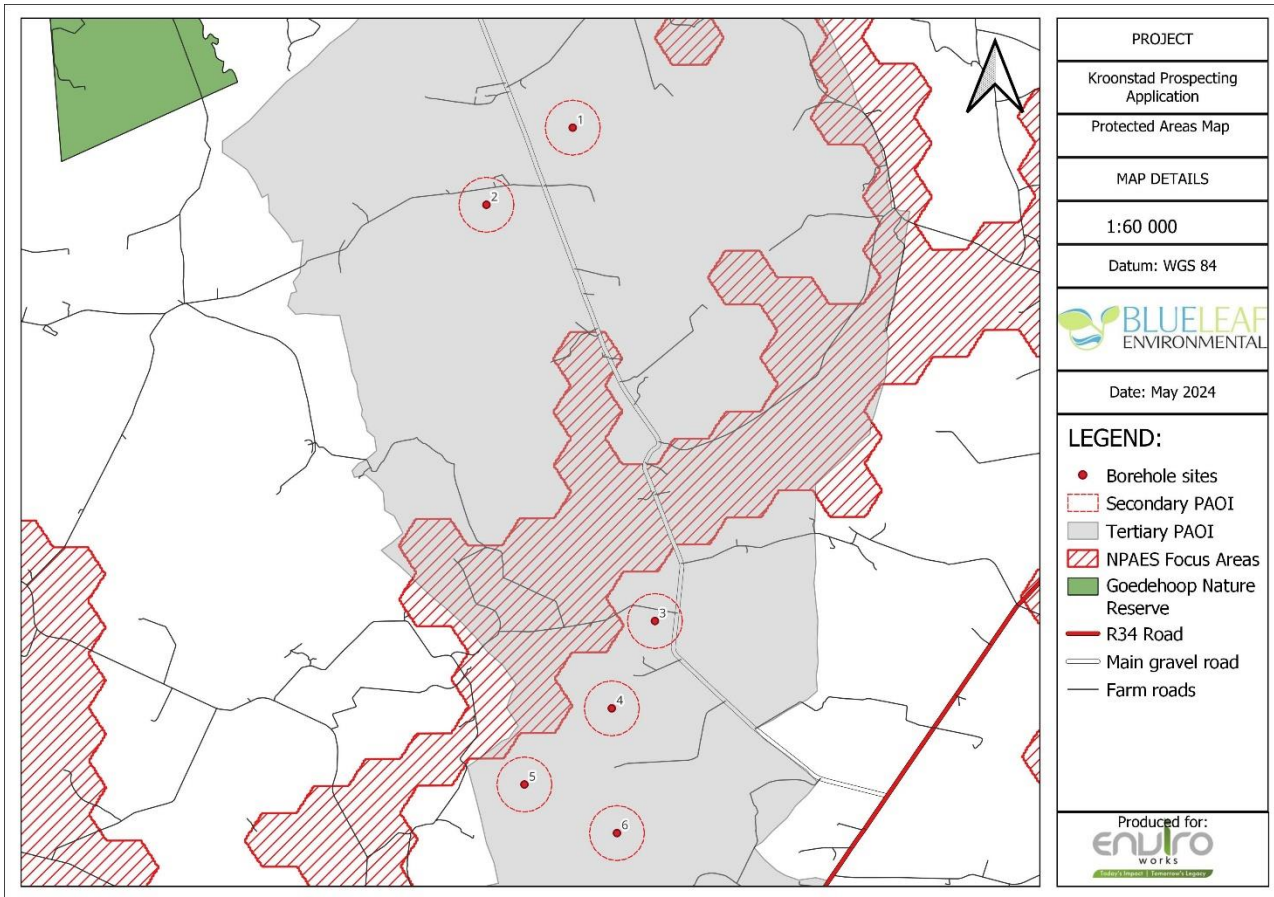


Figure 3.5: Protected areas and NPAES in and around the project site

3.12. Alien and Invasive species

It should be noted that the CARA regulations for the legal obligations regarding alien invasive plants in South Africa have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which was promulgated on 1 October 2014. However, CARA has not been repealed and is still included as a reference point to use in terms of the management of Alien and Invasive Species (AIS) within agricultural land.

The National Environmental Management: Biodiversity Act, (Act No. 10 of 2004; NEM:BA) provides a list of Alien and Invasive Species (AIS) for management (GN. R. 898 of 2014 as amended in 2016). AIS are classified into the following categories:

- **Category 1a:** species which must be combatted or eradicated.
- **Category 1b:** species which must be controlled.
- **Category 2:** species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit.

➤ **Category 3:** as species which are subject to exemptions.

Three exotic species that are listed as 'Not Evaluated' (i.e. exotic) on the Red List of South African Plants were identified on site. These species should be managed during construction to avoid spreading.

Category 1b

The following three species listed in this category were observed on site:

1. *Datura stramonium* (Thorn apple)

As these species must be controlled it is recommended that all specimens within the Primary PAOI be removed from site and moved to a registered landfill site.

Tagetes minuta (Khaki weed) and *Bidens pilosa* (Black Jacks) are not classified as invasive species and should therefore just be managed during drilling.

4. Site Ecological Importance

4.1. DFFE Screening Report Site Verification

The DFFE Screening Report has listed the terrestrial biodiversity theme for the site as **very high**. Based on the site visit and assessment, the site's terrestrial biodiversity theme for the prospecting points can be reduced to low as none of the points is located within any biodiversity sensitive area. All biodiversity sensitive areas including CBA's, ESA's protected areas, NPAES Focus Areas, and endangered ecosystems (the nearby Vaal -Vet Sandy Grassland ecosystem is classified as endangered) are avoided.

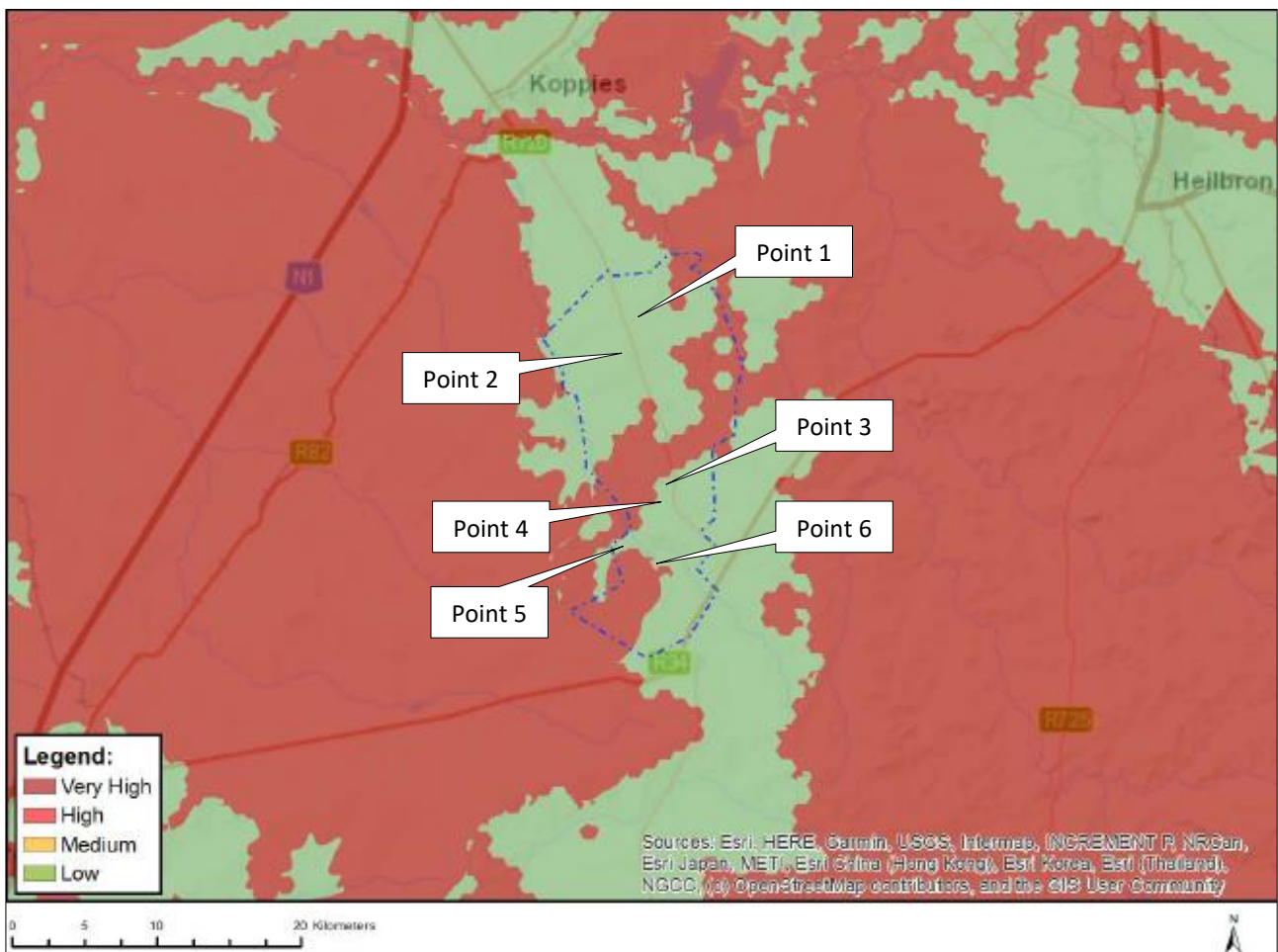


Figure 4.1: Terrestrial Biodiversity sensitivity as per the DFFE Screening Tool Report

The DFFE Screening Report listed the plant species theme sensitivity for the site as **low**. Based on the site visit and assessment, and due to the absence of any protected plants within the prospecting borehole points, the site's plant species theme sensitivity should remain as low. Of the 25 species occurring on site, 3 are alien and/or invasive species, including an agricultural crop (maize). No protected plants were identified.

The DFFE Screening Report listed the animal species theme sensitivity for the site as **medium**. Based on the site visit and assessment, and due to the presence of intact habitats where some of the

sensitive species listed in the DFFE Screening Report, AND other non-identified species may occur (although none were observed during the site visit), the site’s animal species theme sensitivity should remain as medium.

4.2. Site Ecological Importance

Site Ecological Importance (SEI) was separately determined for each environmental theme. Environmental constraints were identified and aligned with specific characteristics of the site. The following site characteristics contributed to determining site sensitivities.

Plant and animals

SEI for both plants and animals were determined using the methodology prescribed by the Species Environmental Assessment Guideline (SANBI; 2022) and summarised in section 2.5 of this report. Below is a table summarising the various components of Plant and Animal SEI assessed:

Components assessed	Sensitivity allocation	Justification
Conservation Importance (CI)	Very low for agricultural land.	<ul style="list-style-type: none"> ➤ No confirmed and highly unlikely populations of SCC. ➤ No confirmed and highly unlikely populations of range-restricted species. ➤ No natural habitat remaining.
	Medium for grassland areas.	<ul style="list-style-type: none"> ➤ Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) ➤ Any area of natural habitat of threatened ecosystem type with status of VU. ➤ Presence of range-restricted species. ➤ > 50% of receptor contains natural habitat with potential to support SCC.
Functional Integrity (FI)	Very low for agricultural land.	<ul style="list-style-type: none"> ➤ Small (200 m²) area. ➤ No habitat connectivity except for flying species or flora with wind-dispersed seeds. ➤ Several minor and major current negative ecological impacts.
	High for grassland areas.	<ul style="list-style-type: none"> ➤ Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type ➤ Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. ➤ Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Biodiversity Integrity (BI)	Very low for agricultural land	CI x FI
	Medium for grassland	
Receptor Resilience (RR)	High for entire site	<ul style="list-style-type: none"> ➤ Habitat can recover relatively quickly (within 5 years) where >75% of the original species composition and functionality returns. ➤ Species have a high likelihood of returning to the site once the disturbance or impact has been removed.

Components assessed	Sensitivity allocation	Justification
Site Ecological Importance (SEI) (BI x RR)	Very low for bare and transformed areas	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
	Low for grassland areas	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

A combined SEI map was developed for both plant and animal themes assessed in this report (Figure 4.2). This map was developed based on the identified environmental characteristics found within the site and listed in section 4.2 above.

Terrestrial biodiversity

Terrestrial biodiversity site sensitivity was determined for the Total PAOI (borehole footprint + secondary PAOI + tertiary PAOI). Sensitivity was first based on the DFFE Screening Tool Report outcome and secondly, a subsequent confirmation of these sensitivities during the site visit. Additional biodiversity related constraints (if any) were also identified and aligned with specific characteristics of the site. The following site characteristics contributed to confirming or disputing the site sensitivity:

Biodiversity indicator	Site characteristic contributing to sensitivity	Sensitivity allocation
Vegetation types located within the PAOI	Central Free State Grassland vegetation	Low
	Vaal-Vet Sandy Grassland vegetation	High
CBA and ESA areas	Landscape functionality will change minimally. Minimise impacts on surrounding functionalities.	High
Surface water features (rivers and wetlands)	High ecological functionality and ecological corridor	High

A detailed terrestrial biodiversity sensitivity map for the total PAOI was developed based on the identified environmental characteristics found within the site (Figure 4.2).

All six prospecting borehole points has a low sensitivity for both Plant & Animal Species as well as Terrestrial Biodiversity. No sensitive areas as shown in the sensitivity maps above will be impacted provided that the borehole points do not move.

The proposed mitigation measures provided below were designed to mitigate the impacts on the project site area in an acceptable manner to ensure minimal negative impacts on the environment.

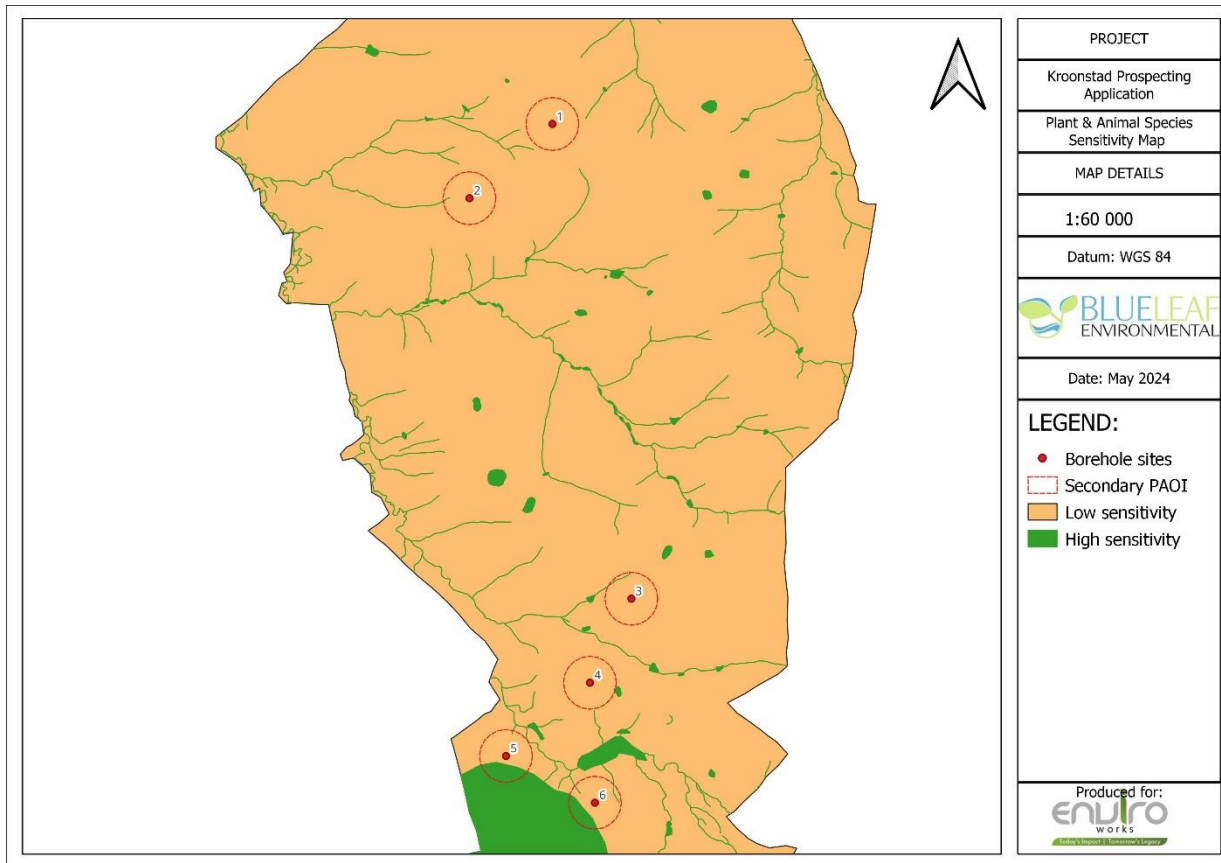


Figure 4.1: Plant and animal sensitivity map of the total PAOI

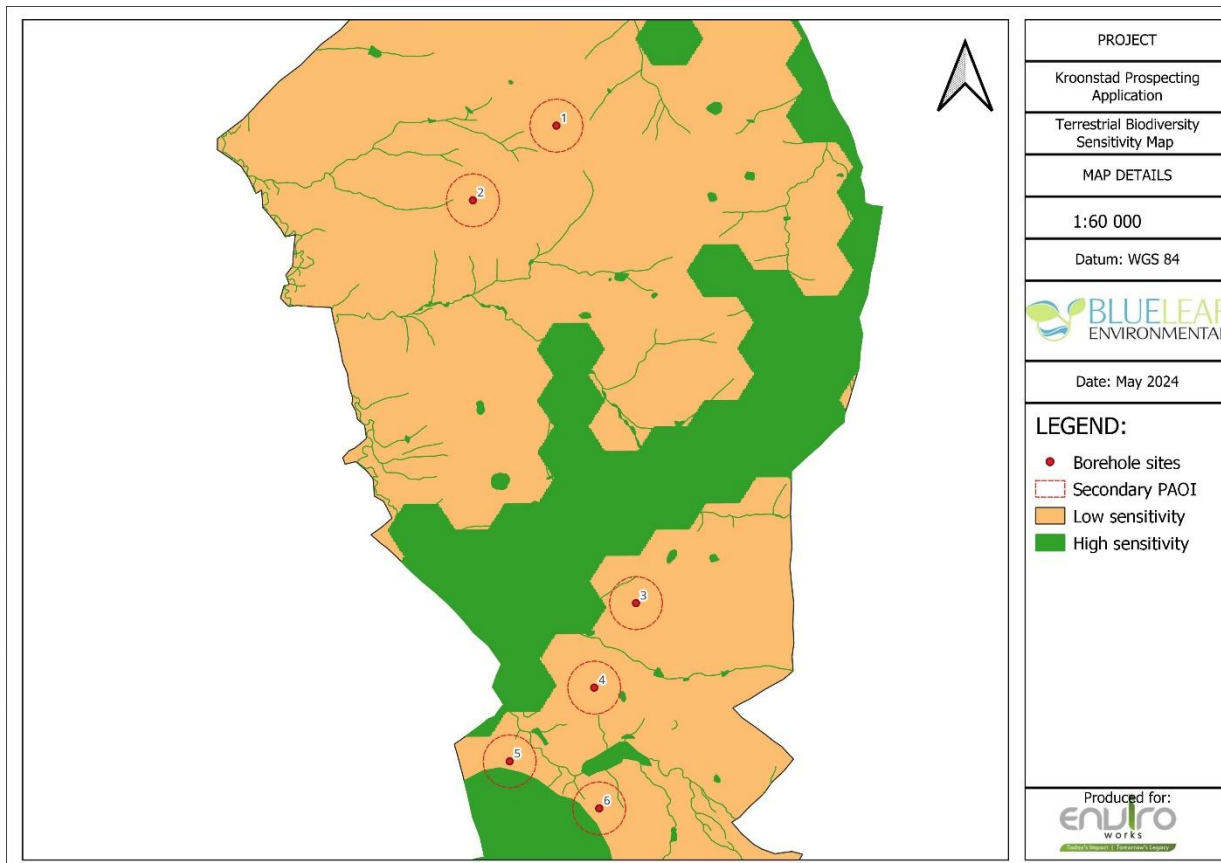


Figure 4.2: Terrestrial biodiversity sensitivity map for the proposed project.

5. Impact assessment

The following issues were identified during the assessment of the proposed Kroonstad North prospecting project.

5.1 Identified impacts

The following ecological issues were identified during the assessment of the proposed development:

#	Activity causing impact (Issue)	Description of impact
1.	Vegetation clearing	<p>1.1. Soil compaction Damage to soil structure, compaction, soil chemistry, reduced organic matter and ability to use, filter or retain water means that soil can't function effectively to grow food, support living organisms such as worms, plant roots and fungi, or store carbon (which helps to reduce carbon emissions).</p>
		<p>1.2. Loss of natural vegetation Clearing vegetation will result in the temporary loss of up to 150 m² of intact grassland, resulting in the reduction of natural grassland in the Biome.</p>
		<p>1.3. Spread of alien and invasive plant species Removal of natural vegetation will increase the risk of alien plant species invasion.</p>

All impacts identified above were assessed as per the assessment methodology described in Chapter 3.8 of this report. Each impact was described on how it will impact within a specific phase of the project, namely Planning and Design, Construction and Operations.

Issue 1:	Vegetation clearing for construction
Consequence of issue	Clearing of endemic vegetation including will result in a range of issues including increasing soil compaction, reducing endemic vegetation types, and increasing the risk of alien vegetation spreading.
Number of impacts	3 (Impacts 1.1 to 1.3)

Impact 1.1: Soil compaction	
Phase of expansion: Construction (Prospecting) Phase	
Nature of impact	Negative: Damage to soil structure, compaction, soil chemistry, reduced organic matter and ability to use, filter or retain water means that soil can't function effectively to grow food, support living organisms such as worms, plant roots and fungi, or store carbon (which helps to reduce carbon emissions). This impact is relevant in all temporarily impacted areas.
Cumulative impact	Loss of fertile soils in the area.
Indirect impacts	Loss of vegetation and habitat.
Residual impacts	Loss of soils in temporary impacted areas surrounding the road infrastructure through the setup of laydown areas, stockpile areas and driving on natural vegetated areas outside the POAI.

Classification of impact	Before mitigating	After mitigating	Consequence of Impact (pre-mitigation only)
Duration of impact	3	1	Occur during construction (prospecting) only.
Extent of impact	2	1	Impact in temporary footprints only.
Intensity of impact	4	1	Soil processes will be permanently altered.
Severity	9	3	Duration + extent + intensity
Probability of impact occurring	5	2	Impact will occur on commencement of prospecting.
Frequency	1	1	Continuous throughout prospecting.
Incidence	6	3	Frequency + Probability
Degree of reversibility	High		Impact can be reversed.
Irreplaceability	Medium		Soils play an important role in an ecosystem and must be conserved where possible.
Mitigations	Mitigatory potential		Recommended mitigations
	High		
			<ul style="list-style-type: none"> - All footprints must be clearly demarcated. No activities will be allowed outside the footprints. - Any topsoil removed and stockpiled must be replaced during rehabilitation. - No soil may be removed from site. - All sites must be fully rehabilitated.
Significance of impact (Severity x Incidence)	Pre-mitigation significance		Post-mitigation significance
	Medium negative (54)		Very low negative (9)

Impact 1.2: Loss of natural vegetation	
Phase of expansion: Construction (Prospecting) Phase	
Nature of impact	Negative: Clearing will result in the permanent loss of up to 150 m ² of intact grassland, resulting in the reduction of natural grassland in the Biome.
Cumulative impact	Reduction of natural Central Free State Grassland.
Indirect impacts	Loss of habitat.
Residual impacts	Loss of up to 150 m ² of natural vegetation. This impact is temporary.

Classification of impact	Before mitigating	After mitigating	Consequence of Impact (pre-mitigation only)
Duration of impact	3	1	Clearing will result in the temporary loss of 150m ² of natural vegetation. Drilling points can be rehabilitated.
Extent of impact	3	2	All the vegetation within the prospecting footprint will be removed.
Intensity of impact	3	1	Temporary impact.
Severity	9	4	Duration + extent + intensity
Probability of impact occurring	5	3	Impact will definitely occur on commencement of construction.
Frequency	3	1	Permanent removal of vegetation
Incidence	8	4	Frequency + Probability
Degree of reversibility	High		Impact can be reversed.
Irreplaceability	Medium		Vegetation will be temporary removed. Endemic forest thicket but with a low ecosystem threat.
Mitigations	Mitigatory potential		Recommended mitigations
	Medium		<ul style="list-style-type: none"> - The prospecting footprint must be demarcated prior to commencing. All contractors must be made aware of this demarcation. - Clearing must remain within the demarcated areas. - All prospecting areas must be rehabilitated and revegetated. - All areas outside the demarcated footprint will be considered as No-Go areas. No activities (temporary or permanent) will be allowed in these areas.
Significance of impact (Severity x Incidence)	Pre-mitigation significance		Post-mitigation significance
	Medium negative (72)		Very low negative (8)

Impact 1.3: Spread of alien and invasive plant species	
Phase of expansion: Construction Phase	
Nature of impact	Negative: Removal of natural vegetation will increase the risk of alien plant species invasion. Contractor can also unknowingly import exotic and invasive species through their plant and equipment.
Cumulative impact	Increase in regional spread of alien plants. Loss of grassland vegetation.
Indirect impacts	Spread of alien vegetation into surrounding areas.
Residual impacts	Decreased risk of alien vegetation occurrence and spread.

Classification of impact	Before mitigating	After mitigating	Consequence of Impact (pre-mitigation only)
Duration of impact	3	1	Clearing will occur throughout construction.
Extent of impact	3	1	The construction footprint and surrounding areas will be impacted.
Intensity of impact	3	1	All cleared areas have a risk of alien vegetation growth.
Severity	9	3	Duration + extent + intensity
Probability of impact occurring	3	3	Alien vegetation will grow on cleared areas and soil stockpiles.
Frequency	2	1	Impact will occur throughout construction phase.
Incidence	5	4	Frequency + Probability
Degree of reversibility	High		Impact can be managed throughout construction.
Irreplaceability	Low		All alien vegetation must be repeatedly removed within footprint during construction and operations.
Mitigations	Mitigatory potential		Recommended mitigations
	Medium		<ul style="list-style-type: none"> - All visible alien plants must be removed prior to top- and subsoil removal. - Sites must be monitored and managed for alien vegetation during prospecting. - Removal must occur through appropriate methods such as hand pulling, application of chemicals, cutting, etc. in accordance with the NEMBA: Alien Invasive Species Regulations. - Any alien plants removed must be dumped at the local registered dumpsite.
Significance of impact (Severity x Incidence)	Pre-mitigation significance		Post-mitigation significance
	Low negative (45)		Very low negative (12)

6. Conclusion

6.1. Assessment summary

BlueLeaf has been appointed by Enviroworks Consulting on behalf of Reef Exploration (Pty) Ltd, to undertake a Terrestrial Biodiversity, Plant and Animal Species Assessment as part of the EIA process conducted by Enviroworks.

The contents of this specialist report comply with the legislated requirements as described in the following environmental theme and associated specialist assessment protocols as listed in the projects' Screening Tool Report:

1. Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity.
2. Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species.
3. Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species.

The Species Environmental Assessment Guidelines published in 2022 were used for the implementation of the Terrestrial Fauna Flora Species Protocols in this report.

The site is situated on various farms between Koppies and Edenville and located 45 km east of Kroonstad in the Free-State. Farming consists of a mix of maize crop farming, game farms, and cattle grazing.

The proposed six boreholes are located at the following coordinates:

Borehole #	Coordinates	
1.	27° 22.303'S	27° 38.648'E
2.	27° 23.151'S	27° 37.704'E
3.	27° 27.707'S	27° 39.543'E
4.	27° 28.668'S	27° 39.072'E
5.	27° 29.497'S	27° 38.121'E
6.	27° 30.029'S	27° 39.129'E

The PAOI is defined according to important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities. The PAOI sets the minimum spatial extent of the study area, and the assessment will be focused within this area. The following site descriptors were used to delineate each PAOI:

PAOI	Area (ha)	Description	Probability of impact occurring
Primary PAOI	6 x (5m x 5m) boreholes = 150 m ²	The Primary PAOI includes all boreholes within the boundary of the development site. This is the area directly impacted by prospecting.	Definite
Secondary PAOI	6 x 85 ha buffer = (510 ha)	The secondary PAOI includes all areas within a 500 m buffer of the proposed prospecting sites. These areas are not directly impacted by the development unless	Likely

		temporary footprints like site camps, laydown areas and stockpiles are placed in them. Assessing this PAOI will not only result in identifying potential indirect and cumulative impacts but will also allow for micro-movement of infrastructure.	
Tertiary PAOI	18 350 ha	The tertiary PAOI includes all farm portions where prospecting will occur on. These areas are not directly impacted by the development. Assessing this PAOI will result in identifying potential indirect and cumulative impacts.	Unlikely
Total PAOI	18 350 ha	The Primary, Secondary and Tertiary PAOI's are collectively referred to as the Total PAOI (or just the PAOI) or Study Site in this report and demarcate the extent of the study site that will be assessed.	Likely

The landscape within the project site is relatively flat with an incision running through the site where elevation decreases because of a perennial stream cutting through the landscape. Average elevations at the borehole sites are 1 470 m.a.s.l. (meters above sea level). The highest point of elevation is at borehole 1 (1 490 m.a.s.l) and lowest at various borehole points at 1 445 m.a.s.l.

The geology of the borehole sites constitutes sedimentary mudstones and sandstone mainly of the Adelaide subgroup (Beaufort Group, Karoo Supergroup), as well as those of the Ecca Group (Karoo Supergroup found in the extreme northern section, giving rise to vertic, melanic and red soils (typical forms are Arcadia, Bonheim, Kroonstad, Valsrivier and Rensburg.

Current land use has been determined and the entire study area consists of grassland, barren land as well as cultivated land. The land is currently being used for cattle grazing, maize crop farming as well as game farming. No signs of alien vegetation can be observed on site with some vegetation been degraded due to grazing. Signs of high impact grazing is evident. Wetlands can be observed throughout the site.

The SANBI VegMap (2018) lists the proposed six boreholes within a single vegetation type, namely Central Free-State Grassland. SANBI classifies Central Free-State Grassland as Least concerned with a conservation target of 24%. No serious infestation by alien flora has been observed, but encroachment of dwarf karoo shrubs becomes a problem in the degraded southern parts of this vegetation unit.

Prospecting boreholes 1,3,5 and 6 are all located on intact grassland areas. These areas consist of intact grassland with karoo shrubs, mostly *Vachellia karroo* interspersed in areas where high-level grazing has occurred. *Themeda triandra* is the dominant grass type but has been replaced by *Eragrostis* in fire prone and high grazing areas. No plant or animal SCC were observed.

Boreholes 2 and 4 are located within transformed agricultural landscapes. Maize fields dominate these areas and no natural vegetation occur.

No plant SCC or plants not considered as SCC but still requiring permits for removal was identified on site. Of the 24 plants listed, only 15 occurred on site.

Although the site visit did not identify any animal species or trace thereof (prints, scat, nests, etc.) occurring on site, some species may still occur on site. These include reptiles. Even though no animal Search & Rescue (S&R) will be required prior to commencement of construction, a staff member must be trained in venomous snake handling and removal. All construction plant, machines, offices, and excavations must be checked first thing daily during construction and all reptiles caught must be relocated to a safe area outside the footprint. No animals must be intentionally killed on site.

6.2. Site sensitivity

The DFFE Screening Report has listed the terrestrial biodiversity theme for the site as **very high**. Based on the site visit and assessment, the site's terrestrial biodiversity theme for the prospecting points can be reduced to low as none of the points is located within any biodiversity sensitive area.

The DFFE Screening Report listed the plant species theme sensitivity for the site as **low**. Based on the site visit and assessment, and due to the absence of any protected plants within the prospecting borehole points, the site's plant species theme sensitivity should remain as low. Of the 25 species occurring on site, 3 are alien and/or invasive species, including an agricultural crop (maize). No protected plants were identified.

The DFFE Screening Report listed the animal species theme sensitivity for the site as **medium**. Based on the site visit and assessment, and due to the presence of intact habitats where some of the sensitive species listed in the DFFE Screening Report, AND other non-identified species may occur (although none were observed during the site visit), the site's animal species theme sensitivity should remain as medium.

SEI has been calculated a **Very low** for bare and transformed areas and **Low** for grassland areas.

All six prospecting borehole points has a low sensitivity for both Plant & Animal Species as well as Terrestrial Biodiversity. No sensitive areas as shown in the sensitivity maps above will be impacted provided that the borehole points do not move.

6.3. Alternatives

No site alternatives or layout alternatives are proposed. The proposed development is NOT considered as fatally flawed provided that all mitigation measures provided in this report are implemented.

6.4. Cumulative impacts

In terms of Environmental Impact Assessment, Cumulative Impact is defined as:

“Means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities”.

The following cumulative impacts were identified:

,

1. Loss of natural vegetation. Clearing vegetation will result in the temporary loss of up to 150 m² of intact grassland, resulting in the reduction of natural grassland in the Biome.
2. Increased risk of alien invasive plants spreading to surrounding areas because of vegetation clearing. Contractor can also unknowingly import exotic and invasive species through their plant and equipment.

6.3. Levels of acceptable change

The proposed development is considered as an acceptable change to the environment provided all proposed mitigations are implemented.

6.4. Levels to be avoided

The site is not located in any SWSA or FEPA sub-catchment sensitive area. It is also not located in any CBA or ESA or any threatened ecosystem. Provided that all mitigation measures proposed in this report are implemented, these risks (as identified in this report) are considered as acceptable changes to the local environment.

6.5. Biodiversity offsetting

The project will not require biodiversity offsetting as per the NEMA National Biodiversity Offset Guideline (GN R 3569) legislated on the 23rd of June 2023.

The Biodiversity Offset Guideline is an implementation guideline contemplated in section 24J of the National Environmental Management Act, 1998 (NEMA). Guidelines published in terms of that section give guidance on, *inter alia*, the implementation, administration, and institutional arrangements of the Environmental Impact Assessment Regulations, 2014 (EIA Regulations) or subsequent regulations regarding the environmental impact assessment process.

6.6. Current impacts

The following impacts are currently occurring on site:

- Cattle are being grazed on all naturally vegetated grassland.
- Maize crops are grown in sections on site.

6.7. Mitigations

The following mitigations must be included into the EMPr:

Soil compaction:

- All footprints must be clearly demarcated. No activities will be allowed outside the footprints.
- Any topsoil removed and stockpiled must be replaced during rehabilitation.
- No soil may be removed from site.
- All sites must be fully rehabilitated.

Loss of natural vegetation:

- The prospecting footprint must be demarcated prior to commencing. All contractors must be made aware of this demarcation.
- Clearing must remain within the demarcated areas.
- All prospecting areas must be rehabilitated and revegetated.
- All areas outside the demarcated footprint will be considered as No-Go areas. No activities (temporary or permanent) will be allowed in these areas.

Spread of alien and invasive plant species:

- All visible alien plants must be removed prior to top- and subsoil removal.
- Sites must be monitored and managed for alien vegetation during prospecting.
- Removal must occur through appropriate methods such as hand pulling, application of chemicals, cutting, etc. in accordance with the NEMBA: Alien Invasive Species Regulations.
- Any alien plants removed must be dumped at the local registered dumpsite.

6.8. Specialist opinion

The proposed six prospecting boreholes for the Kroonstad North Prospecting project are NOT considered to be Fatally Flawed and no components of the proposed project have been identified as flawed.

No site or layout alternatives are proposed.

The ecological impacts of all aspects for the proposed Kroonstad North Prospecting project were assessed and considered to be acceptable, provided that all mitigation measures provided in this report are implemented.

7. References

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8. Appendix A – List of floral species

Family	Species name		Common name	Red Data Listing	Likelihood of occurrence
Asparagaceae	<i>Asparagus</i>	<i>laricinus</i>	Clusterleaf	Least concerned	Observed
Asteraceae	<i>Bidens</i>	<i>pilosa</i>	Blackjack	Not evaluated	Observed
	<i>Felicia</i>	<i>muricata</i>	Taai-astertjie	Least concerned	High probability
	<i>Helichrysum</i>	<i>dregeanum</i>	Bergankerkaroo	Least concerned	Probable
	<i>Nidorella</i>	<i>podocephala</i>	Conyza	Least concerned	Observed
	<i>Pentzia</i>	<i>globosa</i>	Hair karoo	Least concerned	Probable
	<i>Pseudognaphalium</i>	<i>luteoalbum</i>	Jersey cudweed	Least concerned	Probable
	<i>Seriphium</i>	<i>plumosum</i>	Slangbos	Least concerned	Observed
	<i>Tagetes</i>	<i>minuta</i>	Khaki weed	Not evaluated	Observed
Fabaceae	<i>Vachellia</i>	<i>karoo</i>	Sweet Thorn	Least concerned	Observed
Malvaceae	<i>Hermannia</i>	<i>depressa</i>	Itshesizwe	Least concerned	Probable
	<i>Hibiscus</i>	<i>pusillus</i>	Bladderweed	Least concerned	Probable
Oxidalaceae	<i>Oxalis</i>	<i>depressa</i>	Suring	Least concerned	Probable
Poaceae	<i>Aristida</i>	<i>congesta</i>	Catstail	Least concerned	Observed
	<i>Cynodon</i>	<i>dactylon</i>	Couch grass	Least concerned	Observed
	<i>Digitaria</i>	<i>argyrograpta</i>	Silver Finger grass	Least concerned	Observed
	<i>Eragrostis</i>	<i>curvula</i>	Love grass	Least concerned	Observed
	<i>Paspalum</i>	<i>distichum</i>	Dallis grass	Least concerned	Observed
	<i>Panicum</i>	<i>coloratum</i>	Bufallo grass	Least concerned	High probability
	<i>Setaria</i>	<i>sphacelata</i>	Bristlegrass	Least concerned	Observed
	<i>Themeda</i>	<i>triandra</i>	Red grass	Least concerned	Observed
	<i>Tragus</i>	<i>koelerioides</i>	Carrot grass	Least concerned	High probability
	<i>Zea</i>	<i>mays</i>	Maise/Corn	Least concerned	Observed
Solanaceae	<i>Datura</i>	<i>stramonium</i>	Thorn apple	Not evaluated	Observed