



## Terrestrial Ecology Assessment for the proposed Tetra 4 Cluster 2 Project

### Virginia, Free State Province

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#### CLIENT



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# 1 Introduction

The Biodiversity Company was appointed to complete an ecological assessment, as part of the environmental authorisation process for the proposed Tetra 4 Cluster 2 project in Virginia Free State. The project area and the associated infrastructure is located approximately 17 km south-east of the town of Welkom and 25 km north of the Theuniseen town. The area is found along the R30 and R730 located in between the R710 and R73 roads.

## 1.1 Background

The following information was provided by EIMS:

In 2012, a Production Right (Ref: 12/4/1/07/2/2) was granted which spans approximately 187 000 hectares for the development of natural gas (Helium and Methane) production operations around the town of Virginia in the Free State Province. Within the approval of the Production Right, the 2010 Environmental Management Programme (EMPr) was approved which is applicable to a large portion of the Production Right area (Figure 1-1).

The activities in the Production Right include:

- Continued exploration activities;
- Drilling and establishment of further production wells throughout the entire production area (260 production wells);
- Installation of intra-field pipelines throughout the entire production area (~500km);
- Installation of boosters and main compressors; and
- Central gas processing plant (not approved in the original EIA and approved EMPr).

On 21 September 2017, the Department of Mineral Resources and Energy (DMRE) issued an integrated environmental authorisation ("Cluster 1 EA") (reference: 12/04/07) to Tetra4 in terms of the NEMA. The Cluster 1 EA (as amended by Cluster 1 EA amendments dated 26 August 2019 and 1 September 2020) authorises the development of "Cluster 1" of the Project. In this EA approval, various new wells and pipelines, booster and compressor stations, a Helium and LNG Facility and associated infrastructure was approved which comprises the first gas field for development within the approved Production Right area. The Cluster 1 EA also authorises certain waste management activities as per the List of Waste Management Activities (Government Notice 921, as amended) published under the National Environmental Management: Waste Act 59 of 2008 (NEMWA).

Furthermore, the following licences have been issued to Tetra4 in respect of Cluster 1 of the Project:

- Provisional Atmospheric Emission Licence (PAEL) dated 4 August 2017 (reference: LDM/AEL/YMK/014) for the Storage and Handling of Petroleum Products [Category 2: Subcategory 2.4 of the Listed Activities (Government Notice 893, as amended) published under the National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA)] by the Lejweleputswa District Municipality. A final atmospheric emission licence will be issued after operation of the plant which is currently under construction; and
- Water Use Licence (WUL) dated 22 January 2019 (reference: 08/C42K/CI/8861) for the construction of pipelines for the Project in terms of section 21(c&i) water uses of the National Water Act 36 of 1998 (NWA) by the Department of Water and Sanitation (DWS).

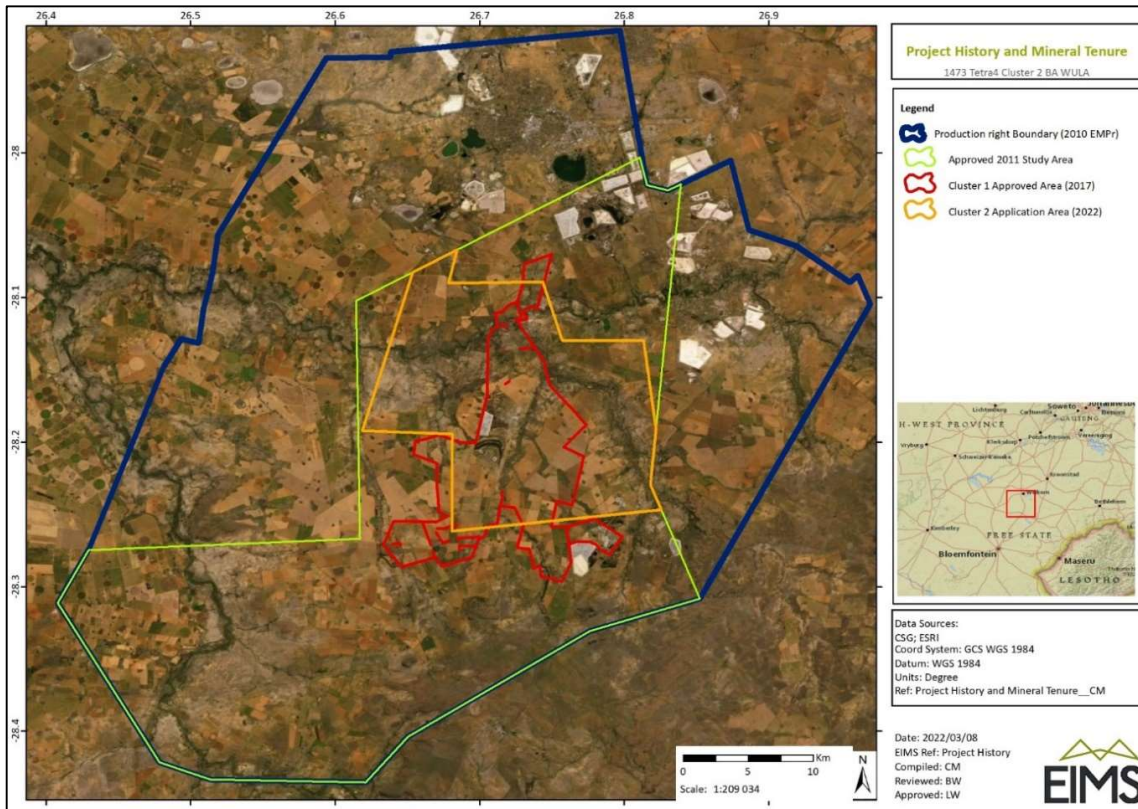


Figure 1-1 Project history and mineral tenure.

The following information is as provided by EIMS:

“Tetra 4 has a natural gas production right over a very large area in the Free State Province, near Virginia. They also have an existing environmental authorisation and associated water use licence for their current production activities (referred to as Cluster 1 above). Tetra 4 wishes to expand their current production operations onto other areas which still fall within the approved Production Right, but outside of the areas approved in the EA and WUL. The planned expansions will include the following (Figure 1-2):

- Expansions to the current LNG and Helium production plant located on the Farm Mond van Doorn Rivier. The planned expansions will be to increase the helium and LNG production capacities significantly (~30 fold increase) and increase the footprint of the existing approved plant by approximately 10ha.
- The drilling of new gas wells ~300 wells spread over a total study area (Cluster 2) of approximately 27500ha.
- The installation of trenched pipelines connecting the wells to localised booster compressors and then to in-field compressor stations (~3 sites) and subsequently the compressor stations to the main plant area.
- There will be a requirement to have short powerline and water connections to the compressor sites.”



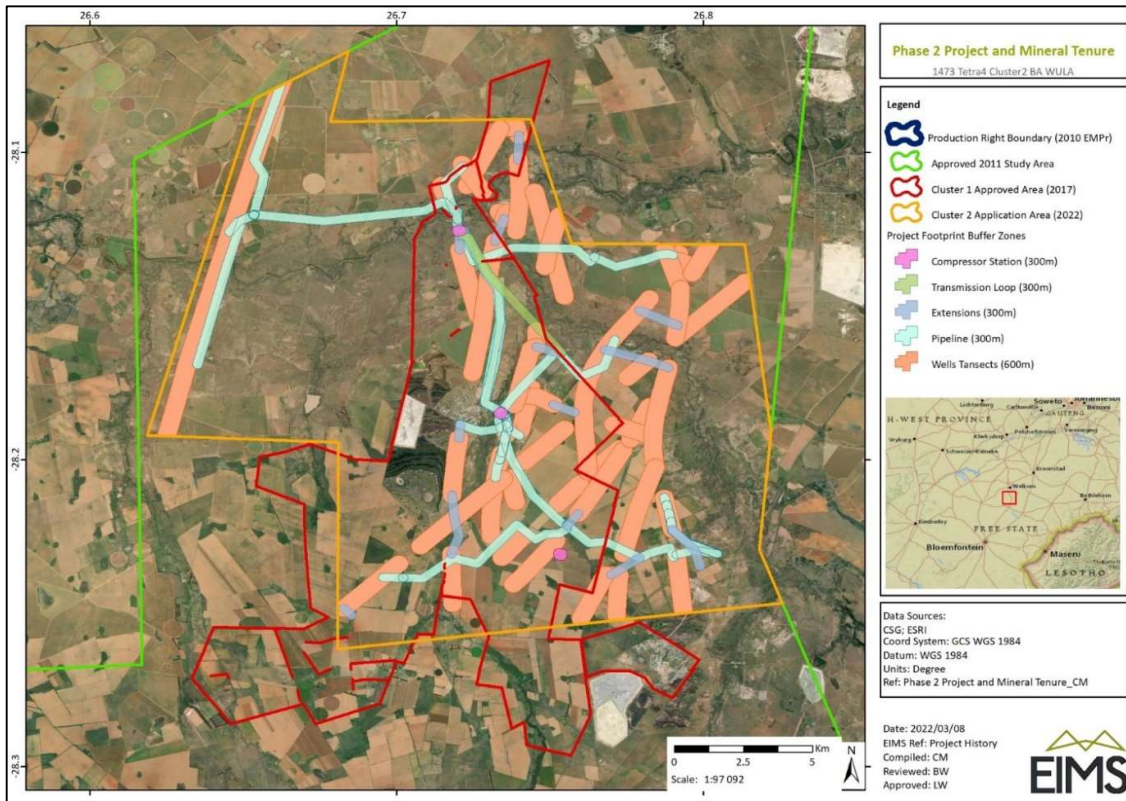


Figure 1-2 Cluster 2 study area and proposed infrastructure footprint buffer zones

This assessment was conducted per the amendments to the Environmental Impact Assessment Regulations, 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020): "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 Authorisation" (Reporting Criteria). The National Web-based Environmental Screening Tool has characterised the terrestrial sensitivity of the project area as "Very High".

The purpose of the specialist studies is to provide relevant input into the environmental authorisation process. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the project.

## 1.2 Terms of Reference

The Terms of Reference (ToR) included the following:

- Description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any desktop sensitive receptors in terms of relevant specialist disciplines (fauna and flora) that occur in the project area, and the manner in which these sensitive receptors may be affected by the project;
- Identify 'significant' desktop ecological, botanical and faunal features within the proposed project areas;

- Identification of conservation significant habitats around the project area which might be impacted;
- Screening to identify any critical issues (potential fatal flaws) that may result in project delays or rejection of the application;
- Provide a map to identify sensitive receptors in the project area, based on available maps and database information;

### **1.3 Project Description**

Tetra 4 Cluster 2 is located some 11 km from Virginia in the Free State Province, within the Matjhabeng and Lejweleputswa District Municipality. The area surrounding the project area consists mainly of agricultural fields with interspersed mining activities and secondary roads. Natural areas include the Sand River and surrounds with natural fields occurring in certain areas. The project layout is shown in Figure 1-3.

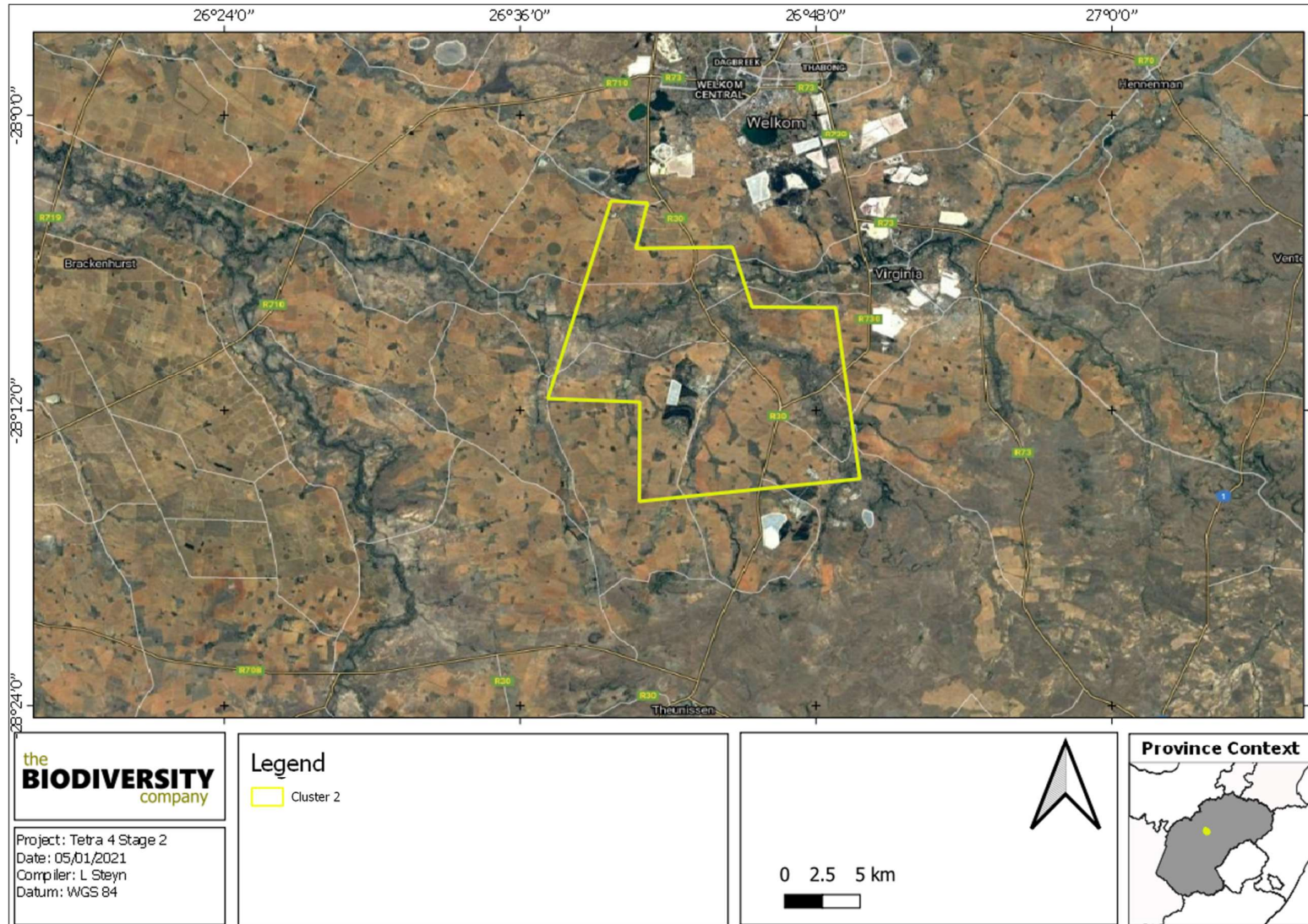






Figure 1-3 Project location on a regional scale

## 2 Specialist Details

<b>Report Name</b>	Terrestrial Ecology Assessment for the proposed Tetra 4 Cluster 2 Project COLLIERY	
<b>Submitted to</b>		
<b>Report Writer</b>	<b>Lindi Steyn</b>	
<b>(Desktop)</b>	<p>Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from Basic Assessments to Environmental Impact Assessments following IFC standards.</p>	
<b>Report Writer and Fieldwork</b>	<b>Martinus Erasmus</b>	
	<p>Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015. Martinus is Cand. Sci. Nat. registered (118630) is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.</p>	
<b>Report Reviewer</b>	<b>Andrew Husted</b>	
	<p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.</p>	
<b>Declaration</b>	<p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>	

### 3 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 3-1).

*Table 3-1 A list of key legislative requirements relevant to biodiversity and conservation in Free State*

Region	Legislation
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)	
Sustainable Utilisation of Agricultural Resources (Draft Legislation).	
White Paper on Biodiversity	
Provincial	Boputhatswana Nature Conservation Act 3 of 1973
	Free State Nature Conservation Ordinance 8 of 1969

## 4 Methods

### 4.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

### 4.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on the best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
  - Ecosystem Threat Status – an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
  - Ecosystem Protection Level – an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
  - South Africa Protected Areas Database (SAPAD) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attributes information for both formally protected areas and areas that have less formal protection. SAPAD is updated continuously and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
  - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are, therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- The Free State Critical Biodiversity Areas (CBA) map accounts for terrestrial fauna and flora only. The inclusion of the aquatic component was limited to the Freshwater Ecosystem Priority Areas (FEPA) catchments (included in the cost layer and for the identification of Ecological Support Areas (ESAs)) and wetland clusters (included in the ESAs only). The areas are subdivided as Critical Biodiversity Areas (CBA1), CBA2, Degraded, ESA1, ESA2, Other and Protected:
  - Critical Biodiversity Areas (CBAs) – Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems.
  - Ecological Support Areas (ESAs) - Areas are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas.

They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure.

- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- Hydrological Setting:
  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.
  - Strategic Water Source Areas (SWSAs) (Le Maitre *et al.*, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.
  - National Freshwater Ecosystem Priority Areas (NFEPAs) – The NFEPAs spatial data has been incorporated in the above mentioned SAIIAE spatial data set. However, to ensure that this data sets are considered we included it as the Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.*, 2011).

#### 4.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape. The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A field guide to Wild flowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.*, 1998);

- Medicinal Plants of South Africa (Van Wyk *et al.*, 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.*, 2015).

Additional information regarding ecosystems, vegetation types, and Species of Conservation Concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012); and
- Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2016).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

#### 4.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised the following:

- Compilation of expected species lists;
- Identification of any Red Data or SCC potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

Mammal distribution data was obtained from the following information sources:

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al.*, 2010);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland ([www.ewt.org.za](http://www.ewt.org.za)) (EWT, 2016); and
- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2019) ([mammalmap.adu.org.za](http://mammalmap.adu.org.za)).

While the Avifauna distribution, and other pertinent data, was obtained from:

- Southern African Bird Atlas Project 2 (SABAP2, 2019);
- Birdlife South Africa (2015);
- Birdlife. (2017). Important Bird Areas Factsheets;
- Checklist of the Birds of the World (Del Hoyo *et al.*, 1996);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.*, 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.*, 2005).

A herpetofauna desktop assessment of the possible species in the area was undertaken and attention was paid to the SCCs, sources used included the IUCN (2017) and ADU (2019). Herpetofauna distributional data was obtained from the following information sources:

- South African Reptile Conservation Assessment (SARCA) ([sarca.adu.org](http://sarca.adu.org));



- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.*, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- Animal Demography Unit (ADU) - FrogMAP (frogmap.adu.org.za);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.*, 2004); and
- Ensuring a future for South Africa's frogs (Measey, 2011).

## 4.2 Biodiversity Field Assessment

A single field survey was undertaken in March from the 14<sup>th</sup> till the 18<sup>th</sup> of March (Summer) 2022, which is a dry-season survey, to determine the presence of SCC. Effort was made to cover all the different habitat types within the limits of time and access, focus being placed on areas where proposed infrastructure was going to be placed, referred to as the study area.

### 4.2.1 Flora Survey

The fieldwork and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field to perform a vegetation and ecological assessment. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed opencast areas.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed mostly on sensitive habitats overlapping with the proposed project areas.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g. livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

### 4.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles) avifauna and mammals. The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls;
- Motion Camera trapping;
- Identification of tracks and signs; and

- Utilization of local knowledge.

Site selection for trapping focussed on the representative habitats within the project area. Sites were selected based on GIS mapping and Google Earth imagery and then the final selection was confirmed through ground-truthing during the surveys.

The herpetofauna field assessment was conducted in each habitat or vegetation type within the project area, as identified from the desktop assessment, with a focus on those areas which will be most impacted by the proposed development (i.e. the infrastructure development and waste dumping areas). The herpetological field survey comprised the following techniques:

- Hand searching is used for reptile species that shelter in or under particular habitats. Visual searches, typically undertaken for species which activities occur on surfaces or for species that are difficult to detect by hand-searches or trap sampling. Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.).

### 4.3 Terrestrial Site Ecological Importance

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 4-1 and Table 4-2, respectively.

Table 4-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km <sup>2</sup> . 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 an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km <sup>2</sup> . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, 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	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only 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	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	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 4-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
<b>Very High</b>	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.
<b>High</b>	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, with no signs of major past disturbance and good rehabilitation potential.
<b>Medium</b>	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 and a few signs of minor past disturbance. Moderate rehabilitation potential.
<b>Low</b>	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.
<b>Very Low</b>	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 4-3.

Table 4-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 4-4.

**Table 4-4 Summary of Resource Resilience (RR) criteria**

Resilience	Fulfilling Criteria
<b>Very High</b>	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: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
<b>High</b>	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: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
<b>Medium</b>	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: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
<b>Low</b>	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: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
<b>Very Low</b>	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 4-5.

**Table 4-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)**

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the project is provided in Table 4-6.

**Table 4-6 Guidelines for interpreting Site Ecological Importance in the context of the development activities**

Site Ecological Importance	Interpretation in relation to development activities
<b>Very High</b>	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.
<b>High</b>	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.
<b>Medium</b>	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
<b>Low</b>	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
<b>Very Low</b>	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

## 5 Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- Only a single season survey will be conducted for the respective studies, this would constitute a wet season survey with its limitations;
- Access to certain portions within the study area was not possible due to the fact that the land owner did not give the go-ahead;
- Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature it is possible that some plant and animal species that are present on site were not recorded during the field investigations; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

## 6 Results and discussion

### 6.1 Desktop Baseline

#### 6.1.1 Ecologically Important Landscape Features

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI. The desktop analysis and their relevance to this project are listed in Table 6-1.

*Table 6-1 Desktop spatial features examined*

Desktop Information Considered	Relevant/Irrelevant	Section
Critical Biodiversity Area	Relevant – Intersects CB1, CBA2, ESA1 and ESA2	6.1.2
Ecosystem Threat Status	Relevant – Located within an Endangered and Least Concerned ecosystem	6.1.3.1
Ecosystem Protection Level	Relevant – Located within a Not Protected and a Poorly Protected ecosystem	6.1.3.2
Protected Areas	Relevant – Within 5km of a protected area	6.1.4
National Protected Area Expansion Strategy	Relevant –Overlap any NPAES areas	6.1.4
Important Bird and Biodiversity Areas	Irrelevant – Does not overlap IBA, is 29,5 km from the Willem Pretorius Nature Reserve IBA	
South African Inventory of Inland Aquatic Ecosystems	Relevant – overlaps with three CR rivers and numerous unclassified wetlands.	6.1.6
National Freshwater Ecosystem Priority Areas	Relevant – overlaps with a true FEPA wetland and an unclassified river.	6.1.6.1
Strategic Water Source Areas	Irrelevant – Not located within a SWSA, closest SWSA is 122 km away	-

### **6.1.2 Biodiversity Spatial Plan (BSP)**

Conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). The proposed development overlaps with an area regarded as CBA1, CBA2, ESA1, ESA2, Other, and Degraded. The project area falls across both a CBA2 and an ESA1 classified area (Figure 6-1). The Power line, water pipeline, roads and return water corridor falls across the ESA1 areas.

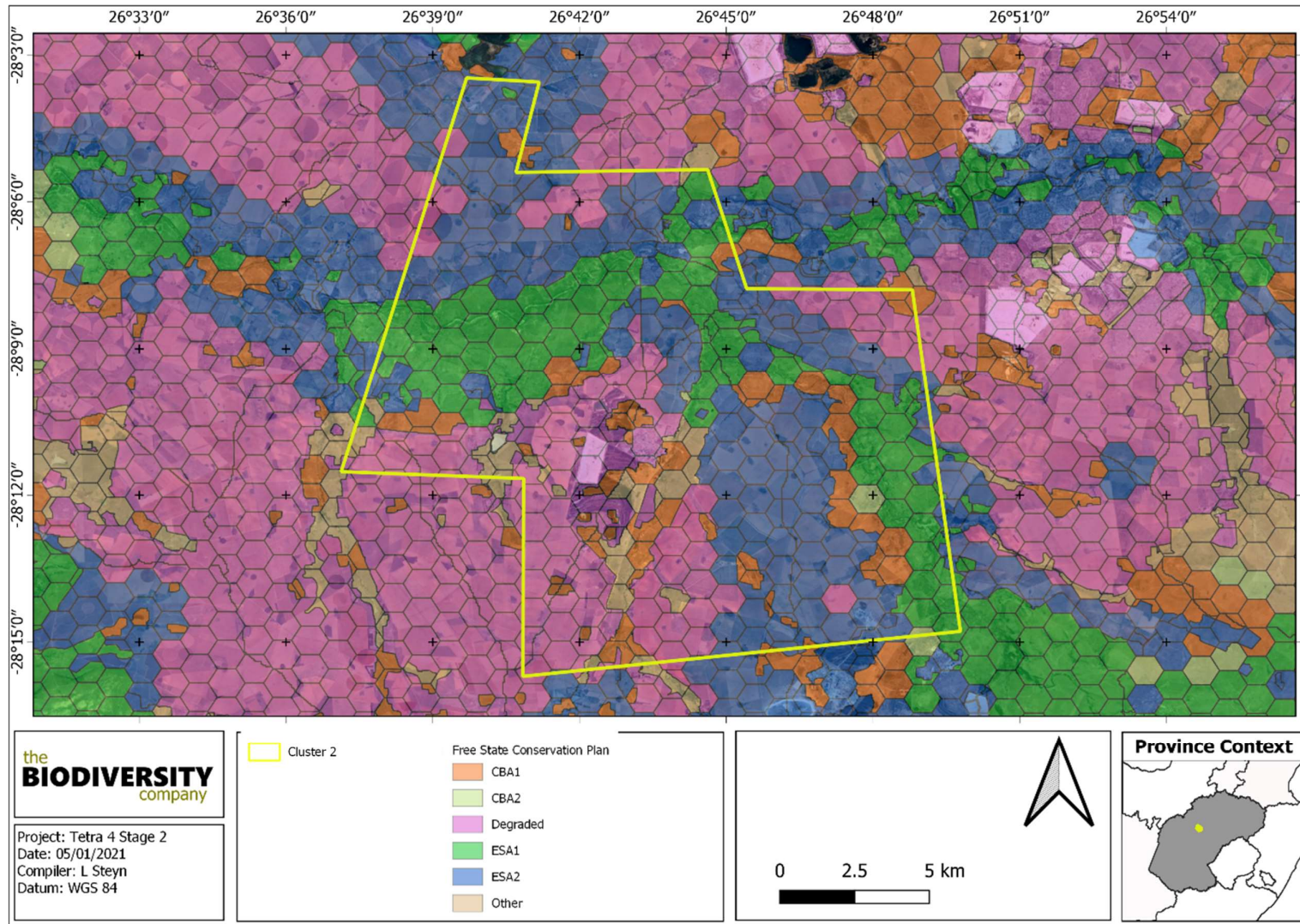


Figure 6-1 Project area superimposed on the Free State BSP.

### 6.1.3 The National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.*, 2019).

The purpose of the NBA is to assess the state of South Africa’s biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al.*, 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al.*, 2019).

#### 6.1.3.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al.*, 2019).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al.*, 2019).

The project area was superimposed on the terrestrial ecosystem threat status (Figure 6-2). According to the spatial dataset the proposed development overlaps with LC and EN ecosystems.

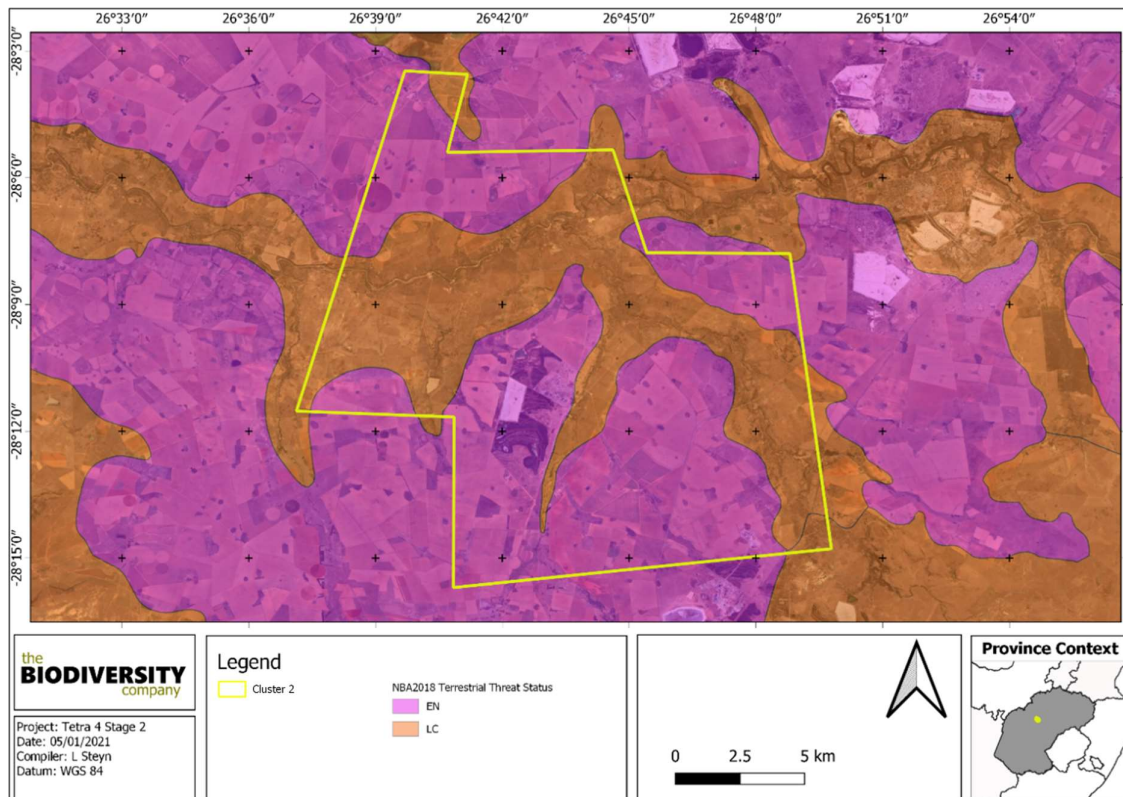


Figure 6-2 The project area showing the regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)



### 6.1.3.2 Ecosystem Protection Level

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.*, 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 6-3). The proposed development overlaps with NP and PP ecosystems

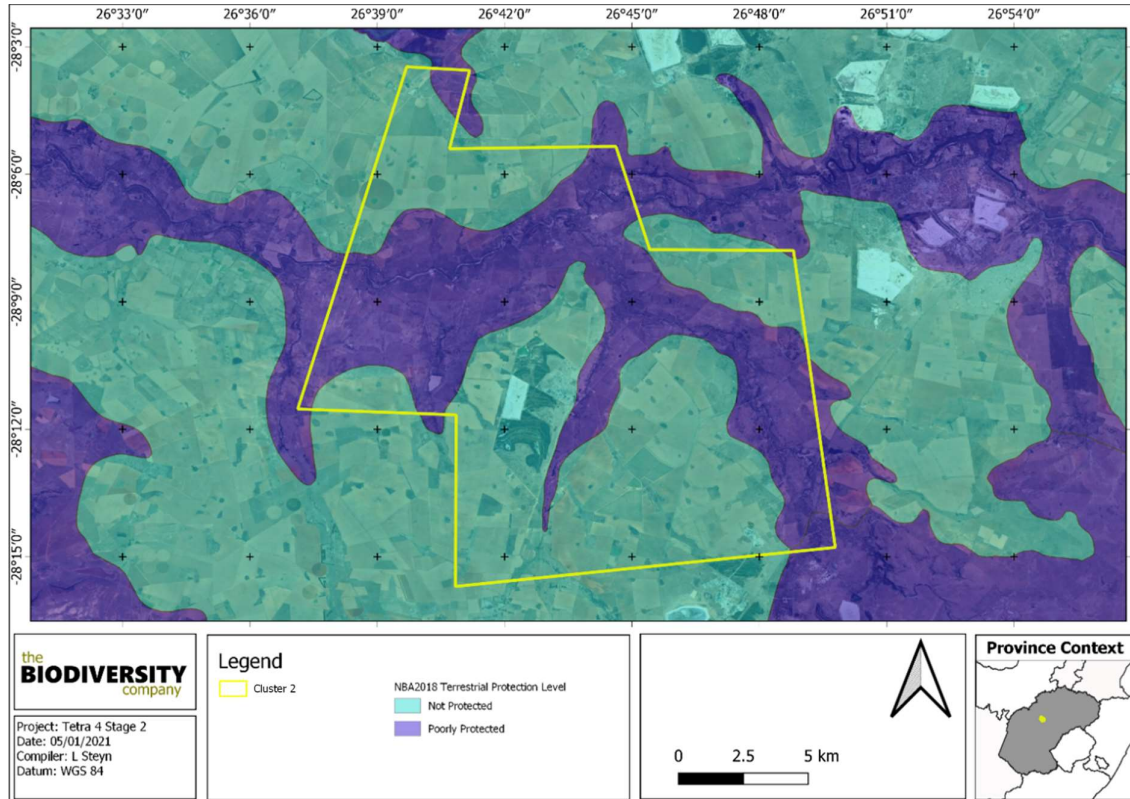


Figure 6-3 The project area showing the regional level of protection of terrestrial ecosystems (NBA, 2018)

### 6.1.4 Protected Areas

According to the protected area spatial datasets, the proposed development does not occur within any protected area but does overlap with an NPAES area and is within the 5 km buffer of protected areas. The H.J Joel Private Nature Reserve is found 876 m from the project area (Figure 6-4). The south-eastern corner of the project area overlaps with a NPAES priority focus area (Figure 6-5).

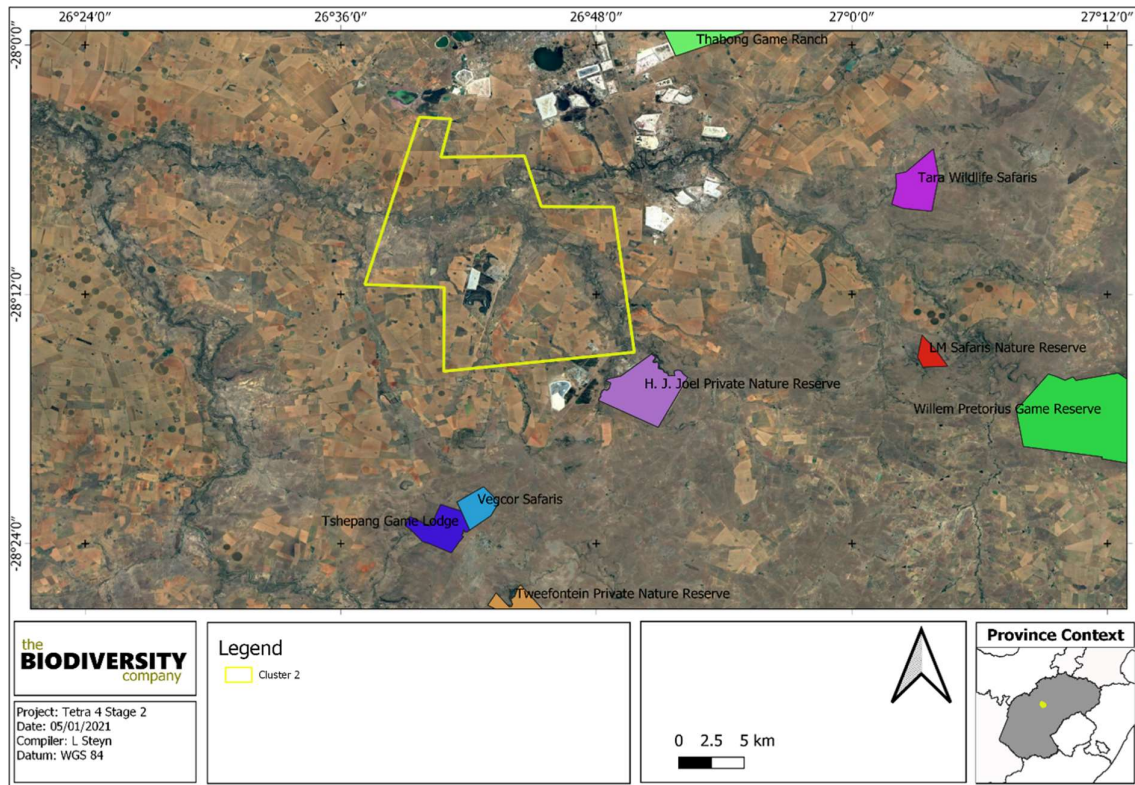


Figure 6-4 Map illustrating the location of protected areas proximal to the assessment area

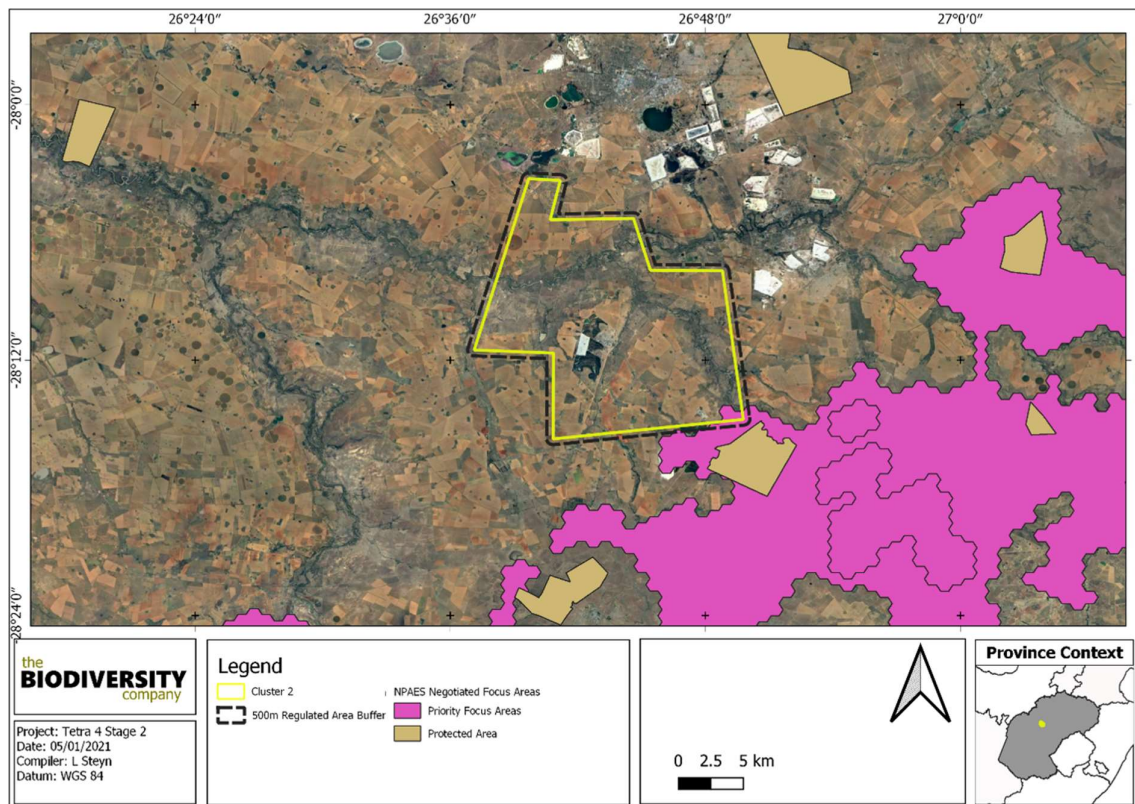


Figure 6-5 Map illustrating the location of NPAES proximal to the assessment area

### 6.1.5 Important Bird and Biodiversity Areas (IBAs)

The proposed development does not overlap any IBA (Figure 6-6). The closest IBA, the Willem Pretorius Nature Reserve, is located approximately 29.5 km to the east.

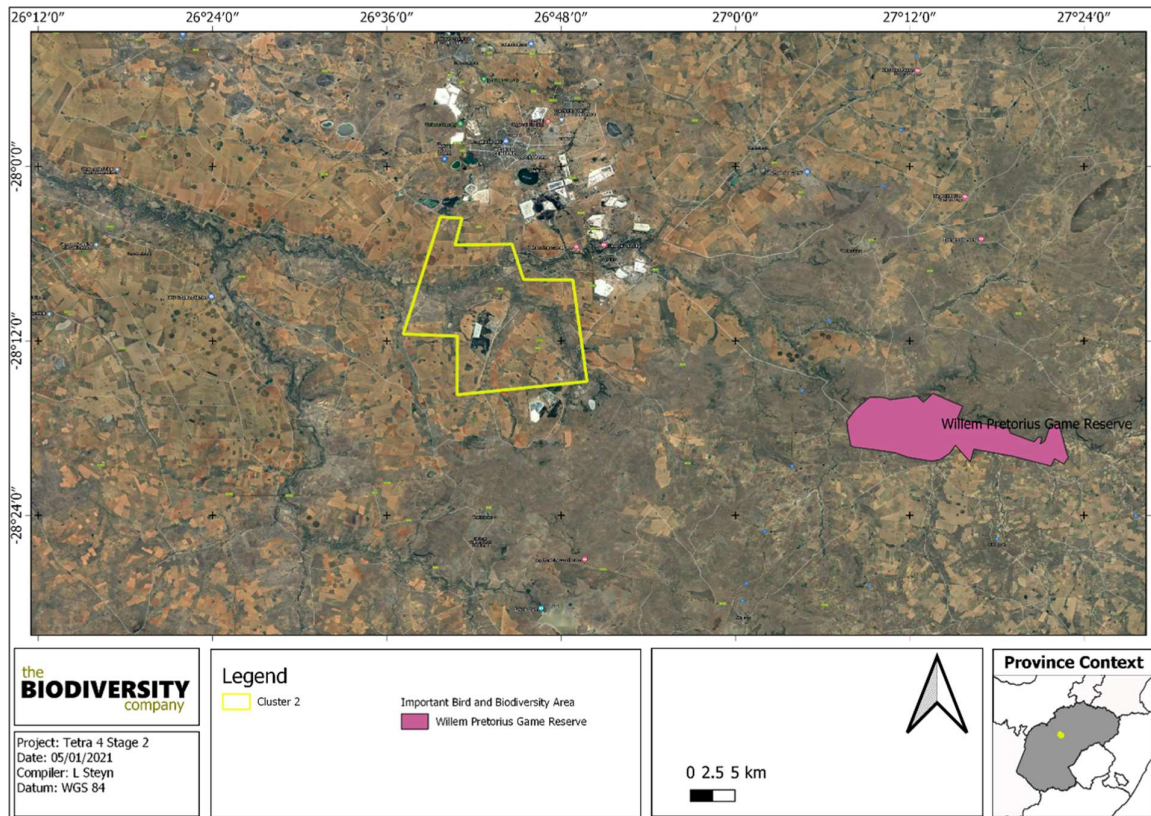


Figure 6-6 Map illustrating the location of Important Bird and Biodiversity Areas (IBAs) in relation to the assessment area

### 6.1.6 Hydrological Setting

Three major river systems assessed as part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) overlap with the proposed development area (Sand River, Doring River and Bosluisspruit) (Figure 6-7).

The threat status, protection level and condition of South African rivers and wetlands were released with the National Biodiversity Assessment (NBA) 2018. Ecosystem Threat Status (ETS) are based on the extent to which each type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LC. Critically Endangered, EN and VU ecosystem types are collectively referred to as 'threatened' (Van Deventer *et al*, 2019; Van Niekerk *et al*, 2019; Skowno *et al*, 2019). The rivers were all classed as CR, while the wetlands were not evaluated as part of NBA 2018.

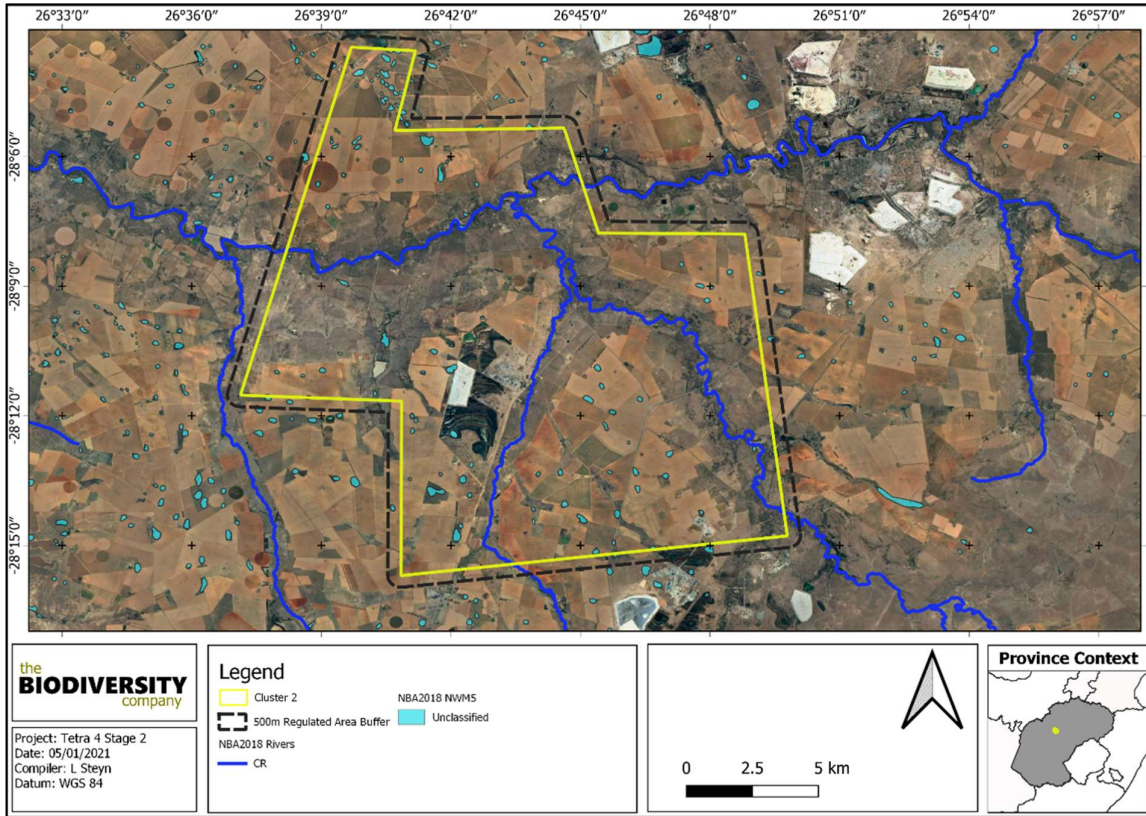


Figure 6-7 Map illustrating the hydrological context of the assessment area based on the NBA spatial dataset (2018)

### 6.1.6.1 National Freshwater Ecosystem Priority Areas

Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.*, 2011). Figure 6-8 shows the assessment area overlaps with a true FEPA wetland and an unclassified river.

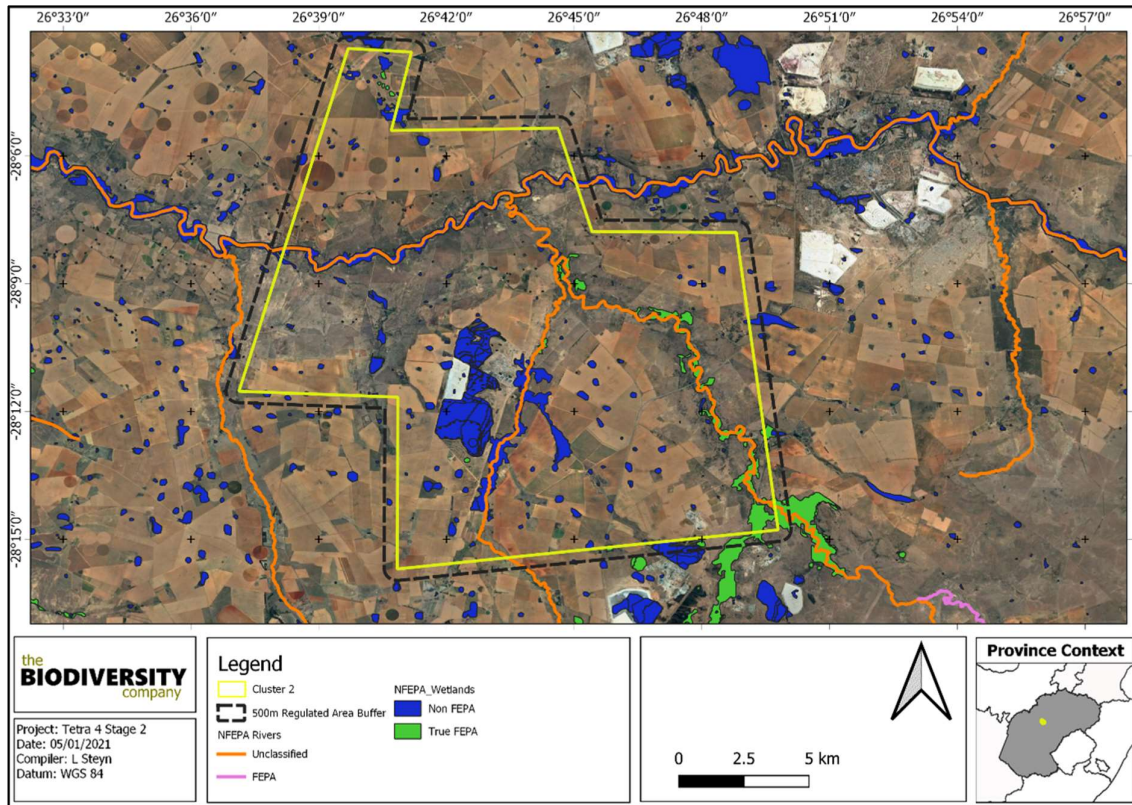


Figure 6-8 Map illustrating the hydrological context of the assessment area based on the NFEPA spatial dataset (2011)

### 6.1.7 Desktop Vegetation Baseline

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

#### 6.1.7.1 Vegetation Types

The project area is situated within the Grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- a) Seasonal precipitation; and
- b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

On a fine-scale vegetation type, the project area overlaps with Highveld Alluvial Vegetation and Vaal Vet Sandy Grassland, with 2 smaller portions overlapping with Western Free State Clay Grassland and Central Free State Grassland respectively (Figure 6-9). The two major vegetation types are discussed.

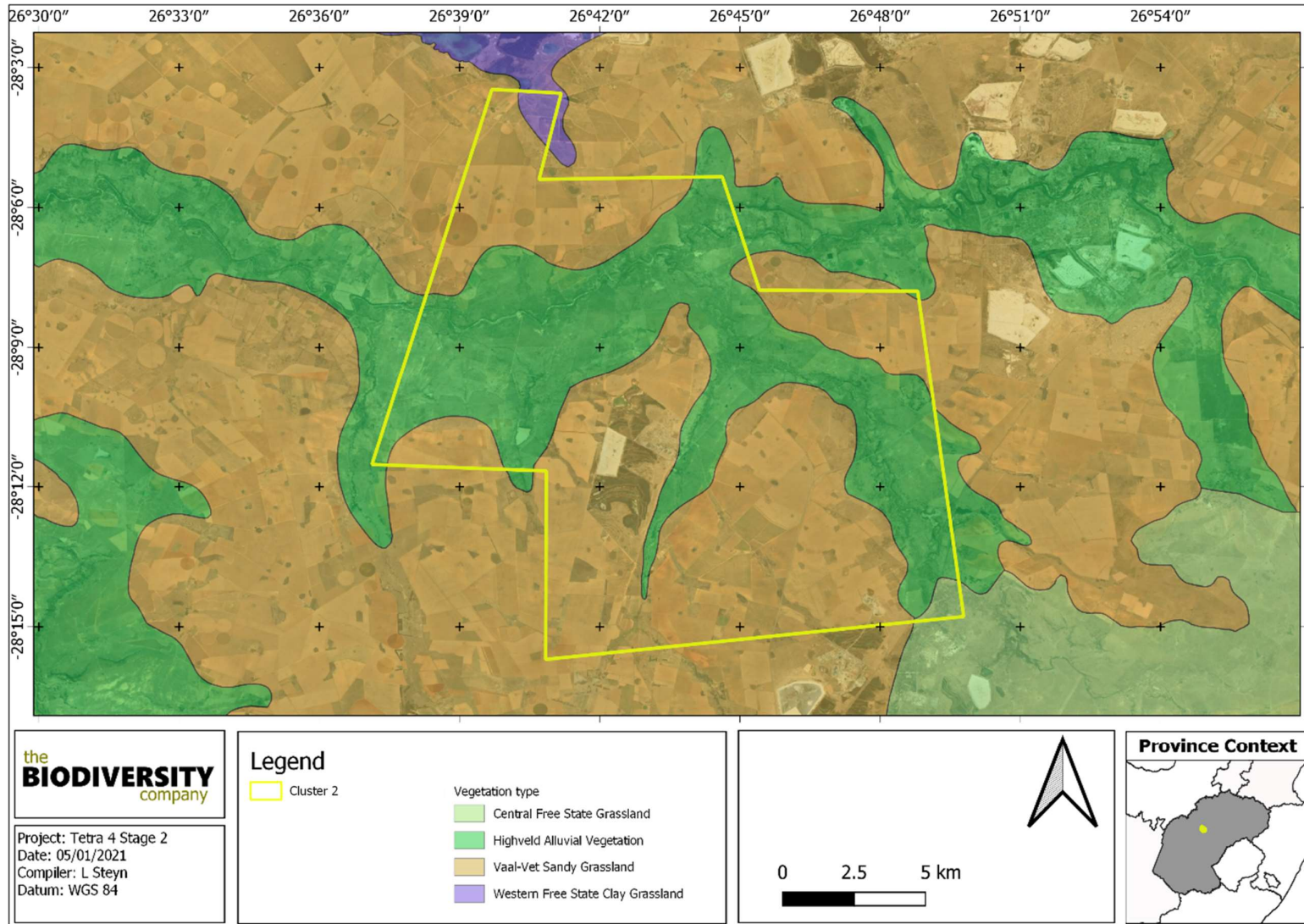


Figure 6-9 The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)

### 6.1.7.1.1 Highveld Alluvial Vegetation

The highveld alluvial vegetation type is characterised by flat topography supporting riparian thickets dominated by *Acacia karroo*. This vegetation type can be found in the Free State, North West, Mpumalanga and Gauteng Province. It is embedded in the Grassland and Savanna biomes.

#### Important Taxa:

The important taxa are divided into the main growth areas namely: Riparian thicket, Reed Beds, Flooded grasslands & herblands and Open water.

#### Riparian thickets

Small Trees: *Acacia karroo*, *Salix mucronata* subsp. *mucronata*, *S. mucronata* subsp. *woodii* (d, within subescarpment grasslands of KwaZulu-Natal), *Ziziphus mucronata*, *Celtis africana*, *Rhus lancea*.

Tall Shrubs: *Gymnosporia buxifolia*, *Rhus pyroides*, *Diospyros lycioides*, *Ehretia rigida*, *Grewia flava*.

Low Shrubs: *Asparagus laricinus*, *A. suaveolens*.

Woody Climber: *Clematis brachiata*.

Succulent Shrub: *Lycium hirsutum*

Graminoids: *Setaria verticillata*, *Panicum maximum*.

Herb: *Pollichia campestris*.

#### Reed beds

Megagraminoid: *Phragmites australis*

#### Flooded grasslands & herblands

Low Shrubs: *Gomphocarpus fruticosus*, *Felicia muricata*.

Succulent Shrub: *Salsola rabieana*.

Graminoids: *Agrostis lachnantha*, *Andropogon eucomus*, *Chloris virgata*, *Cynodon dactylon*, *Eragrostis plana*, *Hemarthria altissima*, *Imperata cylindrica*, *Ischaemum fasciculatum*, *Miscanthus junceus*, *Paspalum distichum*, *Andropogon appendiculatus*, *Brachiaria marlothii*, *Cyperus denudatus*, *C. longus*, *Echinochloa holubii*, *Eragrostis obtusa*, *E. porosa*, *Fimbristylis ferruginea*, *Panicum coloratum*, *Pycreus mundii*, *Sporobolus africanus*, *S. fimbriatus*, *Themeda triandra*, *Urochloa panicoides*.

Herbs: *Persicaria lapathifolia*, *Alternanthera sessilis*, *Barleria macrostegia*, *Corchorus asplenifolius*, *Equisetum ramosissimum*, *Galium capense*, *Hibiscus pusillus*, *Lobelia angolensis*, *Nidorella resedifolia*, *Persicaria amphibia*, *P. hystricula*, *Pseudognaphalium oligandrum*, *Pulicaria scabra*, *Rorippa fluviatilis* var. *fluviatilis*, *Senecio inornatus*, *Stachys hyssopoides*, *Vahlia capensis*.

Geophytic Herbs: *Crinum bulbispermum*, *Haplocarpha lyrata*.

#### Open water

Aquatic Herb: *Myriophyllum spicatum*.

#### Conservation Status

According to Mucina & Rutherford (2006), this vegetation type is classified as LT. The national target for conservation protection for both these vegetation types is 31%, with nearly 10% statutorily conserved in the Barberspan (a Ramsar site), Bloemhof Dam, Christiana, Faan Meintjes, Sandveld, Schoonspruit, Soetdoring and Wolwespruit Nature Reserves.

### 6.1.7.1.2 Vaal Vet Sandy Grassland

This vegetation type is a plains-dominated landscape with some scattered, slightly undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element occurs here. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall (Mucina & Rutherford, 2006).

#### Important Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the Vaal Vet Sandy Grassland vegetation type:

Graminoids: *Antheophora pubescens* (d), *Aristida congesta* (d), *Chloris virgata* (d), *Cymbopogon caesius* (d), *Cynodon dactylon* (d), *Digitaria argyrograpta* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. plana* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum gilvum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Brachiaria serrata*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula*, *E. obtusa*, *E. superba*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*.

Herbs: *Stachys spathulata* (d), *Barleria macrostegia*, *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Geigeria aspera* var. *aspera*, *Helichrysum caespitium*, *Hermannia depressa*, *Hibiscus pusillus*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala*.

Geophytic Herbs: *Bulbine narcissifolia*, *Ledebouria marginata*. Succulent Herb: *Tripteris aghillana* var. *integrifolia*.

Low Shrubs: *Felicia muricata* (d), *Pentzia globosa* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H. paronychioides*, *Ziziphus zeyheriana*.

#### Endemic Taxon

Herb: *Lessertia phillipsiana*.

#### Conservation status

This vegetation type is classified as Endangered according to Mucina and Rutherford (2006). The conservation target for this vegetation type is 24% with only 0.3% statutorily conserved in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves. More than 63% has been transformed for cultivation (ploughed for commercial crops) and the rest under strong grazing pressure from cattle and sheep.

### 6.1.7.2 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2022) database, 463 plant species have the potential to occur in the project area and its surroundings (Figure 6-10) and can be seen in (Appendix B). Of these 463 plant species, no species are listed as being Species of Conservation Concern (SCC).



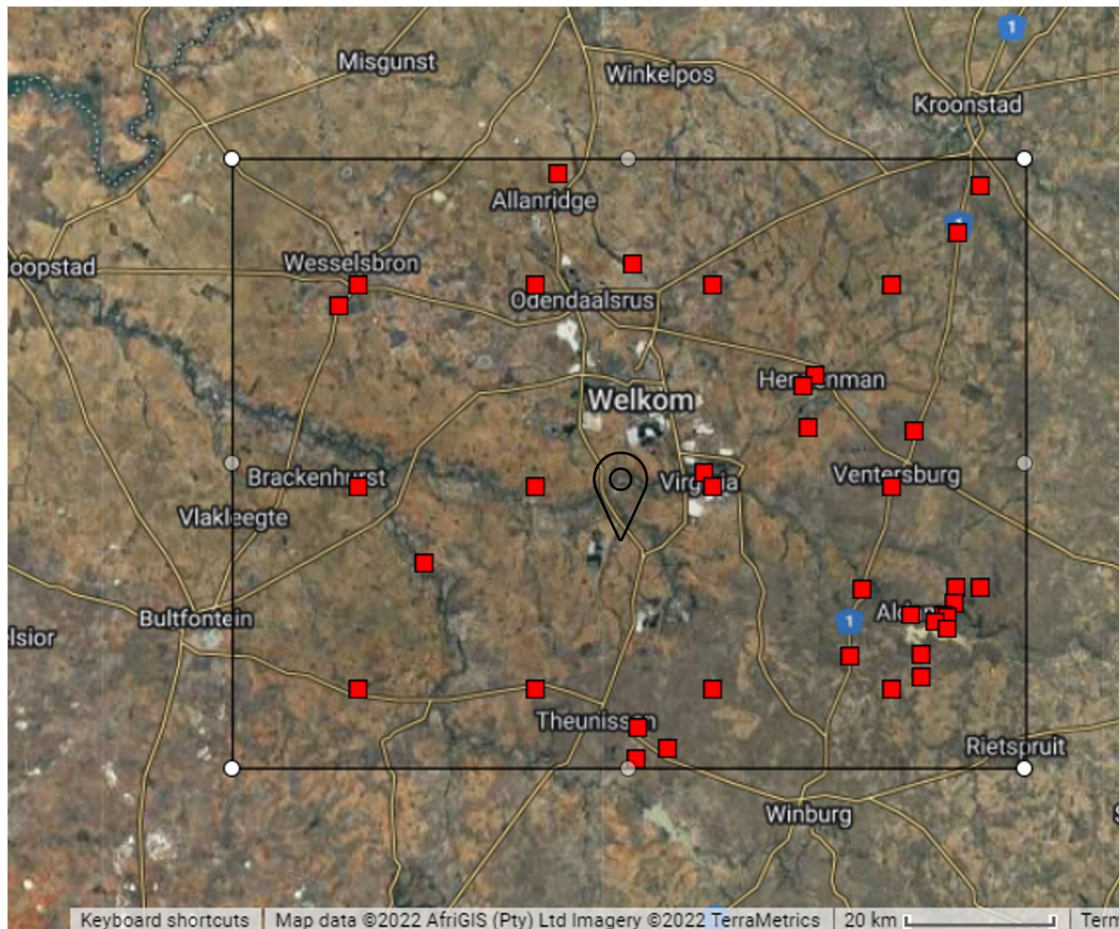


Figure 6-10 Map showing the grid drawn in order to compile an expected plant species list (BODATSA-POSA, 2022.) The red squares are cluster markers of botanical records as per POSA data. The icon indicates the centre of the project area.

### 6.1.8 Desktop Faunal Baseline

#### 6.1.8.1.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 236 bird species have the potential to occur in the vicinity of the project area. The full list of potential bird species is provided in Appendix C. The SCC expected can be seen in Table 6-2; and nine of these have a moderate-high likelihood of occurrence based on the suitable habitat and food sources present in the project area. Two species were confirmed during the field assessment.

Table 6-2 List of bird species of regional or global conservation importance that are expected to occur in close vicinity to the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	NT	High
<i>Charadrius pallidus</i>	Plover, Chestnut-banded	NT	NT	Moderate
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC	Low
<i>Ciconia nigra</i>	Stork, Black	VU	LC	Low

<i>Eupodotis caerulescens</i>	Korhaan, Blue	LC	NT	High
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC	Moderate
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR	Moderate
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC	Moderate
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	VU	Confirmed
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT	High
<i>Phoenicopterus roseus</i>	Flamingo, Greater	NT	LC	Confirmed
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC	High
<i>Sagittarius serpentarius</i>	Secretarybird	EN	EN	Confirmed

*Calidris ferruginea* (Curlew Sandpiper) is migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic and may be seen in parts of South Africa during winter. During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and salt pans (IUCN, 2017). Due to the presence of these habitat types within the project area the likelihood of occurrence of this species was rated as high.

*Eupodotis caerulescens* (Blue Korhaan) is listed as NT according to the IUCN (2017). Their moderately rapid decline is accredited to habitat loss that is a result of intensive agriculture. They are found in high grassveld in close proximity to water, usually above an altitude of 1 500m (del Hoyo *et al.*, 1996). The species nests in bare open ground, situated in thick grass or cropland. Based on the required habitat the likelihood of occurrence of this species is rated as high.

*Falco biarmicus* (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins. The likelihood of incidental records of this species in the project area is rated as high due to the presence of many bird species on which Lanner Falcons may predate.

*Falco chicquera* (Red-necked Falcon) is classed as NT on a global scale. This species was recently split from its Indian counterpart *Falco chicquera chicquera*. The African species is mostly found in semi-desert and savanna areas with some trees for perching. The number of this species is declining due to ongoing habitat degradation. The likelihood of occurrence in the project area is rated as high due to the availability of suitable habitat.

*Gyps africanus* (White-backed Vulture) has a large range and only occurs throughout sub-Saharan Africa. Primarily a lowland species of open wooded savanna, particularly areas of *Acacia* (*Vachellia*). It requires tall trees for nesting. According to the IUCN (2017) this species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution, and poisoning. The likelihood of suitably large trees for nesting for this species is low at the project site, but due to the relatively degraded nature of certain areas in the project area and the abundance of game farms, the likelihood of occurrence for the species is moderate.

*Mycteria ibis* (Yellow-billed Stork) is listed as EN on a regional scale and LC on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa. It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (IUCN, 2017). The presence of water bodies within the project area creates a high possibility that this species may occur there.

*Oxyura maccoa* (Maccoa Duck) has a large northern and southern range, South Africa is part of its southern distribution. During the species' breeding season, it inhabits small temporary and permanent

inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) on which it relies for nesting (IUCN, 2017). The species was confirmed present<sup>1</sup> in the area during the March 2022 field assessment.

*Phoeniconaias minor* (Lesser Flamingo) is listed as NT on a global and regional scale whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements, and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft, muddy material for nest building (IUCN, 2017). *Phoenicopterus roseus* was confirmed during the March 2022 field assessment.

*Rostratula benghalensis* (Greater Painted-snipe) shows a preference for recently flooded areas in shallow lowland freshwater temporary or permanent wetland, it has a wide range of these freshwater habitats which they occur in, in this case, sewage pools, reservoirs, mudflats overgrown with marsh grass which may possibly exist within the project area, thus the likelihood of occurrence is high.

*Sagittarius serpentarius* (Secretarybird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). The species was confirmed present<sup>2</sup> in the area during the March 2022 field assessment.

### 6.1.8.1.2 Mammals

The IUCN Red List Spatial Data and the MammalMap database lists 89 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are normally limited to protected areas, however still included in the appendices. Ten (10) of these expected species are regarded as SCC.

Table 6-3 List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	Confirmed
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC	Moderate
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT	Low
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Moderate
<i>Hydriectis maculicollis</i>	Spotted-necked Otter	VU	NT	Moderate
<i>Leptailurus serval</i>	Serval	NT	LC	High
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN	Low
<i>Panthera pardus</i>	Leopard	VU	VU	Low
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	Confirmed
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC	Moderate

*Aonyx capensis* (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water. The species was confirmed present<sup>3</sup> in the area during the March 2022 field assessment.

<sup>1</sup> Confirmed photo by Mike Adam, Martinus Erasmus

<sup>2</sup> Confirmed observation by Martinus Erasmus

<sup>3</sup> Confirmed track by Martinus Erasmus

*Atelerix frontalis* (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and therefore not often seen, there is suitable habitat in the project area and therefore the likelihood of occurrence is rated as moderate.

*Felis nigripes* (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the project area can be considered to be suitable for the species and the likelihood of occurrence is rated as moderate.

*Panthera pardus* (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although known to occur and persist outside of formally protected areas, the densities in these areas are considered to be low. The likelihood of occurrence in the project area which is in such close proximity to an urban area, and where they are likely to be persecuted, is regarded as low.

*Parahyaena brunnea* (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the project area is moderate to good. Prey species are most likely absent for the project area and as such the likelihood of occurrence is rated as low. The species was confirmed present<sup>4</sup> in the area during the March 2022 field assessment.

*Poecilogale albinucha* (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the project area and the likelihood of occurrence of this species is therefore considered to be moderate.

### 6.1.8.1.3 Herpetofauna (Reptiles & Amphibians)

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 48 reptile species are expected to occur within the area (Appendix E). Three (3) are regarded as SCC (Table 6-4).

Table 6-4 Threatened reptile species that are expected to occur within the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	LC	Moderate
<i>Psammophis leightoni</i>	Cape Sand Snake	VU	LC	Unlikely
<i>Smaug giganteus</i>	Giant Dragon Lizard	VU	VU	Confirmed

*Homoroselaps dorsalis* (Striped Harlequin Snake) is partially fossorial and known to inhabit old termitaria in grassland habitat (IUCN, 2017). Most of its range is at moderately high altitudes, reaching 1,800 m in Mpumalanga and Swaziland, but it is also found at elevations as low as about 100 m in KwaZulu-Natal. The likelihood of occurrence was rated as moderate.

<sup>4</sup> Confirmed track by Martinus Erasmus

*Smaug giganteus* (Giant Dragon Lizard) is categorised as VU on both a regional and an international scale. It is endemic to South Africa, where it is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga (IUCN, 2017). Habitat loss due to agriculture is a continuing threat. Large portions of the grassland habitat are underlain by coal beds of varying quality and extent, and exploitation of coal for fuel has and will result in further habitat loss. The species was confirmed present<sup>5</sup> in the project area during the field assessment.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2019) 15 amphibian species have the potential to occur in the project area (Appendix F Amphibian expected in the project area). No amphibian SCCs are expected to occur in the project area.

Based on the IUCN Red List Spatial Data and AmphibianMap, 17 amphibian species are expected to occur within the area (Appendix B). One of the species are SCCs (Table 6-5).

**Table 6-5** *Threatened amphibian species that are expected to occur within the project area*

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT	LC	Confirmed

The Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that may potentially occur in the project area. The Giant Bull Frog is listed as NT on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The species was confirmed present<sup>6</sup> in the project area during the field assessment.

## 6.2 Field Survey

The following sections provide the results from the field survey for the proposed development that was undertaken during the March 2022.

### 6.2.1 Flora Assessment

This section is divided into the following sections:

- Indigenous flora;
  - Protected plant species; and
- Invasive Alien Plants (IAPs).

#### 6.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area. A total of 122 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 6-6). Plants listed as Category 1 alien or invasive species under the NEMBA appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised' according to NEMBA, appear in blue text. Some of the plant species recorded can be seen in Figure 6-11.

The list of plant species recorded is by no means comprehensive, and repeated surveys during different phenological periods not covered may likely yield up to 20% additional flora species for the project area. However, floristic analysis conducted to date is regarded as a sound representation of the local flora for the project area.

<sup>5</sup> Confirmed dens and scale by Mike Adams and Martinus Erasmus

<sup>6</sup> Confirmed individual by Mike Adams

Table 6-6 Trees, shrub and herbaceous plant species recorded in the project area

Family	Scientific Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Acanthaceae	<i>Blepharis squarrosa</i>	LC	Endemic	
Acanthaceae	<i>Crabbea angustifolia</i>	LC	Endemic	
Agavaceae	<i>Chlorophytum cooperi</i>	LC	Not Endemic	
Aizoaceae	<i>Delosperma herbeum</i>	LC	Not Endemic	
Amaranthaceae	<i>Achyranthes aspera</i>			Naturalized exotic
Amaranthaceae	<i>Gomphrena celosioides</i>			Naturalized exotic
Amaryllidaceae	<i>Ammocharis coranica</i>	LC-Schedule 6 Protected	Not Endemic	
Amaryllidaceae	<i>Boophone disticha</i>	LC Schedule -6 Protected	Not Endemic	
Anacardiaceae	<i>Schinus terebinthifolius</i>			Naturalized exotic
Anacardiaceae	<i>Searsia lancea</i>	LC	Not Endemic	
Anacardiaceae	<i>Searsia pyroides var. pyroides</i>	LC	Not Endemic	
Apocynaceae	<i>Nerium oleander</i>			NEMBA Category 1b.
Asclepiadaceae	<i>Gomphocarpus fruticosus subsp. fruticosus</i>	LC	Indigenous	
Asparagaceae	<i>Asparagus cooperi</i>	LC	Not Endemic	
Asparagaceae	<i>Asparagus laricinus</i>	LC	Not Endemic	
Asparagaceae	<i>Eucomis autumnalis</i>	LC -Schedule 6 Protected	Not Endemic	
Asphodelaceae	<i>Aloe dominella</i>	Near Threatened B1ab(ii,iii,v) (-Schedule 6 Protected)	Endemic	
Asteraceae	<i>Artemisia afra</i>	LC	Not Endemic	
Asteraceae	<i>Berkheya onopordifolia var. onopordifolia</i>	LC	Not Endemic	
Asteraceae	<i>Berkheya pinnatifida</i>	LC	Not Endemic	
Asteraceae	<i>Bidens pilosa</i>			Naturalized exotic weed
Asteraceae	<i>Cirsium vulgare</i>			NEMBA Category 1b.
Asteraceae	<i>Conyza bonariensis</i>			Naturalized exotic

<b>Asteraceae</b>	<i>Cotula anthemoides</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Felicia muricata subsp. muricata</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Geigeria burkei</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Hilliardiella elaeagnoides</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Macleodium zeyheri</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Nidorella anomala</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Schkuhria pinnata</i>			Naturalized exotic
<b>Asteraceae</b>	<i>Senecio inornatus</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Stoebe plumosa</i>	LC	Not Endemic	
<b>Asteraceae</b>	<i>Tagetes minuta</i>			Naturalized exotic
<b>Asteraceae</b>	<i>Xanthium stramonium</i>			NEMBA Category 1b.
<b>Asteraceae</b>	<i>Zinnia peruviana</i>			Naturalized exotic
<b>Cactaceae</b>	<i>Opuntia ficus-indica</i>			NEMBA Category 1b.
<b>Cactaceae</b>	<i>Opuntia stricta</i>			NEMBA Category 1b.
<b>Campanulaceae</b>	<i>Wahlenbergia undulata</i>	LC	Not Endemic	
<b>Cannabaceae</b>	<i>Celtis africana</i>	LC	Not Endemic	
<b>Caryophyllaceae</b>	<i>Pollichia campestris</i>	LC	Not Endemic	
<b>Commelinaceae</b>	<i>Commelina africana</i>	LC	Not Endemic	
<b>Commelinaceae</b>	<i>Commelina erecta</i>	LC	Not Endemic	
<b>Commelinaceae</b>	<i>Cyanotis speciosa</i>	LC	Not Endemic	
<b>Convolvulaceae</b>	<i>Cuscuta campestris</i>			Naturalized exotic
<b>Cucurbitaceae</b>	<i>Cucumis zeyheri</i>	LC	Not Endemic	
<b>Ebenaceae</b>	<i>Diospyros austro-africana</i>	LC	Not Endemic	
<b>Fabaceae</b>	<i>Chamaecrista mimosoides</i>	LC	Not Endemic	
<b>Fabaceae</b>	<i>Robinia pseudoacacia</i>			NEMBA Category 1b.

<b>Fabaceae</b>	<i>Vachellia karroo</i>	LC	Not Endemic	
<b>Geraniaceae</b>	<i>Monsonia angustifolia</i>	LC	Not Endemic	
<b>Hyacinthaceae</b>	<i>Dipcadi longifolium</i>	LC	Not Endemic	
<b>Hyacinthaceae</b>	<i>Ledebouria marginata</i>	LC	Not Endemic	
<b>Hyacinthaceae</b>	<i>Schizocarphus nervosus</i>	LC-Schedule 6 Protected		
<b>Hypoxidaceae</b>	<i>Hypoxis hemerocallidea</i>	LC	Not Endemic	
<b>Hypoxidaceae</b>	<i>Hypoxis iridifolia</i>	LC	Not Endemic	
<b>Iridaceae</b>	<i>Gladiolus crassifolius</i>	LC-Schedule 6 Protected	Not Endemic	
<b>Iridaceae</b>	<i>Gladiolus permeabilis</i>	LC-Sched 6 Protected	Endemic	
<b>Malvaceae</b>	<i>Hermannia depressa</i>	LC	Not Endemic	
<b>Malvaceae</b>	<i>Hibiscus trionum</i>	LC	Not Endemic	
<b>Malvaceae</b>	<i>Hibiscus trionum</i>			Naturalized exotic
<b>Malvaceae</b>	<i>Malva neglecta</i>			Naturalized exotic
<b>Meliaceae</b>	<i>Melia azedarach</i>			NEMBA Category 1b.
<b>Moraceae</b>	<i>Morus alba</i>			NEMBA Category 3
<b>Myrtaceae</b>	<i>Eucalyptus camaldulensis</i>			NEMBA Category 1b
<b>Oxalidaceae</b>	<i>Oxalis depressa</i>	LC	Not Endemic	
<b>Pentzia Globosa</b>	<i>Pentzia globosa</i>	LC	Not Endemic	
<b>Pinaceae</b>	<i>Pinus pinaster</i>			NEMBA Category 2
<b>Poaceae</b>	<i>Aristida adscensionis</i>	LC	Not Endemic	
<b>Poaceae</b>	<i>Aristida canescens subsp. canescens</i>	LC	Not Endemic	
<b>Poaceae</b>	<i>Aristida congesta subsp. barbicollis</i>	LC	Not Endemic	
<b>Poaceae</b>	<i>Aristida congesta subsp. congesta</i>	LC	Not Endemic	
<b>Poaceae</b>	<i>Arundo donax</i>			NEMBA Category 1b.
<b>Poaceae</b>	<i>Bambusa sp</i>			Naturalized exotic



Poaceae	<i>Bewisia biflora</i>	LC	Not Endemic	
Poaceae	<i>Cenchrus ciliaris</i>	LC	Not Endemic	
Poaceae	<i>Chloris gayana</i>	LC	Not Endemic	
Poaceae	<i>Cortaderia selloana</i>			NEMBA Category 1b.
Poaceae	<i>Cymbopogon caesius</i>	LC	Not Endemic	
Poaceae	<i>Cynodon dactylon</i>	LC	Not Endemic	
Poaceae	<i>Digitaria eriantha</i>	LC	Not Endemic	
Poaceae	<i>Eleusine coracana</i>			Naturalized exotic
Poaceae	<i>Eragrostis chloromelas</i>	LC	Not Endemic	
Poaceae	<i>Eragrostis curvula</i>	LC	Not Endemic	
Poaceae	<i>Eragrostis gummiflua</i>	LC	Not Endemic	
Poaceae	<i>Eragrostis obtusa</i>	LC	Not Endemic	
Poaceae	<i>Eragrostis superba</i>	LC	Not Endemic	
Poaceae	<i>Fingerhuthia africana</i>	LC	Not Endemic	
Poaceae	<i>Heteropogon contortus</i>	LC	Not Endemic	
Poaceae	<i>Hyparrhenia hirta</i>	LC	Not Endemic	
Poaceae	<i>Hyperthelia dissoluta</i>	LC	Not Endemic	
Poaceae	<i>Melinis repens</i>	LC	Not Endemic	
Poaceae	<i>Microchloa caffra</i>	LC	Not Endemic	
Poaceae	<i>Panicum maximum</i>	LC	Not Endemic	
Poaceae	<i>Paspalum dilatatum</i>	LC	Indigenous	
Poaceae	<i>Pennisetum clandestinum</i>			NEMBA Category 1b.
Poaceae	<i>Phragmites australis</i>	LC	Not Endemic	
Poaceae	<i>Pogonarthria squarrosa</i>	LC	Not Endemic	
Poaceae	<i>Setaria pumila</i>	LC	Not Endemic	

Poaceae	<i>Setaria sphacelata</i> var. <i>Sericea</i>	LC	Not Endemic	
Poaceae	<i>Setaria sphacelata</i> var. <i>sphacelata</i>	LC	Not Endemic	
Poaceae	<i>Setaria sphacelata</i> var. <i>torta</i>	LC	Not Endemic	
Poaceae	<i>Setaria verticillata</i>	LC	Not Endemic	
Poaceae	<i>Sporobolus africanus</i>	LC	Not Endemic	
Poaceae	<i>Themeda triandra</i>	LC	Not Endemic	
Poaceae	<i>Trachypogon spicatus</i>	LC	Not Endemic	
Poaceae	<i>Trichoneura grandiglumis</i>	LC	Not Endemic	
Poaceae	<i>Urochloa mosambicensis</i>	LC	Not Endemic	
Polygonaceae	<i>Persicaria lapathifolia</i>			Naturalized exotic
Rhamnaceae	<i>Ziziphus mucronata</i> subsp. <i>mucronata</i>	LC	Not Endemic	
Rosaceae	<i>Prunus persica</i>			Naturalized exotic
Salicaceae	<i>Populus alba</i>			NEMBA Category 2
Salicaceae	<i>Populus deltoides</i>			Naturalized exotic
Salicaceae	<i>Salix babylonica</i>			Naturalized exotic
Scrophulariaceae	<i>Jamesbrittenia aurantiaca</i>	LC	Not Endemic	
Scrophulariaceae	<i>Selago densiflora</i>	LC	Not Endemic	
Solanaceae	<i>Datura ferox</i>			NEMBA Category 1b.
Solanaceae	<i>Solanum lichtensteinii</i>	LC	Not Endemic	
Tamaricaceae	<i>Tamarix chinensis</i>			NEMBA Category 1b.
Typhaceae	<i>Typha capensis</i>	LC	Not Endemic	
Verbenaceae	<i>Verbena astrigera</i>			Naturalized exotic
Verbenaceae	<i>Verbena bonariensis</i>			NEMBA Category 1b.
Zygophyllaceae	<i>Tribulus terrestris</i>	LC	Not Endemic	



Figure 6-11 Some of the plants recorded in the project area: A) *Blepharis squarrosa*, B) *Aloe dominella* (NT), C) *Dipcadi longifolium*, D) *Berkheya onopordifolia* var. *onopordifolia* and E) *Gladiolus permeabilis*

### 6.2.1.1.1 Protected plant species

Several individuals of protected plant species that are protected by the Free State Nature Conservation Ordinance 8 of 1969 were observed in various parts of the project area. According to the list of protected species under Schedule, if any individuals of these plant species are to be disturbed, permits must be obtained from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA).

### 6.2.1.2 Invasive Alien Plants

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- *Category 1a*: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- *Category 1b*: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- *Category 2*: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- *Category 3*: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
  - Section 75 of the NEMBA;
  - The relevant invasive species management programme developed in terms of regulation 4; and
  - Any directive issued in terms of section 73(3) of the NEMBA.

Fourteen (14) IAP species were recorded within the project area. These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

## 6.2.2 Faunal Assessment

Avifauna, Mammal and Herpetofauna observations and recordings fall under this section.

### 6.2.2.1 Avifauna

Eighty-nine (89) (37.7 % of expected) species were recorded in the project area during the survey based on either direct observation, vocalisations, or the presence of visual tracks & signs, (Table 6-7) (Figure 6-12). Four (4) (red text) species are rated as SCC, whereas 75 were listed as protected provincially.

Table 6-7 A list of avifaunal species recorded for the project area

Species	Common Name	Conservation Status		Free State Conservation Ordinance 8 of 1969
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC	-
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC	Schedule 1 Protected
<i>Alopochen aegyptiaca</i>	Goose, Egyptian	Unlisted	LC	Schedule 1/2 Protected
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC	Schedule 1 Protected
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC	Schedule 1 Protected
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC	Schedule 1 Protected
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC	Schedule 1/2 Protected
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC	Schedule 1 Protected
<i>Apus apus</i>	Swift, Common	Unlisted	LC	Schedule 1 Protected
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC	Schedule 1 Protected
<i>Ardea intermedia</i>	Egret, Yellow-billed (Intermediate)	Unlisted	LC	Schedule 1 Protected
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC	Schedule 1 Protected
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC	Schedule 1 Protected
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC	Schedule 1 Protected
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC	Schedule 1 Protected
<i>Bostrychia hagedash</i>	Ibis, Hadedash	Unlisted	LC	Schedule 1 Protected
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC	Schedule 1 Protected
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC	Schedule 1 Protected
<i>Buteo buteo</i>	Buzzard, Common (Steppe)	Unlisted	LC	Schedule 1 Protected
<i>Buteo rufofuscus</i>	Buzzard, Jackal	Unlisted	LC	Schedule 1 Protected
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC	Schedule 1 Protected
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC	Schedule 1 Protected
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC	Schedule 1 Protected
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC	Schedule 1 Protected
<i>Circus macrourus</i>	Harrier, Pallid	NT	NT	Schedule 1 Protected
<i>Columba livia</i>	Dove, Rock	Unlisted	LC	-
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC	Schedule 1 Protected
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC	-
<i>Corythornis cristatus</i>	Kingfisher, Malachite	Unlisted	Unlisted	Schedule 1 Protected

## Tetra 4 Cluster 2

<i>Cursorius temminckii</i>	Cursor, Temminck's	Unlisted	LC	Schedule 1 Protected
<i>Dendrocygna viduata</i>	Duck, White-faced Whistling	Unlisted	LC	Schedule 1 Protected
<i>Egretta ardesiaca</i>	Heron, Black	Unlisted	LC	Schedule 1 Protected
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC	Schedule 1 Protected
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC	Schedule 1 Protected
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC	Schedule 1 Protected
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC	-
<i>Euplectes ardens</i>	Widowbird, Red-collared	Unlisted	LC	-
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC	-
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC	-
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC	Schedule 1 Protected
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	LC	Schedule 1 Protected
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC	Schedule 1 Protected
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC	Schedule 1 Protected
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC	Schedule 1 Protected
<i>Lamprolornis bicolor</i>	Starling, Pied	Unlisted	LC	-
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC	Schedule 1 Protected
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC	Schedule 1 Protected
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC	Schedule 1 Protected
<i>Melierax canorus</i>	Goshawk, Southern Pale Chanting	Unlisted	LC	Schedule 1 Protected
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC	Schedule 1 Protected
<i>Microcarbo africanus</i>	Cormorant, Reed	Unlisted	LC	Schedule 1 Protected
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC	Schedule 1 Protected
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC	Schedule 1 Protected
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC	Schedule 1 Protected
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC	Schedule 1/2 Protected
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC	Schedule 1 Protected
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC	Schedule 1 Protected
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	VU	Schedule 1 Protected
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC	-
<i>Phoenicopterus roseus</i>	Flamingo, Greater	NT	LC	Schedule 1 Protected
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC	Schedule 1 Protected
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC	Schedule 1 Protected
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC	Schedule 1/2 Protected
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC	Schedule 1 Protected
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC	-
<i>Ploceus velatus</i>	Masked-weaver, Southern	Unlisted	LC	-
<i>Podiceps nigricollis</i>	Grebe, Black-necked	Unlisted	LC	Schedule 1 Protected

## Tetra 4 Cluster 2

<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC	Schedule 1 Protected
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC	Schedule 1/2 Protected
<i>Rhinoptilus africanus</i>	Courser, Double-banded	Unlisted	LC	Schedule 1 Protected
<i>Sagittarius serpentarius</i>	Secretarybird	VU	EN	Schedule 1 Protected
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC	Schedule 1 Protected
<i>Spatula hottentota</i>	Teal, Hottentot	Unlisted	LC	Schedule 1 Protected
<i>Spatula smithii</i>	Shoveler, Cape	Unlisted	LC	Schedule 1 Protected
<i>Spilopelia senegalensis</i>	Dove, Laughing	Unlisted	LC	-
<i>Sporopipes squamifrons</i>	Finch, Scaly-feathered	Unlisted	LC	-
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC	-
<i>Sturnus vulgaris</i>	Starling, Common	Unlisted	LC	Schedule 1 Protected
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC	Schedule 1 Protected
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC	Schedule 1 Protected
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC	Schedule 1 Protected
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC	Schedule 1 Protected
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC	Schedule 1 Protected
<i>Upupa africana</i>	Hoopoe, African	Unlisted	LC	Schedule 1 Protected
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC	Schedule 1 Protected
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC	Schedule 1 Protected
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC	Schedule 1 Protected
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC	Schedule 1 Protected
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC	Schedule 1 Protected



Figure 6-12 Some of the avifaunal species recorded; A) Heron, Black (*Egretta ardesiaca*), B) Bokmakierie (*Telophorus zeylonus*) and C) Duck, Maccoa (*Oxyura maccoa*) (NT), D) Stilt, Black-winged (*Himantopus himantopus*), E) Courser, Double-banded (*Rhinoptilus africanus*), F) Kingfisher, Malachite (*Corythornis cristatus*) and G) Dove, Namaqua (*Oena capensis*).



### 6.2.2.2 Mammals

Twenty-two (22) mammal species were observed during the survey of the project area (Table 6-8) based on either direct observation or the presence of visual tracks and signs (Figure 6-13). Three (3) (in red text) of the species recorded are regarded as SCC. Four (4) mammal species are considered 'captive' species as these were only present within the game farm areas, marked in blue text.

Table 6-8 Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status		Free State Nature Conservation Ordinance 8 of 1969
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Antidorcas marsupialis</i>	Springbok	LC	LC	Schedule 2-Protected
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	-
<i>Atilax paludinosus</i>	Water Mongoose	LC	LC	-
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC	-
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC	LC	-
<i>Connochaetes taurinus</i>	Blue Wildebeest	LC	LC	Schedule 2-Protected
<i>Cryptomys hottentotus</i>	Southern African Mole-rat	LC	LC	-
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC	-
<i>Damaliscus pygargus</i>	Blesbok	LC	LC	Schedule 2-Protected
<i>Genetta genetta</i>	Small-spotted Genet	LC	LC	-
<i>Giraffa camelopardalis</i>	Giraffe	LC	VU	Schedule 2-Protected
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC	-
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC	-
<i>Kobus leche</i>	Lechwe	Unlisted	NT	-
<i>Leptailurus serval</i>	Serval	NT	LC	-
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC	Schedule 2-Protected
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	LC	LC	-
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	-
<i>Raphicerus campestris</i>	Steenbok	LC	LC	Schedule 2-Protected
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC	Schedule 2-Protected
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	LC	Schedule 2-Protected
<i>Xerus inauris</i>	South African Ground Squirrel	LC	LC	-



Figure 6-13 Photograph illustrating some of the mammal species recorded in the project area. A) Small-spotted Genet (*Genetta genetta*), B) Water Mongoose (*Atilax paludinosus*), C) Vervet Monkey (*Chlorocebus pygerythrus*), D) Yellow Mongoose (*Cynictis penicillata*), E) Slender Mongoose (*Herpestes sanguineus*) and F) Cape Porcupine (*Hystrix africae australis*).



Figure 6-14 Photograph illustrating some of the mammal species recorded in the project area. A) Scrub Hare scat (*Lepus saxatilis*), B) Black-backed Jackal spoor (*Canis mesomelas*) and C) Brown Hyaena spoor (*Parahyaena brunnea*) (NT) and D) Cape Clawless Otter spoor (*Aonyx capensis*)

### 6.2.2.3 Herpetofauna

#### 6.2.2.3.1 Reptiles

Eleven (11) species of reptiles were recorded in the project area during survey period. (Table 6-9) (Figure 6-15). One SCC, namely *Smaug giganteus* (Sungazer/Giant Dragon Lizard) was recorded during the field assessment. However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture.

*Smaug giganteus* (Sungazer/Giant Dragon Lizard) is categorised as VU on both a regional and an international scale. Additionally, the species is listed on the Convention on International Trade in Endangered Species (CITES) Appendix II, as well as a Threatened or Protected Species (TOPS). It is endemic to South Africa, where it is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga with an estimated EOO (km<sup>2</sup>) of 37 617 (Alexander *et al.*, 2018). The species is considered to be a habitat specialist, that is highly philopatric (tending to return to or remain near a particular site or area) for burrowing sites. Sungazers/Giant Dragon Lizards also won't easily disperse across the landscape to make new burrows should its habitat be destroyed (Alexander *et al.*, 2018)

Habitat loss due to agriculture is a continuing threat. Large portions of the grassland habitat are underlain by coal beds of varying quality and extent, and exploitation of coal for fuel has and will result in further habitat loss. Another substantial threat to the species is illegal collection for the pet trade to an extent that it is one of the most exported species from South Africa with 1 194 individuals exported between 1985 and 2014 for pet trade (Parusnath *et al.*, 2017; UNEP-WCMC, 2017).

A collection of burrows was observed during the field survey (Figure 6-15), it is however presumed that there are several additional burrows. Due to the sensitivity of this species, especially in regard to its illegal collection, no waypoints will be displayed or provided in this report.

Table 6-9 Summary of reptile species recorded within the project area

Species	Common Name	Conservation Status		Free State Nature Conservation Ordinance 8 of 1969
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	LC	-
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC	-
<b><i>Smaug giganteus</i></b>	<b>Sungazer</b>	<b>VU</b>	<b>VU</b>	<b>Schedule 1 Protected</b>
<i>Boaedon capensis</i>	Brown House Snake	LC	LC	-
<i>Pseudaspis cana</i>	Mole Snake	LC	LC	-
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	LC	LC	-
<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC	LC	-
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	LC	LC	-
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC	-
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC	LC	-
<i>Varanus niloticus</i>	Nile Monitor	LC	LC	-



Figure 6-15 Some of the reptile species recorded in the project area: A) Red-lipped Snake (*Crotaphopeltis hotamboeia*); B) Brown House Snake (*Boaedon capensis*); C) Sungazer (*Smaug giganteus*) burrow; D) Speckled Rock Skink (*Trachylepis punctatissima*); E) Delalande's Beaked Blind Snake (*Rhinyotyphlops lalandei*); F) Mole Snake (*Pseudaspis cana*); and G) Sungazer (*Smaug giganteus*) habitat.

### 6.2.2.3.2 Amphibians

Four (4) amphibian species were recorded in the project area (Table 6-10 and Figure 6-16). One species recorded was a SCCs.

Table 6-10 Summary of amphibian species recorded within the project area

Species	Common Name	Conservation Status		Free State Nature Conservation Ordinance 8 of 1969
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Amietia queckettii</i>	Common River Frog	LC	LC	-
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC	-
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT	LC	-
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC	-

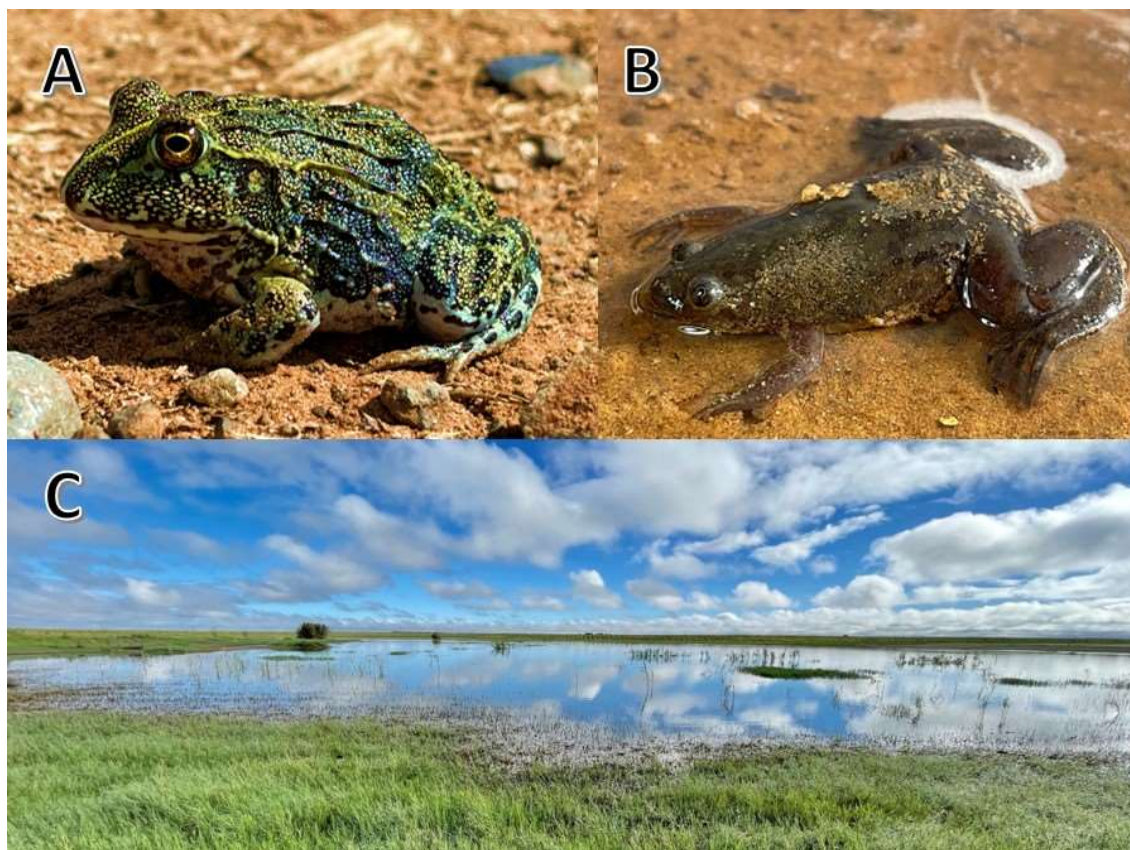


Figure 6-16 Some of the amphibian species recorded in the project area: A) Juvenile Giant Bullfrog (*Pyxicephalus adspersus*); B) Common Platanna (*Xenopus laevis*); and C) One of several temporary pans and wetlands within the project area which provide ideal breeding sites for *Pyxicephalus adspersus*.

## **6.2.3 Habitat Assessment and Site Ecological Importance**

### **6.2.3.1 Habitat Assessment**

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 6-17 and Figure 6-18. Emphasis was placed on limiting timed meander searches along the proposed area within the natural habitats and therefore habitats with a higher potential of hosting SCC

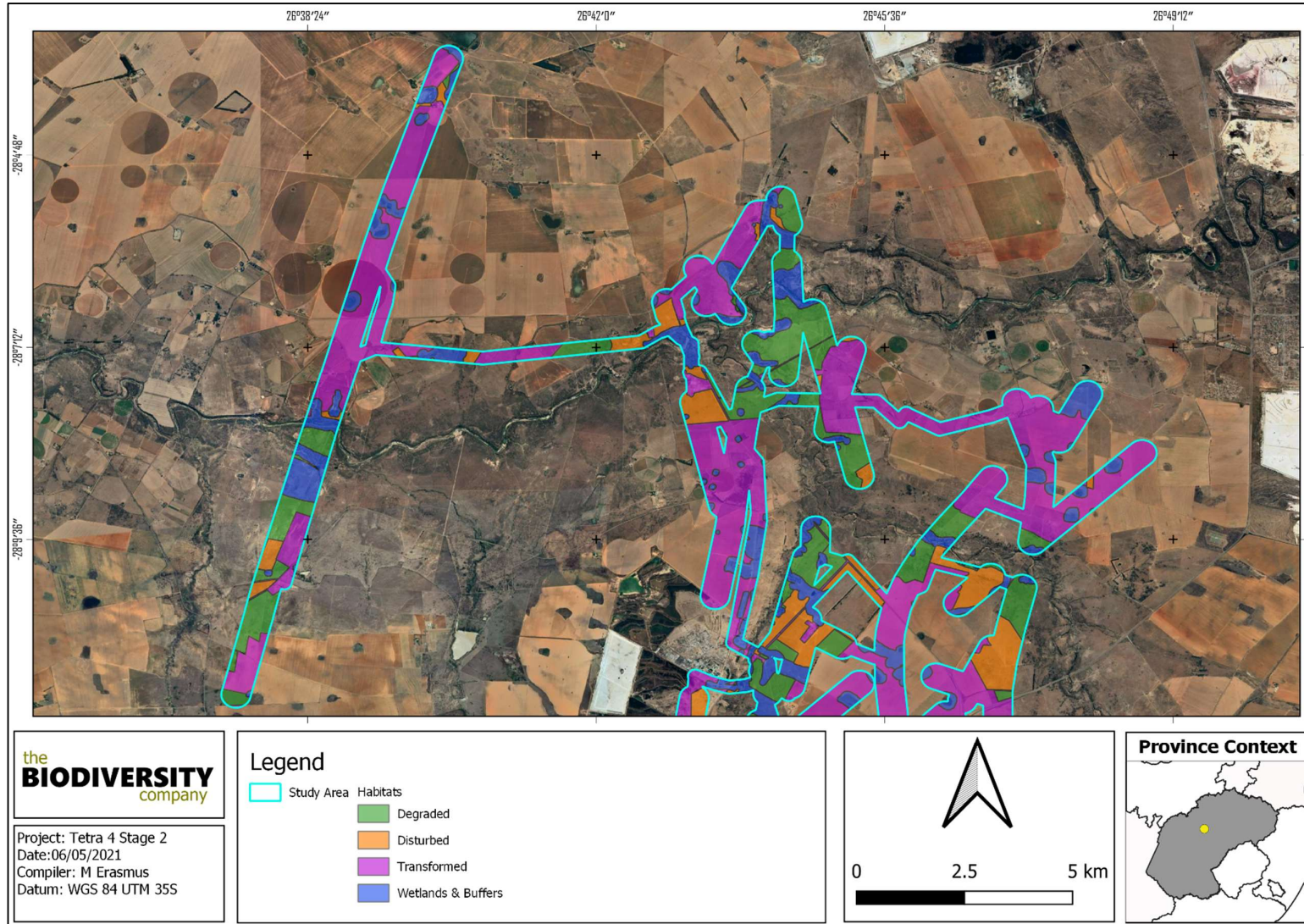


Figure 6-17 Habitats identified within the project area.



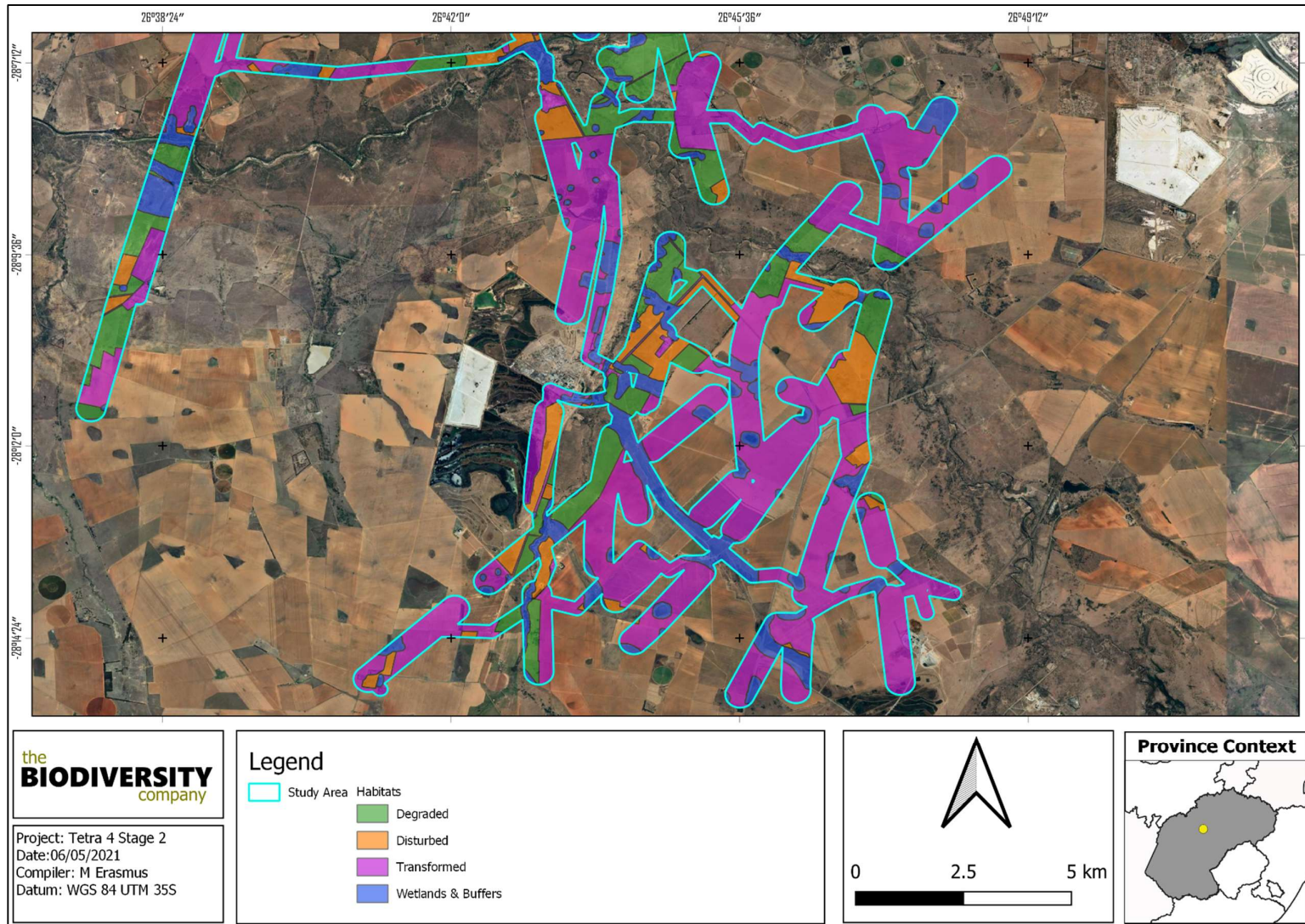


Figure 6-18 Habitats identified within the project area.

### Degraded Habitat (Vaal Vet Sandy Grassland and Alluvial Vegetation)

The degraded habitat includes areas that are connected to and play a crucial role regarding the water resource habitats present. This habitat type is regarded as semi-natural, but disturbed due to fragmentation, grazing by livestock and also human infringement in areas close to roads (Figure 6-19 and Figure 6-20).

Generally, this habitat unit has intact ecological functioning attributed to faunal communities found in this habitat. The current ecological condition of this habitat, regarding the driving forces, are inconsistent due to the different land uses. Portions of these areas have been disturbed by the historic and current grazing pressure. Additionally, the presence of some disturbances such as AIP presence or edge effect impacts on floral communities have resulted in decreased habitat integrity. The condition difference within this habitat depends on the extent of the disturbance in some areas being more severe, usually related to one being more overgrazed than the other.

Although the habitat unit is not entirely disturbed, ongoing and historic disturbances have resulted in the plant community no longer being fully representative of the reference vegetation. However, the habitat indicators that are known to show 'unhealthy' Dry Highveld Grassland such as grassland dominated by karroid shrubs, or the absence of endangered animal species.

The main ecological characteristics of dry highveld grasslands, which the Vaal Vet Sandy Grassland, is classified as, (SANBI, 2013):

- Climate; fundamentally different from any other grassland systems due to the significant difference in climate. This grassland experiences cold (frost) winters, but a defining difference is the low and highly variable summer rainfall that affects the grassland productivity, due to water being the main factor affecting growth, and not the duration or temperature of the season;
- Fire; plays a role in maintaining these grasslands, however not as important as grazing. Due to its slow growing nature, the grassland recovers slowly from fire events;
- Grazing, a slow growing sweetveld grassland being able to support animal production for most of the year, grazing is an important driver in these systems. and this is the most important ecosystem process that can be managed to maintain biodiversity and productivity in these ecosystems;
- Life-history strategies; due to the environmental conditions, driven primarily by adaptation to drought, the plants persist mainly through being long-lived, perennial plants replacing themselves through seeds or vegetative reproduction;
- Encroachment by invasive woody species; due to the factors limiting encroachment (fire, rainfall and frost) being variable in this grassland, if the biomass is reduced by grazing or decreased fire intensity, bush encroachment by trees such as *Vachellia karoo*, or woody karroid shrubs (such as *Pentzia* and *Felicia* species) can occur.
- Geology; The underlying geology is an important determinant of the biodiversity patterns and processes. Especially dolerite sheets that correlates to high levels of plant species richness and endemism.

The portions of this remaining habitat unit can thus be regarded as incredibly important, not only within the local landscape, but also regionally; it acts as a greenland, used for habitat, foraging area and movement corridors for fauna (including the SCC recorded). The habitat sensitivity of the degraded habitat is regarded as high/very high, mainly due to the role of this habitat to biodiversity within a very fragmented local landscape, not to mention the various ecological datasets.

The management and spatial guidelines for the land use of these grasslands that are relevant to this project area include (SANBI,2013);

- Avoid habitat loss in threatened grassland vegetation types: Threatened vegetation types such as Vaal-Vet Sandy Grassland are highly fragmented and there should be no further habitat loss, or ploughing, in these vegetation types without proper impact assessments.



Figure 6-19 Examples of degraded habitat (grassland) from the project area.



Figure 6-20 Examples of degraded habitat (alluvial vegetation) from the project area.

### Water resources (Wetlands, rivers and riparian zones)

This habitat unit represents the water resource habitats with the adjacent vegetation that it is connected to (Figure 6-21 & Figure 6-22). The riparian habitat unit or riparian zone represents areas associated with the Sand River as well as a small tributary to the river. Although the stream and associated dams are in a relatively modified poor condition with the presence of invasive species, bank erosion and overgrazing/trampling adjacent to the stream, the riparian vegetation serves an important ecological function with high conservation value. Riparian areas have high conservation value and can be considered the most important part of a watershed for a wide range of values and resources. They provide important habitat for a large volume of wildlife and often forage for domestic animals. The vegetation they contain are an important part of the water balance for the hydrological cycle through evapotranspiration. The wetlands (and riparian zones) habitat unit is considered to be of very high ecological sensitivity due to the contribution of the various wetland (and riparian) features to faunal migratory connectivity, ecoservices provision and the unique habitat provided for faunal and floral species. The wetland habitats have been provided by the wetland specialist, and the accompanying

wetland report must be consulted for the relevance and sensitivity of these systems which have been included within this report.

Even though somewhat disturbed, the ecological integrity, importance, and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora, including the SCC recorded. The preservation of this system is an important aspect to consider for the proposed development, even more so due to the high sensitivity of the area according to the various ecological datasets. This habitat needs to be protected and improved due to the role of this habitat as a water resource.



*Figure 6-21 A photo of the Water resource (Sand River and riparian) habitat in the project area.*



*Figure 6-22 A photo of the Water resource (wetland) habitat the project area.*

### **Disturbed Habitat**

The disturbed habitat is regarded as areas that has been impacted by edge effects of transformed areas as well as direct impacts from historic and ongoing overgrazing, dumping and infringement (Figure 6-23 & Figure 6-24). This area has been disturbed and modified from its natural state, it represents habitat that is more disturbed than the 'degraded habitat' area, but not as disturbed as the 'transformed' area. This habitat is regarded as areas that have been impacted more by historic overgrazing,

mismanagement, and harmful land use (historic agriculture). These habitats aren't entirely transformed but in a constant disturbed state as they can't recover to a more natural state due to ongoing disturbances and impacts it receives from grazing and mismanagement. These areas are considered to have a medium sensitivity due to the fact that the areas may be used as a movement corridor and in many cases form a barrier between the more degraded bushveld and the transformed areas.



Figure 6-23 A photo of the disturbed habitat in the project area.



Figure 6-24 A photo of the disturbed habitat the project area.

### Transformed Habitat

The transformed habitat unit, which is the largest of the habitat units, represents areas where vegetation cover has been significantly impacted by current and historical mining and agricultural activities as well as through infrastructure associated with the mining/agricultural activities (Figure 6-25 & Figure 6-26). This habitat unit has no conservation value from an ecological perspective.



Figure 6-25 A illustration of transformed habitat the project area.



Figure 6-26 A illustration of transformed habitat the project area.

### 6.2.3.2 Site Ecological Importance

The biodiversity theme sensitivity as indicated in the screening report was derived to be *Very High* (Figure 6-27). This was based on the CBA 1, ESA 1 & 2 areas as well as the NPAES area. The animal sensitivity was rated as *Medium*, while the plant sensitivity was rated as *Low*.

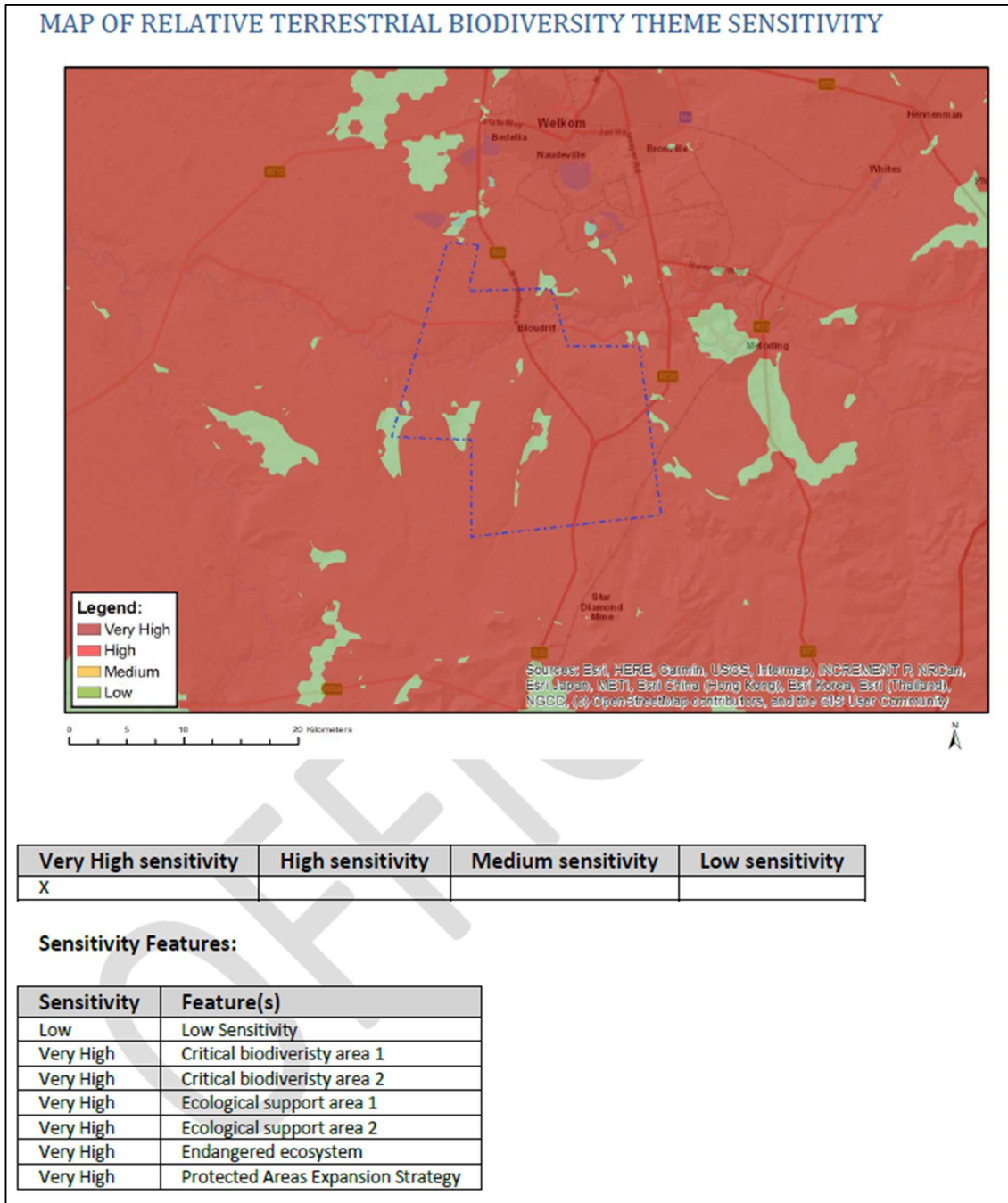


Figure 6-27 Biodiversity Theme Sensitivity, Screening Report

As per the terms of reference for the project, GIS sensitivity maps are required in order to identify sensitive features in terms of the relevant specialist discipline/s within the project area. The sensitivity scores identified during the field survey for each terrestrial habitat are mapped. The location and extent of these habitats are illustrated in Figure 6-28 and Figure 6-29. Based on the criteria provided in Section 4.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 6-11). The sensitivities of the habitat types delineated are illustrated in 'Very High/High Sensitivity' areas are due to the following, and the guidelines can be seen in Table 6-12:

- All habitats within the assessment area were observed to be utilised by threatened (local classification) species during the field survey, these species comprised of:

Tetra 4 Cluster 2

- One flora species;
  - Four (4) avifaunal species;
  - Three (3) mammal species;
  - One (1) reptile species; and
  - One (1) amphibian species.
- Unique, important (EN Ecosystem CBA1/ESA 1& 2) and very low resilience habitats (water resource); and
  - Habitat that is regarded as crucial to the survival of a threatened species.

**Table 6-11** Summary of habitat types delineated within the field assessment area of the project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Degraded (Sensitive Species)	High	High	Medium	Low	Very High
Degraded	High	Medium	Medium	Low	High
Water Resource	High	Medium	Medium	Very Low	High
Disturbed	Medium	Medium	Medium	Medium	Medium
Transformed	Very Low	Very Low	Very Low	Medium	Very Low

**Table 6-12** Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to development activities
<b>Very High</b>	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.
<b>High</b>	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.
<b>Medium</b>	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
<b>Very Low</b>	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.



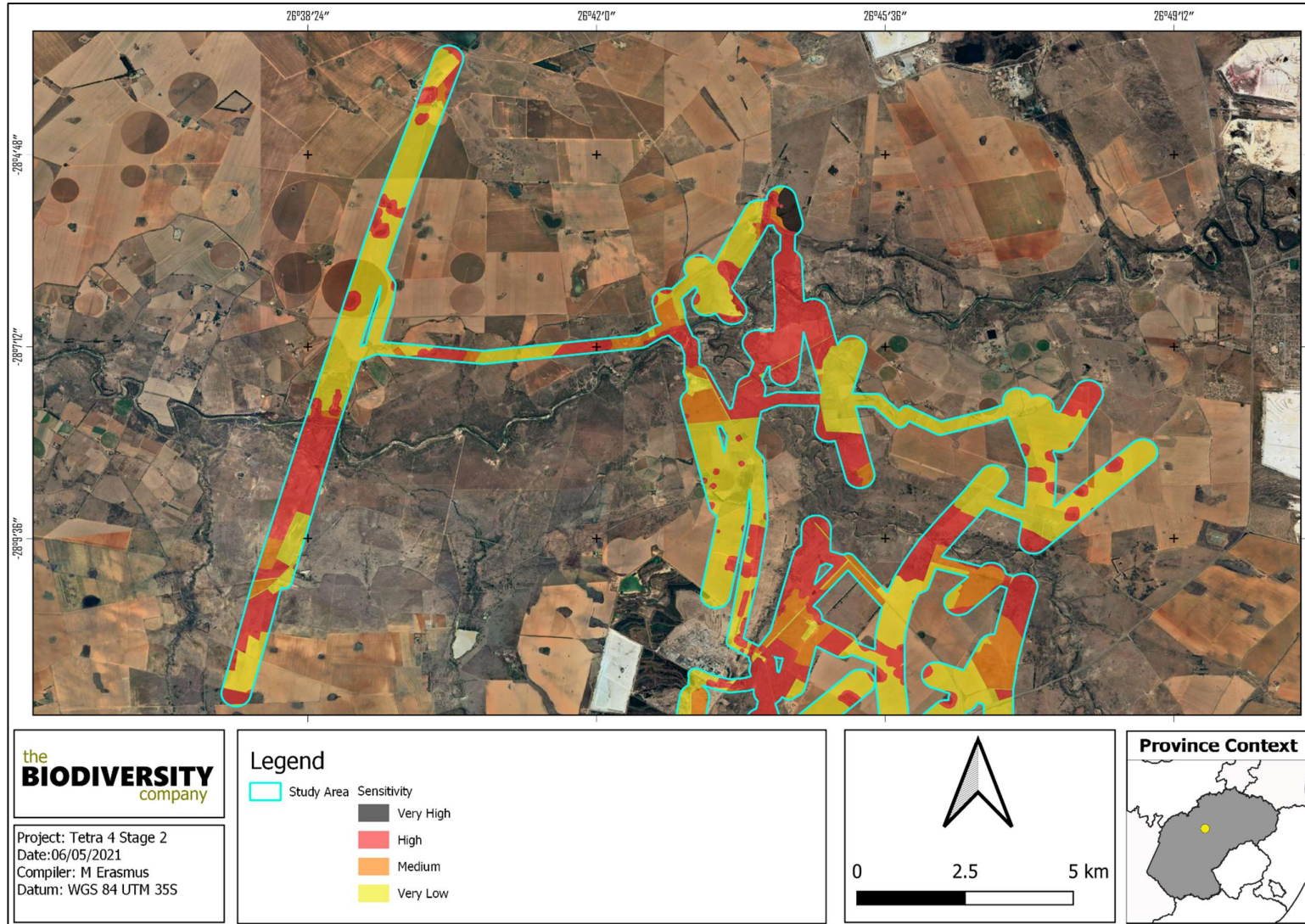


Figure 6-28 The study area superimposed over the sensitivities in the area

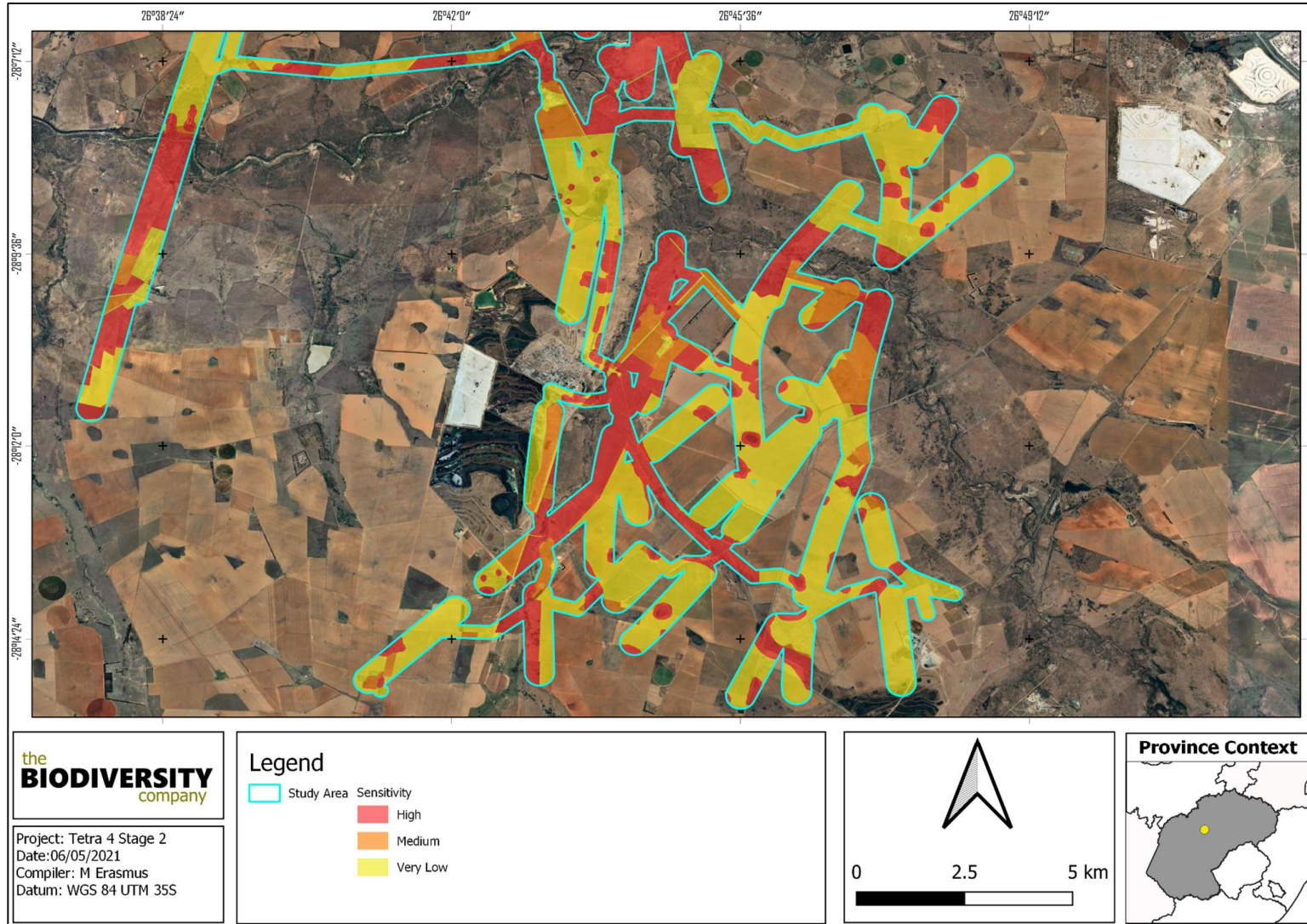


Figure 6-29 The study area superimposed over the sensitivities in the area

## 7 Impact Assessment

The sections below serve to outline and summarise the types of perceived impacts from the proposed activities on the terrestrial biodiversity and ecology of the project, as well as responses to the concerns raised by stakeholders. The associated significance of each impact is evaluated as relevant to the local biodiversity and the likely project activities.

### 7.1 Anticipated Activities

The proposed activities associated with the expansion of gas mining can be seen overlaid with the overall sensitivity (Figure 6-28 and Figure 6-29). It is evident from the figure that the following may have a negative effect on more sensitive water resources, most impacts involve the water resources and the habitats connected to these:

- Expansions to the current LNG and Helium production plant located on the Farm Mond van Doorn Rivier. The planned expansions will be to increase the helium and LNG production capacities significantly (~30 fold increase) and increase the footprint of the existing approved plant by approximately 10 ha;
- The drilling of new gas wells ~300 wells spread over a total study area (Cluster 2) of approximately ~27 500 ha;
- The installation of trenched pipelines connecting the wells to localised booster compressors and then to in-field compressor stations (~3 sites) and subsequently the compressor stations to the main plant area; and
- There will be a requirement to have short powerline and water connections to the compressor sites.”

### 7.2 Stakeholder Comments

Highlighted concerns/comments from stakeholders relevant are represented and discussed in Table 7-1 below.

Table 7-1 Stakeholder considerations relevant to the report

Comment	Tetra4 EIA formal response	Specialist Response
Alien and invader plant species, all phases. (Viewed from Cluster 1)	Tetra4 has and implement an alien and invasive plant species management plan and continuously monitors and applies control measures as required. It has been noted that the areas of most concern, is areas where the background site is already predominated by these species.	Fourteen (14) IAP species listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b were recorded within the project area.  As per the Tetra4 response, due to the predominant land uses (agriculture), the AIP are numerous and have proliferated. Due to this the infestation will require tedious and long during management and control.  Any landowner is responsible for any Category 1b species within their 'property' and must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA
Disturbance of wildlife, (Construction and operational phases)	Disturbance of wildlife - to be assessed by specialist during EIA	Assuming this mainly pertains to the numerous game farm areas. Even though many of these could not be assessed due to access limitations, these will be addressed in the sections below.

<b>Visual impact and landscape character, Vegetation.</b>	Visual impact and landscape character, Vegetation. - to be assessed by specialist during EIA and should be noted that this is very subjective	Assuming this mainly pertains to the general landscape and not natural areas specifically, the impact in habitats and vegetation however be addressed in the sections below.
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### 7.3 Review of Cluster 1 EIA and EMPr

The impacts and mitigation measures from Cluster 1 that are still relevant/adequate are represented and discussed in Table 7-2 below.

Table 7-2 Cluster 1 Environmental Impacts and EMPr

Ref #	Activities	Impact/ Aspect	Management/ Mitigation Measures	Suggested Amendment
2	All	Management of sensitive areas	Any drill sites or infrastructure routes located inside medium, high or very high sensitive sites on the sensitivity /constraint map require a site-specific pre-commencement assessment. The pre-commencement assessment must address the sensitive aspects on site, as identified in the overall sensitivity / constraint map. The pre-commencement assessment must be compiled by the site Environmental Officer (EO) with a suitable environmental qualification and experience. All recommendations of the pre-commencement assessment must be implemented on site. The completeness and adequacy of the pre-commencement assessment in respect of identifying and managing on site sensitivities must be included in the monthly ECO reports and annual independent audit. [Amendment 2019/05].	Plan the placement of infrastructure in such a way that areas identified as Very High are avoided. If avoidance is not possible, suitable engineering solutions must be used to traverse these areas. Development in High sensitivity areas must be minimised as much is feasible. The infrastructure should be realigned to prioritise development within very low sensitivity areas. Mitigated development in medium sensitivity areas is permissible.
9	Exploration/ Production drilling	Management of sensitive areas	Once prospective drilling sites are identified, a suitably trained EO must undertake a site-specific pre-commencement assessment to assess the site for any potential environmental sensitivities prior to commencement. Should environmental sensitivities be identified, the relevant Tetra4 Response or Action Plan Procedures must be adhered to [Amendment 2019/05].	A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season and any SSC should be noted. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated
11	All	Management of sensitive areas	After any site-specific assessment, the Environmental Management Programme must be amended to include any site specific requirements. The site assessment must include a survey of the preferred footprint area (including access routes) to identify any potential sensitive/ red data species (flora and fauna).	
15	All	Loss of watercourse habitat	Locate pipeline/ trunkline alignments/ compressors outside of buffered watercourses (sensitive watercourse habitat) as far as possible. Buffered watercourses within proximity to the construction footprints should be demarcated on site for the entire construction process to help indicate sensitive areas and prevent unauthorized access. Unavoidable crossings should ideally be located perpendicular to the direction of flow at the shortest possible crossing distances. Long crossings along the length of wetlands, rivers and drainage lines should be avoided as far as practically possible. Aboveground pipeline watercourse crossings that are suspended on plinths are recommended as opposed to the excavation, lowering and infilling of pipelines in watercourses. Tetra4 should make provision in the design phase for permanent access tracks/ roads that will be required for the maintenance of the pipeline. A construction method statement should be prepared by the	

17	All	Flora and fauna direct and indirect mortality	<p>Search and rescue of species of concern. Obtain permits for disturbance/destruction of any listed/protected species found on site. Where possible, undertake activities in previously disturbed areas and/or habitats with lower sensitivity. Where possible, locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible.</p>	<p>contractor with input from a watercourse specialist prior to the start of construction.</p> <p>Appropriate speed humps, enforcing of speed limits and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist. Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds.</p> <p>Any excavations or holes must be conducted in a progressive manner. Should the holes/excavations stay open overnight they must be covered temporarily, to ensure no small fauna species fall in.</p> <ul style="list-style-type: none"> <li>• Equip open trenches with suitable ramps or steps every 50 m so that trapped animals can escape. In areas where there is high animal activity, fine-mesh fences should be laid out around the open section of trenches and secured to minimise the likelihood of animals falling in.</li> <li>• Conduct daily patrols to rescue any animals trapped in the pipeline trench.</li> </ul> <p>Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.</p> <ul style="list-style-type: none"> <li>• Driving on access roads at night should be limited or if possible avoided in order to reduce or prevent wildlife road mortalities which occur more frequently during this period.</li> </ul> <p>Once the development layout has been confirmed, the open areas must be fenced off appropriately pre-construction in order to allow animals to move or be moved into these areas before breaking ground activities occur. Construction activities must take place systemically, especially in relation to the game farm areas. <b>These particularly pertains for Game Farm Areas.</b></p> <p>The design of the proposed OHLs must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins <i>et al.</i>, 2015). Any OHLs must be of a design that minimizes electrocution risk by using adequately insulated ‘bird friendly’ monopole structures, with clearances between live components of 2 m or greater. Monitoring of the OHL route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation. OHLs, especially over the</p>
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				water resource areas, must be fitted with bird diverters throughout the whole area and not just the portions adjacent to the poles
21	Processing facilities	Decrease in surface water quality	Design and implement a site specific stormwater management plan for the compressor and helium/LNG plant that will enable dispersed release of runoff at outlets, with outlets located outside (upslope) of buffered watercourses (where possible), ensure separation of clean and dirty water and provide for adequate dirty water containment. Ensure that sufficient ablution facilities are available on site and that septic tanks are located outside of buffered watercourses. Stabilise new channels that form as a result of headcut erosion or other forms of erosion once they are recorded [Amendment 2019/05].	
30	All	Management of sensitive species	If sensitive species occur within the preferred footprint, the first option should be to relocate the proposed footprint followed by the alternative of preparing a relocation plan (prepared by a suitably qualified specialist).	
36	Exploration/ Production drilling	Water pollution and waste management	<p><u>To mitigate the effluent from long term drilling sites (&gt;3 years):</u> Separation pits (sumps) for wastewater and grease and oil polluted fluids should be excavated and constructed to treat wastewater; Where excavating these pits, topsoil and subsoil should be stored separately; Sump areas should be lined with PVC to prevent seepage; In order to contain non-biodegradable oil and fuel spills, drip pans or PVC lining should be provided for mobile pans and drip pans; For stationary drill rigs, thin concrete slabs and/or with PVC lining should be installed before the stationary drill rigs are erected; Sump areas must be designed to accommodate the 1:100 year flood event. Clean and dirty water streams must be separated. Sump areas must be designed to accommodate the 1:100 year flood event. Clean and dirty water streams must be separated. The location and design of the sumps must be in accordance with the applicable GN 704 conditions [Amendment 2019/05]; and Sump areas should be constructed in such a way that clean water (stormwater) is diverted away from these areas. <u>To mitigate effluent from short term drillings sites (&lt;3 years):</u> The topsoil layer of the surface area required for the drill should be excavated and stored according to accepted topsoil management practices; A contiguous impervious PVC layer (e.g. large silage sheets) is placed under the drill (within the excavated area) to collect any spills; Spills of hazardous substances should be collected and disposed of according to the approved EMPR requirements at a suitably licensed facility; Collected spills from the drill must not be allowed to contaminate the soils and/or the closed water system utilised for the drilling fluids; and It is recommended that where possible, closed, above ground tanks are utilised for future drilling as opposed to sumps/pits.</p> <p>All clean water should be diverted away from the site. Minimize the area that is disturbed during production activities in order to minimize the potential stormwater disturbance and to reduce the sediment loads to receiving water courses. Adequate drainage and erosion protection in the form of cut-off berms or trenches should be provided where necessary.</p>	
37	Construction areas	Stormwater control and management	All clean water should be diverted away from the site. Minimize the area that is disturbed during production activities in order to minimize the potential stormwater disturbance and to reduce the sediment loads to receiving water courses. Adequate drainage and erosion protection in the form of cut-off berms or trenches should be provided where necessary.	Keep the surface & sub-surface water as well as storm water away that may run off from the construction areas from the low laying areas, such as drainage lines as well as the surrounding areas, from leaving the project area in an uncontrolled manner.

38	All	Noise, vibration, visual and dust impacts	The contractor must prevent labourers from loitering in the area and causing noise disturbance. Ensure that all equipment is in a good working condition to ensure that no additional noise is admitted from them. Light impact should be kept to a minimum (e.g. use of full cut-off lighting fixtures if necessary). Retain vegetation where possible to maintain its natural noise and visual screening function. Reduce speed limit on gravel roads to reduce noise generation.	Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals. Outside lighting should be designed and limited to minimize impacts on fauna. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.
42	All	Loss / destruction of natural habitat	Where possible, locate infrastructure in previously disturbed places and/or habitats with a lower sensitivity score. Rehabilitate disturbed areas as soon as possible. Control alien plants.	The areas to be developed must be specifically demarcated to prevent movement into surrounding environments, especially wetlands and watercourses. Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.
48	All	Disruption of aquatic communities	Ideally, no vehicle access tracks/roads should transect through watercourses. Access tracks/roads should be designed in such a way to minimise overlap with watercourses. Use existing access roads/tracks as far as possible. Construction and unavoidable access tracks/roads through wetlands, rivers and other watercourses must provide habitat connectivity between upstream and downstream reaches (e.g. flume pipes and/or culverts) and to reduce the risk of scour erosion and channel incision within the watercourse. . No unauthorised driving should be allowed through watercourses. Driving can only occur on specially designed tracks/roads that minimised the risk of erosion and surface flow concentration. No perched flumes should be present in temporary construction running tracks and/or permanent access tracks. In the case of aboveground pipelines, the pipeline should not be located 'flush' along the surface profile of the watercourse with no gap between the natural ground level and the pipeline. Aboveground pipelines should rather be suspended on plinths of a sufficient height that will allow the free movement of indigenous fauna present within the study area, such as tortoises, as recorded in the Bosluissspruit channel near existing well SPG3.	
49	All	Watercourse erosion	Prevent the use of only one or two flume pipes in access/running tracks located in watercourses, specifically unchannelled valley bottom wetland and seep wetlands where concentrated flows can result in headcut development and the formation of a channel. Surface flows should also be spread out in channelled watercourse crossings through the use of several flume pipes to prevent channel incision and scour erosion. Access tracks should be maintained during the entire construction process and removed once construction is completed. Flume pipes should be monitored and kept free of blockages. Construction in watercourses should ideally occur during the dry season. Any new erosion features identified should be stabilised during the construction process (soft interventions such as hay bales, rock packs, runoff control berms and 'bio-socks' are recommended). Erosion control features should be maintained. Keep vegetation clearing to a minimum on the adjacent slopes to prevent erosion on approaches bordering watercourses. Small temporary contour	



			<p>berms may be used to help control runoff on approaches should it be required. Drainage furrows that may be required to create dry working conditions should ideally be avoided as they can easily erode during high flow events. Development of a watercourse monitoring plan before the onset of the construction phase, and the development and implementation of a watercourse rehabilitation plan during the latter half of the construction phase to ensure the eroded wetlands and other watercourses are stabilised and rehabilitated. Dewatering discharges at construction sites should be done in a silt bay to prevent erosion and sedimentation in adjacent watercourses. Runoff from the construction footprint should be controlled on site to prevent concentrated point releases of water into downslope watercourses. Care needs to be taken not to initiate or aggravate erosion in watercourses.</p> <p>The use of smaller/quieter equipment when operating near receptors. Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. Where possible only undertake construction activities during the day. If night-time activities are required, do not operate closer than 500 m from any sensitive receptors. Ensure a good working relationship between the developer and all potentially noise-sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500 m from them at night). Information that should be provided to potentially sensitive receptor(s) includes: Proposed working dates, the duration that work will take place in an area, and working times; The reason why the activity is taking place; The construction methods that will be used; and Contact details of a responsible person where any complaints can be lodged should there be an issue of concern. When simultaneous noise emitting activities are to take place close to potential noise-sensitive receptors, co-ordinate the working time with periods when the receptors are not at home.</p>	
50	All	Noise impacts from construction activities		
53	All	Establishment of informal settlements close to the project area	No informal settlers should be allowed on private property within the development area. If any person erects an illegal structure the landowner and police should be informed immediately and asked to remove the structure.	
56	Exploration/ Production drilling	Spillage of oils, fuel and chemicals	The placement of drip trays under the drilling rigs should be implemented and recorded to minimize the contamination of waste oil from the drilling rig. Drilling fluids should be biodegradable and should be kept in a lined mud pit or surface container. Proper rehabilitation and off site removal of excess fluids should take place. Oil recovered from the drilling rigs and any vehicle on site should be collected, stored and disposed of at licenced facilities or provided to accredited vendors for recycling.	A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or

				removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.
57	All	Increased soil erosion	Ensure that topsoil (0-30 cm approx.) and subsoil (30 cm +) are stored separately during excavation, so they can be replaced in the correct order. Ensure that pipeline route is re-vegetated as soon as possible after construction and that soil surface is in good condition.	
62	All	Blockage of floral and faunal seasonal and dispersal movements	Where possible, undertake activities in previously disturbed areas and/or habitats with lower sensitivity. Where possible, locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible. Rehabilitate disturbed areas as soon as possible.	
63	All	Pollution of wetland habitats	Control all waste sources emanating from proposed activities. Maintain minimum distances from aquatic and wetland habitats, where possible. Undertake activities in previously disturbed areas and/or habitats with lower sensitivity.	
64	All	Decrease in surface water quality in watercourses	Store all hazardous materials (Incl. hydrocarbons) in a bunded area, outside of buffered watercourses. Stripped and excavated subsoil and topsoil stockpiles should be stored outside of buffered wetland areas and be protected from erosion. This may not be possible for long wetland crossings in seep and other wetlands, in which case topsoil can be stored on low berms within the wetland on geotextile material. Topsoil and subsoil should however be protected from erosion. Approaches that border watercourses, particularly those along steep and long slopes, should receive runoff control measures to prevent siltation and concentrated flow into watercourses. Inspect vehicles for leaks and repair all leaks immediately. Any generators used in watercourses should be used with a functional drip tray. Ensure that sufficient ablution facilities are available on site and that they are located outside of buffered watercourses. Stabilise new channels that form as a result of headcut erosion or other forms of erosion once they are recorded. Sediment deposition should be prevented in watercourses and especially watercourse channels through the following measures: Implementing stormwater control measures around construction areas; and Dewatering during excavation activities in watercourses should be released in a silt bay with sufficient capacity that filters and retains sediment before the water is released into the watercourses. Sediment deposition events into watercourses should be evaluated by an experienced ECO/ wetland specialist and based on the magnitude of the impact recommendations can be made regarding the removal of deposited material.	
71	All	Displacement of faunal species	Where possible, undertake activities in previously disturbed places and/or habitats with a lower sensitivity score. Rehabilitate disturbed areas as soon as possible.	The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna

				<ul style="list-style-type: none"> <li>The schedule and progression of the construction work must be planned and designed in a manner in which any area is only disrupted for a short period</li> </ul>
72	All	Increase in poaching incidents	<p>If areas are fenced, the fences must be checked for snares on a daily basis for the duration of the construction period. All incidences must be reported to the closest police station. Anti-poaching toolbox talks should form part of the induction process of all the fencing teams. Any contractor or employee caught poaching should be removed from site.</p>	
75	All	Watercourse erosion	<p>Use existing access roads as far as possible. Unavoidable new permanent access roads/tracks in watercourses should be designed to prevent erosion downstream of the crossings by using several flume pipes, preferably culverts, or other structures, such as concrete fords. All temporary and permanent vehicle access tracks/roads in watercourses will require approval from DWS in the form of a Water Use License. New permanent access roads/tracks should be located along existing infrastructure footprints as far as possible and at areas that will enable the shortest crossing distance through watercourses. Long crossings along the length of watercourses (parallel to its flow direction) should be avoided. Remnant erosion features that remain after the rehabilitation phase should be addressed until full rehabilitation and closure is achieved. Rehabilitation interventions should be considered with care and not worsen erosion once implemented [Amendment 2019/05]. Identified permanent access tracks should be maintained during the entire operational phase of the project and blockages should be removed, while erosion features should be repaired once observed. Concrete fords (low water bridges) are preferred as crossing structures in larger watercourse channels, compared to culverts and flume pipes, which are more likely to result in erosion and require more regular maintenance. The Helium plant should receive stormwater mitigation measures at its outlets that will prevent concentrated flow. Stormwater mitigation measures and flow outlets should be located outside of buffered watercourses.</p>	
77	Exploration/ Production drilling and Processing facilities	Pollution prevention and usage of water sources	<p>All contaminated water and spillage will be drained from the containment area into primary and secondary fully lined sumps. Drilling water should be kept in closed circuit and re-circulated to the drilling machine. Water condensate from the gas polishing process (Dehydration) should be treated to remove volatile compounds, before evaporation. Make up water will be introduced when required. All domestic effluent water from the site should be collected and disposed of in an appropriate and legal manner such as a French drain system which is situated not closer than 100 metres from any streams, rivers, pans, dams or boreholes. Do not exceed the water abstraction permit and General Authorisation (GA) limits for water use for drilling activities. All LNG processing facilities and storage vessels must include adequate (at least 110% containment volume) secondary liquid containment areas (e.g. bunds). [Amendment 2019/05].</p>	

82	Exploration/ Production drilling	Contamination from leakage and spillage	The pipeline needs to be inspected regularly to find and fix any leakages. A water quality monitoring plan needs to be produced and implemented to determine any changes in the water quality. Any water (Incl. condensate) generated at the conventional and unconventional well heads need to be captured in some form of dirty water storage facility. This water can be tested and treated (if needed) and used for irrigation or discharge into the environment if found to be suitable. Should the water be found to be unsuitable for irrigation or discharge into the environment, the contaminated water will be disposed of at a suitable licenced facility.
83	All	Pollution of habitats	Control all waste sources emanating from operations activities. A defined waste management system must be implemented according to the hierarchy of waste management (avoid, reduce, reuse, recycle, dispose). All wastes generated must be stored and disposed of according to relevant legal requirements.
85	Exploration/ Production drilling	Contamination from leakage and spillage	All wells should be capped to prevent the spilling of contaminated groundwater. The water quality monitoring plan should be implemented in this phase to monitor any deterioration of the water quality.
89	All	Environmental Awareness	All personnel should undergo environmental awareness and induction training. A register should be kept of all attendees. Toolbox talks should be scheduled to ensure continuous environmental awareness training. Emergency procedures should be communicated and displayed prominently on the site. A copy of the EMPr should be available on the work site at all times. Appointed sub-contractors must be made aware of their obligations under this EMPr.
91	All	Management of flora and fauna	Vegetation should be retained as far as possible. Establish an alien invasive plant eradication programme for the control of weed species. This must be monitored for a period of time following rehabilitation to ensure that alien invasive plants do not establish themselves. Unnecessary damage or disturbance to vegetation should be prevented. No trees or shrubs should be felled or damaged for the purpose of obtaining firewood, unless otherwise agreed to with the landowner. Areas outside the footprint (including all infrastructure) should be considered as no-go areas. No faunal species are allowed to be purposefully killed. Any potential protected or sensitive areas should be clearly demarcated and noted as no-go areas.
93	All	Water abstraction	The necessary DWS permits should be obtained if it is expected that DWS abstraction limits will be triggered before water abstraction is undertaken. Obtain agreement from landowner to abstract water from existing boreholes. If required, abstraction of water should be kept within the permit limits as issued to the landowner by DWA. Water may only be obtained from approved sources. [Amendment 2019/05].
101	All	Habitat fragmentation and edge effects	Undertake activities in previously disturbed areas and/or habitats with lower sensitivity where possible. Locate activities on the boundaries of existing disturbance where possible. Use existing access roads as much as possible. Rehabilitate disturbed areas as soon as possible.

102	All	Loss of watercourse habitat/ Alterations of the river banks and river bed	<p>Locate pipeline/trunkline alignments outside of buffered watercourses (sensitive watercourse habitat) as far as possible. Buffered watercourses should be demarcated on site for the entire construction process to help indicate sensitive areas and prevent unauthorised access. Mitigation for pipeline construction primarily includes the avoidance of watercourse crossings. Where crossings are unavoidable, crossings should be located along existing infrastructure features, such as roads, dam walls and existing pipelines. Unavoidable crossings should ideally be located perpendicular to the direction of flow at the shortest possible crossing distances. Long crossings along the length of wetlands, rivers and drainage lines should be avoided as far as practically possible. Horizontal directional drilling is recommended for the Sand River and Bosluisspruit crossings, as opposed to the clearing, temporary damming, excavation, lowering and infilling of pipelines in these river watercourses. Vegetation clearing, topsoil stripping, trenching and infilling to bury the pipeline, are considered to be an acceptable approach in other types of watercourse crossings. The construction servitude should however not remain bare (stripped for longer than a month at a time), while trenches should not remain open for more than five days. It is therefore recommended that the pipeline be completely constructed in sections, rather than removing all of the topsoil and creating open trenches across the entire study area for prolonged periods of time. The servitude width should be restricted in watercourse crossings to reduce the footprint of the impact. Topsoil material should only be stripped in the area where trench excavation is required, while the surrounding area in the servitude is only cleared of vegetation. Limited topsoil stripping is conditional on the prevention of soil compaction by heavy motorised vehicles (HMTVs) through the use and maintenance of running tracks. Examples of running tracks include bogmats or rock aggregate combined with geotextile fabric and flume pipes. Alternatively topsoil across the entire width of the construction servitude (often referred to as the right of way) can be stripped and stored separately outside of buffered watercourses. Removed topsoil and subsoil should be sorted separately in stockpiles and protected from erosion when required. Additional erosion protection measures should be implemented for stockpiles that are to be stored for an extended duration [Amendment 2019/05].</p>	
103	All	Loss of watercourse habitat/ Alterations of the river banks and river bed	<p>A construction method statement should be prepared by the contractor prior to the start of construction. Conditions stated in the water use license should also be implemented. The use of old and new quarry sites for bedding and padding material, as well as other needs (e.g. the discard of spoil material) should not be located within wetlands and other watercourse types. Watercourse crossings and construction methods affecting watercourse must comply with the approved water use licence and associated DWS approved method statements [Amendment 2019/05]. The use of sites outside the study area will also be subject to environmental authorisation. Provision should be</p>	

			<p>made in the design phase for permanent access tracks/roads that will be required for the maintenance of the pipeline. After completion of the construction phase, the reinstatement of the original topography of the watercourse (its geomorphological template) should be undertaken followed by re-vegetation activities. The following mitigation measures are recommended: Limit the construction activities to the smallest area possible; Reinstatement the geomorphological template of the watercourse crossing using subsoil material, followed by topsoil material on top. This should be done as soon as possible after completion of construction activities; During the reinstatement of watercourse profiles to the pre-construction profile, entrenched gullies and channels may have to be cut back to create a lower gradient that will not be susceptible to erosion; Once the crossing has been shaped and topsoil reintroduced to stripped areas, biojute can be applied according to specification to avoid rill formation and undercutting below biojute material. During the start of the growing season the annual grass <i>Eragrostis tef</i> can be introduced through manual broadcasting on reinstated watercourse surfaces. Rehabilitated areas within watercourse boundaries must be protected from overgrazing. Protection methods must be identified in consultation with the respective landowners [Amendment 2019/05].</p>	
108	All	Encroachment/ invasion of alien plants (specifically into watercourses)	<p>Restrict the clearing of watercourse vegetation as far as possible. Areas that have been cleared should be re-vegetated with indigenous species or other suitable plant species, such as <i>Eragrostis tef</i>, after construction and initial rehabilitation work (reinstatement of the geomorphological template) is completed. Compile and implement an alien plant control program with a particular focus on alien control in watercourses (including wetlands) during the rehabilitation phase of the project. Rehabilitate disturbed areas as soon as possible. Restrict new footprints to disturbed areas as far as possible. Regular monitoring should be undertaken in the watercourses to check any possible invasion by alien vegetation so that they can be weeded out before they grow and spread out.</p>	

## 7.4 Biodiversity Risk Assessment

### 7.4.1 Impact Assessment Considerations and Procedure

The project activities will have a negative effect on the natural environment of the area. Anthropogenic activities drive habitat destruction leading to the displacement of fauna and flora and possibly causing direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, foraging and nesting sites, and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation is likely to reduce the habitat available for all types of fauna species and hence reduce animal populations and species compositions within the area.

The additional impacts associated with the proposed activities, which weren't considered covered in the existing approved Cluster 1 EIA and EMP, are considered in this section. The first additional impact that was not considered, was the impact to the recorded Sungazer (*Smaug giganteus*). In the context of Cluster 1, the species was not recorded, even though the project areas overlap (Figure 7-1).



Figure 7-1 Illustration of the project area from Cluster 1 (left) and Cluster 2 (right). Red circle indicates area overlap for Cluster 1

The species environmental guidelines SANBI (2020) indicate that specific directives contained within a Biodiversity Management Plan (BMP) must take precedence as mitigation measures. According to the guidelines, SANBI (2020), there is a BMP currently in development for the IUCN VU Sungazer (*Smaug giganteus*) that specifically states that: 'Destruction of intact habitat with extant Sungazer populations is not permitted'. Therefore, avoidance mitigation and not minimisation mitigation would be applicable in such a case. Additionally, the protocols advise a minimum buffer of 250 meters, to up to 400 m buffer to be applied around the periphery of Sungazer colonies, which in this case represent the Very High sensitivity area. There are no mitigation measures that can be described in this report that will reduce the significance of the risk to an acceptable level, and hence no impact significance rating will be conducted. The development within these Very High Sensitivity areas is considered 'No-Go'. In order to guide the development, mitigations regarding the species can be seen in Table 7-3 below

Table 7-3 Mitigations for Sensitive species

Activities	Impact/ Aspect	Management/ Mitigation Measures
All	Management of sensitive area.	Very High sensitivity area to be avoided and declared a No-go area. The Medium and High sensitivity area in relation to this area must be avoided, as these act as buffers for the population. If possible, all livestock (including cattle, pigs, goats, domestic dogs and cats) must be kept out of the area at all times.
All	Loss / destruction of natural habitat	The areas to be developed must be specifically demarcated to prevent movement into surrounding environments, especially grassland surrounding the Very High Sensitivity area. Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.

Tetra 4 Cluster 2

<b>All</b>	Fauna direct and indirect mortality. Possibility of poaching incidents	Any and all information within this report and additional reports pertaining to the locality of the species, must not divulged or made available to the public. Due to the sensitivity of this species, especially in regard to its illegal collection, no locality data should be displayed or provided to the public. Any person during the application process should treat the information with the necessary confidentiality. Any large lizard mortalities should be cross checked to confirm the identification. Traffic and car movement
<b>All</b>	Environmental Awareness	All personnel should undergo environmental awareness and induction training regarding the species and their sensitivity. Stakeholder engagement with landowners must be conducted to assist in the presence/absence of the species Sungazer ( <i>Smaug giganteus</i> ) or "Ou Volk".
<b>All, Especially Planning Phase</b>	Management of fauna	Consultation and communication with the lead or implementing agent for the species, Endangered Wildlife Trust (EWT), must be implemented before any construction within or close to the specific area. Monitoring and Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented by the EWT.

The second additional impacts pertain to the 33kV and 132kV powerlines. The powerlines in relation to the biodiversity sensitivity can be seen in Figure 7-2 and Figure 7-3. From a biodiversity perspective, the main concern for the activity pertains to water resources, as most of the area is very low sensitivity. All mitigation regarding linear infrastructure, especially in relation to water resources, thus apply, including the suggested amendments.



Figure 7-2 Illustration of the 33kV powerline in relation to the sensitivity.



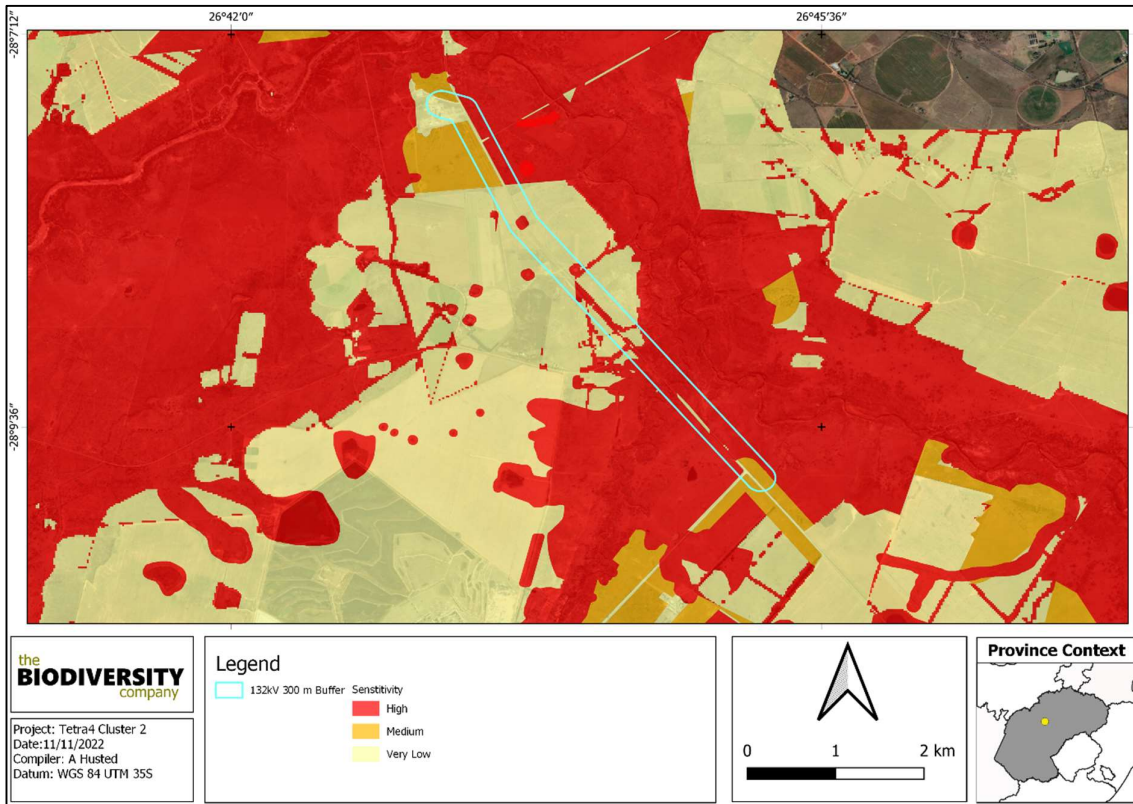


Figure 7-3 Illustration of the 132kV powerline in relation to the sensitivity.

## 8 Conclusion

The aim of this Biodiversity Assessment was to provide information to guide the risk of the proposed activity to the ecosystems and their inherent fauna and flora within the project area.

Based on the latest available ecologically relevant spatial datasets, the following information is pertinent to the degraded and water resource habitats in the project area:

- It is recognised as a CBA 1 and ESA 1& 2 as per the Free State Conservation Plan; and
- Categorised as intact constituents of an EN ecosystem or CR river as identified by the National Biodiversity Assessment.

The ecological integrity, importance, and functioning of these terrestrial biodiversity areas provide a variety of ecological services that are considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved.

Observation and species records during the field survey denote that certain habitats within the assessment area were utilised by threatened flora and fauna species, comprising of:

- One flora species;
- Four (4) avifaunal species;
- Three (3) mammal species;
- One (1) reptile species; and
- One (1) amphibian species.

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a high confidence in the information provided. The survey ensured that there was a suitable groundtruth coverage of the assessment area and major habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The developer is urged to provide a layout or design which represents a compromise between the needs of the development and the environmental concerns at the site, especially in regard to the very high/high sensitivity areas. A potential suggested alternative could be to make use of the existing agricultural areas within the surrounds.

The existence and importance of these habitats is regarded as crucial, due to the fauna species recorded as well as the role of this intact unique habitat to biodiversity within a very fragmented and disturbed local landscape, not to mention the sensitivity according to various ecological datasets.

### 8.1 Recommendations

The following recommendation are provided to ensure that the ecosystem and biodiversity is adequately protected:

- A follow up survey to more accurately determine the population size and extent of *Smaug giganteus* (Sungazer/Giant Dragon Lizard) is strongly recommended.

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## 10 Appendices

### 10.1 Appendix A Specialist declarations

#### DECLARATION

I, Martinus Erasmus, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

May 2022

## DECLARATION

I, Lindi Steyn, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Lindi Steyn

Terrestrial Ecologist

The Biodiversity Company

May 2022

## DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Wetland Ecologist

The Biodiversity Company

May 2022



## 10.2 Appendix B Flora species expected in the project area and surrounds

Family	Taxon	Author	IUCN	Ecology
Malvaceae	<i>Abutilon galpinii</i>	A.Meeuse	LC	Indigenous
Malvaceae	<i>Abutilon sp.</i>			
Cucurbitaceae	<i>Acanthosicyos naudinianus</i>	(Sond.) C.Jeffrey	LC	Indigenous
Amaranthaceae	<i>Achyranthes aspera var. aspera</i>	L.		Not indigenous; Naturalised
Amaranthaceae	<i>Achyranthes aspera var. sicula</i>	L.		Indigenous
Cyperaceae	<i>Afroscirpoides dioeca</i>	(Kunth) Garcia-Madr.		Indigenous; Endemic
Poaceae	<i>Agrostis lachnantha var. lachnantha</i>	Nees	LC	Indigenous
Amaranthaceae	<i>Alternanthera sessilis</i>	(L.) DC.		Not indigenous; Naturalised; Invasive
Amaranthaceae	<i>Amaranthus hybridus subsp. hybridus</i>	L.		Not indigenous; Naturalised
Amaranthaceae	<i>Amaranthus thunbergii</i>	Moq.	LC	Indigenous
Anacampserotaceae	<i>Anacampseros filamentosa subsp. filamentosa</i>	(Haw.) Sims		Indigenous; Endemic
Anacampserotaceae	<i>Anacampseros ustulata</i>	E.Mey. ex Fenzl	LC	Indigenous; Endemic
Boraginaceae	<i>Anchusa riparia</i>	A.DC.	LC	Indigenous; Endemic
Poaceae	<i>Andropogon appendiculatus</i>	Nees	LC	Indigenous
Poaceae	<i>Andropogon schirensis</i>	Hochst. ex A.Rich.	LC	Indigenous
Poaceae	<i>Anthephora pubescens</i>	Nees	LC	Indigenous
Rubiaceae	<i>Anthospermum sp.</i>			
Menispermaceae	<i>Antizoma angustifolia</i>	(Burch.) Miers ex Harv.	LC	Indigenous; Endemic
Aponogetonaceae	<i>Aponogeton junceus</i>	Lehm.	LC	Indigenous
Scrophulariaceae	<i>Aptosimum elongatum</i>	(Hiern) Engl.	LC	Indigenous; Endemic
Asteraceae	<i>Arctotis stoechadifolia</i>	P.J.Bergius	LC	Indigenous; Endemic
Poaceae	<i>Aristida adscensionis</i>	L.	LC	Indigenous
Poaceae	<i>Aristida bipartita</i>	(Nees) Trin. & Rupr.	LC	Indigenous
Poaceae	<i>Aristida canescens subsp. canescens</i>	Henrard	LC	Indigenous
Poaceae	<i>Aristida congesta subsp. barbicollis</i>	Roem. & Schult.	LC	Indigenous
Poaceae	<i>Aristida congesta subsp. congesta</i>	Roem. & Schult.	LC	Indigenous
Poaceae	<i>Aristida diffusa subsp. burkei</i>	Trin.	LC	Indigenous
Poaceae	<i>Aristida junciformis subsp. junciformis</i>	Trin. & Rupr.	LC	Indigenous; Endemic
Poaceae	<i>Aristida meridionalis</i>	Henrard	LC	Indigenous
Poaceae	<i>Aristida stipitata subsp. gracilliflora</i>	Hack.	LC	Indigenous
Asteraceae	<i>Artemisia afra var. afra</i>	Jacq. ex Willd.	LC	Indigenous
Apocynaceae	<i>Asclepias meyeriana</i>	(Schltr.) Schltr.	LC	Indigenous; Endemic
Asparagaceae	<i>Asparagus laricinus</i>	Burch.	LC	Indigenous
Asparagaceae	<i>Asparagus setaceus</i>	(Kunth) Jessop	LC	Indigenous
Asparagaceae	<i>Asparagus suaveolens</i>	Burch.	LC	Indigenous

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<b>Apocynaceae</b>	<i>Aspidoglossum interruptum</i>	(E.Mey.) Bullock	LC	Indigenous
<b>Aspleniaceae</b>	<i>Asplenium adiantum-nigrum</i> var. <i>adiantum-nigrum</i>	L.	LC	Indigenous
<b>Aspleniaceae</b>	<i>Asplenium aethiopicum</i>	(Burm.f.) Bech.	LC	Indigenous
<b>Aspleniaceae</b>	<i>Asplenium capense</i>	(Kunze) Bir, Fraser-Jenk. & Lovis	LC	Indigenous
<b>Asteraceae</b>	<i>Aster</i> sp.			
<b>Amaranthaceae</b>	<i>Atriplex nummularia</i> subsp. <i>nummularia</i>	Lindl.		Not indigenous; Naturalised; Invasive
<b>Amaranthaceae</b>	<i>Atriplex semibaccata</i>	R.Br.		Not indigenous; Naturalised; Invasive
<b>Amaranthaceae</b>	<i>Atriplex suberecta</i>	I.Verd.	LC	Not indigenous; Naturalised; Invasive
<b>Iridaceae</b>	<i>Babiana hypogaea</i>	Burch.	LC	Indigenous
<b>Acanthaceae</b>	<i>Barleria macrostegia</i>	Nees	LC	Indigenous
<b>Amaranthaceae</b>	<i>Bassia indica</i>	(Wight) A.J.Scott		Not indigenous; Naturalised
<b>Elatinaceae</b>	<i>Bergia</i> sp.			
<b>Asteraceae</b>	<i>Berkheya onopordifolia</i> var. <i>onopordifolia</i>	(DC.) O.Hoffm. ex Burt Davy	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Berkheya pinnatifida</i> subsp. <i>stobaeoides</i>	(Thunb.) Thell.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Bidens pilosa</i>	L.		Not indigenous; Naturalised
<b>Acanthaceae</b>	<i>Blepharis squarrosa</i>	(Nees) T.Anderson	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Bolusia acuminata</i>	(DC.) Polhill	LC	Indigenous; Endemic
<b>Amaryllidaceae</b>	<i>Boophone disticha</i>	(L.f.) Herb.	LC	Indigenous
<b>Poaceae</b>	<i>Brachiaria eruciformis</i>	(Sm.) Griseb.	LC	Indigenous
<b>Poaceae</b>	<i>Brachiaria nigropedata</i>	(Ficalho & Hiern) Stapf	LC	Indigenous
<b>Poaceae</b>	<i>Brachiaria serrata</i>	(Thunb.) Stapf	LC	Indigenous
<b>Poaceae</b>	<i>Bromus catharticus</i>	Vahl	NE	Not indigenous; Naturalised; Invasive
<b>Poaceae</b>	<i>Bromus leptoclados</i>	Nees	LC	Indigenous
<b>Poaceae</b>	<i>Bromus</i> sp.			
<b>Amaryllidaceae</b>	<i>Brunsvigia radulosa</i>	Herb.	LC	Indigenous; Endemic
<b>Bryaceae</b>	<i>Bryum argenteum</i>	Hedw.		Indigenous
<b>Bryaceae</b>	<i>Bryum dichotomum</i>	Hedw.		Indigenous
<b>Asphodelaceae</b>	<i>Bulbine abyssinica</i>	A.Rich.	LC	Indigenous
<b>Asphodelaceae</b>	<i>Bulbine narcissifolia</i>	Salm-Dyck	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Bulbostylis hispidula</i> subsp. <i>pyriformis</i>	(Vahl) R.W.Haines	LC	Indigenous
<b>Apiaceae</b>	<i>Bupleurum mundtii</i>	Cham. & Schltld.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Calpurnia sericea</i>	Harv.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Carex glomerabilis</i>	V.I.Krecz.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Carex spartea</i>	Wahlenb.		Indigenous
<b>Cyperaceae</b>	<i>Carex uhligii</i>	K.Schum. ex C.B.Clark		Indigenous
<b>Cannabaceae</b>	<i>Celtis africana</i>	Burm.f.	LC	Indigenous
<b>Poaceae</b>	<i>Cenchrus sphacelatus</i>	(Nees) Morrone	LC	Indigenous
<b>Apocynaceae</b>	<i>Ceropegia differens</i> subsp. <i>grata</i>	Bruyns		Indigenous; Endemic

<b>Solanaceae</b>	<i>Cestrum aurantiacum</i>	Lindl.		Not indigenous; Naturalised; Invasive
<b>Scrophulariaceae</b>	<i>Chaenostoma neglectum</i>	J.M.Wood & M.S.Evans	LC	Indigenous; Endemic
<b>Scrophulariaceae</b>	<i>Chaenostoma patrioticum</i>	(Hiern) Kornhall	LC	Indigenous; Endemic
<b>Verbenaceae</b>	<i>Chascanum pinnatifidum</i> var. <i>pinnatifidum</i>	(L.f.) E.Mey.	LC	Indigenous
<b>Aizoaceae</b>	<i>Chasmatophyllum musculinum</i>	(Haw.) Dinter & Schwantes	LC	Indigenous; Endemic
<b>Pteridaceae</b>	<i>Cheilanthes eckloniana</i>	(Kunze) Mett.	LC	Indigenous
<b>Poaceae</b>	<i>Chloris gayana</i>	Kunth	LC	Indigenous
<b>Poaceae</b>	<i>Chloris pycnothrix</i>	Trin.	LC	Indigenous
<b>Poaceae</b>	<i>Chloris virgata</i>	Sw.	LC	Indigenous
<b>Apiaceae</b>	<i>Choritaenia capensis</i>	Benth.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Chrysocoma</i> sp.			
<b>Asteraceae</b>	<i>Cirsium vulgare</i>	(Savi) Ten.		Not indigenous; Naturalised; Invasive
<b>Cleomaceae</b>	<i>Cleome rubella</i>	Burch.	LC	Indigenous
<b>Peraceae</b>	<i>Clutia natalensis</i>	Bernh.	LC	Indigenous; Endemic
<b>Peraceae</b>	<i>Clutia pulchella</i> var. <i>pulchella</i>	L.	LC	Indigenous
<b>Commelinaceae</b>	<i>Commelina africana</i> var. <i>africana</i>	L.	LC	Indigenous
<b>Commelinaceae</b>	<i>Commelina africana</i> var. <i>lancispatha</i>	L.	LC	Indigenous
<b>Commelinaceae</b>	<i>Commelina livingstonii</i>	C.B.Clarke	LC	Indigenous
<b>Commelinaceae</b>	<i>Commelina subulata</i>	Roth	LC	Indigenous
<b>Nyctaginaceae</b>	<i>Commicarpus pentandrus</i>	(Burch.) Heimerl	LC	Indigenous
<b>Convolvulaceae</b>	<i>Convolvulus boedeckerianus</i>	Peter	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Conyza podocephala</i>	DC.		Indigenous; Endemic
<b>Malvaceae</b>	<i>Corchorus asplenifolius</i>	Burch.	LC	Indigenous
<b>Malvaceae</b>	<i>Corchorus schimperi</i>	Cufod.	LC	Indigenous
<b>Apocynaceae</b>	<i>Cordylogyne globosa</i>	E.Mey.	LC	Indigenous; Endemic
<b>Rubiaceae</b>	<i>Cordylostigma virgatum</i>	(Willd.) Groeninckx & Dessein		Indigenous
<b>Caryophyllaceae</b>	<i>Corrigiola litoralis</i> subsp. <i>litoralis</i>	L.	NE	Indigenous
<b>Asteraceae</b>	<i>Cotula anthemoides</i>	L.	LC	Indigenous; Endemic
<b>Acanthaceae</b>	<i>Crabbea angustifolia</i>	Nees	LC	Indigenous; Endemic
<b>Acanthaceae</b>	<i>Crabbea hirsuta</i>	Harv.	LC	Indigenous
<b>Asteraceae</b>	<i>Crassothonna protecta</i>	(Dinter) B.Nord.	LC	Indigenous; Endemic
<b>Crassulaceae</b>	<i>Crassula corallina</i> subsp. <i>corallina</i>	Thunb.	LC	Indigenous; Endemic
<b>Crassulaceae</b>	<i>Crassula lanceolata</i> subsp. <i>transvaalensis</i>	(Eckl. & Zeyh.) Endl. ex Walp.	LC	Indigenous
<b>Crassulaceae</b>	<i>Crassula nudicaulis</i> var. <i>nudicaulis</i>	L.	LC	Indigenous; Endemic
<b>Crassulaceae</b>	<i>Crassula</i> sp.			
<b>Crassulaceae</b>	<i>Crassula tabularis</i>	Dinter	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Crotalaria burkeana</i>	Benth.	LC	Indigenous

<b>Fabaceae</b>	<i>Crotalaria sphaerocarpa</i> subsp. <i>sphaerocarpa</i>	Perr. ex DC.	LC	Indigenous
<b>Fabaceae</b>	<i>Crotalaria virgulata</i> subsp. <i>grantiana</i>	Klotzsch	LC	Indigenous
<b>Cucurbitaceae</b>	<i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i>	Naudin	LC	Indigenous
<b>Asteraceae</b>	<i>Curio radicans</i>	(L.f.) P.V.Heath	LC	Indigenous; Endemic
<b>Convolvulaceae</b>	<i>Cuscuta campestris</i>	Yunck.		Not indigenous; Naturalised; Invasive
<b>Araliaceae</b>	<i>Cussonia paniculata</i> subsp. <i>sinuata</i>	Eckl. & Zeyh.	LC	Indigenous; Endemic
<b>Commelinaceae</b>	<i>Cyanotis speciosa</i>	(L.f.) Hassk.	LC	Indigenous
<b>Amaranthaceae</b>	<i>Cyathula uncinulata</i>	(Schrad.) Schinz	LC	Indigenous
<b>Poaceae</b>	<i>Cymbopogon caesius</i>	(Hook. & Arn.) Stapf	LC	Indigenous
<b>Poaceae</b>	<i>Cymbopogon marginatus</i>	(Steud.) Stapf ex Burtt Davy	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Cymbopogon pospischillii</i>	(K.Schum.) C.E.Hubb.	NE	Indigenous
<b>Apocynaceae</b>	<i>Cynanchum viminale</i> subsp. <i>viminale</i>	(L.) L.		Indigenous
<b>Poaceae</b>	<i>Cynodon dactylon</i>	(L.) Pers.	LC	Indigenous
<b>Poaceae</b>	<i>Cynodon incompletus</i>	Nees	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Cynodon transvaalensis</i>	Burtt Davy	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus capensis</i>	(Steud.) Endl.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Cyperus decurvatus</i>	(C.B.Clarke) C.Archer & Goetgh.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Cyperus denudatus</i>	L.f.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus difformis</i>	L.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus eragrostis</i>	Lam.		Not indigenous; Naturalised
<b>Cyperaceae</b>	<i>Cyperus esculentus</i> var. <i>esculentus</i>	L.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus fastigiatus</i>	Rottb.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Cyperus laevigatus</i>	L.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus longus</i> var. <i>tenuiflorus</i>	L.	NE	Indigenous
<b>Cyperaceae</b>	<i>Cyperus marginatus</i>	Thunb.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus semitrifidus</i>	Schrad.	LC	Indigenous; Endemic
<b>Cyperaceae</b>	<i>Cyperus usitatus</i>	Burch.	LC	Indigenous
<b>Lobeliaceae</b>	<i>Cyphia triphylla</i>	E.Phillips	LC	Indigenous; Endemic
<b>Amaranthaceae</b>	<i>Cyphocarpa angustifolia</i>	(Moq.) Lopr.	LC	Indigenous
<b>Poaceae</b>	<i>Dactyloctenium aegyptium</i>	(L.) Willd.	LC	Indigenous
<b>Aizoaceae</b>	<i>Delosperma</i> sp.			
<b>Asteraceae</b>	<i>Denekia capensis</i>	Thunb.	LC	Indigenous
<b>Apiaceae</b>	<i>Deverra burchellii</i>	(DC.) Eckl. & Zeyh.	LC	Indigenous
<b>Caryophyllaceae</b>	<i>Dianthus basuticus</i> subsp. <i>basuticus</i>	Burtt Davy	NE	Indigenous; Endemic
<b>Caryophyllaceae</b>	<i>Dianthus micropetalus</i>	Ser.	LC	Indigenous; Endemic
<b>Acanthaceae</b>	<i>Dicliptera leistneri</i>	K.Balkwill	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Dicoma anomala</i> subsp. <i>anomala</i>	Sond.	LC	Indigenous
<b>Urticaceae</b>	<i>Didymodoxa caffra</i>	(Thunb.) Friis & Wilmot-Dear	LC	Indigenous

Poaceae	<i>Digitaria argyrograpta</i>	(Nees) Stapf	LC	Indigenous
Poaceae	<i>Digitaria eriantha</i>	Steud.	LC	Indigenous
Poaceae	<i>Digitaria sanguinalis</i>	(L.) Scop.	NE	Not indigenous; Naturalised
Poaceae	<i>Digitaria tricholaenoides</i>	Stapf	LC	Indigenous; Endemic
Poaceae	<i>Diheteropogon amplexens</i> var. <i>amplexens</i>	(Nees) Clayton	LC	Indigenous
Asteraceae	<i>Dimorphotheca zeyheri</i>	Sond.	LC	Indigenous; Endemic
Ebenaceae	<i>Diospyros austroafricana</i> var. <i>microphylla</i>	De Winter	LC	Indigenous; Endemic
Ebenaceae	<i>Diospyros lycioides</i> subsp. <i>lycioides</i>	Desf.	LC	Indigenous
Hyacinthaceae	<i>Dipcadi longifolium</i>	(Ker Gawl.) Baker	LC	Indigenous
Fabaceae	<i>Dolichos angustifolius</i>	Eckl. & Zeyh.	LC	Indigenous; Endemic
Fabaceae	<i>Dolichos linearis</i>	E.Mey.	LC	Indigenous; Endemic
Hyacinthaceae	<i>Drimia elata</i>	Jacq. ex Willd.	DD	Indigenous
Hyacinthaceae	<i>Drimia</i> sp.			
Dryopteridaceae	<i>Dryopteris inaequalis</i>	(Schldl.) Kuntze	LC	Indigenous; Endemic
Iridaceae	<i>Duthiastrum linifolium</i>	(E.Phillips) M.P.de Vos	LC	Indigenous; Endemic
Amaranthaceae	<i>Dysphania multifida</i>	(L.) Mosyakin & Clemants		Not indigenous; Naturalised; Invasive
Poaceae	<i>Echinochloa crus-galli</i>	(L.) P.Beauv.	LC	Indigenous
Poaceae	<i>Echinochloa holubii</i>	(Stapf) Stapf	LC	Indigenous
Poaceae	<i>Ehrharta erecta</i> var. <i>natalensis</i>	Lam.	LC	Indigenous; Endemic
Cyperaceae	<i>Eleocharis limosa</i>	(Schrad.) Schult.	LC	Indigenous
Poaceae	<i>Eleusine coracana</i> subsp. <i>africana</i>	(L.) Gaertn.	LC	Indigenous
Poaceae	<i>Eleusine indica</i>	(L.) Gaertn.	LC	Indigenous
Poaceae	<i>Elionurus muticus</i>	(Spreng.) Kunth	LC	Indigenous
Poaceae	<i>Enneapogon desvauxii</i>	P.Beauv.	LC	Indigenous
Poaceae	<i>Enneapogon scoparius</i>	Stapf	LC	Indigenous
Poaceae	<i>Eragrostis barrelieri</i>	Daveau	NE	Not indigenous; Naturalised
Poaceae	<i>Eragrostis bicolor</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis biflora</i>	Hack. ex Schinz	LC	Indigenous
Poaceae	<i>Eragrostis capensis</i>	(Thunb.) Trin.	LC	Indigenous
Poaceae	<i>Eragrostis chloromelas</i>	Steud.	LC	Indigenous; Endemic
Poaceae	<i>Eragrostis cilianensis</i>	(All.) Vignolo ex Janch.	LC	Indigenous
Poaceae	<i>Eragrostis curvula</i>	(Schrad.) Nees	LC	Indigenous
Poaceae	<i>Eragrostis gummiflua</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis lappula</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis mexicana</i> subsp. <i>virescens</i>	(Hornem.) Link	NE	Not indigenous; Naturalised
Poaceae	<i>Eragrostis micrantha</i>	Hack.	LC	Indigenous
Poaceae	<i>Eragrostis nindensis</i>	Ficalho & Hiern	LC	Indigenous
Poaceae	<i>Eragrostis obtusa</i>	Munro ex Ficalho & Hiern	LC	Indigenous; Endemic

Poaceae	<i>Eragrostis plana</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis planiculmis</i>	Nees	LC	Indigenous; Endemic
Poaceae	<i>Eragrostis pseudobtusa</i>	De Winter	NE	Indigenous; Endemic
Poaceae	<i>Eragrostis racemosa</i>	(Thunb.) Steud.	LC	Indigenous
Poaceae	<i>Eragrostis remotiflora</i>	De Winter	LC	Indigenous; Endemic
Poaceae	<i>Eragrostis sp.</i>			
Poaceae	<i>Eragrostis stapfii</i>	De Winter	LC	Indigenous
Poaceae	<i>Eragrostis superba</i>	Peyr.	LC	Indigenous
Poaceae	<i>Eragrostis tef</i>	(Zuccagni) Trotter	NE	Not indigenous; Naturalised
Poaceae	<i>Eragrostis trichophora</i>	Coss. & Durieu	LC	Indigenous
Poaceae	<i>Eriochloa fatmensis</i>	(Hochst. & Steud.) Clayton	LC	Indigenous
Brassicaceae	<i>Erucastrum strigosum</i>	(Thunb.) O.E.Schulz	LC	Indigenous; Endemic
Ebenaceae	<i>Euclea crispa subsp. crispa</i>	(Thunb.) Gurke	LC	Indigenous
Euphorbiaceae	<i>Euphorbia clavarioides</i>	Boiss.	LC	Indigenous; Endemic
Euphorbiaceae	<i>Euphorbia inaequilatera</i>	Sond.	LC	Indigenous
Euphorbiaceae	<i>Euphorbia pulvinata</i>	Marloth	LC	Indigenous; Endemic
Euphorbiaceae	<i>Euphorbia rhombifolia</i>	Boiss.	LC	Indigenous; Endemic
Euphorbiaceae	<i>Euphorbia spartaria</i>	N.E.Br.	LC	Indigenous
Euphorbiaceae	<i>Euphorbia striata</i>	Thunb.	LC	Indigenous; Endemic
Asteraceae	<i>Euryops empetrifolius</i>	DC.	LC	Indigenous; Endemic
Asteraceae	<i>Euryops sp.</i>			
Poaceae	<i>Eustachys paspaloides</i>	(Vahl) Lanza & Mattei	LC	Indigenous
Asteraceae	<i>Felicia burkei</i>	(Harv.) L.Bolus	LC	Indigenous; Endemic
Cyperaceae	<i>Fimbristylis dichotoma subsp. dichotoma</i>	(L.) Vahl	LC	Indigenous
Poaceae	<i>Fingerhuthia africana</i>	Lehm.	LC	Indigenous; Endemic
Phyllanthaceae	<i>Flueggea virosa subsp. virosa</i>	(Roxb. ex Willd.) Royle	LC	Indigenous
Frankeniaceae	<i>Frankenia pulverulenta</i>	L.	LC	Indigenous
Cyperaceae	<i>Fuirena pubescens var. pubescens</i>	(Poir.) Kunth	LC	Indigenous
Rubiaceae	<i>Galium capense subsp. garipense</i>	Thunb.	NE	Indigenous; Endemic
Asteraceae	<i>Garuleum pinnatifidum</i>	(Thunb.) DC.	LC	Indigenous; Endemic
Asteraceae	<i>Gazania krebsiana subsp. krebsiana</i>	Less.	LC	Indigenous
Asteraceae	<i>Geigeria aspera var. aspera</i>	Harv.	LC	Indigenous; Endemic
Asteraceae	<i>Geigeria burkei subsp. burkei</i>	Harv.	NE	Indigenous
Iridaceae	<i>Gladiolus dalenii subsp. dalenii</i>	Van Geel	LC	Indigenous
Iridaceae	<i>Gladiolus ecklonii</i>	Lehm.	LC	Indigenous; Endemic
Iridaceae	<i>Gladiolus permeabilis subsp. edulis</i>	D.Delaroche	LC	Indigenous
Verbenaceae	<i>Glandularia aristigera</i>	(S.Moore) Tronc.		Not indigenous; Naturalised; Invasive
Asteraceae	<i>Gnaphalium filagopsis</i>	Hilliard & B.L.Burt	LC	Indigenous
Thymelaeaceae	<i>Gnidia sp.</i>			

<b>Scrophulariaceae</b>	<i>Gomphostigma virgatum</i>	(L.f.) Baill.	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia flava</i>	DC.	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia occidentalis var. occidentalis</i>	L.	LC	Indigenous
<b>Celastraceae</b>	<i>Gymnosporia buxifolia</i>	(L.) Szyszyl.	LC	Indigenous
<b>Amaryllidaceae</b>	<i>Haemanthus humilis subsp. humilis</i>	Jacq.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Haplocarpha scaposa</i>	Harv.	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum cerastioides var. cerastioides</i>	DC.	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum nudifolium var. nudifolium</i>	(L.) Less.	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum paronychioides</i>	DC.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Helichrysum pumilio subsp. pumilio</i>	(O.Hoffm.) Hilliard & B.L.Burt	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Helichrysum zeyheri</i>	Less.	LC	Indigenous; Endemic
<b>Rhamnaceae</b>	<i>Helinus integrifolius</i>	(Lam.) Kuntze	LC	Indigenous
<b>Brassicaceae</b>	<i>Heliophila carnosa</i>	(Thunb.) Steud.	LC	Indigenous
<b>Boraginaceae</b>	<i>Heliotropium lineare</i>	(A.DC.) Gurke	LC	Indigenous
<b>Poaceae</b>	<i>Hemarthria altissima</i>	(Poir.) Stapf & C.E.Hubb.	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia bicolor</i>	Engl. & Dinter	LC	Indigenous; Endemic
<b>Malvaceae</b>	<i>Hermannia depressa</i>	N.E.Br.	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia sp.</i>			
<b>Asteraceae</b>	<i>Hertia ciliata</i>	(Harv.) Kuntze	LC	Indigenous; Endemic
<b>Apiaceae</b>	<i>Heteromorpha arborescens var. abyssinica</i>	(Spreng.) Cham. & Schtdl.	LC	Indigenous
<b>Poaceae</b>	<i>Heteropogon contortus</i>	(L.) Roem. & Schult.	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus calyphyllus</i>	Cav.	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus microcarpus</i>	Garcke	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus pusillus</i>	Thunb.	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus trionum</i>	L.		Not indigenous; Naturalised
<b>Asteraceae</b>	<i>Hilliardiella capensis</i>	(Houtt.) H.Rob., Skvarla & V.A.Funk		Indigenous
<b>Apocynaceae</b>	<i>Huernia sp.</i>			
<b>Poaceae</b>	<i>Hyparrhenia anamesa</i>	Clayton	LC	Indigenous
<b>Poaceae</b>	<i>Hyparrhenia dregeana</i>	(Nees) Stapf ex Stent	LC	Indigenous
<b>Poaceae</b>	<i>Hyparrhenia hirta</i>	(L.) Stapf	LC	Indigenous
<b>Hypericaceae</b>	<i>Hypericum lalandii</i>	Choisy	LC	Indigenous
<b>Asteraceae</b>	<i>Hypochoeris microcephala var. albiflora</i>	(Sch.Bip.) Cabrera		Not indigenous; Naturalised
<b>Fabaceae</b>	<i>Indigofera alternans var. alternans</i>	DC.	LC	Indigenous
<b>Fabaceae</b>	<i>Indigofera daleoides var. daleoides</i>	Benth. ex Harv.	NE	Indigenous
<b>Fabaceae</b>	<i>Indigofera filipes</i>	Benth. ex Harv.	LC	Indigenous
<b>Fabaceae</b>	<i>Indigofera sessilifolia</i>	DC.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Indigofera torulosa var. angustiloba</i>	E.Mey.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Indigofera zeyheri</i>	Spreng. ex Eckl. & Zeyh.	LC	Indigenous; Endemic

## Tetra 4 Cluster 2

<b>Convolvulaceae</b>	<i>Ipomoea oblongata</i>	E.Mey. ex Choisy	LC	Indigenous
<b>Convolvulaceae</b>	<i>Ipomoea oenotheroides</i>	(L.f.) Raf. ex Hallier f.	LC	Indigenous; Endemic
<b>Convolvulaceae</b>	<i>Ipomoea simplex</i>	Thunb.	LC	Indigenous
<b>Acanthaceae</b>	<i>Isoglossa woodii</i>	C.B.Clarke	LC	Indigenous; Endemic
<b>Scrophulariaceae</b>	<i>Jamesbrittenia albiflora</i>	(I.Verd.) Hilliard	LC	Indigenous; Endemic
<b>Scrophulariaceae</b>	<i>Jamesbrittenia atropurpurea</i> subsp. <i>atropurpurea</i>	(Benth.) Hilliard	LC	Indigenous
<b>Scrophulariaceae</b>	<i>Jamesbrittenia aurantiaca</i>	(Burch.) Hilliard	LC	Indigenous
<b>Scrophulariaceae</b>	<i>Jamesbrittenia stricta</i>	(Benth.) Hilliard	LC	Indigenous; Endemic
<b>Juncaceae</b>	<i>Juncus rigidus</i>	Desf.	LC	Indigenous
<b>Acanthaceae</b>	<i>Justicia orchiooides</i> subsp. <i>glabrata</i>	L.f.	LC	Indigenous; Endemic
<b>Crassulaceae</b>	<i>Kalanchoe thyrsiflora</i>	Harv.	LC	Indigenous; Endemic
<b>Achariaceae</b>	<i>Kiggelaria africana</i>	L.	LC	Indigenous
<b>Poaceae</b>	<i>Koeleria capensis</i>	(Steud.) Nees	LC	Indigenous
<b>Cyperaceae</b>	<i>Kyllinga alata</i>	Nees	LC	Indigenous
<b>Cyperaceae</b>	<i>Kyllinga alba</i>	Nees	LC	Indigenous
<b>Verbenaceae</b>	<i>Lantana rugosa</i>	Thunb.	LC	Indigenous
<b>Iridaceae</b>	<i>Lapeirousia plicata</i> subsp. <i>foliosa</i>	(Jacq.) Diels		Indigenous; Endemic
<b>Araceae</b>	<i>Lemna gibba</i>	L.	LC	Indigenous
<b>Fabaceae</b>	<i>Leobordea adpressa</i> subsp. <i>adpressa</i>	(N.E.Br.) B.-E.van Wyk & Boatwr.	LC	Indigenous; Endemic
<b>Brassicaceae</b>	<i>Lepidium bonariense</i>	L.		Not indigenous; Naturalised
<b>Poaceae</b>	<i>Leptochloa fusca</i>	(L.) Kunth	LC	Indigenous
<b>Fabaceae</b>	<i>Lessertia depressa</i>	Harv.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Lessertia frutescens</i> subsp. <i>microphylla</i>	(L.) Goldblatt & J.C.Manning	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Lessertia stricta</i>	L.Bolus	LC	Indigenous; Endemic
<b>Linaceae</b>	<i>Linum thunbergii</i>	Eckl. & Zeyh.	LC	Indigenous
<b>Fabaceae</b>	<i>Listia heterophylla</i>	E.Mey.	LC	Indigenous
<b>Fabaceae</b>	<i>Listia marlothii</i>	(Engl.) B.-E.van Wyk & Boatwr.	LC	Indigenous; Endemic
<b>Boraginaceae</b>	<i>Lithospermum hirsutum</i>	E.Mey. ex A.DC.	LC	Indigenous; Endemic
<b>Boraginaceae</b>	<i>Lithospermum scabrum</i>	Thunb.	LC	Indigenous; Endemic
<b>Lobeliaceae</b>	<i>Lobelia erinus</i>	L.	LC	Indigenous
<b>Lobeliaceae</b>	<i>Lobelia sonderiana</i>	(Kuntze) Lammers	LC	Indigenous
<b>Lobeliaceae</b>	<i>Lobelia thermalis</i>	Thunb.	LC	Indigenous
<b>Fabaceae</b>	<i>Lotononis divaricata</i>	(Eckl. & Zeyh.) Benth.	NE	Indigenous; Endemic
<b>Solanaceae</b>	<i>Lycium arenicola</i>	Miers	LC	Indigenous
<b>Solanaceae</b>	<i>Lycium cinereum</i>	Thunb.	LC	Indigenous; Endemic
<b>Solanaceae</b>	<i>Lycium hirsutum</i>	Dunal	LC	Indigenous; Endemic
<b>Solanaceae</b>	<i>Lycium horridum</i>	Thunb.	LC	Indigenous; Endemic
<b>Malvaceae</b>	<i>Malva neglecta</i>	Wallr.		Not indigenous; Naturalised



## Tetra 4 Cluster 2

<b>Malvaceae</b>	<i>Malva pusilla</i>	Sm.		Not indigenous; Naturalised
<b>Scrophulariaceae</b>	<i>Manulea parviflora var. limonioides</i>	Benth.	LC	Indigenous; Endemic
<b>Hyacinthaceae</b>	<i>Massonia jasminiflora</i>	Burch. ex Baker	LC	Indigenous; Endemic
<b>Celastraceae</b>	<i>Maytenus undata</i>	(Thunb.) Blakelock	LC	Indigenous
<b>Poaceae</b>	<i>Melica decumbens</i>	Thunb.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Melica racemosa</i>	Thunb.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Melinis nerviglumis</i>	(Franch.) Zizka	LC	Indigenous
<b>Poaceae</b>	<i>Melinis repens subsp. repens</i>	(Willd.) Zizka	LC	Indigenous
<b>Lamiaceae</b>	<i>Mentha longifolia subsp. capensis</i>	(L.) Huds.	LC	Indigenous
<b>Lamiaceae</b>	<i>Mentha longifolia subsp. polyadena</i>	(L.) Huds.	LC	Indigenous; Endemic
<b>Aizoaceae</b>	<i>Mestoklema arboriforme</i>	(Burch.) N.E.Br. ex Glen	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Microchloa caffra</i>	Nees	LC	Indigenous
<b>Mniaceae</b>	<i>Mielichhoferia subnuda</i>	Sim		Indigenous
<b>Phrymaceae</b>	<i>Mimulus gracilis</i>	R.Br.	LC	Indigenous
<b>Iridaceae</b>	<i>Moraea pallida</i>	(Baker) Goldblatt	LC	Indigenous; Endemic
<b>Myrsinaceae</b>	<i>Myrsine africana</i>	L.	LC	Indigenous
<b>Scrophulariaceae</b>	<i>Nemesia fruticans</i>	(Thunb.) Benth.	LC	Indigenous
<b>Rubiaceae</b>	<i>Nenax microphylla</i>	(Sond.) T.M.Salter	LC	Indigenous; Endemic
<b>Amaryllidaceae</b>	<i>Nerine laticoma</i>	(Ker Gawl.) T.Durand & Schinz	LC	Indigenous
<b>Asteraceae</b>	<i>Nolletia ciliaris</i>	(DC.) Steetz	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Oedera humilis</i>	(Less.) N.G.Bergh		Indigenous; Endemic
<b>Onagraceae</b>	<i>Oenothera indecora</i>	Cambess.		Not indigenous; Naturalised; Invasive
<b>Onagraceae</b>	<i>Oenothera tetraptera</i>	Cav.		Not indigenous; Naturalised; Invasive
<b>Rubiaceae</b>	<i>Oldenlandia herbacea</i>	(L.) Roxb.		Indigenous
<b>Oleaceae</b>	<i>Olea europaea subsp. cuspidata</i>	L.		Indigenous
<b>Resedaceae</b>	<i>Oligomeris dregeana</i>	(Mull.Arg.) Mull.Arg.	LC	Indigenous; Endemic
<b>Ophioglossaceae</b>	<i>Ophioglossum polyphyllum var. polyphyllum</i>	A.Braun	LC	Indigenous
<b>Poaceae</b>	<i>Oropetium capense</i>	Stapf	LC	Indigenous
<b>Asteraceae</b>	<i>Osteospermum leptolobum</i>	(Harv.) Norl.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Osteospermum muricatum subsp. muricatum</i>	E.Mey. ex DC.	LC	Indigenous
<b>Asteraceae</b>	<i>Osteospermum scariosum var. scariosum</i>	DC.	NE	Indigenous; Endemic
<b>Santalaceae</b>	<i>Osyris lanceolata</i>	Hochst. & Steud.	LC	Indigenous
<b>Poaceae</b>	<i>Panicum coloratum</i>	L.	LC	Indigenous
<b>Poaceae</b>	<i>Panicum deustum</i>	Thunb.	LC	Indigenous
<b>Poaceae</b>	<i>Panicum maximum</i>	Jacq.	LC	Indigenous
<b>Poaceae</b>	<i>Panicum schinzii</i>	Hack.	LC	Indigenous
<b>Poaceae</b>	<i>Panicum sp.</i>			
<b>Poaceae</b>	<i>Panicum stapfianum</i>	Fourc.	LC	Indigenous; Endemic

<b>Papaveraceae</b>	<i>Papaver aculeatum</i>	Thunb.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Paspalum dilatatum</i>	Poir.	NE	Not indigenous; Naturalised; Invasive
<b>Poaceae</b>	<i>Paspalum distichum</i>	L.	LC	Not indigenous; Naturalised; Invasive
<b>Geraniaceae</b>	<i>Pelargonium dolomiticum</i>	R.Knuth	LC	Indigenous; Endemic
<b>Pteridaceae</b>	<i>Pellaea calomelanos var. calomelanos</i>	(Sw.) Link	LC	Indigenous
<b>Asteraceae</b>	<i>Pentzia globosa</i>	Less.	LC	Indigenous; Endemic
<b>Polygonaceae</b>	<i>Persicaria lapathifolia</i>	(L.) Delarbre		Not indigenous; Naturalised; Invasive
<b>Poaceae</b>	<i>Phragmites australis</i>	(Cav.) Steud.	LC	Indigenous
<b>Phyllanthaceae</b>	<i>Phyllanthus maderaspatensis</i>	L.	LC	Indigenous
<b>Asteraceae</b>	<i>Platycarphella parvifolia</i>	(S.Moore) V.A.Funk & H.Rob.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Pogonarthria squarrosa</i>	(Roem. & Schult.) Pilg.	LC	Indigenous
<b>Polygalaceae</b>	<i>Polygala hottentotta</i>	C.Presl	LC	Indigenous
<b>Portulacaceae</b>	<i>Portulaca quadrifida</i>	L.	LC	Indigenous
<b>Potamogetonaceae</b>	<i>Potamogeton pectinatus</i>	L.	LC	Indigenous
<b>Rosaceae</b>	<i>Potentilla supina</i>	L.		Indigenous
<b>Fabaceae</b>	<i>Prosopis glandulosa var. glandulosa</i>	Torr.	NE	Not indigenous; Naturalised
<b>Pedaliaceae</b>	<i>Pterodiscus speciosus</i>	Hook.	LC	Indigenous
<b>Ranunculaceae</b>	<i>Ranunculus trichophyllus</i>	Chaix	LC	Indigenous
<b>Apocynaceae</b>	<i>Raphionacme dyeri</i>	Retief & Venter	LC	Indigenous; Endemic
<b>Resedaceae</b>	<i>Reseda lutea subsp. lutea</i>	L.	NE	Not indigenous; Naturalised; Invasive
<b>Rhamnaceae</b>	<i>Rhamnus prinoides</i>	L'Her.	LC	Indigenous
<b>Vitaceae</b>	<i>Rhoicissus tridentata subsp. cuneifolia</i>	(L.f.) Wild & R.B.Drumm.	NE	Indigenous
<b>Fabaceae</b>	<i>Rhynchosia adenodes</i>	Eckl. & Zeyh.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Rhynchosia pentheri var. pentheri</i>	Schltr. ex Zahlbr.	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Rhynchosia totta var. totta</i>	(Thunb.) DC.	LC	Indigenous
<b>Ricciaceae</b>	<i>Riccia albolimbata</i>	S.W.Arnell		Indigenous
<b>Ricciaceae</b>	<i>Riccia albovestita</i>	O.H.Volk		Indigenous
<b>Ricciaceae</b>	<i>Riccia argenteolimbata</i>	O.H.Volk & Perold		Indigenous
<b>Ricciaceae</b>	<i>Riccia atropurpurea</i>	Sim		Indigenous
<b>Ricciaceae</b>	<i>Riccia cavernosa</i>	Hoffm.		Indigenous
<b>Ricciaceae</b>	<i>Riccia okahandjana</i>	S.W.Arnell		Indigenous
<b>Ricciaceae</b>	<i>Riccia pottsiana</i>	Sim		Indigenous; Endemic
<b>Ricciaceae</b>	<i>Riccia simii</i>	Perold		Indigenous
<b>Ricciaceae</b>	<i>Riccia volkii</i>	S.W.Arnell		Indigenous
<b>Rosaceae</b>	<i>Rosa rubiginosa</i>	L.		Not indigenous; Naturalised; Invasive
<b>Rubiaceae</b>	<i>Rubia petiolaris</i>	DC.	LC	Indigenous
<b>Aizoaceae</b>	<i>Ruschia indurata</i>	(L.Bolus) Schwantes	LC	Indigenous; Endemic
<b>Aizoaceae</b>	<i>Ruschia rigens</i>	L.Bolus	LC	Indigenous; Endemic

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<b>Aizoaceae</b>	<i>Ruschia sp.</i>			
<b>Salicaceae</b>	<i>Salix babylonica var. babylonica</i>	L.		Not indigenous; Naturalised
<b>Amaranthaceae</b>	<i>Salsola aphylla</i>	L.f.	LC	Indigenous
<b>Amaranthaceae</b>	<i>Salsola glabrescens</i>	Burt Davy	LC	Indigenous; Endemic
<b>Amaranthaceae</b>	<i>Salsola kali</i>	L.		Not indigenous; Naturalised; Invasive
<b>Lamiaceae</b>	<i>Salvia repens var. repens</i>	Burch. ex Benth.	LC	Indigenous; Endemic
<b>Lamiaceae</b>	<i>Salvia repens var. transvaalensis</i>	Burch. ex Benth.	LC	Indigenous; Endemic
<b>Lamiaceae</b>	<i>Salvia runcinata</i>	L.f.	LC	Indigenous
<b>Lamiaceae</b>	<i>Salvia verbenaca</i>	L.	LC	Not indigenous; Naturalised; Invasive
<b>Asteraceae</b>	<i>Schistostephium crataegifolium</i>	(DC.) Fenzl ex Harv.	LC	Indigenous
<b>Asteraceae</b>	<i>Schkuhria pinnata</i>	(Lam.) Kuntze ex Thell.		Not indigenous; Naturalised
<b>Cyperaceae</b>	<i>Schoenoplectus corymbosus</i>	(Roth ex Roem. & Schult.) J.Raynal	LC	Indigenous
<b>Cyperaceae</b>	<i>Schoenoplectus muricinux</i>	(C.B.Clarke) J.Raynal	LC	Indigenous
<b>Cyperaceae</b>	<i>Schoenoxiphium sp.</i>			
<b>Salicaceae</b>	<i>Scolopia zeyheri</i>	(Nees) Harv.	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia burchellii</i>	(Sond. ex Engl.) Moffett	LC	Indigenous; Endemic
<b>Anacardiaceae</b>	<i>Searsia ciliata</i>	(Licht. ex Schult.) A.J.Mill.	LC	Indigenous; Endemic
<b>Anacardiaceae</b>	<i>Searsia dentata</i>	(Thunb.) F.A.Barkley	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia lancea</i>	(L.f.) F.A.Barkley	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia leptodictya forma leptodictya</i>	(Diels) T.S.Yi, A.J.Mill. & J.Wen	NE	Indigenous
<b>Anacardiaceae</b>	<i>Searsia pyroides var. pyroides</i>	(Burch.) Moffett	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia tridactyla</i>	(Burch.) Moffett	LC	Indigenous; Endemic
<b>Convolvulaceae</b>	<i>Seddera capensis</i>	(E.Mey. ex Choisy) Hallier f.	LC	Indigenous
<b>Asteraceae</b>	<i>Senecio achilleifolius</i>	DC.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Senecio affinis</i>	DC.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Senecio consanguineus</i>	DC.	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Senecio coronatus</i>	(Thunb.) Harv.	LC	Indigenous
<b>Asteraceae</b>	<i>Senecio hastatus</i>	L.	LC	Indigenous; Endemic
<b>Amaranthaceae</b>	<i>Sericorema remotiflora</i>	(Hook.f.) Lopr.	LC	Indigenous
<b>Fabaceae</b>	<i>Sesbania notialis</i>	J.B.Gillett	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Setaria incrassata</i>	(Hochst.) Hack.	LC	Indigenous
<b>Poaceae</b>	<i>Setaria nigrirostris</i>	(Nees) T.Durand & Schinz	LC	Indigenous
<b>Poaceae</b>	<i>Setaria pumila</i>	(Poir.) Roem. & Schult.	LC	Indigenous
<b>Poaceae</b>	<i>Setaria sp.</i>			
<b>Poaceae</b>	<i>Setaria sphacelata var. sphacelata</i>	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
<b>cccccc</b>	<i>Setaria sphacelata var. torta</i>	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
<b>Poaceae</b>	<i>Setaria verticillata</i>	(L.) P.Beauv.	LC	Indigenous
<b>Malvaceae</b>	<i>Sida dregei</i>	Burt Davy	LC	Indigenous

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<b>Caryophyllaceae</b>	<i>Silene undulata</i>	Aiton		Indigenous
<b>Brassicaceae</b>	<i>Sisymbrium capense</i>	Thunb.	LC	Indigenous; Endemic
<b>Solanaceae</b>	<i>Solanum campylacanthum</i>	Hochst. ex A.Rich.		Indigenous
<b>Solanaceae</b>	<i>Solanum retroflexum</i>	Dunal	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Sporobolus discosporus</i>	Nees	LC	Indigenous
<b>Poaceae</b>	<i>Sporobolus fimbriatus</i>	(Trin.) Nees	LC	Indigenous
<b>Poaceae</b>	<i>Sporobolus ioclados</i>	(Trin.) Nees	LC	Indigenous
<b>Poaceae</b>	<i>Sporobolus ludwigii</i>	Hochst.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Sporobolus sp.</i>			
<b>Lamiaceae</b>	<i>Stachys spathulata</i>	Burch. ex Benth.	LC	Indigenous
<b>Apocynaceae</b>	<i>Stapelia grandiflora var. grandiflora</i>	Masson	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Stipagrostis uniplumis var. neesii</i>	(Licht.) De Winter	LC	Indigenous
<b>Aizoaceae</b>	<i>Stomatium ermininum</i>	(Haw.) Schwantes	LC	Indigenous; Endemic
<b>Orobanchaceae</b>	<i>Striga bilabiata subsp. bilabiata</i>	(Thunb.) Kuntze	LC	Indigenous
<b>Orobanchaceae</b>	<i>Striga sp.</i>			
<b>Asteraceae</b>	<i>Tagetes minuta</i>	L.		Not indigenous; Naturalised; Invasive
<b>Tamaricaceae</b>	<i>Tamarix chinensis</i>	Lour.		Not indigenous; Naturalised; Invasive
<b>Asteraceae</b>	<i>Tarchonanthus camphoratus</i>	L.	LC	Indigenous
<b>Asteraceae</b>	<i>Tarchonanthus minor</i>	Less.	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Tarigidia aequiglumis</i>	(Gooss.) Stent	LC	Indigenous; Endemic
<b>Fabaceae</b>	<i>Tephrosia capensis var. capensis</i>	(Jacq.) Pers.	LC	Indigenous
<b>Fabaceae</b>	<i>Tephrosia sp.</i>			
<b>Poaceae</b>	<i>Themeda triandra</i>	Forssk.	LC	Indigenous
<b>Santalaceae</b>	<i>Thesium resedoides</i>	A.W.Hill	LC	Indigenous
<b>Asphodelaceae</b>	<i>Trachyantha asperata var. asperata</i>	Kunth	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Tragus berteronianus</i>	Schult.	LC	Indigenous
<b>Poaceae</b>	<i>Tragus koelerioides</i>	Asch.	LC	Indigenous
<b>Poaceae</b>	<i>Tragus racemosus</i>	(L.) All.	LC	Indigenous
<b>Aizoaceae</b>	<i>Trianthema parvifolia var. parvifolia</i>	E.Mey. ex Sond.	LC	Indigenous
<b>Aizoaceae</b>	<i>Trianthema salsoloides var. transvaalensis</i>	Fenzl ex Oliv.	LC	Indigenous
<b>Zygophyllaceae</b>	<i>Tribulus terrestris</i>	L.	LC	Indigenous
<b>Boraginaceae</b>	<i>Trichodesma angustifolium subsp. angustifolium</i>	Harv.	LC	Indigenous
<b>Poaceae</b>	<i>Trichoneura grandiglumis</i>	(Nees) Ekman	LC	Indigenous
<b>Pottiaceae</b>	<i>Trichostomum brachydontium</i>	Bruch		Indigenous
<b>Poaceae</b>	<i>Triraphis andropogonoides</i>	(Steud.) E.Phillips	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Trisetopsis imberbis</i>	(Nees) Roser, A.Wolk & Veldkamp		Indigenous; Endemic
<b>Poaceae</b>	<i>Urochloa panicoides</i>	P.Beauv.	LC	Indigenous
<b>Fabaceae</b>	<i>Vachellia hebeclada subsp. hebeclada</i>	(DC.) Kyal. & Boatwr.	LC	Indigenous; Endemic

<b>Fabaceae</b>	<i>Vachellia karroo</i>	(Hayne) Banfi & Galasso	LC	Indigenous
<b>Verbenaceae</b>	<i>Verbena bonariensis</i>	L.		Not indigenous; Naturalised; Invasive
<b>Santalaceae</b>	<i>Viscum rotundifolium</i>	L.f.	LC	Indigenous
<b>Campanulaceae</b>	<i>Wahlenbergia albens</i>	(Spreng. ex A.DC.) Lammers	LC	Indigenous; Endemic
<b>Campanulaceae</b>	<i>Wahlenbergia androsacea</i>	A.DC.	LC	Indigenous
<b>Xyridaceae</b>	<i>Xyris gerrardii</i>	N.E.Br.	LC	Indigenous
<b>Apocynaceae</b>	<i>Xysmalobium undulatum</i> var. <i>undulatum</i>	(L.) W.T.Aiton	LC	Indigenous
<b>Rhamnaceae</b>	<i>Ziziphus mucronata</i> subsp. <i>mucronata</i>	Willd.	LC	Indigenous
<b>Fabaceae</b>	<i>Zornia capensis</i> subsp. <i>capensis</i>	Pers.	LC	Indigenous

### 10.3 Appendix C Avifauna species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
<i>Apalis thoracica</i>	Apalis, Bar-throated	Unlisted	LC
<i>Recurvirostra avosetta</i>	Avocet, Pied	Unlisted	LC
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Batis pririt</i>	Batis, Pirit	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops bullockoides</i>	Bee-eater, White-fronted	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC
<i>Ixobrychus minutus</i>	Bittern, Little	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Buteo buteo</i>	Buzzard, Common (Steppe)	Unlisted	LC
<i>Buteo rufufuscus</i>	Buzzard, Jackal	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra flaviventris</i>	Canary, Yellow	Unlisted	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Oenanthe familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Emarginata sinuata</i>	Chat, Sickle-winged	Unlisted	LC
<i>Cisticola textrix</i>	Cisticola, Cloud	Unlisted	LC
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levallant's	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Petrochelidon spilodera</i>	Cliff-swallow, South African	Unlisted	LC
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Microcarbo africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Phalacrocorax lucidus</i>	Cormorant, White-breasted	Unlisted	LC
<i>Centropus burchellii</i>	Coucal, Burchell's	Unlisted	Unlisted
<i>Rhinoptilus africanus</i>	Cursorer, Double-banded	Unlisted	LC
<i>Cursorius temminckii</i>	Cursorer, Temminck's	Unlisted	LC
<i>Zapornia flavirostra</i>	Crake, Black	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC

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<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Spilopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC
<i>Dendrocygna bicolor</i>	Duck, Fulvous	Unlisted	LC
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	VU
<i>Thalassornis leuconotus</i>	Duck, White-backed	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced Whistling	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Hieraaetus pennatus</i>	Eagle, Booted	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Ardea alba</i>	Egret, Great	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Ardea intermedia</i>	Egret, Yellow-billed (Intermediate)	Unlisted	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Falco peregrinus</i>	Falcon, Peregrine	Unlisted	LC
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC
<i>Sporopipes squamifrons</i>	Finch, Scaly-feathered	Unlisted	LC
<i>Lagonosticta rhodopareia</i>	Firefinch, Jameson's	Unlisted	LC
<i>Lagonosticta senegala</i>	Firefinch, Red-billed	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Phoenicopterus roseus</i>	Flamingo, Greater	NT	LC
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Melaenornis silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Scleroptila gutturalis</i>	Francolin, Orange River	Unlisted	LC
<i>Anser anser</i>	Goose, Domestic	Unlisted	LC
<i>Alopochen aegyptiaca</i>	Goose, Egyptian	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Micronisus gabar</i>	Goshawk, Gabar	Unlisted	LC
<i>Melierax canorus</i>	Goshawk, Southern Pale Chanting	Unlisted	LC
<i>Podiceps nigricollis</i>	Grebe, Black-necked	Unlisted	LC

<i>Podiceps cristatus</i>	Grebe, Great Crested	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Chlorocichla flaviventris</i>	Greenbul, Yellow-bellied	Unlisted	LC
<i>Tringa nebularia</i>	Greenshank, Common	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Chroicocephalus cirrocephalus</i>	Gull, Grey-headed	Unlisted	LC
<i>Larus dominicanus</i>	Gull, Kelp	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	Unlisted	LC
<i>Polyboroides typus</i>	Harrier-Hawk, African	Unlisted	LC
<i>Egretta ardesiaca</i>	Heron, Black	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea goliath</i>	Heron, Goliath	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC
<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Upupa africana</i>	Hoopoe, African	Unlisted	LC
<i>Lophoceros nasutus</i>	Hornbill, African Grey	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadeda	Unlisted	LC
<i>Vidua funerea</i>	Indigobird, Dusky	Unlisted	LC
<i>Vidua chalybeata</i>	Indigobird, Village	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Falco rupicoloides</i>	Kestrel, Greater	Unlisted	LC
<i>Falco naumanni</i>	Kestrel, Lesser	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	LC
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Megaceryle maxima</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Corythornis cristatus</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Eupodotis caeruleus</i>	Korhaan, Blue	LC	NT
<i>Afrotis afroides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Mirafra fasciolata</i>	Lark, Eastern Clapper	Unlisted	LC
<i>Calandrella cinerea</i>	Lark, Red-capped	Unlisted	LC
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Calendulauda sabota</i>	Lark, Sabota	Unlisted	LC



<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Ptyonoprogne fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Ploceus velatus</i>	Masked-weaver, Southern	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Colius colius</i>	Mousebird, White-backed	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Struthio camelus</i>	Ostrich, Common	Unlisted	LC
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC
<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Vidua paradisaea</i>	Paradise-whydah, Long-tailed	Unlisted	LC
<i>Anthoscopus minutus</i>	Penduline-tit, Cape	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Charadrius pallidus</i>	Plover, Chestnut-banded	NT	NT
<i>Charadrius hiaticula</i>	Plover, Common Ringed	Unlisted	LC
<i>Pluvialis squatarola</i>	Plover, Grey	Unlisted	LC
<i>Charadrius pecuarius</i>	Plover, Kittlitz's	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC
<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC
<i>Pytilia melba</i>	Pytilia, Green-winged	Unlisted	LC
<i>Coturnix coturnix</i>	Quail, Common	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Rallus caerulescens</i>	Rail, African	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Calidris pugnax</i>	Ruff	Unlisted	LC

<i>Actitis hypoleucos</i>	Sandpiper, Common	Unlisted	LC
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	NT
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC
<i>Tringa glareola</i>	Sandpiper, Wood	Unlisted	LC
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	Unlisted	LC
<i>Cercotrichas paena</i>	Scrub-robin, Kalahari	Unlisted	LC
<i>Cercotrichas coryphoeus</i>	Scrub-robin, Karoo	Unlisted	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	EN
<i>Tadorna cana</i>	Shelduck, South African	Unlisted	LC
<i>Spatula smithii</i>	Shoveler, Cape	Unlisted	LC
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Gallinago nigripennis</i>	Snipe, African	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	Unlisted	LC
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	Unlisted	LC
<i>Eremopterix leucotis</i>	Sparrowlark, Chestnut-backed	Unlisted	LC
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Pternistis natalensis</i>	Spurfowl, Natal	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Sturnus vulgaris</i>	Starling, Common	Unlisted	LC
<i>Lamprotornis bicolor</i>	Starling, Pied	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Creatophora cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC
<i>Calidris minuta</i>	Stint, Little	LC	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC
<i>Ciconia nigra</i>	Stork, Black	VU	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Cinnyris fuscus</i>	Sunbird, Dusky	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Cecropis cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC

<i>Cecropis semirufa</i>	Swallow, Red-breasted	Unlisted	LC
<i>Hirundo albigularis</i>	Swallow, White-throated	Unlisted	LC
<i>Porphyrio madagascariensis</i>	Swampphen, African Purple	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Tachymarptis melba</i>	Swift, Alpine	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Tchagra australis</i>	Tchagra, Brown-crowned	Unlisted	LC
<i>Anas capensis</i>	Teal, Cape	Unlisted	LC
<i>Spatula hottentota</i>	Teal, Hottentot	Unlisted	LC
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Turdus smithi</i>	Thrush, Karoo	Unlisted	LC
<i>Melaniparus cinerascens</i>	Tit, Ashy	Unlisted	LC
<i>Curruca subcoerulea</i>	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Brunhilda erythronotos</i>	Waxbill, Black Cheeked	Unlisted	LC
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	Unlisted
<i>Granatina granatina</i>	Waxbill, Violet-eared	Unlisted	LC
<i>Oenanthe pileata</i>	Wheatear, Capped	Unlisted	LC
<i>Myrmecocichla monticola</i>	Wheatear, Mountain	Unlisted	LC
<i>Zosterops virens</i>	White-eye, Cape	Unlisted	LC
<i>Zosterops pallidus</i>	White-eye, Orange River	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC
<i>Vidua regia</i>	Whydah, Shaft-tailed	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Dendropicops fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Jynx ruficollis</i>	Wryneck, Red-throated	Unlisted	LC

## 10.4 Appendix D Mammals expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
<i>Aethomys ineptus</i>	Tete Veld Rat	LC	LC
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	LC
<i>Antidorcas marsupialis</i>	Sclater's Shrew	LC	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC
<i>Atilax paludinosus</i>	Water Mongoose	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Caracal caracal</i>	Caracal	LC	LC
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC	LC
<i>Crociodura cyanea</i>	Reddish-grey Musk Shrew	LC	LC
<i>Crociodura fuscomurina</i>	Tiny Musk Shrew	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	LC	LC
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT
<i>Elephantulus myurus</i>	Eastern Rock Sengi	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	LC	LC
<i>Felis nigripes</i>	Black-footed Cat	VU	VU
<i>Felis silvestris</i>	African Wildcat	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	LC	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT
<i>Hystrix africaeausstralis</i>	Cape Porcupine	LC	LC
<i>Ichneumia albicauda</i>	White-tailed Mongoose	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	LC	LC
<i>Leptailurus serval</i>	Serval	NT	LC
<i>Lepus capensis</i>	Cape Hare	LC	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC
<i>Lepus victoriae</i>	African Savanna Hare	LC	LC
<i>Malacothrix typica</i>	Gerbil Mouse	LC	LC
<i>Mastomys coucha</i>	Multimammate Mouse	LC	LC
<i>Mellivora capensis</i>	Honey Badger	LC	LC
<i>Mus musculus</i>	House Mouse	Unlisted	LC
<i>Mus orangiae</i>	Free State Pygmy Mouse	NE	Unlisted
<i>Myotis welwitschii</i>	Welwitsch's Hairy Bat	LC	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN

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<i>Neoromicia capensis</i>	Cape Serotine Bat	LC	LC
<i>Neoromicia zuluensis</i>	Aloe Bat	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Otocyon megalotis</i>	Bat-eared Fox	LC	LC
<i>Otomys irroratus</i>	Vlei Rat (Fynbos type)	LC	LC
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Papio ursinus</i>	Chacma Baboon	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT
<i>Pedetes capensis</i>	Springhare	LC	LC
<i>Phacochoerus africanus</i>	Common Warthog	LC	LC
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC
<i>Procavia capensis</i>	Rock Hyrax	LC	LC
<i>Proteles cristata</i>	Aardwolf	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rattus rattus</i>	House Rat	Exotic (Not listed)	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	LC	LC
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	LC
<i>Saccostomus campestris</i>	Pouched Mouse	LC	LC
<i>Scotophilus dinganii</i>	Yellow House Bat	LC	LC
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	LC	LC
<i>Suncus varilla</i>	Lesser Dwarf Shrew	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	LC
<i>Thryonomys swinderianus</i>	Greater Cane Rat	LC	LC
<i>Vulpes chama</i>	Cape Fox	LC	LC
<i>Xerus inauris</i>	Cape Ground Squirrel	LC	LC

## 10.5 Appendix E Reptiles species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	LC	LC
<i>Afroedura nivaria</i>	Drankensberg Flat Gecko	LC	LC
<i>Agama aculeata distanti</i>	Eastern Ground Agama	LC	LC
<i>Agama atra</i>	Southern Rock Agama	LC	LC
<i>Agama hispida</i>	Southern Spiny Agama	LC	LC
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Bitis arietans arietans</i>	Puff Adder	LC	Unlisted
<i>Boaedon capensis</i>	Brown House Snake	LC	LC
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	Unlisted
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Elapsoidea sundevallii</i>	Sundevall's Garter Snake	LC	Unlisted
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	LC	LC
<i>Homopus femoralis</i>	Greater Dwarf Tortoise	LC	LC
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	LC
<i>Karusasaurus polyzonus</i>	Southern Karusa Lizard	LC	LC
<i>Lamprophis aurora</i>	Aurora House Snake	LC	LC
<i>Leptotyphlops scutifrons scutifrons</i>	Peters' Thread Snake	LC	Unlisted
<i>Lycophidion capense capense</i>	Cape Wolf Snake	LC	Unlisted
<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC	Unlisted
<i>Monopeltis capensis</i>	Cape Worm Lizard	LC	LC
<i>Naja nivea</i>	Cape Cobra	LC	Unlisted
<i>Nucras holubi</i>	Holub's Sandveld Lizard	LC	Unlisted
<i>Nucras intertexta</i>	Spotted Sandveld Lizard	LC	Unlisted
<i>Pachydactylus capensis</i>	Cape Gecko	LC	Unlisted
<i>Pachydactylus mariquensis</i>	Common Banded Gecko	LC	LC
<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink	LC	Unlisted
<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	LC	LC
<i>Pedioplanis lineocellata lineocellata</i>	Spotted Sand Lizard	LC	Unlisted
<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	Unlisted
<i>Prosymna ambigua</i>	Angolan Shovel-snout	Unlisted	LC
<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	LC	LC
<i>Psammobates oculifer</i>	Serrated Tent Tortoise	LC	Unlisted
<i>Psammophis crucifer</i>	Cross-marked Grass Snake	LC	LC
<i>Psammophis leightoni</i>	Cape Sand Snake	VU	LC
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC	Unlisted

<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC	LC
<i>Pseudaspis cana</i>	Mole Snake	LC	Unlisted
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC	Unlisted
<i>Smaug giganteus</i>	Giant Dragon Lizard	VU	VU
<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC	LC
<i>Trachylepis capensis</i>	Cape Skink	LC	Unlisted
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC
<i>Trachylepis punctulata</i>	Speckled Sand Skink	LC	Unlisted
<i>Trachylepis varia</i>	Variable Skink	LC	LC
<i>Varanus albigularis albigularis</i>	Southern Rock Monitor	LC	Unlisted
<i>Varanus niloticus</i>	Water Monitor	LC	Unlisted

## 10.6 Appendix F Amphibian expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
<i>Amietia delalandii</i>	Delalande's River Frog	LC	Unlisted
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC
<i>Amietia poyntoni</i>	Poynton's River Frog	LC	LC
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Poyntonophrynus vertebralis</i>	Southern Pygmy Toad	LC	LC
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT	LC
<i>Sclerophrys capensis</i>	Raucous Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Sclerophrys poweri</i>	Power's Toad	LC	LC
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC	LC
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	LC
<i>Xenopus laevis</i>	Common Platanna	LC	LC



