THE TERRESTRIAL ECOLOGY BASIC ASSESSMENT FOR THE PROPOSED ORKNEY 132 KV POWER LINE

Orkney, Free State

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CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a terrestrial ecology assessment for the establishment of a 132KVA grid connection to the Taulekoa Mine, outside of Orkney. The following is as per the project description provided by Genesis Eco-Energy Developments:

Genesis Eco-Energy Developments (Pty) Ltd proposes the construction and operation of grid connection infrastructure consisting of a Switching Substation and a 132kV power line between authorised Orkney Solar Farm Substation (DFFE Ref: 14/12/16/3/3/2/954) and the existing Vaal Reefs Ten Substation, situated at the Tau Lekoa Mine. The proposed grid connection infrastructure will be located within the City of Matlosana Local Municipality, Dr Kenneth Kaunda District Municipality near the town of Orkney in the North West Province.

The grid connection infrastructure will include a substation on portion 21 of the Farm Wolvehuis 114, and power line within a 300 m wide (both sides of the R502) and 7.3 km long corridor. The corridor extends between the authorised Orkney Solar farm and the Vaal Reefs Ten Substation. The 300 m wide corridor will allow for the optimisation of the infrastructure to accommodate identified environmental sensitivities. The servitude of the power line will be up to 36 m in width. The grid connection corridor (300 m wide corridor) will consist of:

- 132kV Switching substation; and
- 132kV power line.

The grid connection corridor traverses the following affected properties, namely:

- Remaining Extent of the Farm Wolvenhuis 114HP;
- Portion 21 of the Farm Wolvenhuis 114HP;
- Portion 22 of the Farm Wolvenhuis 114HP;
- Remaining Extent of the Farm Goedenoeg 433IP;
- Portion 12 of the Farm Goedenoeg 433IP;
- Portion 24 of the Farm Goedenoeg 433IP;
- Portion 27 of the Farm Goedenoeg 433IP;
- Portion 31 of the Farm Goedenoeg 433IP;
- Portion 33 of the Farm Goedenoeg 433IP;
- Portion 47 of the Farm Goedenoeg 433IP;
- Portion 62 of the Farm Goedenoeg 433IP; and
- Portion 81 of the Farm Goedenoeg 433IP.

The approach was informed by 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 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 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 and avian sensitivities of the project area as "Low", while the animal sensitivity is rated as 'High".

The purpose of the specialist studies is to provide relevant input into the environmental authorisation process and to provide a report for the proposed activities associated with the project. 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 proposed project.

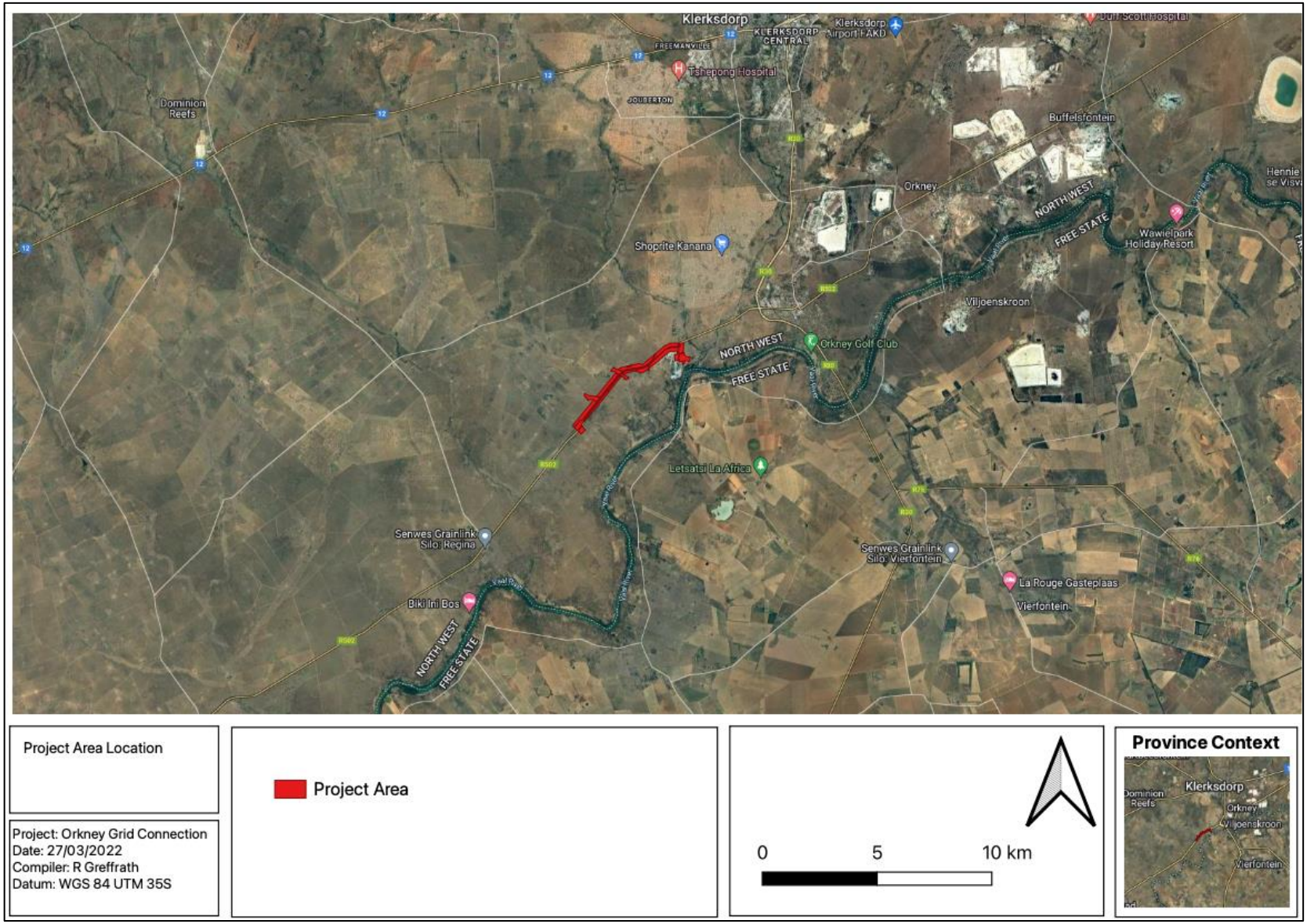


Figure 1-1 Location of the project area in relation to the nearby town of Klerksdorp.

1.2 Specialist Details

Report Name	**THE TERRESTRIAL ECOLOGY BASIC ASSESSMENT FOR THE PROPOSED ORKNEY 132 KV POWER LINE**
Reference	**Ref: 14/12/16/3/3/2/954**
Submitted to	savannah environmental
Report Writer (Fauna and Flora)	**Rudolph Greffrath** 
	Rudolph is a terrestrial ecology specialist with 14 years of experience in biodiversity baseline assessments, biodiversity action planning design and development, biodiversity off-set design and implementation, biodiversity strategy design, conservation management planning and implementation, IFC performance standards best practice, ecological restoration, ecosystems services and environmental impact assessments, across Africa. He is Pr Sci Nat registered (400018/17) in Conservation Science field of practice.
Report Writer (Avifauna)	**Ernest Porter**
	Ernest has gained birding experience in the Northern Cape, North West, Mpumalanga, Limpopo, Kwazulu Natal, Free State, Western Cape and also Gauteng. He is a qualified FGASA NQF2 Field Guide and a committee member of Black Eagle Project Roodekrans and The Botanical Society of South Africa (Bankenveld Branch).
Report Reviewer	**Andrew Husted** 
	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.
Declaration	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.

1.3 Scope of Work

The principle aim of the assessment was to provide information to identify the risks stemming from the proposed activity and to identify potential ecological constraints within the project area/corridor. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the project area;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the project area;
- Field survey to ascertain the species composition of the present flora and fauna community within the project area;
- Field survey for the delineation, classification and assessment of wetlands within the 500 m regulated area;
- Delineate and map the habitats and their respective sensitivities that occur within the project area;
- Identify the manner that the proposed project impacts the ecological considerations and evaluate the level of risk of these potential impacts; and
- The prescription of mitigation measures and recommendations for identified risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 2-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the Free State Province

Region	Legislation / Guideline
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	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), Threatened or Protected Species Regulations
	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, GNR 320 of Government Gazette 43310 (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, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	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 Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	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

3 Methods

3.1 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.

3.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno et al, 2019) (NBA)- The purpose of the NBA is to assess the state of South Africa's biodiversity based on 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* – 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* – 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. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - *South Africa Protected Areas Database (SAPAD) (DEA, 2021)* – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attribute

information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis 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, 2016)* – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- Free State Biodiversity Sector Plan

  The 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).

  A CBA is considered a significant and ecologically sensitive area and needs to be kept in a pristine or near-natural state to ensure the continued functioning of ecosystems (SANBI, 2017). A CBA represents the best choice for achieving biodiversity targets. ESAs are not essential for achieving targets, but they play a vital role in the continued functioning of ecosystems and often are essential for proper functioning of adjacent CBAs.

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – 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.

3.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) 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 project area (Figure 3-1). 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.

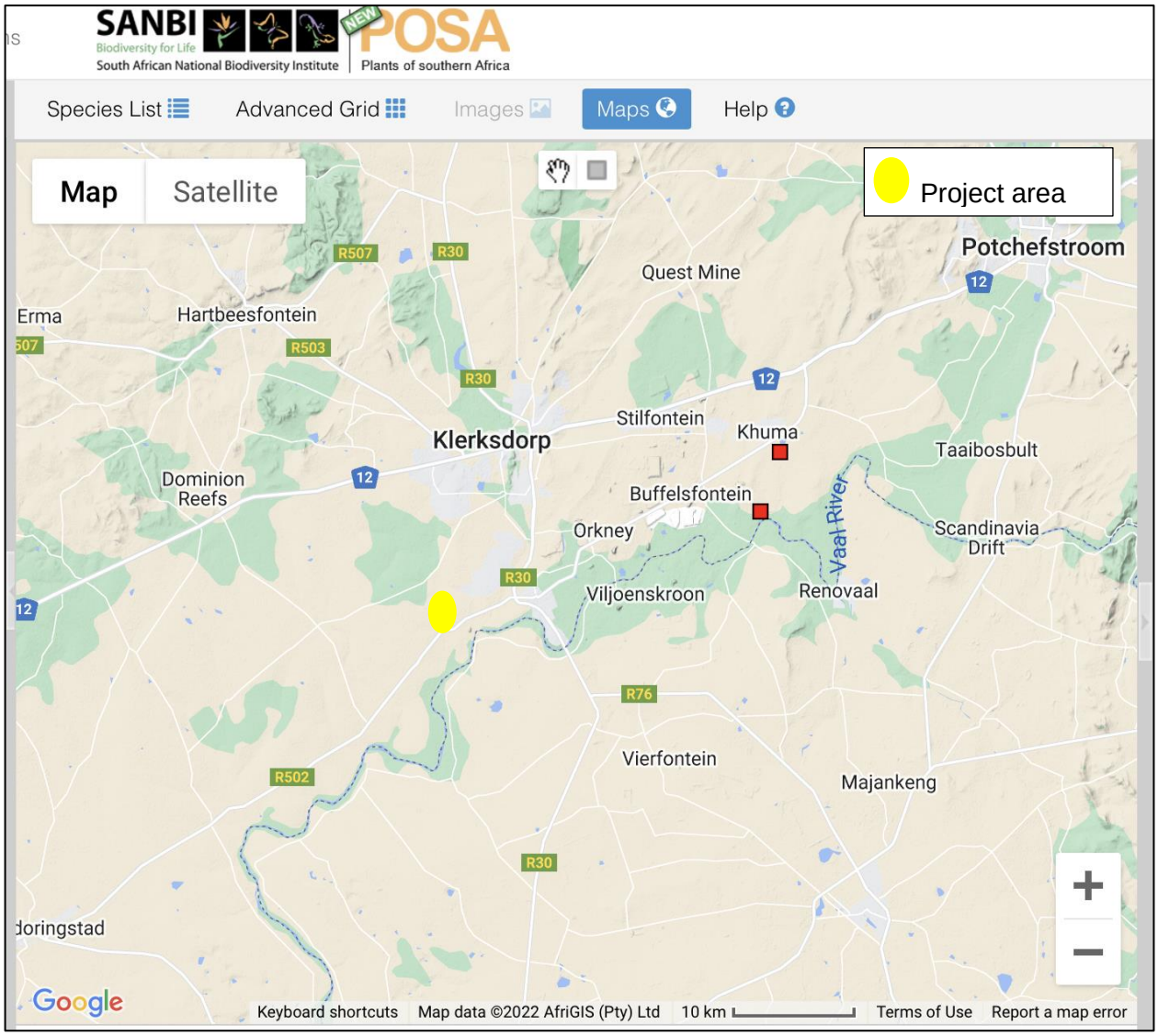


Figure 3-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

3.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following, compiling an expected:

- Amphibian list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2627 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2627 quarter degree square;
- Avifauna list, generated for the SABAP2 dataset by looking at pentads 2645_2745; 2645_2750; 2645_2755; 2650_2745; 2650_2750; 2650_2755; 2655_2745; 2655_2750; 2655_2755); and
- Mammal list from the IUCN spatial dataset (2017).

3.2 Field Assessment

One field survey was undertaken for the project. Table 3-1 summarises the timing and period of the survey undertaken.

Table 3-1 Summary of surveys undertaken for the biodiversity impact assessment

Survey Number	Season	Date/s	Comments
1	Wet (Summer)	March 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the AOI as well as the footprint of the proposed development. Vegetation and habitat units were also identified.

Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant species and any sensitive or important features (e.g., drainage lines, rock outcrops, termite mounds etc.).

3.2.1 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 rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

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 highly efficient 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.

3.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles),and mammals. The faunal field survey comprised of the following techniques:

- *Visual and auditory searches* - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed; and listening to species calls;
- 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.); and
- Utilization of local knowledge.

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

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al,* 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Smithers' Mammals of Southern Africa (Apps, 2000);

- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.,* 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.,* 2005).

3.2.3 Avifuana

The field assessment was conducted in late March. Areas surrounding the project area were also surveyed, this included areas on the Vaal River (Figure 3-2). The purpose of these additional surveys was to determine if any larger water birds were present in the area to ensure they are not affected by the development.

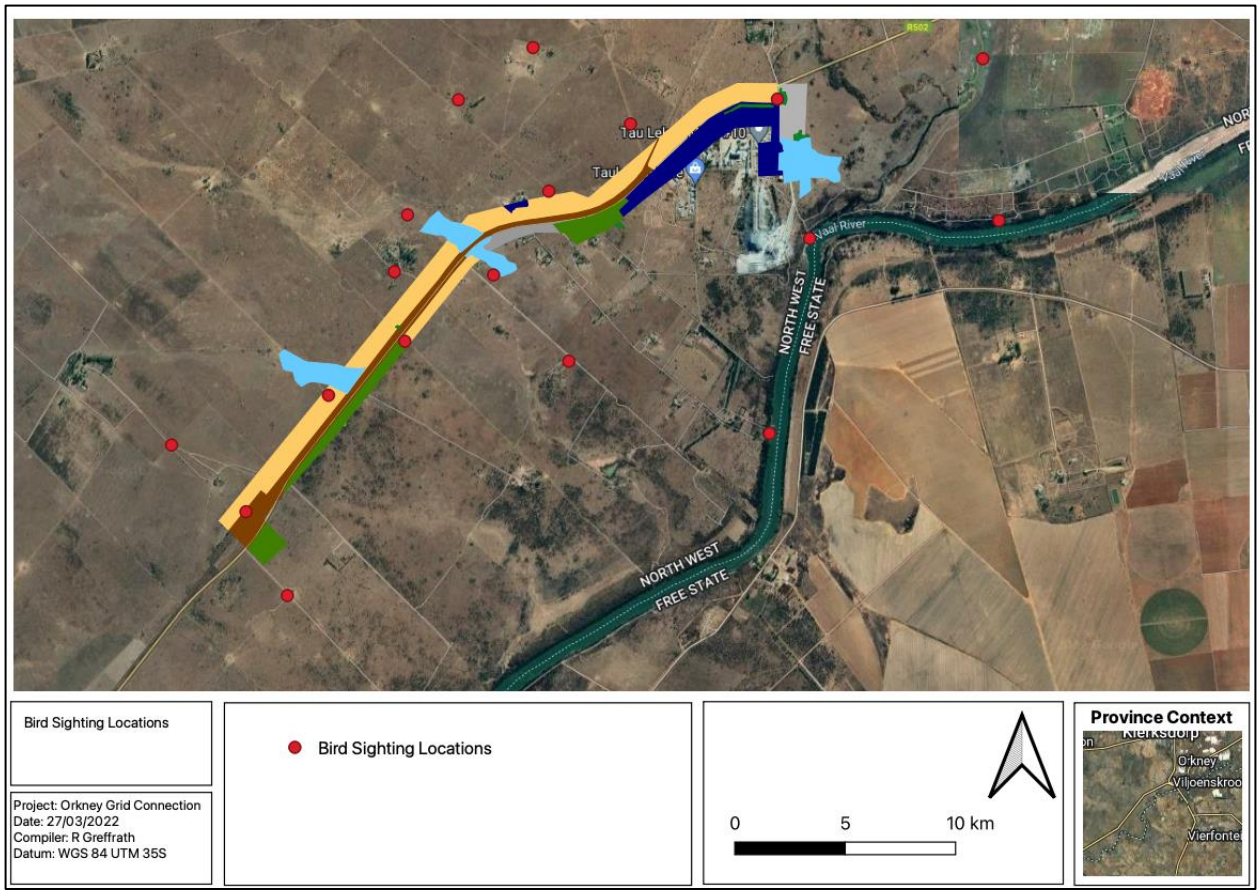


Figure 3-2 Map illustrating the field survey area

Sampling consisted of standardized point counts as well as random diurnal incidental surveys and vantage point surveys. Standardized point counts (following Buckland *et al.* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. Each point count was run over a 10 min period, with a 2 minute settling time. The horizontal detection limit was set at 50 m. At each point the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, river scanning and road cruising. Short term flight analysis and vantage point surveys were also conducted, these results are included as part of the incidental information.

3.2.1 Data Analysis

Point count data was arranged into a matrix with point count samples in rows and species in columns. The table formed the basis of the various subsequent statistical analyses. This data was first used to distinguish similarities / differences in the species composition between the two identified avifaunal habitats, the matrix was converted into a Bray-Curtis dissimilarity matrix. The data was subject to fourth root transformation to downscale the contribution of very abundant species while upscaling the influence of less abundant species. However, the effect was negligible and ultimately the raw data proved more informative. Thirdly, raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. The Shannon Diversity Index (H') was the metric used to estimate diversity. Lastly, present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

3.3 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 3-2 and

Table 3-3, respectively.

Table 3-2 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^2. 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^2. 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 3-3 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	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.
High	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.
Medium	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.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	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 3-4.

Table 3-4 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 3-5.

Table 3-5 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (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.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (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.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (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.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a

	low likelihood of: (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.
Very Low	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 3-6.

Table 3-6 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 proposed project is provided in Table 3-7.

Table 3-7 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

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

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.

3.4 Assumptions and 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 route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The area was only surveyed during one short term wet season survey and therefore, this assessment does not consider temporal trends;
- 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 for resource delineations is accurate to within five metres. Therefore, the delineations plotted digitally may be offset by a maximum of five metres to either side.

4 Results & Discussion

4.1 Desktop Assessment

4.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in Table 4-1.

Table 4-1 Summary of relevance of the proposed project to ecologically important landscape features.

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Endangered ecosystem	4.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Not Protected Ecosystem	4.1.1.2
Protected Areas	Irrelevant – Not close to any Protected Area	-
Critical Biodiversity Area	Relevant – The project area overlaps with a CBA2 and ESA1 areas.	4.1.1.3
National Protected Areas Expansion Strategy	Relevant – The project area is 2directly adjacent to the Vaal Grasslands NPAES protected area	4.1.1.4
Important Bird and Biodiversity Areas	Irrelevant – Located more that 90km from the project area	-
Coordinated Waterbird Count	Relevant – 10 km from a CWAC site Grootrietpan	4.1.1.5
Coordinated Avifaunal Road Count	Relevant – Close to 1 known route	4.1.1.6

4.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is 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. According to the spatial dataset the proposed project overlaps with a EN ecosystem (Figure 4-1).

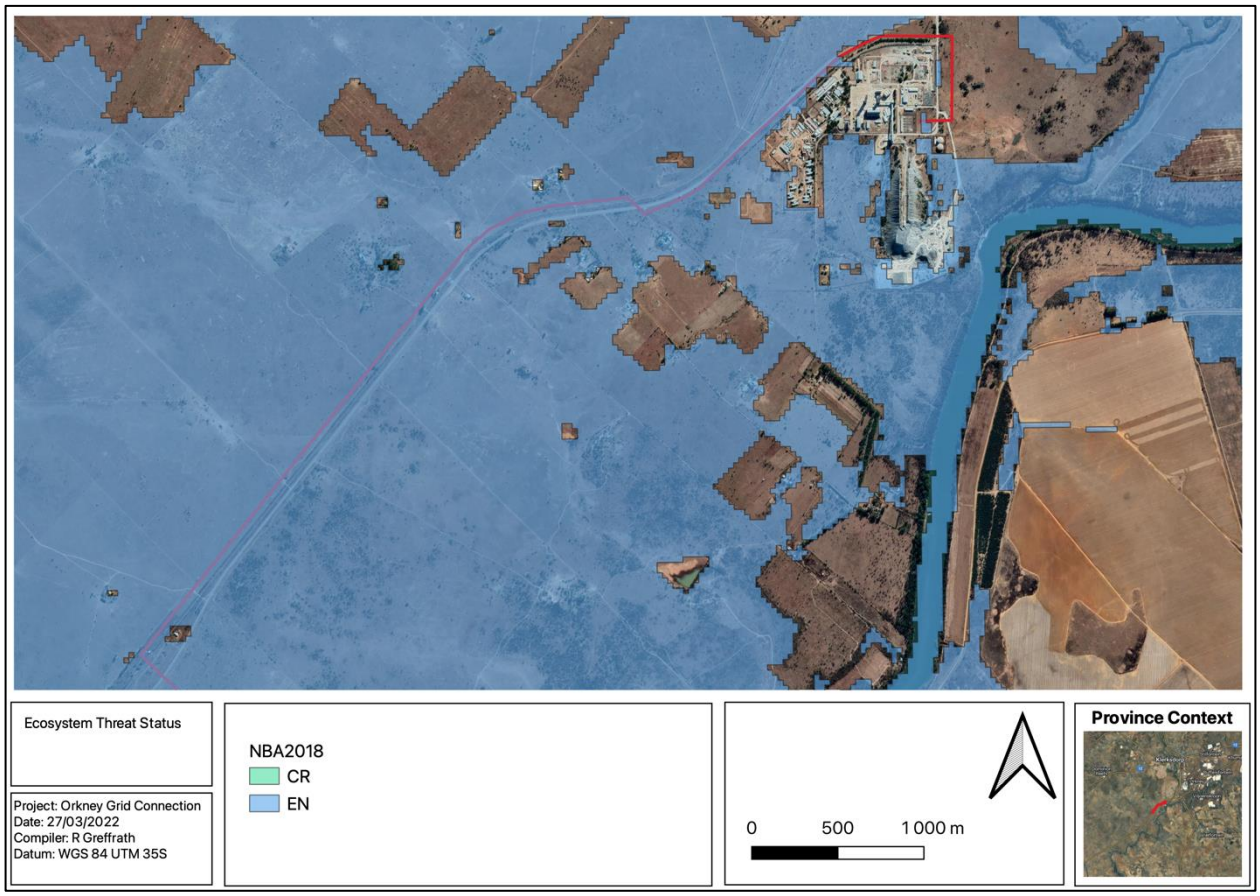


Figure 4-1 Map illustrating the ecosystem threat status associated with the project area.

4.1.1.2 Ecosystem Protection Level

This is 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. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a NP ecosystem (Figure 4-2).

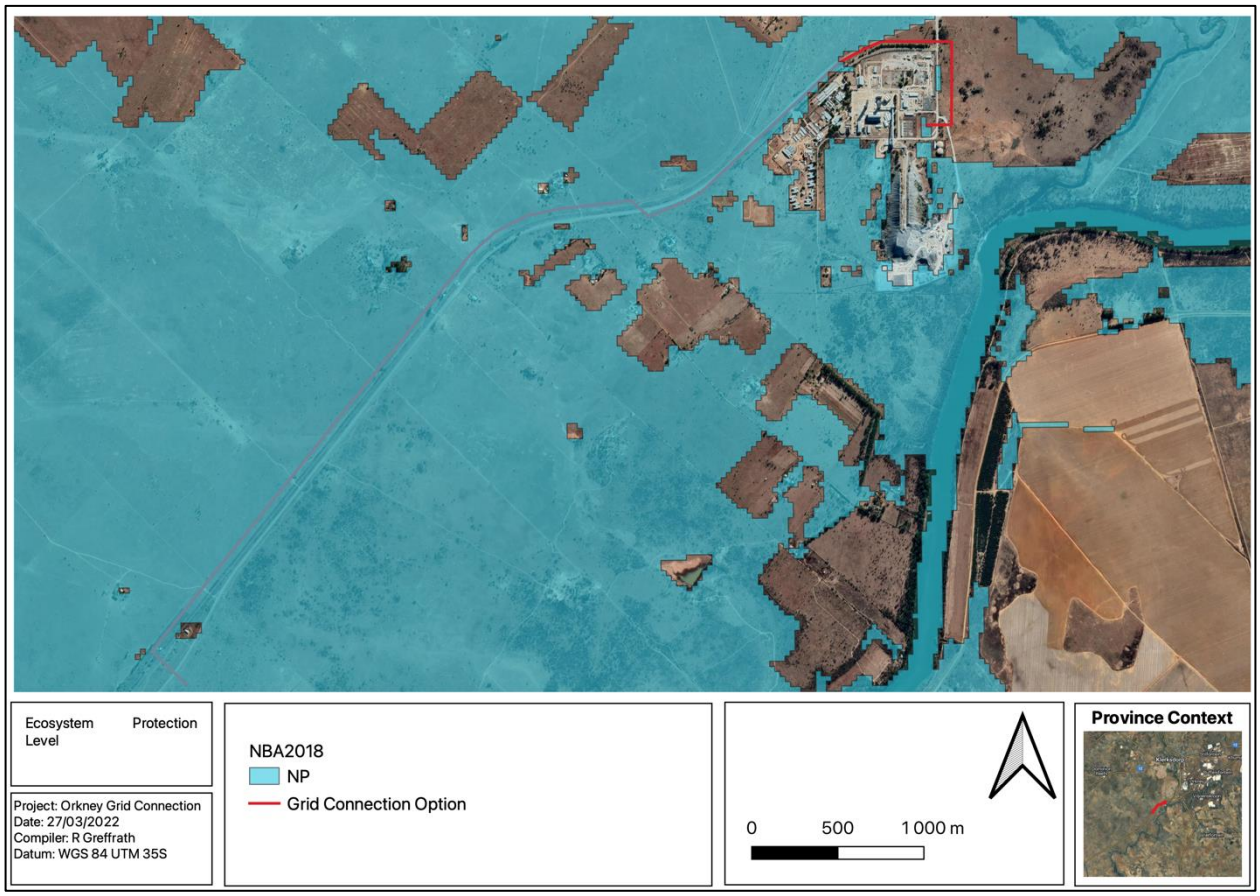


Figure 4-2 Map illustrating the ecosystem protection level associated with the project area

4.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and degraded areas that have been irreversibly modified from their natural state.

Figure 4-3 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with CBA2 and ESA1 areas.

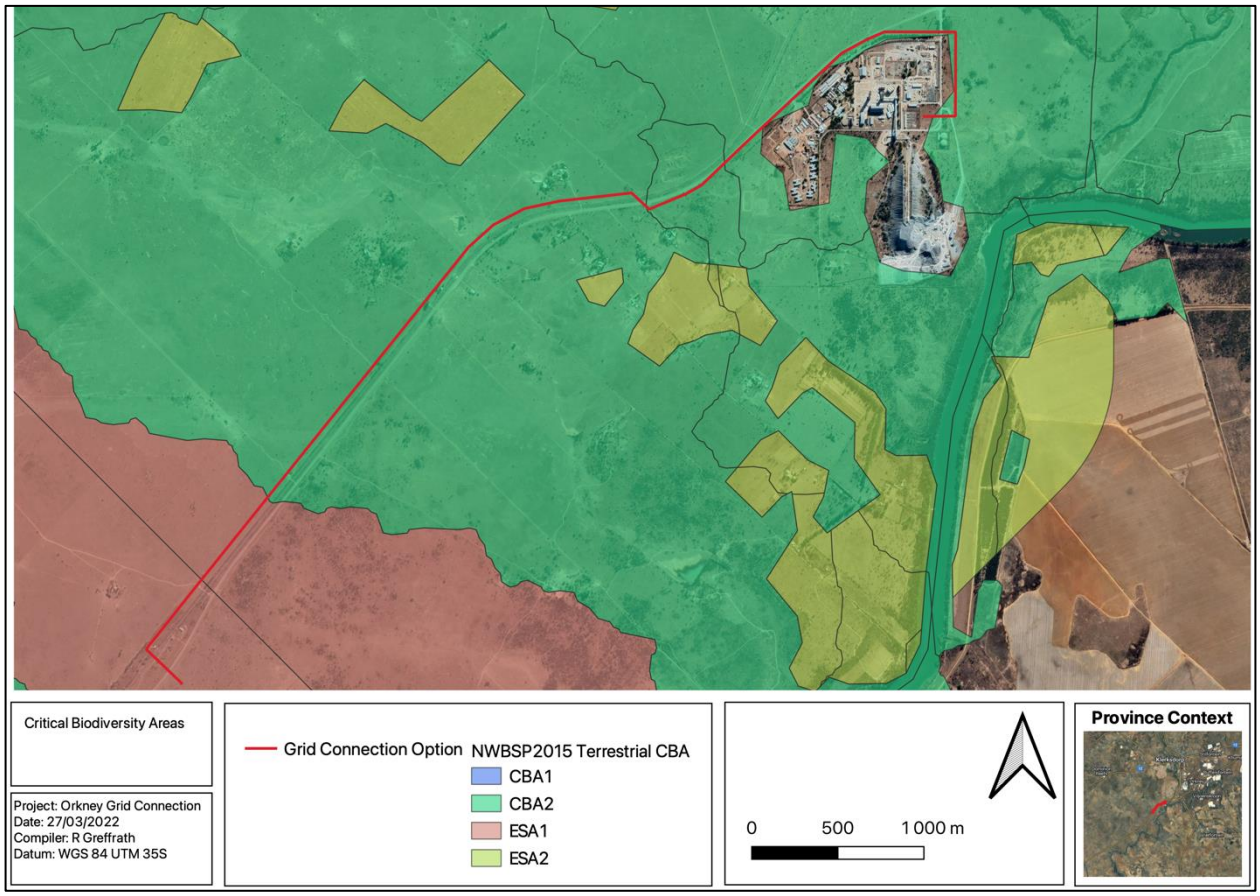


Figure 4-3 Map illustrating the locations of CBAs in the project area

4.1.1.4 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for finescale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area is not within a NPAES protected area as can be seen in Figure 4-4.

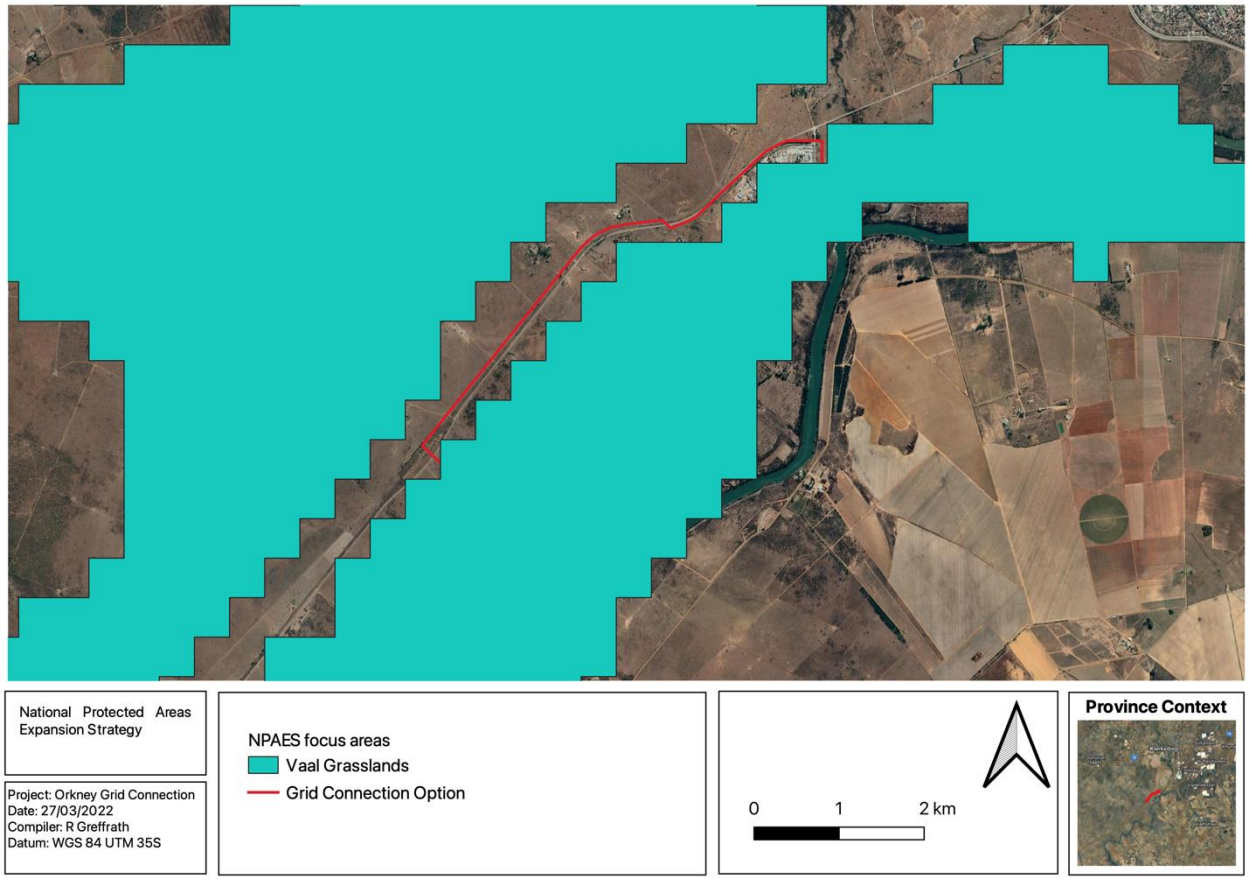


Figure 4-4 The project area in relation to the National Protected Area Expansion Strategy

4.1.1.5 Coordinated Waterbird Counts

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to International waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the heath of wetlands. For a full description of CWAC please refer to http://cwac.birdmap.africa/about.php. The Grootrietpan (27102654) site is the closest CWAC to the project area, it is approximately 50km south east. This site was registered in 2008 as a Coordinated Waterbird count site. Forty (40) birds have been recorded (Table 4-9).

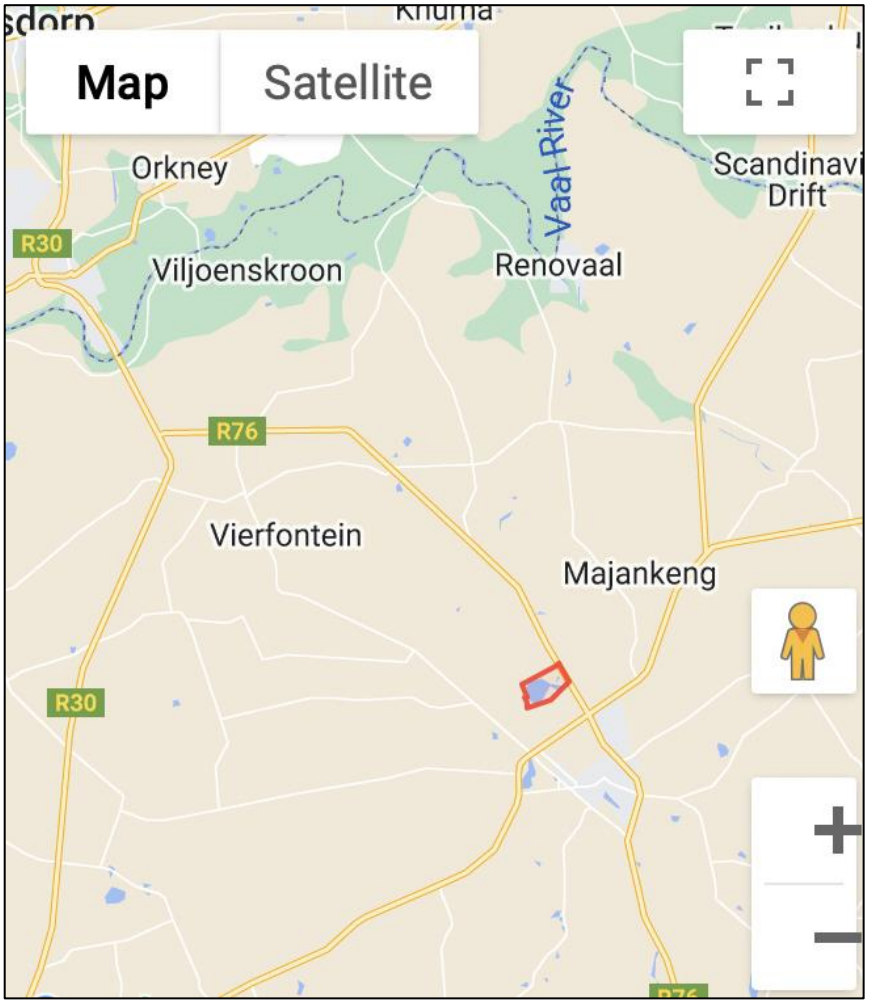


Figure 4-5 ***The closest Coordinated Waterbird Count site (Grootrietpan (27102654)) to the project area***

Table 4-2 ***Water birds recorded at the CWAC site***

pp	Common name	Taxonomic name	Average reporting rate
269	Avocet, Pied	*Recurvirostra avosetta*	6.00
212	Coot, Red-knobbed	*Fulica cristata*	64.75
50	Cormorant, Reed	*Microcarbo africanus*	12.33
47	Cormorant, White-breasted	*Phalacrocorax lucidus*	6.00
52	Darter, African	*Anhinga rufa*	6.00
101	Duck, Fulvous Whistling	*Dendrocygna bicolor*	31.33
91	Duck, Knob-billed	*Sarkidiornis melanotos*	7.00
104	Duck, White-backed	*Thalassornis leuconotus*	5.67
100	Duck, White-faced Whistling	*Dendrocygna viduata*	20.67
96	Duck, Yellow-billed	*Anas undulata*	45.33
58	Egret, Great	*Ardea alba*	19.00
60	Egret, Intermediate	*Ardea intermedia*	1.00
59	Egret, Little	*Egretta garzetta*	1.00
86	Flamingo, Greater	*Phoenicopterus roseus*	291.50

87	Flamingo, Lesser	*Phoeniconaias minor*	244.00
89	Goose, Egyptian	*Alopochen aegyptiaca*	43.33
88	Goose, Spur-winged	*Plectropterus gambensis*	6.00
6	Grebe, Little	*Tachybaptus ruficollis*	32.67
55	Heron, Black-headed	*Ardea melanocephala*	1.50
56	Heron, Goliath	*Ardea goliath*	1.00
54	Heron, Grey	*Ardea cinerea*	3.50
57	Heron, Purple	*Ardea purpurea*	4.00
81	Ibis, African Sacred	*Threskiornis aethiopicus*	13.33
83	Ibis, Glossy	*Plegadis falcinellus*	32.00
84	Ibis, Hadada	*Bostrychia hagedash*	6.33
228	Jacana, African	*Actophilornis africanus*	10.00
245	Lapwing, Blacksmith	*Vanellus armatus*	22.75
210	Moorhen, Common	*Gallinula chloropus*	7.75
211	Moorhen, Lesser	*Paragallinula angulata*	3.00
238	Plover, Three-banded	*Charadrius tricollaris*	13.50
90	Shelduck, South African	*Tadorna cana*	18.50
94	Shoveler, Cape	*Spatula smithii*	15.67
270	Stilt, Black-winged	*Himantopus himantopus*	19.00
253	Stint, Little	*Calidris minuta*	30.00
76	Stork, Yellow-billed	*Mycteria ibis*	4.00
99	Teal, Blue-billed	*Spatula hottentota*	2.00
98	Teal, Cape	*Anas capensis*	9.67
97	Teal, Red-billed	*Anas erythrorhyncha*	11.67
305	Tern, Whiskered	*Chlidonias hybrida*	1.00

4.1.1.6 Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane *Anthropoides paradiseus* and Denham's/Stanley's Bustard *Neotis denhami.* Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), roadcounts are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 4-6 shows that the project area lies close to one of the routes.

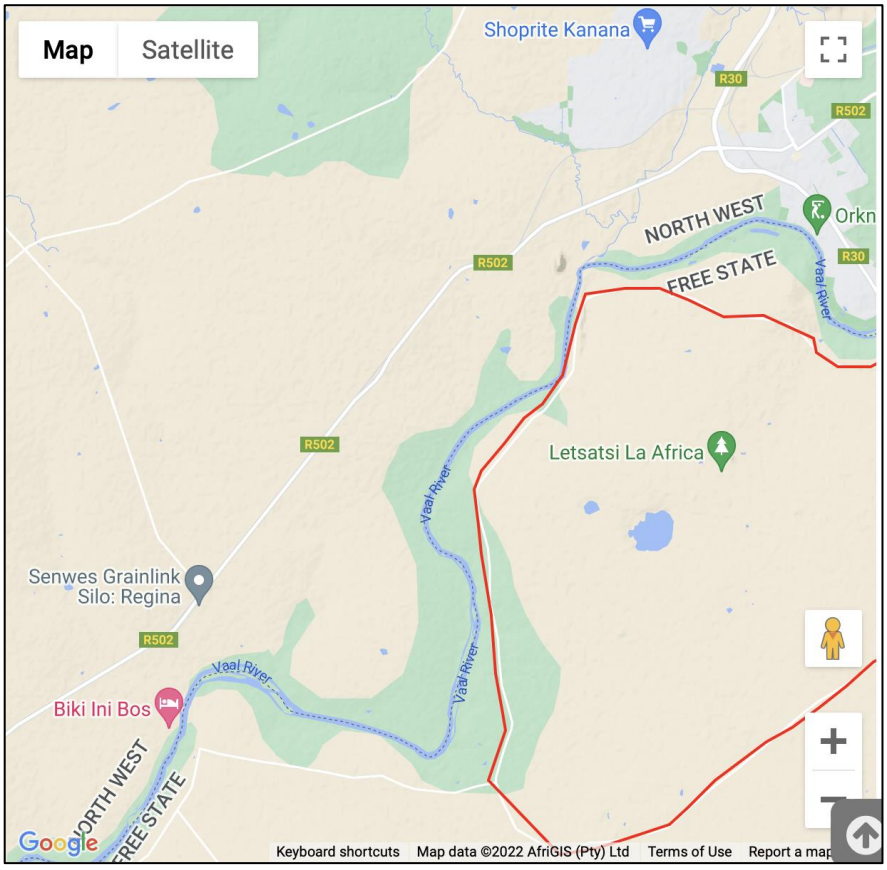


Figure 4-6 The project area along the R502 in relation to the nearby CAR route in red

4.1.2 Flora Assessment

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

4.1.2.1 Vegetation Type

The project area is situated within the Grassland biomes. 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 the Vaal-Vet Sandy Grassland vegetation type (Figure 4-7).

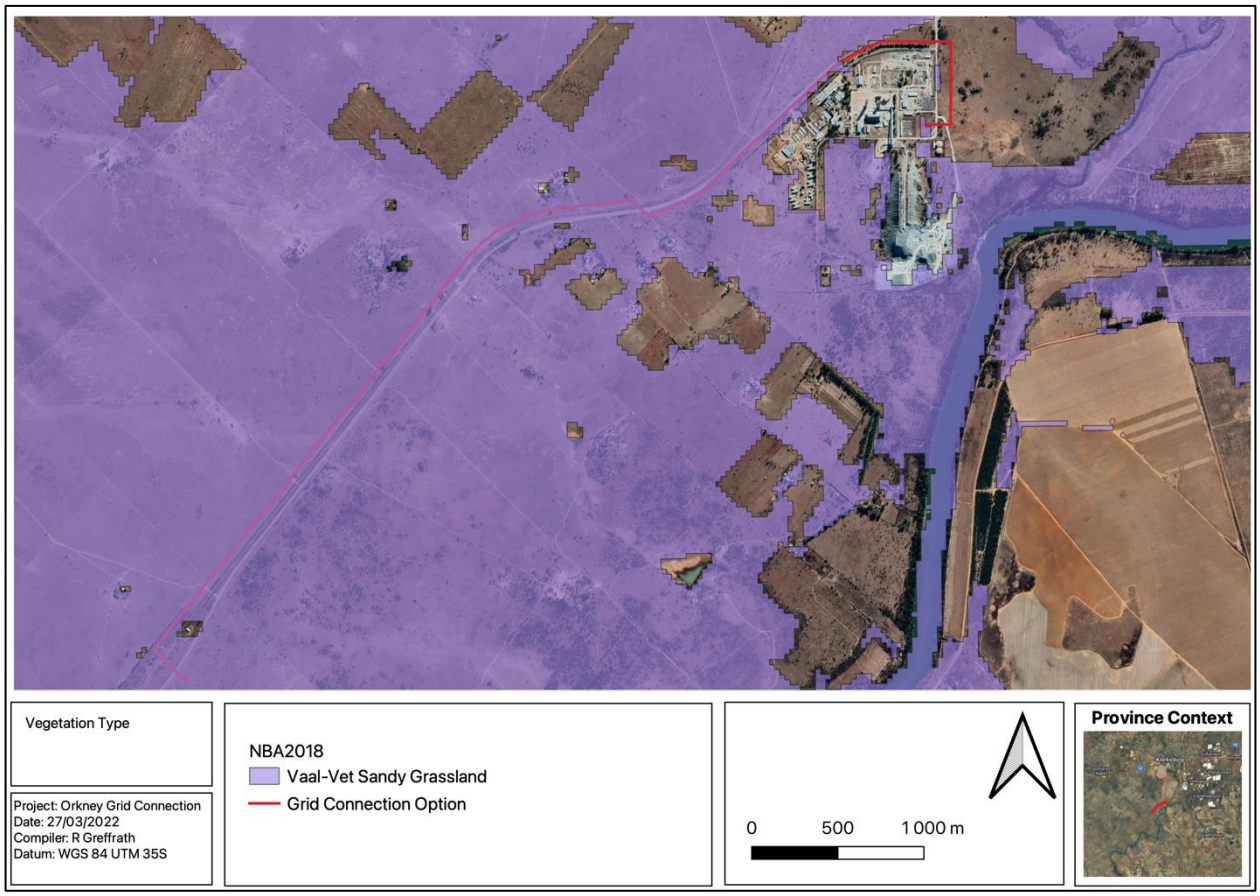


Figure 4-7 Map illustrating the vegetation type associated with the project area

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

Herbs: *Stachys spathulata*, *Barleria macrostegia*, *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Geigeria aspera* var. *aspera*, *Helichrysum caespititium*, *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*, *Pentzia globosa*, *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H. paronychioides*, *Ziziphus zeyheriana*.

Endemic Taxon

Herb: *Lessertia phillipsiana*.

Conservation status of the Vegetation Type

The conservation status of this vegetation type is classified as EN, with the conservation target set as %. Only 0.3% is statutorily conserved in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves. More than 63 % has been transformed for cultivation.

4.1.2.2 Expected Flora Species

The POSA database indicates that 26 species of indigenous plants are expected to occur within the project area. Appendix A provides the list of species and their respective conservation status and endemism. One (1) SCC based on their conservation status could be expected to occur within the project area Pearsonia bracteate (NT).

4.1.3 Faunal Assessment

4.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 14 amphibian species are expected to occur within the area (Appendix B). One (1) are regarded as threatened (Table 4-3).

Table 4-3 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)	
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Moderate

Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that will possibly occur in the project area especially in the area with the wetlands. The Giant Bull Frog is listed as near threatened 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).

4.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 35 reptile species are expected to occur within the area (Appendix C). One (1) is regarded as threatened (Table 4-4). No habitat is present in the project area for any of the SCCs.

Table 4-4 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)	
Psammophis leightoni	Cape Sand Snake	VU	LC	Low

4.1.3.3 Mammals

The IUCN Red List Spatial Data lists 56 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Four (4) of these expected species are regarded as threatened (

Table 4-5), one of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

Table 4-5 Threatened mammal species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Moderate
Atelerix frontalis	South Africa Hedgehog	NT	LC	Low
Leptailurus serval	Serval	NT	LC	Moderate
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT	NT	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. Based on the presence of the wetland on the edge of the project area which could provide suitable habitat, however very seasonal the species were given a moderate likelihood of occurrence.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Some areas of suitable habitat can be found in the project area; therefore the likelihood of occurrence is rated as moderate.

Otomys auratus (Southern African Vlei Rat (Grassland type). The species is widely distributed throughout the Highveld grasslands and Drakensberg Escarpment of South Africa, Lesotho and Swaziland, with isolated populations in the Soutpansberg Mountains of northern Limpopo and the Eastern Highlands of Zimbabwe. This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water.

4.1.4 Avifauna

The SABAP2 Data lists 292 avifauna species that could be expected to occur within the area (Appendix E). Eleven (11) of these expected species are regarded as threatened (Table 4-6). Six of the species have a low likelihood of occurrence due to lack of suitable habitat and food sources in the project area. The likelihood of occurrence is also related to the disturbed nature of the project area.

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

Common Name	Scientific Name	RD (Regional, Global)		Likelihood of occurrence
Maccoa Duck	*Oxyura maccoa*	NT	VU	Low
Lanner Falcon	*Falco biarmicus*	VU	LC	Moderate
Greater Flamingo	*Phoenicopterus roseus*	NT	LC	Moderate
Curlew Sandpiper	*Calidris ferruginea*	LC	NT	Low
Abdim's Stork	*Ciconia abdimii*	NT	LC	Low
Yellow-billed Stork	*Mycteria ibis*	EN	LC	High
Caspian Tern	*Hydroprogne caspia*	VU	LC	Low
Grey Crowned Crane	*Balearica regulorum*	EN	EN	Low

Lesser Flamingo	*Phoeniconaias minor*	NT	NT	Low
Greater Painted-snipe	*Rostratula benghalensis*	NT	LC	Low
Blue Crane	*Grus paradisea*	NT	VU	Low

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 likelihood of occurrence of this species in the project area was rated as low.

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 natural veld condition and the presence of many bird species on which Lanner Falcons may predate.

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). Due to the absence of its preferred habitat within the project area, combined the proximity of the urban area, the likelihood of occurrence is low.

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and Least Concern (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 extensive water bodies within the Project area creates a high possibility that this species may occur there.

4.2 Field Assessment

The following sections provide the results from the field survey for the proposed development that was undertaken on the 22-23 March 2022.

4.2.1 Flora Assessment

This section is divided into two sections:

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

4.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area covered. A total of 70 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 4-7**Error! Reference source not found.**). 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 4-8.The list of plant species recorded to is by no means comprehensive, and repeated surveys during different phenological periods not covered, may likely yield up to 20-30% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area.

Table 4-7 Plant species recorded in the field assessment

Species	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Aloe maculata	Soap aloe (Provincially Protected)			
Ammocaris coranica	Ground Lilly			
Anthephora pubescens	Wool Grass			
Aristida congesta barbicolis	Spreading three awn			
Aristida congesta congesta	Tassel Tree-awn			
Asclepias fruticosa	Milkweed			
Asparagus laricinus	Cluster leaved asparagus			
Barleria macrostegia				
Berkheya radula				
Boophane disticha	Poison bulb (Provincially Protected)			
Bothriochloa insculpta	Pinhole Grass			
Brachiaria serrata	Velvet Signal Grass			
Bulbine narcissifolia	Strap Leaved Bulbine			
Chloris virgata	Feather top Chloris			
Cymbopogon caesius	Broad-leaved Turpentine Grass			
Cynodon dactylon	Couch Grass			
Cyperus compressus				
Cyperus congestus				
Dichrostachys cinerea	Sickle bush			1b
Digitaria argyrograpta				
Elionurus muticus	Wire Grass			
Eragrostis chloromelas	(Narrow) Curly Leaf			
Eragrostis lehmanniana	Lehmans love Grass			
Eragrostis plana	Tough love Grass			

Eragrostis superba	Saw tooth Love grass			
Eragrostis trichophora	Hairy Love Grass			
Eucalyptus camaldulensis	Red River Gum			1b
Eucomis autumnalis	Pineapple Lilly (Provincially Protected)			
Felicia muricata	White Felicia			
Gazania krebsiana	Common Gazania			
Gladiolus crassifolius	Thick-leaved Gladiolus (Provincially Protected)			
Gleditsia triacanthos	Honey Locust			1b
Grewia flava	Velvet Raisin			
Heteropogon contortus	Spear Grass			
Hyparrhenia filipendula	Fine Thatching Grass			
Hyparrhenia hirta	Common Thatching Grass			
Hypoxis hemerocallidea	Star-flower			
Hypoxis rigidula	Silver-leaved star-flower			
Ledebouria marginata				
Ledebouria revulata	Common squill			
Mariscus congestus				
Melinis repens	Natal Red Top			
Monsonia burkeana				
Opuntia robusta	Blue leaf Cactus			1a
Pentzia globosa				
Phoenix reclinata	Wild date Palm			
Phragmites australis	Common Reed			
Pogonarthria squarrosa	Herringbone Grass			
Rhynchosia adenodes				
Salix babylonica	Weeping Willow			

Searsia pyroides	Common Wild Current			
Senecio inornatus				
Senegalia erubescens	Blue thorn			
Solanum incanum	Grey Bitter-apple			
Tagetes minuta	Tall Khaki Weed			
Tarchonanthus camphoratus	Wild camphor bush			
Themeda triandra	Red Grass			
Tithonia diversiflora	Mexican Sunflower			1b
Tragus berteronianus	Carrot-seed Grass			
Trichoneura grandiglumis	Small Rolling Grass			
Tripteris aghillana var. integrifolia				
Typha capensis	Bulrush			
Urochloa panicoides	Herringbone Grass			
Vachellia karoo	Sweet thorn			
Verbena bonariensis	Tall Verbena			1b
Vernonia oligocephala	Bicoloured-leaved Vernonia			
Ziziphus mucronata	Buffalo thorn			
Ziziphus zeyheriana				

Figure 4-8 ***Photographs illustrating some of the flora recorded within the assessment area. A) Hypoxis hemerocallidea, B) Boophone disticha, C) Bulbine narcissifolia and D) Ledebouria revulata***

4.2.1.2 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 IAP 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.

Six (6) listed 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.

4.2.2 Faunal Assessment

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

4.2.2.1 Amphibians and Reptiles

No species of reptiles were recorded in the project area during survey period (Table 4-8). However, there is the possibility of more species being present, as certain reptile species are secretive and require

long-term surveys to ensure capture. Two (2) amphibian species were recorded during the survey period (Table 4-8) (**Error! Reference source not found.**). None of the herpetofauna species recorded a re regarded as threatened.

Table 4-8 Summary of herpetofauna species recorded within the project area.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Cacosternum boettgeri	Common Caco	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC

4.2.2.2 Mammals

Three (3) mammal species were observed during the survey of the project area (Table 4-9) based on either direct observation or the presence of visual tracks and signs (Table 4-9). None of the species recorded are regarded as a SCC.

Table 4-9 Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Xerus inauris	Cape Ground Squirrel	LC	LC

Figure 4-9 Photographs illustrating some of the mammal species recorded within the assessment area. A) Cape Porcupine B) Cape Ground Squirrel (Xerus inauris).

4.2.3 Avifauna

Seventy (70) bird species were recorded in the survey. The full list of species recorded, their threat status, guild and location observed is shown in Appendix F. The Red-billed Quelea had the highest abundance (Table 4-10). None of the species recoded were SCCs. Some of the species recoded on site is shown in Figure 4-10.

Table 4-10 ***Dominant avifaunal species within the project area during the survey as defined as those species whose relative abundances cumulatively account for more than 70.6% of the overall abundance shown alongside the frequency with which a species was detected.***

Common Name	Scientific Name	Relative abundance	Frequency
Red-billed Quelea	*Quelea quelea*	0,190	38,889
Little Swift	*Apus affinis*	0,068	22,222
European Bee-eater	*Merops apiaster*	0,059	38,889
Amur Falcon	*Falco amurensis*	0,048	22,222
Barn Swallow	*Hirundo rustica*	0,048	22,222
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*	0,040	38,889
Greater Striped Swallow	*Cecropis cucullata*	0,040	22,222
White-browed Sparrow-Weaver	*Plocepasser mahali*	0,032	44,444
Blacksmith Lapwing	*Vanellus armatus*	0,030	27,778
South African Cliff Swallow	*Petrochelidon spilodera*	0,029	22,222
Helmeted Guineafowl	*Numida meleagris*	0,027	5,556
Egyptian Goose	*Alopochen aegyptiaca*	0,025	27,778
Crowned Lapwing	*Vanellus coronatus*	0,023	11,111
Speckled Pigeon	*Columba guinea*	0,019	27,778
Zitting Cisticola	*Cisticola juncidis*	0,017	50,000
Black-chested Prinia	*Prinia flavicans*	0,017	50,000
Acacia Pied Barbet	*Tricholaema leucomelas*	0,017	44,444
African Wattled Lapwing	*Vanellus senegallus*	0,017	5,556
White-rumped Swift	*Apus caffer*	0,015	11,111

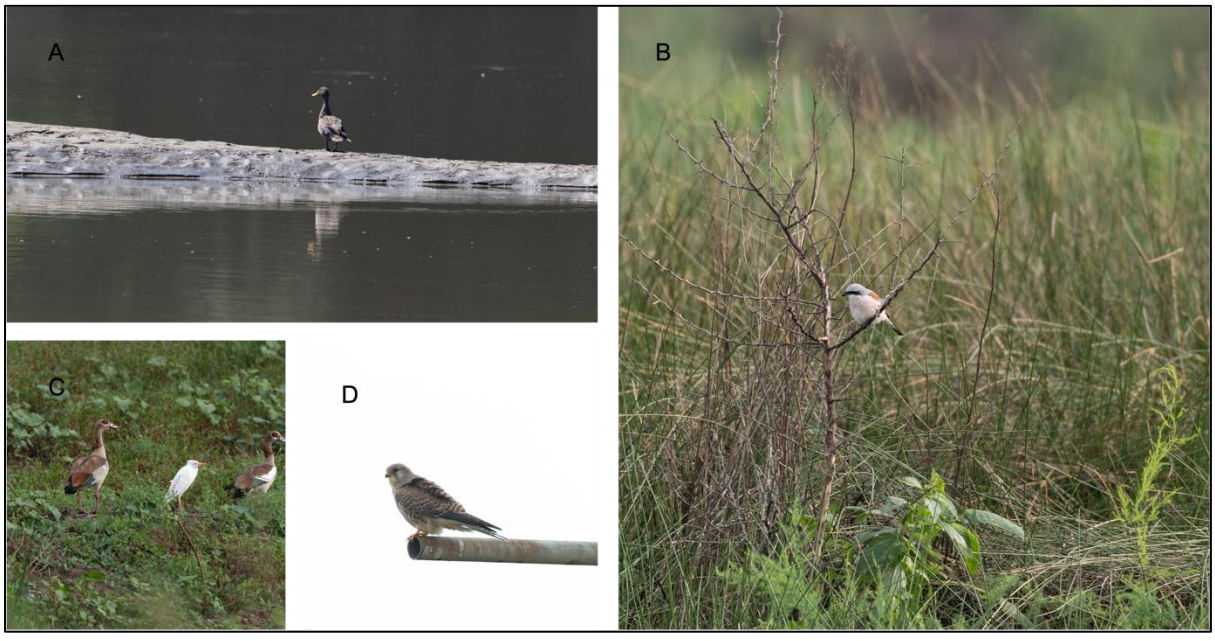


Figure 4-10 ***Some of the birds recorded in the project area: A) Yellow-billed Duck, B) Red-backed Shrike), C) Egyptian Goose and Western Cattle Egret, D) Amur Falcon***

4.2.3.1 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by IGD, insectivore ground diurnal (Figure 4-11). OMD, omnivore multiple diurnal made up the second highest group, followed by GGD, granivore ground diurnal and IAD, insectivore air diurnal. The feeding groups collaborate the main habitat divisions found in the project area i.e., grasslands and water resource areas.

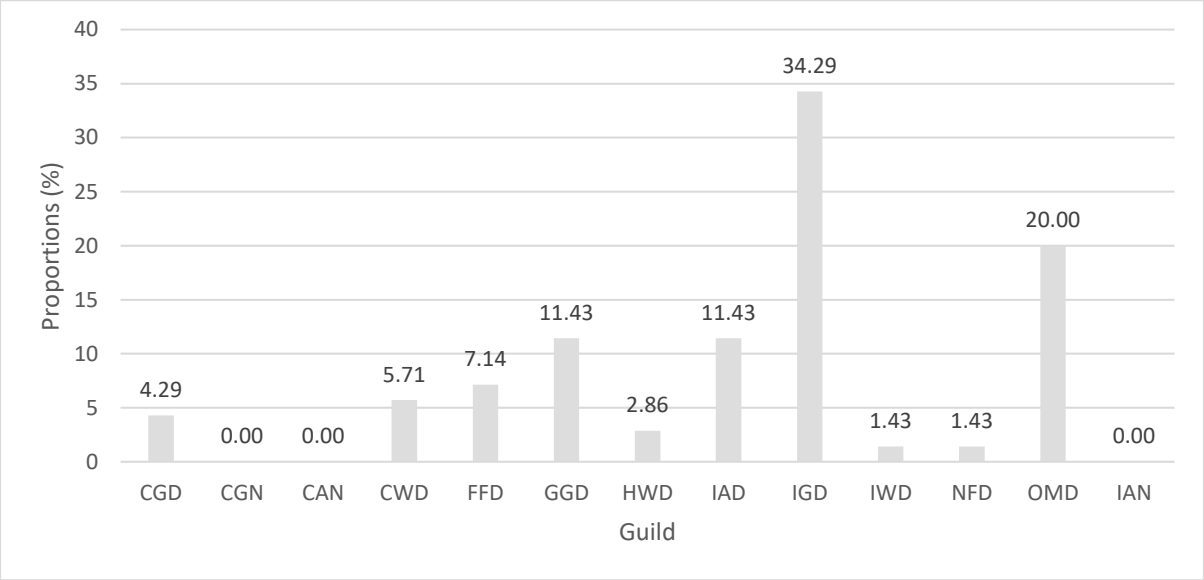


Figure 4-11 Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GCD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal.

4.2.3.2 Risk Species

Six species were found that would be regarded as high risk species (Table 4-11). Risk species are species that are regarded as collision prone species and species that would have a high electrocution risk. No species were identified that would be sensitive to habitat loss. These could be species that are not necessarily SCC but would be impacted on by this development. The power line poses a collision risk for larger birds.

Table 4-11 At risk species found in the surveys.

Taxon	Common Name	*Collisions*	*Electrocutions*
Haliaeetus vocifer	African Fish Eagle	x	x
Afrotis afraoides	Northern Black Korhaan	x	
Bostrychia hagedash	Hadeda (Hadada) Ibis	x	
Numida meleagris	Helmeted Guineafowl		x
Anas sparsa	African Black Duck	x	
Anas undulata	Yellow-billed Duck	x	
Alopochen aegyptiaca	*Egyptian Goose*	X	X

Corvus albus	*Pied Crow*		X
Anhinga rufa	*African Darter*	x	

5 Habitat Assessment and Site Ecological Importance

5.1 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 5-1. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC.

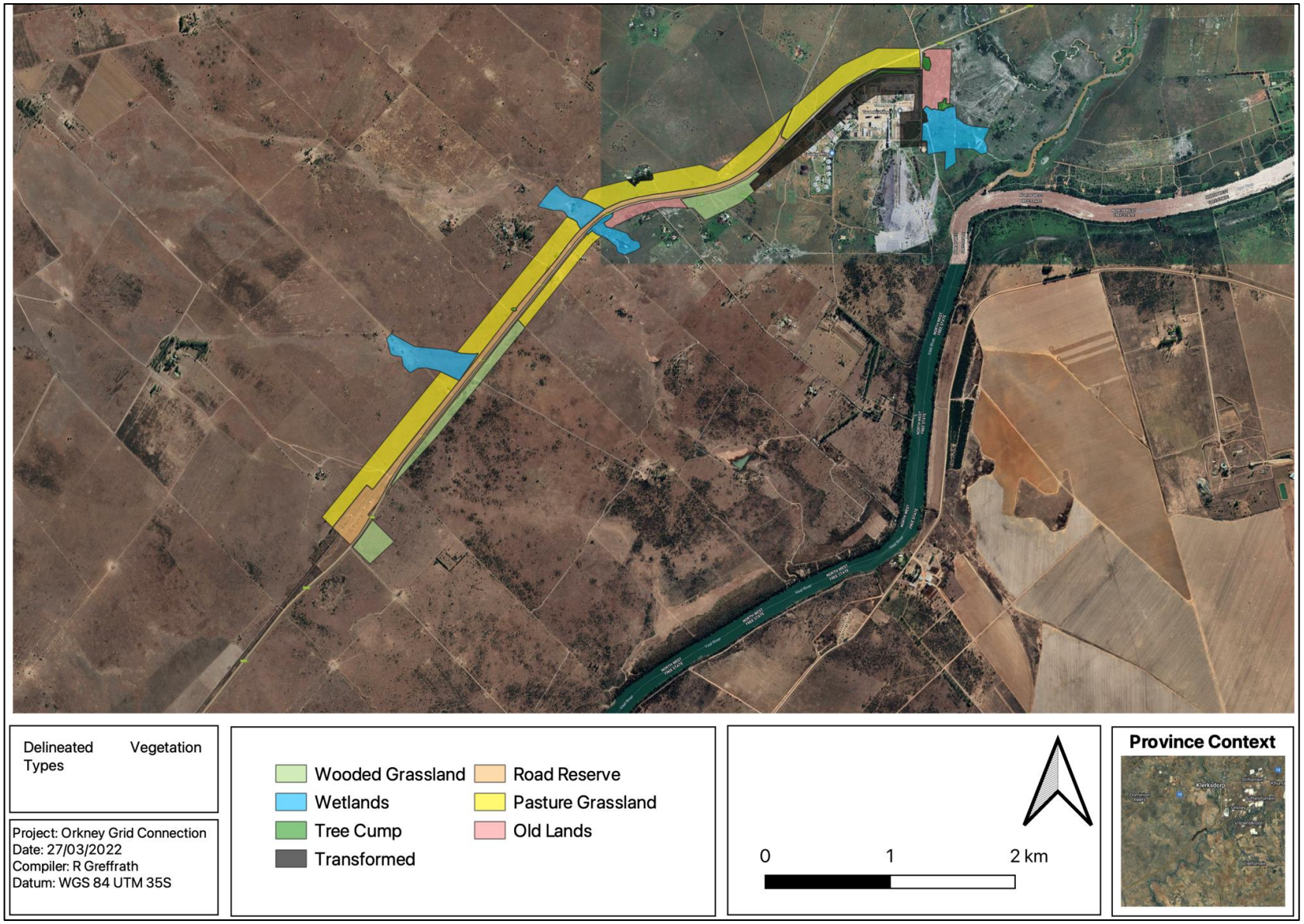


Figure 5-1 Habitats identified in the project area.

5.1.1 Pasture Grassland/Wooded Grassland

Vaal-Vet Grassland habitat includes grassland areas that is connected to and plays a crucial role with the wetland habitats present. This

habitat type is regarded as semi-natural grassland, but disturbed due to grazing by livestock and also human infringement in areas close to roads (Figure 5-2 and Figure 5-3).

Generally, this habitat unit has moderate ecological function attributed to floral communities, including the protected species. The current ecological condition of this habitat are unbalanced due to the current land use and impact. Portions of this grassland have been disturbed by the historic and current high 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. A condition gradient is present in this habitat with some areas being more disturbed than others, this gradient is dependent on the level of overgrazing.

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.

Figure 5-2 Examples of degraded Grassland habitat from the project area

Figure 5-3 Examples of degraded Grassland habitat from the project area

5.1.2 Wetlands

This habitat unit represents the wetland areas as well as drainage areas. Even though 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 (Figure 5-4 and Figure 5-5). The preservation of this system is the most important aspect to consider for the proposed development. This habitat needs to be protected and improved due to the role of this habitat as a water resource.

Figure 5-4 Examples of wetland habitat from the project area.

Figure 5-5 Examples of wetland habitat from the project area.

5.1.3 Disturbed Grassland

This habitat are areas where the grassland has been altered due to historic and/or current human activity as well as livestock pressure (Figure 5-6 & Figure 5-7). These habitats that are not entirely transformed but in a constant modified state as it cannot recover to a more natural state due to ongoing disturbances and pressures imposed from the surrounding transformed areas and the current land use. These areas are considered to have a low sensitivity due to the fact that these areas may be used as a movement corridor and in many cases form a barrier between the more natural grassland and the transformed areas.

Figure 5-6 Example of disturbed habitat from the project area.

Figure 5-7 Example of disturbed habitat from the project area.

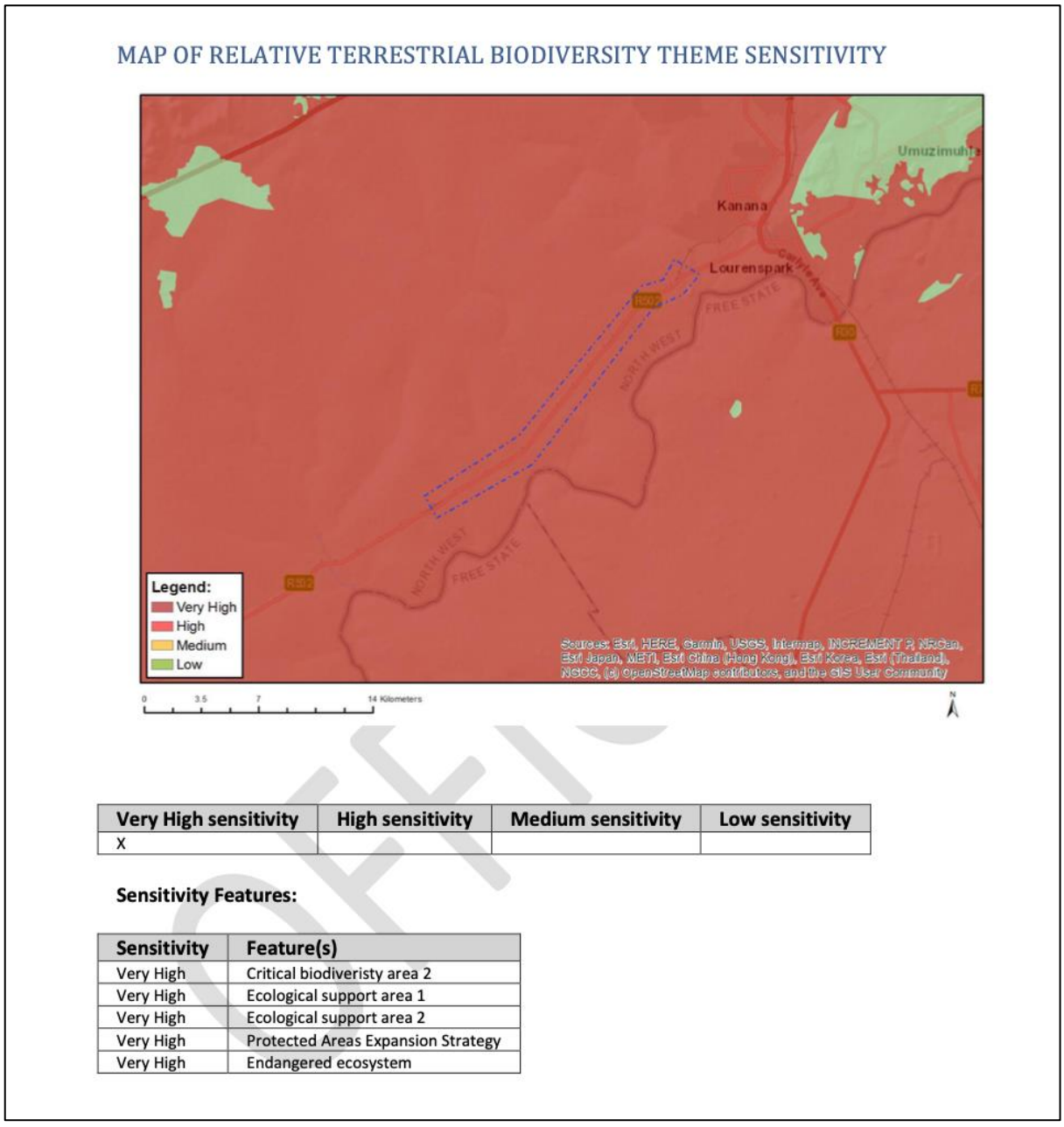
5.1.4 Transformed

The transformed areas are the areas which have little to no natural areas left due to being transformed by the informal housing, roads, mining practise and other infrastructure such as power lines. Indirect impacts arise from the extensive anthropogenic presence from the current and historic land use (Figure 5-8). This habitat contributed to the high amount of alien vegetation recorded.

Figure 5-8 Example of transformed habitat from the project area.

5.2 Site Ecological Importance

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, (Figure 5-9) while the fauna and plant sensitivity was rated as 'Medium'.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area 1
Very High	Ecological support area 2
Very High	Protected Areas Expansion Strategy
Very High	Endangered ecosystem

Figure 5-9 Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.

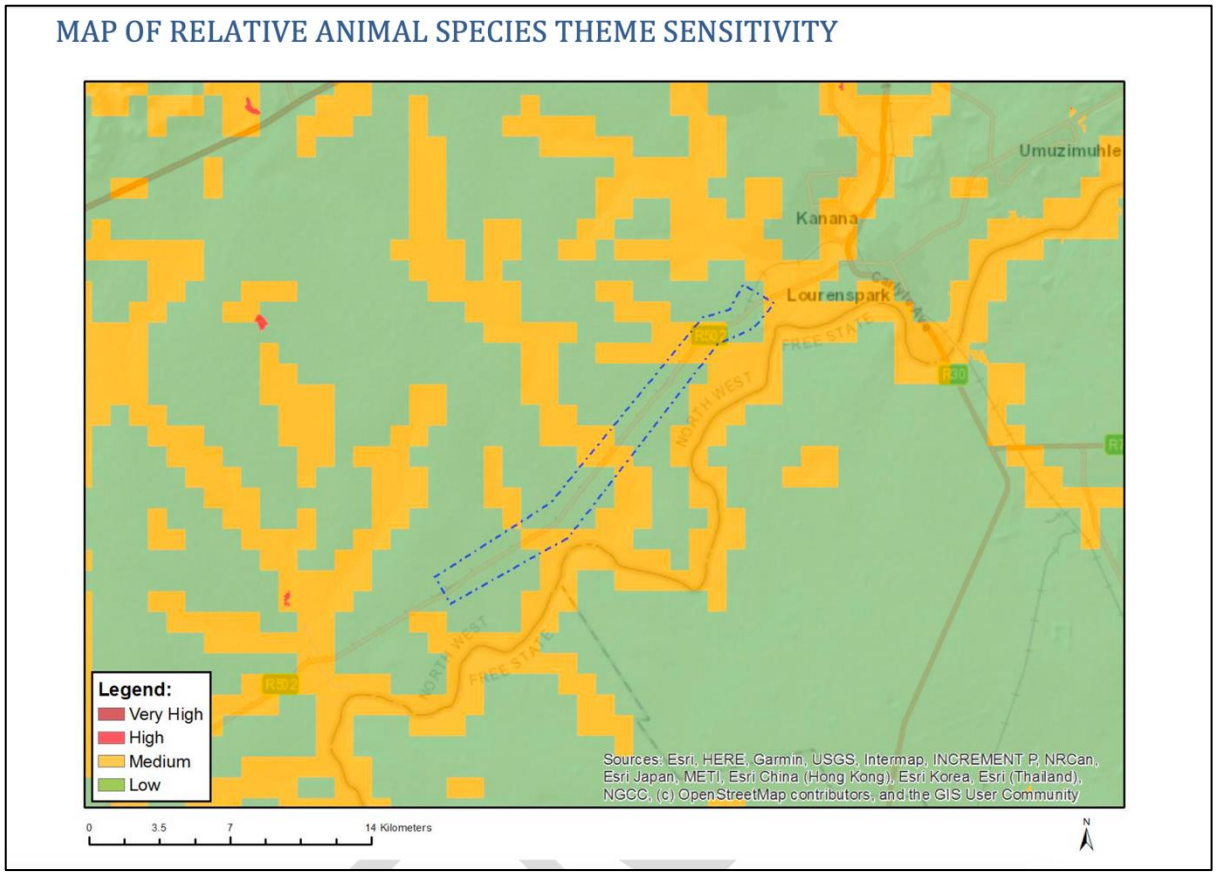


Figure 5-10 Fauna Theme Sensitivity, National Web based Environmental Screening Tool.

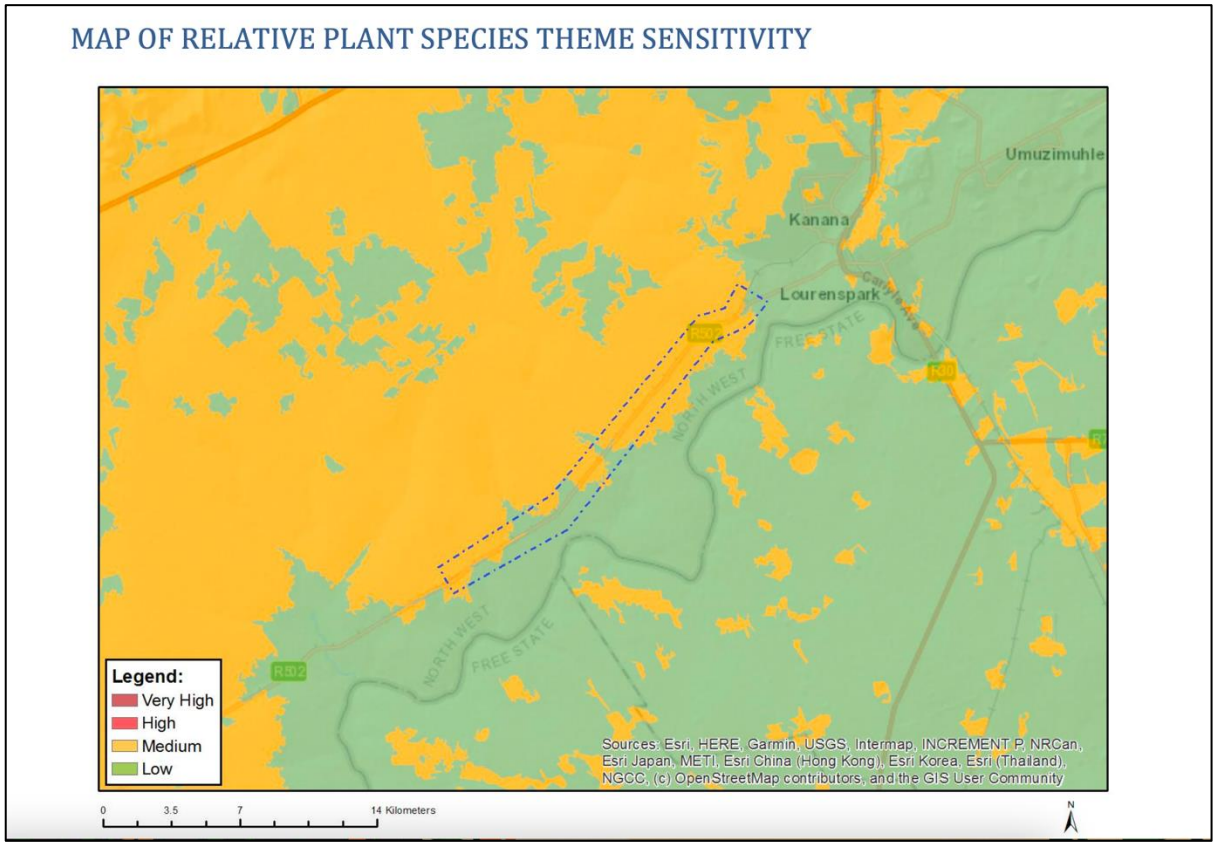


Figure 5-11 Plant Theme Sensitivity, National Web based Environmental Screening Tool.

The medium sensitivity as far as plants animals are concerned is seen as accurate, as the project area provides connectivity in the greater area, as well as natural habitat.

The location and extent of these habitats are illustrated in Figure 5-1. Based on the criteria provided in Section 3.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 5-1). The sensitivities of the habitat types delineated are illustrated in Figure 5-12.

'High Sensitivity' areas are due to the following and the guidelines can be seen in Table 5-2.

- Unique, sensitive water resources and low resilience habitats.

Table 5-1 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Wetlands	Medium	Medium	Medium	Low	High
Pasture Grassland and Wooded Grassland	Low	Medium	Low	Low	Medium
Road Reserve/Old Lands/Tree clumps	Low	Low	Low	Medium	Low
Transformed	Very Low	Very Low	Low	Medium	Very Low

Table 5-2 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

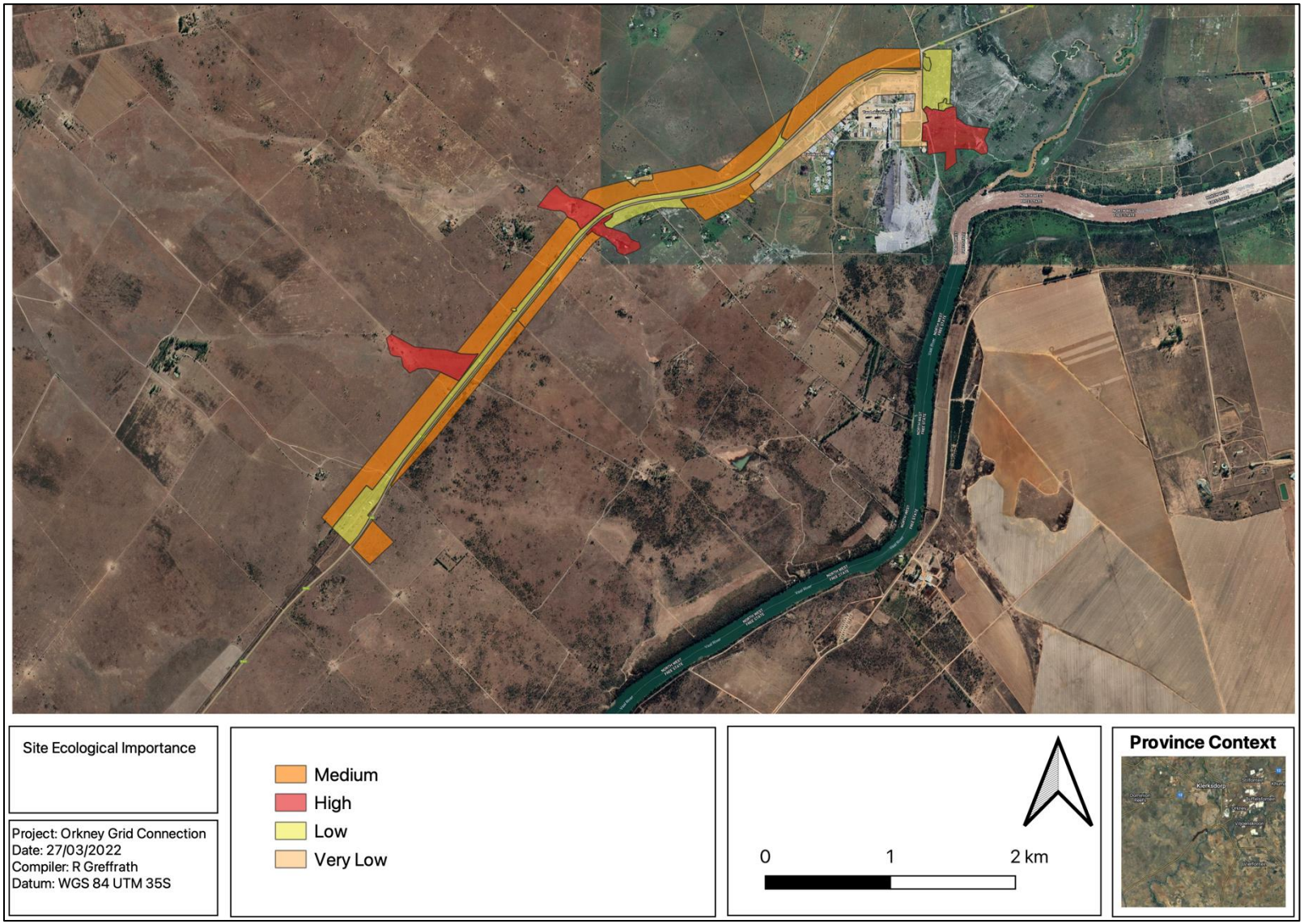


Figure 5-12 Sensitivity of the project area

6 Impact Risk Assessment

The section below and associated tables serve to indicate and summarise the significance of perceived impacts on the terrestrial ecology of the project area. Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the project area. The relevant impacts associated with the proposed construction of the development were then subjected to a prescribed impact assessment methodology which were provided by Savannah Environmental and is available on request.

6.1 Biodiversity Risk Assessment

6.1.1 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the project area (Figure 6-1). These include:

- Historic land modification and mining;
- Farm roads and main roads (and associated traffic and wildlife road mortalities);
- Grazing and trampling of natural vegetation by livestock in certain areas;
- Power lines;
- Air pollution from the nearby mining;
- Alien and/or Invasive Plants; and
- Fences and associated maintenance.

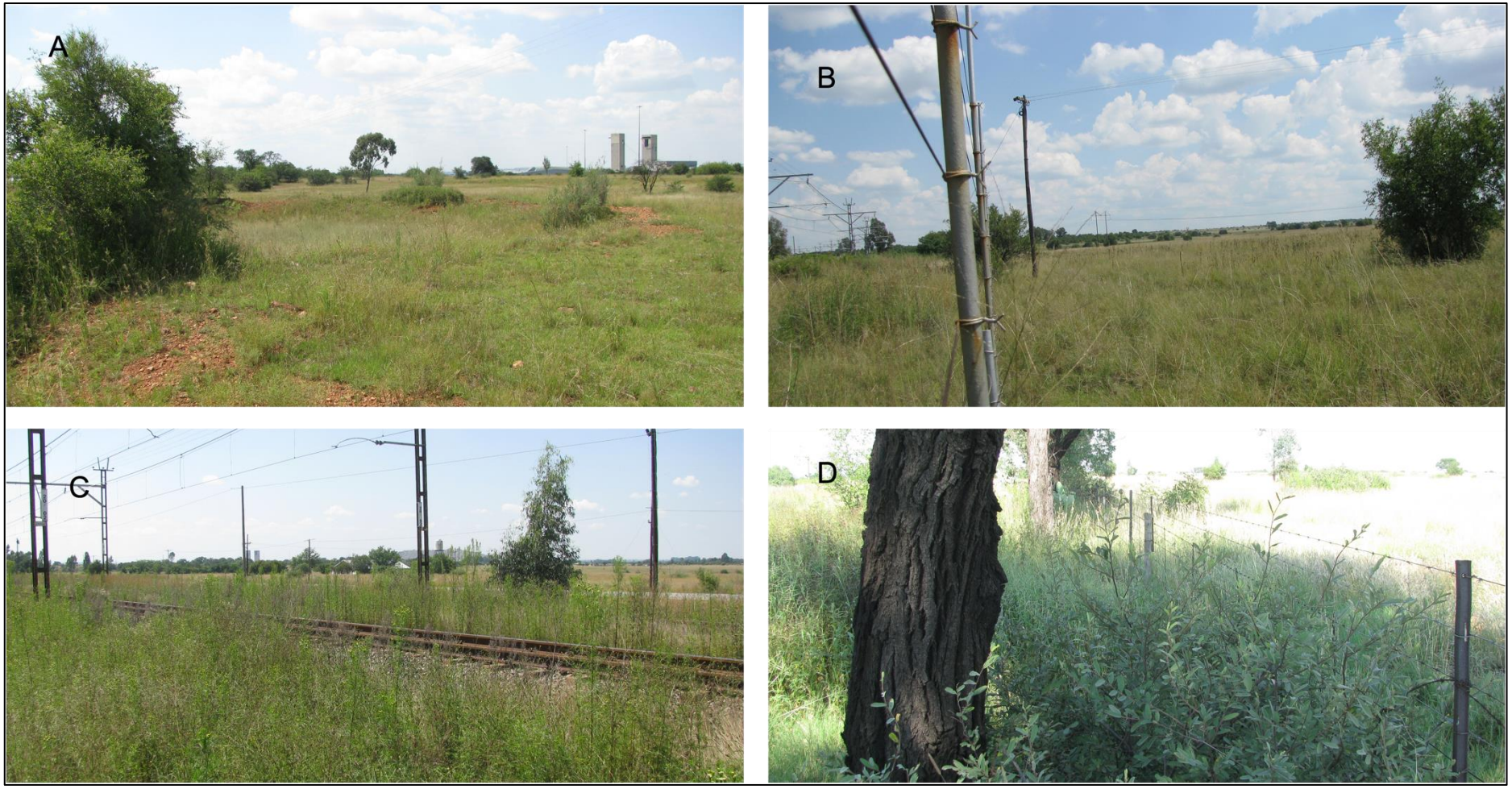


Figure 6-1: A Old borrow pits and Mining, B, Overgrazing and fences, C, Power lines and train tracks, Fences and AIP's

6.1.2 Terrestrial Impact Assessment

Potential impacts were evaluated against the data captured during the desktop and field assessments to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology which were provided by Savannah Environmental and is available on request. This impact section includes the impacts to avifauna.

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

6.1.3 Alternatives Considered

No alternatives were provided for the development.

6.1.4 Loss of Irreplaceable Resources

- Provincially protected plant species could be lost;
- Wetland resources may be lost.

6.1.5 Anticipated Impacts

The impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (Table 6-1).

Table 6-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project activities that can cause loss/impacts to habitat (especially with regard to the proposed infrastructure areas):	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species.	Displacement/loss of flora & fauna (including possible SCC)
	Access roads and servitudes	Increased potential for soil erosion
	Soil dust precipitation	Habitat fragmentation
	Dumping of waste products	Increased potential for establishment of alien & invasive vegetation
	Random events such as fire (cooking fires or cigarettes)	Erosion
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including SCC)
	Vehicles potentially spreading seed	Spreading of potentially dangerous diseases due to invasive and pest species
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	Alteration of fauna assemblages due to habitat modification
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	
Main Impact	**Project activities that can cause direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Clearing of vegetation	Loss of habitat
		Loss of ecosystem services
	Roadkill due to vehicle collision	

	Pollution of water resources due to dust effects, chemical spills, etc.	Increase in rodent populations and associated disease risk
	Loss of nesting sites	
	Intentional killing of fauna for food (hunting)	
	Bird collisions and electrocutions	
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4. Reduced dispersal/migration of fauna	Loss of landscape used as corridor	Reduced dispersal/migration of fauna
		Loss of ecosystem services
	Compacted roads	Reduced plant seed dispersal
	Removal of vegetation	
Main Impact	**Project activities that can cause pollution in watercourses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills	Pollution in watercourses and the surrounding environment
	Erosion	Faunal mortality (direct and indirectly)
		Groundwater pollution
		Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, vehicles)	Disruption/alteration of ecological life cycles due to noise
		Loss of ecosystem services
	Project activities that can cause disruption/alteration of ecological life cycles due to dust	Secondary impacts associated with disruption/alteration of ecological life cycles due to dust
	Vehicles	Loss of ecosystem services
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Loss of SCCs

6.1.6 Unplanned Events

The planned activities will have anticipated impacts as discussed; however, unplanned events may occur on any project and may have potential impacts which will need management.

Table 6-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 6-2 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural Bushveld and ridge.	Appropriate/Adequate fire management plan need to be implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the road	Storm water management plan must be compiled and implemented.

6.1.7 Identification of Additional Potential Impacts

6.1.7.1 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. The mitigation actions required to lower the risk of the impact are provided in Section 8.1.8 of this report.

6.1.7.2 Construction Phase

The following potential main impacts on the biodiversity (including avifauna) (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community (Table 6-3),
- Introduction of alien species, specifically plants (Table 6-4);
- Destruction of protected plant species (Table 6-5);
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) (Table 6-6);
- Poaching (Table 6-7).

Table 6-3 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Loss of vegetation within development footprint		
Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community, including possible protected species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Mitigation is possible however the impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts:		
• The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 6-4 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation arising from construction activities and dust precipitation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts:		
• Long-term broad scale. IAP infestation if not mitigated.		

Table 6-5 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Destruction of protected plant species		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs found cannot be relocated, seed can however be collected from them and used as part of the rehabilitation process	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts:		
• The loss of some of the protected species are unavoidable.		

Table 6-6: Impacts to biodiversity associated with the proposed construction phase

Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Moderate term (3)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts: • It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

Table 6-7 Impacts to biodiversity associated with the proposed construction phase

***Nature:* Poaching**		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: • All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. guineafowl, francolin), and owls, which are often persecuted out of superstition. • Signs must be put up stating that should any person be found poaching any species they will be fined.		

6.1.7.3 Operation Phase

The operational phase of the impact of daily activities is anticipated to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems (Table 6-8);
- Spread of alien and/or invasive species (Table 6-9);
- Ongoing displacement and direct mortalities of faunal community (including possible SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration) (Table 6-10);
- Collisions with power lines and connection lines and fences (Table 6-11); and
- Electrocution by power line and associated connections (Table 6-12).

Table 6-8 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	With Mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts		
• There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.		

Table 6-9 Impacts to biodiversity associated with the proposed operational phase.

Impact Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)

Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts:		
• Long term broad scale IAP infestation if not mitigated.		

Table 6-10 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including possible SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	**With Mitigation**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See section 6.1.8.		
See Biodiversity Management Outcomes		
Residual Impacts		
• Disturbance from maintenance activities will occur albeit at a low and infrequent level. • Less migratory species will be found in the area. • Road killings are still a possibility. • Migratory routes of fauna will change, fauna and flora species composition will change.		

Table 6-11 Impacts to biodiversity associated with the proposed operational phase

Nature:		
Collisions with Power line Infrastructure, including connection lines and fences		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)

Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.
- As power lines/connection lines are to be placed above ground they must be marked with industry standard bird flight diverters.
- Fencing mitigations:
  - Top 2 strands must be smooth wire
  - Routinely retention loose wires
  - Minimum 30 cm between wires
  - Place markers on fences

Residual Impacts:

Collisions of avifauna will still occur regardless of mitigations

Table 6-12 Impacts to biodiversity associated with the proposed operational phase

Nature:		
Electrocution by power line and associated connections		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Infrastructure should be consolidated where possible to minimize the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.
- Live connections must be adequately insulated.
- If any **power lines**/connection lines are to be placed above ground they must be marked with industry standard bird flight diverters.

Residual Impacts:

- Some electrocutions of avifauna might still occur regardless of mitigations

6.1.7.4 Decomissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented. Should the power line and grid system not be removed the impacts will persist.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats (Table 6-13);
- Displacement of faunal community (including possible SCC) due disturbance (road collisions, noise, dust, vibration) (Table 6-14);
- Collisions with power line (Table 6-15).

Table 6-13 Decommissioning activities impacts on the terrestrial biodiversity

Nature:		
Continued fragmentation and degradation of habitats		
	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Very improbable (1)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Implementation of a rehabilitation plan. • Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post construction. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora including seeds of the SCCs found on site		
Residual Impacts:		
• No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.		

Table 6-14 Decommissioning activities impacts on the terrestrial biodiversity

Nature:		
Displacement of faunal community due disturbance (road collisions, noise, dust, vibration).		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Long term (4)	Moderate term (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:
• Dust management needs to be completed in the areas where the infrastructure will be removed, this includes wetting of the soil. This area must be rehabilitated as soon as possible. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the decommissioning area. • All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night. • Area must be walked through prior to decommissioning to ensure fauna species are not affected by the removal of the infrastructure.
Residual Impacts:
• If this is mitigated and correctly monitored no residual impacts should be present

Table 6-15 Decommissioning activities impacts on the terrestrial biodiversity

Nature:		
Electrocution by power line		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• The removal of the power lines will negate this impact		
Residual Impacts:		
• No residual impact		

6.1.7.5 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for fauna and flora. Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Table 6-16 Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss especially in the ecological corridors like the wetland and thereby impact the water resource and ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
• Should the vegetation be removed the impact cannot be mitigated.		
Residual Impacts:		
Will result in the loss of: • Wetlands • Less migratory species will be found in the area. • Road killings are still a possibility. • Migratory routes of fauna will change, fauna and flora species composition will change.		

6.1.8 Biodiversity Management Plan

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines Table 6-17 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the Terrestrial and Freshwater Assessment.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities and the wetland areas in the vicinity of the project area;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

Table 6-17 Mitigation measures including requirements for timeframes, roles and responsibilities for the terrestrial study

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
	Management outcome: Vegetation and Habitats			
Areas rated as High sensitivity and their buffers in proximity to the development areas should be avoided as much is feasible. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. The infrastructure should be realigned to prioritise development within very low/ low sensitivity areas. Mitigated development in medium sensitivity areas is permissible.	Planning and Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
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. All activities must be restricted too within the low/medium sensitivity areas. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
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	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

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. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. All protected and red-data plants should be relocated, and as many other geophytic species as possible. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
Environmentally friendly dust suppressants need to be utilised	Operational phase	Environmental Officer & Contractor	Water pollution	During Phase
The duration of the construction should be kept to a minimum and must take place in the winter to avoid disturbing avifauna.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	During Phase

Management outcome: Fauna

Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. 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	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase

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				
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
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	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight; • Should the holes overnight they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Monitoring of the 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.	Life of project	Environmental Officer & Contractor,	Monitoring of the OHL route	Ongoing

Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Fencing mitigations: • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30cm between wires • Place markers on fences	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Presence of birds stuck /dead in fences Monitor fences for slack wires	During phase
As far as possible power cables within the project site should be thoroughly insulated and preferably buried.	Planning and construction	Environmental Officer & Contractor, Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Bird Diverters must be installed in the correct areas along the power line route	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.

Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the “no-go” to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

7 Conclusion and Impact Statement

7.1 Terrestrial Ecology

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 suitable groundtruth coverage of the assessment area and major habitats and ecosystems were assessed to obtain a general species (fauna (including avifauna) and flora) overview and the major current impacts were observed.

Regarding the current layout, no project infrastructure is expected to have a significant impact on the area, if the mitigation measures are followed, especially pertaining to wetlands, as much of the areas has been found to be modified. No faunal component of significance was observed, which further reduced the impact significance of the development on terrestrial biodiversity. The classification of project area as degraded and other natural area is corroborated.

7.2 Recommendations

The following recommendations should be considered for the authorisation:

- Avoid all delineated wetland areas, and adhered to the recommended 30 m buffer area as much is feasible. Should more area be required for the feasibility of the project, the disturbed areas identified within the wetland areas and buffer may be considered. In the event the disturbed areas are considered for the feasibility of the project, the associated risks must be re-evaluated;
- It is recommended that a wetland rehabilitation plan be implemented for the remaining wetlands within the project area if development occurs within these systems;
- A SCC management plan in which removal and replanting of protected species is managed must be completed; and
- The High sensitivity area should be avoided.

7.3 Impact Statement

The main expected impacts of the proposed power line infrastructure will include the following:

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Direct loss of protected plant species;
- Direct loss of wetlands;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable level. Considering that some areas has been identified as being of low significance for biodiversity maintenance and ecological processes, development may proceed within these areas. All mitigations measures prescribed herein must be considered by the issuing authority for authorisation. No fatal flaws are evident for the proposed project.

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9 Appendix Items

9.1 Appendix A – Flora species expected to occur in the project area.

Genus	Sp1	IUCN	Ecology
Asclepias	*meyeriana*	LC	Indigenous
Cyphia	*persicifolia*	LC	Indigenous; Endemic
Eleocharis	*dregeana*	LC	Indigenous
Marsilea	*farinosa*	LC	Indigenous
Trachyandra	*asperata*	LC	Indigenous
Panicum	*coloratum*	LC	Indigenous
Thesium	*transvaalense*	LC	Indigenous; Endemic
Cotula	*microglossa*	LC	Indigenous; Endemic
Indigofera	*heterotricha*	LC	Indigenous
Aspidoglossum	*biflorum*	LC	Indigenous
Pearsonia	*bracteata*	NT	Indigenous; Endemic
Mesogramma	*apiifolium*	LC	Indigenous
Helichrysum	*dregeanum*	LC	Indigenous
Juncus	*rigidus*	LC	Indigenous
Nerine	*krigei*	LC	Indigenous; Endemic
Senecio	*reptans*	LC	Indigenous; Endemic
Stachys	*hyssopoides*	LC	Indigenous
Lemna	*minor*	LC	Indigenous
Phyllanthus	*incurvus*	LC	Indigenous
Trachyandra	*saltii*	LC	Indigenous
Raphionacme	*velutina*	LC	Indigenous
Asclepias	*aurea*	LC	Indigenous
Helichrysum	*zeyheri*	LC	Indigenous
Listia	*heterophylla*	LC	Indigenous
Potamogeton	*pectinatus*	LC	Indigenous

9.2 Appendix B – Amphibian species expected to occur in the project area

Family	Scientific name	Common name	Red list category
Bufonidae	*Schismaderma carens*	Red Toad	Least Concern
Bufonidae	*Sclerophrys sp.*		
Bufonidae	*Sclerophrys capensis*	Raucous Toad	Least Concern
Bufonidae	*Sclerophrys garmani*	Olive Toad	Least Concern (IUCN, 2016)
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern (IUCN, 2016)
Bufonidae	*Sclerophrys poweri*	Power's Toad	Least Concern
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	Least Concern
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	Least Concern (IUCN, 2013)
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern (2017)
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern (2013)
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog	Near Threatened
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	Least Concern
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	Least Concern

9.3 Appendix C – Reptile species expected to occur in the project area

Family	Scientific name	Common name	Red list category
Agamidae	*Agama aculeata distanti*	Distant's Ground Agama	Least Concern (SARCA 2014)
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern (SARCA 2014)
Chamaeleonidae	*Chamaeleo dilepis*	Common Flap-neck Chameleon	Least Concern (SARCA 2014)
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	Least Concern (SARCA 2014)
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern (SARCA 2014)
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	Least Concern (SARCA 2014)
Elapidae	*Hemachatus haemachatus*	Rinkhals	Least Concern (SARCA 2014)
Elapidae	*Naja nivea*	Cape Cobra	Least Concern (SARCA 2014)
Gekkonidae	*FAMILY Gekkonidae*	Unidentified Gekkonidae	
Gekkonidae	*Hemidactylus mabouia*	Common Tropical House Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern (SARCA 2014)
Lacertidae	*Nucras holubi*	Holub's Sandveld Lizard	Least Concern (SARCA 2014)
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	Least Concern (SARCA 2014)
Lamprophiidae	*Atractaspis bibronii*	Bibron's Stiletto Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Lamprophis aurora*	Aurora House Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis leightoni*	Cape Sand Snake	Vulnerable (SARCA 2014)
Lamprophiidae	*Psammophylax tritaeniatus*	Striped Grass Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern (SARCA 2014)
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Not evaluated
Scincidae	*Panaspis wahlbergii*	Wahlberg's Snake-eyed Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis varia sensu lato*	Common Variable Skink Complex	Least Concern (SARCA 2014)
Testudinidae	*Kinixys lobatsiana*	Lobatse Hinged Tortoise	Least Concern (SARCA 2014)
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern (SARCA 2014)
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern (SARCA 2014)
Varanidae	*Varanus niloticus*	Water Monitor	Least Concern (SARCA 2014)
Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern (SARCA 2014)
Viperidae	*Causus rhombeatus*	Rhombic Night Adder	Least Concern (SARCA 2014)

9.4 Appendix D – Mammal species expected to occur within the project area

Scientific name	Common name	Red list category
Cryptomys hottentotus	Southern African Mole-rat	Least Concern (2016)
Aepyceros melampus	Impala	Least Concern
Alcelaphus buselaphus	Hartebeest	
Alcelaphus buselaphus caama	Red Hartebeest	Least Concern (2008)
Antidorcas marsupialis	Springbok	Least Concern (2016)
Connochaetes gnou	Black Wildebeest	Least Concern (2016)
Connochaetes taurinus taurinus		Least Concern (2016)
Damaliscus pygargus phillipsi	Blesbok	Least Concern (2016)
Kobus ellipsiprymnus	Waterbuck	Least Concern (ver 3.1, 2016)
Kobus ellipsiprymnus ellipsiprymnus		Least Concern (2016)
Raphicerus campestris	Steenbok	Least Concern (2016)
Redunca arundinum	Southern Reedbuck	Least Concern (2016)
Redunca fulvorufula	Mountain Reedbuck	Least Concern
Sylvicapra grimmia	Bush Duiker	Least Concern (2016)
Tragelaphus scriptus	Bushbuck	Least Concern
Tragelaphus strepsiceros	Greater Kudu	Least Concern (2016)
Canis mesomelas	Black-backed Jackal	Least Concern (2016)
Vulpes chama	Cape Fox	Least Concern (2016)
Chlorocebus pygerythrus	Vervet Monkey	Least Concern (2016)
Chlorocebus pygerythrus pygerythrus	Vervet Monkey (subspecies pygerythrus)	Least Concern (2008)
Dama dama	Fallow Deer	Introduced
Equus quagga	Plains Zebra	Least Concern (2016)
Atelerix frontalis	Southern African Hedgehog	Near Threatened (2016)
Caracal caracal	Caracal	Least Concern (2016)
Leptailurus serval	Serval	Near Threatened (2016)
Atilax paludinosus	Marsh Mongoose	Least Concern (2016)
Cynictis penicillata	Yellow Mongoose	Least Concern (2016)
Herpestes sanguineus	Slender Mongoose	Least Concern (2016)
Ichneumia albicauda	White-tailed Mongoose	Least Concern (2016)
Suricata suricatta	Meerkat	Least Concern (2016)
Lepus capensis	Cape Hare	Least Concern
Lepus saxatilis	Scrub Hare	Least Concern
Aethomys namaquensis	Namaqua Rock Mouse	Least Concern
Mastomys coucha	Southern African Mastomys	Least Concern (2016)
Otomys auratus	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)
Rhabdomys pumilio	Xeric Four-striped Grass Rat	Least Concern (2016)
Aonyx capensis	African Clawless Otter	Near Threatened (2016)
Pedetes capensis	South African Spring Hare	Least Concern (2016)
Procavia capensis	Cape Rock Hyrax	Least Concern (2016)

Paraxerus cepapi	Smith's Bush Squirrel	Least Concern (2016)
Xerus inauris	South African Ground Squirrel	Least Concern
Phacochoerus africanus	Common Warthog	Least Concern (2016)
Thryonomys swinderianus	Greater Cane Rat	Least Concern (2016)
Neoromicia capensis	Cape Serotine	Least Concern (2016)
Genetta genetta	Common Genet	Least Concern (2016)

9.5 Appendix E -Avifauna Species expected to occur within the project area

Common Name	*Scientific Name*	RD (Regional, Global)
Bokmakierie	*Telophorus zeylonus*	0
Brubru	*Nilaus afer*	0
Hamerkop	*Scopus umbretta*	0
Neddicky	*Cisticola fulvicapilla*	0
African Quail-finch	*Ortygospiza atricollis*	0
Ruff	*Calidris pugnax*	0
Bar-throated Apalis	*Apalis thoracica*	0
Pied Avocet	*Recurvirostra avosetta*	0
Acacia Pied Barbet	*Tricholaema leucomelas*	0
Black-collared Barbet	*Lybius torquatus*	0
Crested Barbet	*Trachyphonus vaillantii*	0
Pririt Batis	*Batis pririt*	0
European Bee-eater	*Merops apiaster*	0
Little Bee-eater	*Merops pusillus*	0
White-fronted Bee-eater	*Merops bullockoides*	0
Southern Red Bishop	*Euplectes orix*	0
Yellow-crowned Bishop	*Euplectes afer*	0
African Red-eyed Bulbul	*Pycnonotus nigricans*	0
Cinnamon-breasted Bunting	*Emberiza tahapisi*	0
Lark-like Bunting	*Emberiza impetuani*	0
Common (Steppe) Buzzard	*Buteo buteo*	0
Black-throated Canary	*Crithagra atrogularis*	0
Yellow Canary	*Crithagra flaviventris*	0
Yellow-fronted Canary	*Crithagra mozambica*	0
Ant-eating Chat	*Myrmecocichla formicivora*	0
Familiar Chat	*Oenanthe familiaris*	0
Cloud Cisticola	*Cisticola textrix*	0
Desert Cisticola	*Cisticola aridulus*	0
Levaillant's Cisticola	*Cisticola tinniens*	0
Rattling Cisticola	*Cisticola chiniana*	0
Wing-snapping Cisticola	*Cisticola ayresii*	0
Zitting Cisticola	*Cisticola juncidis*	0
Red-knobbed coot	*Fulica cristata*	0
Reed Cormorant	*Microcarbo africanus*	0
White-breasted Cormorant	*Phalacrocorax lucidus*	0
Burchell's Coucal	*Centropus burchellii*	0
Temminck's Courser	*Cursorius temminckii*	0

Baillon's Crake	*Zapornia pusilla*		0
Black Crake	*Zapornia flavirostra*		0
Long-billed crombec	*Sylvietta rufescens*		0
Pied Crow	*Corvus albus*		0
Diederik Cuckoo	*Chrysococcyx caprius*		0
Great Spotted Cuckoo	*Clamator glandarius*		0
Red-chested Cuckoo	*Cuculus solitarius*		0
African Darter	*Anhinga rufa*		0
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*		0
Laughing Dove	*Spilopelia senegalensis*		0
Namaqua Dove	*Oena capensis*		0
Red-eyed Dove	*Streptopelia semitorquata*		0
Rock Dove	*Columba livia*		0
Fork-tailed Drongo	*Dicrurus adsimilis*		0
African Black Duck	*Anas sparsa*		0
Fulvous Whistling Duck	*Dendrocygna bicolor*		0
Maccoa Duck	*Oxyura maccoa*	NT, VU	
White-backed Duck	*Thalassornis leuconotus*		0
White-faced Whistling Duck	*Dendrocygna viduata*		0
Yellow-billed Duck	*Anas undulata*		0
African Fish Eagle	*Haliaeetus vocifer*		0
Spotted Eagle-Owl	*Bubo africanus*		0
Great Egret	*Ardea alba*		0
Yellow-billed (Intermediate) Egret	*Ardea intermedia*		0
Little Egret	*Egretta garzetta*		0
Western Cattle Egret	*Bubulcus ibis*		0
Yellow-bellied Eremomela	*Eremomela icteropygialis*		0
Amur Falcon	*Falco amurensis*		0
Lanner Falcon	*Falco biarmicus*	VU, LC	
Peregrine Falcon	*Falco peregrinus*		0
Red-headed Finch	*Amadina erythrocephala*		0
African Firefinch	*Lagonosticta rubricata*		0
Jameson's Firefinch	*Lagonosticta rhodopareia*		0
Red-billed Firefinch	*Lagonosticta senegala*		0
Southern (Common) Fiscal	*Lanius collaris*		0
Greater Flamingo	*Phoenicopterus roseus*	NT, LC	
Red-chested Flufftail	*Sarothrura rufa*		0
African Paradise Flycatcher	*Terpsiphone viridis*		0
Fairy Flycatcher	*Stenostira scita*		0

Fiscal Flycatcher	*Melaenornis silens*	0
Spotted flycatcher	*Muscicapa striata*	0
Orange River Francolin	*Scleroptila gutturalis*	0
Egyptian Goose	*Alopochen aegyptiaca*	0
Spur-winged Goose	*Plectropterus gambensis*	0
Gabar Goshawk	*Micronisus gabar*	0
Black-necked Grebe	*Podiceps nigricollis*	0
Great Crested Grebe	*Podiceps cristatus*	0
Little Grebe	*Tachybaptus ruficollis*	0
Common Greenshank	*Tringa nebularia*	0
Helmeted Guineafowl	*Numida meleagris*	0
Grey-headed Gull	*Chroicocephalus cirrocephalus*	0
Black Heron	*Egretta ardesiaca*	0
Black-crowned Night Heron	*Nycticorax nycticorax*	0
Black-headed Heron	*Ardea melanocephala*	0
Goliath Heron	*Ardea goliath*	0
Grey Heron	*Ardea cinerea*	0
Purple Heron	*Ardea purpurea*	0
Squacco Heron	*Ardeola ralloides*	0
Green-backed (Striated) Heron	*Butorides striata*	0
African Hoopoe	*Upupa africana*	0
African Sacred Ibis	*Threskiornis aethiopicus*	0
Glossy Ibis	*Plegadis falcinellus*	0
Hadeda (Hadada) Ibis	*Bostrychia hagedash*	0
Dusky Indigobird	*Vidua funerea*	0
Village Indigobird	*Vidua chalybeata*	0
African Jacana	*Actophilornis africanus*	0
Greater Kestrel	*Falco rupicoloides*	0
Lesser Kestrel	*Falco naumanni*	0
Rock Kestrel	*Falco rupicolus*	0
Brown-hooded Kingfisher	*Halcyon albiventris*	0
Giant Kingfisher	*Megaceryle maxima*	0
Malachite Kingfisher	*Corythornis cristatus*	0
Pied Kingfisher	*Ceryle rudis*	0
Black-winged Kite	*Elanus caeruleus*	0
Yellow-billed Kite	*Milvus aegyptius*	0
Northern Black Korhaan	*Afrotis afraoides*	0
African Wattled Lapwing	*Vanellus senegallus*	0
Blacksmith Lapwing	*Vanellus armatus*	0

Crowned Lapwing	*Vanellus coronatus*	0
Eastern Clapper Lark	*Mirafra fasciolata*	0
Melodious Lark	*Mirafra cheniana*	0
Pink-billed Lark	*Spizocorys conirostris*	0
Red-capped Lark	*Calandrella cinerea*	0
Rufous-naped Lark	*Mirafra africana*	0
Sabota Lark	*Calendulauda sabota*	0
Spike-heeled Lark	*Chersomanes albofasciata*	0
Cape Longclaw	*Macronyx capensis*	0
Banded Martin	*Riparia cincta*	0
Brown-throated Martin	*Riparia paludicola*	0
Rock Martin	*Ptyonoprogne fuligula*	0
Common Moorhen	*Gallinula chloropus*	0
Red-faced Mousebird	*Urocolius indicus*	0
Speckled Mousebird	*Colius striatus*	0
White-backed Mousebird	*Colius colius*	0
Common Myna	*Acridotheres tristis*	0
Rufous-cheeked Nightjar	*Caprimulgus rufigena*	0
Black-headed Oriole	*Oriolus larvatus*	0
Common Ostrich	*Struthio camelus*	0
Marsh Owl	*Asio capensis*	0
Western Barn Owl	*Tyto alba*	0
Indian Peafowl	*Pavo cristatus*	0
Speckled Pigeon	*Columba guinea*	0
African Pipit	*Anthus cinnamomeus*	0
Buffy Pipit	*Anthus vaalensis*	0
Plain-backed Pipit	*Anthus leucophrys*	0
Common Ringed Plover	*Charadrius hiaticula*	0
Kittlitz's Plover	*Charadrius pecuarius*	0
Three-banded Plover	*Charadrius tricollaris*	0
Southern Pochard	*Netta erythrophthalma*	0
Black-chested Prinia	*Prinia flavicans*	0
Tawny-flanked Prinia	*Prinia subflava*	0
Green-winged Pytilia	*Pytilia melba*	0
Red-billed Quelea	*Quelea quelea*	0
African Rail	*Rallus caerulescens*	0
Cape Robin-chat	*Cossypha caffra*	0
White-throated Robin-chat	*Cossypha humeralis*	0
Lilac-breasted Roller	*Coracias caudatus*	0

Namaqua Sandgrouse	*Pterocles namaqua*	0
Common Sandpiper	*Actitis hypoleucos*	0
Curlew Sandpiper	*Calidris ferruginea*	LC, NT
Marsh Sandpiper	*Tringa stagnatilis*	0
Wood Sandpiper	*Tringa glareola*	0
Common Scimitarbill	*Rhinopomastus cyanomelas*	0
Kalahari Scrub Robin	*Cercotrichas paena*	0
White-browed Scrub Robin	*Cercotrichas leucophrys*	0
Streaky-headed Seedeater	*Crithagra gularis*	0
South African Shelduck	*Tadorna cana*	0
Cape Shoveler	*Spatula smithii*	0
Lesser Grey Shrike	*Lanius minor*	0
Red-backed Shrike	*Lanius collurio*	0
African Snipe	*Gallinago nigripennis*	0
Cape Sparrow	*Passer melanurus*	0
House Sparrow	*Passer domesticus*	0
Southern Grey-headed Sparrow	*Passer diffusus*	0
Yellow-throated Petronia	*Gymnoris superciliaris*	0
Chestnut-backed Sparrow-lark	*Eremopterix leucotis*	0
White-browed Sparrow-Weaver	*Plocepasser mahali*	0
Little Sparrowhawk	*Accipiter minullus*	0
African Spoonbill	*Platalea alba*	0
Swainson's Spurfowl	*Pternistis swainsonii*	0
Cape Glossy (Cape) Starling	*Lamprotornis nitens*	0
Pied Starling	*Lamprotornis bicolor*	0
Wattled Starling	*Creatophora cinerea*	0
Black-winged Stilt	*Himantopus himantopus*	0
Little Stint	*Calidris minuta*	0
African Stonechat	*Saxicola torquatus*	0
Abdim's Stork	*Ciconia abdimii*	NT, LC
White Stork	*Ciconia ciconia*	0
Yellow-billed Stork	*Mycteria ibis*	EN, LC
Amethyst Sunbird	*Chalcomitra amethystina*	0
White-bellied Sunbird	*Cinnyris talatala*	0
Barn Swallow	*Hirundo rustica*	0
Greater Striped Swallow	*Cecropis cucullata*	0
Pearl-breasted Swallow	*Hirundo dimidiata*	0
Red-breasted Swallow	*Cecropis semirufa*	0
South African Cliff Swallow	*Petrochelidon spilodera*	0

White-throated Swallow	*Hirundo albigularis*		0
African (Purple) Swamphen	*Porphyrio madagascariensis*		0
African Black Swift	*Apus barbatus*		0
African Palm Swift	*Cypsiurus parvus*		0
Little Swift	*Apus affinis*		0
White-rumped Swift	*Apus caffer*		0
Brown-crowned Tchagra	*Tchagra australis*		0
Blue-billed Teal	*Spatula hottentota*		0
Cape Teal	*Anas capensis*		0
Red-billed Teal	*Anas erythrorhyncha*		0
Caspian Tern	*Hydroprogne caspia*	VU, LC	
Whiskered Tern	*Chlidonias hybrida*		0
White-winged Tern	*Chlidonias leucopterus*		0
Spotted Thick-knee	*Burhinus capensis*		0
Groundscraper Thrush	*Turdus litsitsirupa*		0
Karoo Thrush	*Turdus smithi*		0
Ashy Tit	*Melaniparus cinerascens*		0
Cape Penduline-tit	*Anthoscopus minutus*		0
Cape Wagtail	*Motacilla capensis*		0
African Reed Warbler	*Acrocephalus baeticatus*		0
Chestnut-vented Tit-Babbler (Warbler)	*Curruca subcoerulea*		0
Garden Warbler	*Sylvia borin*		0
Icterine Warbler	*Hippolais icterina*		0
Lesser Swamp Warbler	*Acrocephalus gracilirostris*		0
Little Rush Warbler	*Bradypterus baboecala*		0
Willow Warbler	*Phylloscopus trochilus*		0
Black-faced Waxbill	*Brunhilda erythronotos*		0
Blue Waxbill	*Uraeginthus angolensis*		0
Common Waxbill	*Estrilda astrild*		0
Orange-breasted Waxbill	*Amandava subflava*		0
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*		0
Southern Masked Weaver	*Ploceus velatus*		0
Capped Wheatear	*Oenanthe pileata*		0
Mountain Wheatear	*Myrmecocichla monticola*		0
Cape White-eye	*Zosterops virens*		0
Orange River White-eye	*Zosterops pallidus*		0
Long-tailed Paradise Whydah	*Vidua paradisaea*		0
Pin-tailed Whydah	*Vidua macroura*		0
Shaft-tailed Whydah	*Vidua regia*		0

Long-tailed Widowbird	*Euplectes progne*	0
Red-collared Widowbird	*Euplectes ardens*	0
White-winged Widowbird	*Euplectes albonotatus*	0
Green Wood-hoopoe	*Phoeniculus purpureus*	0
Cardinal Woodpecker	*Dendropicos fuscescens*	0
Golden-tailed Woodpecker	*Campethera abingoni*	0
Red-throated Wryneck	*Jynx ruficollis*	0
Chinspot Batis	*Batis molitor*	0
Dwarf Bittern	*Ixobrychus sturmii*	0
Golden-breasted Bunting	*Emberiza flaviventris*	0
Grey Crowned Crane	*Balearica regulorum*	EN, EN
Cape Crow	*Corvus capensis*	0
Klaas's Cuckoo	*Chrysococcyx klaas*	0
Long-crested Eagle	*Lophaetus occipitalis*	0
Lesser Flamingo	*Phoeniconaias minor*	NT, NT
Grey Go-away-bird	*Crinifer concolor*	0
Pale Chanting Goshawk	*Melierax canorus*	0
African Harrier-Hawk	*Polyboroides typus*	0
Eurasian Hobby	*Falco subbuteo*	0
Brown-backed Honeybird	*Prodotiscus regulus*	0
Greater Honeyguide	*Indicator indicator*	0
Lesser Honeyguide	*Indicator minor*	0
Purple Indigobird	*Vidua purpurascens*	0
Woodland Kingfisher	*Halcyon senegalensis*	0
Bronze Mannikin	*Spermestes cucullata*	0
Greater Painted-snipe	*Rostratula benghalensis*	NT, LC
Black-backed Puffback	*Dryoscopus cubla*	0
Black Sparrowhawk	*Accipiter melanoleucus*	0
African Pied Wagtail	*Motacilla aguimp*	0
Great Reed Warbler	*Acrocephalus arundinaceus*	0
Marsh Warbler	*Acrocephalus palustris*	0
Sedge Warbler	*Acrocephalus schoenobaenus*	0
Cape Weaver	*Ploceus capensis*	0
Thick-billed Weaver	*Amblyospiza albifrons*	0
Common Whitethroat	*Curruca communis*	0
Little Bittern	*Ixobrychus minutus*	0
Dark-capped Bulbul	*Pycnonotus tricolor*	0
Tinkling Cisticola	*Cisticola rufilatus*	0
African Cuckoo Hawk	*Aviceda cuculoides*	0

Verreaux's Eagle-Owl	*Bubo lacteus*		0
Marico flycatcher	*Melaenornis mariquensis*		0
Rosy-faced Lovebird	*Agapornis roseicollis*		0
Common House Martin	*Delichon urbicum*		0
African Openbill	*Anastomus lamelligerus*		0
Common Quail	*Coturnix coturnix*		0
Crimson-breasted Shrike	*Laniarius atrococcineus*		0
Marico Sunbird	*Cinnyris mariquensis*		0
Horus Swift	*Apus horus*		0
Violet-eared Waxbill	*Granatina granatina*		0
Double-banded Courser	*Rhinoptilus africanus*		0
Blue Crane	*Grus paradisea*	NT, VU	
Jacobin Cuckoo	*Clamator jacobinus*		0
Blue-cheeked Bee-eater	*Merops persicus*		0
Common (Kurrichane) Buttonquail	*Turnix sylvaticus*		0
Black-chested Snake Eagle	*Circaetus pectoralis*		0
Brown Snake Eagle	*Circaetus cinereus*		0
Jackal Buzzard	*Buteo rufofuscus*		0
Natal Spurfowl	*Pternistis natalensis*		0
Swallow-tailed Bee-eater	*Merops hirundineus*		0
Ovambo Sparrowhawk	*Accipiter ovampensis*		0

9.6 Appendix F – Avifauna species recorded during the survey

Common Name	Scientific Name	RD (Regional, Global)	Guild code	Relative abundance	Frequency
Blacksmith Lapwing	*Vanellus armatus*	0	IGD	0,030	27,778
Amur Falcon	*Falco amurensis*	0	CGD	0,048	22,222
White-browed Sparrow-Weaver	*Plocepasser mahali*	0	OMD	0,032	44,444
Cape Sparrow	*Passer melanurus*	0	GGD	0,002	5,556
Zitting Cisticola	*Cisticola juncidis*	0	IGD	0,017	50,000
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	0	GGD	0,013	27,778
White-backed Mousebird	*Colius colius*	0	FFD	0,004	5,556
Northern Black Korhaan	*Afrotis afraoides*	0	IGD	0,010	22,222
White-bellied Sunbird	*Cinnyris talatala*	0	NFD	0,006	11,111
Southern Masked Weaver	*Ploceus velatus*	0	GGD	0,008	16,667
Common Myna	*Acridotheres tristis*	0	OMD	0,004	5,556
Laughing Dove	*Spilopelia senegalensis*	0	GGD	0,013	27,778
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*	0	GGD	0,040	38,889
Hadeda (Hadada) Ibis	*Bostrychia hagedash*	0	OMD	0,008	16,667
Karoo Thrush	*Turdus smithi*	0	OMD	0,006	11,111
Cape Robin-chat	*Cossypha caffra*	0	OMD	0,006	11,111
Yellow-billed Duck	*Anas undulata*	0	HWD	0,006	11,111
Black-chested Prinia	*Prinia flavicans*	0	IGD	0,017	50,000
Speckled Pigeon	*Columba guinea*	0	FFD	0,019	27,778
African Palm Swift	*Cypsiurus parvus*	0	IAD	0,006	11,111
Little Swift	*Apus affinis*	0	IAD	0,068	22,222
Greater Striped Swallow	*Cecropis cucullata*	0	IAD	0,040	22,222
Spotted flycatcher	*Muscicapa striata*	0	IAD	0,002	5,556
Golden-tailed Woodpecker	*Campethera abingoni*	0	IGD	0,004	11,111
Acacia Pied Barbet	*Tricholaema leucomelas*	0	OMD	0,017	44,444
South African Cliff Swallow	*Petrochelidon spilodera*	0	IAD	0,029	22,222
European Bee-eater	*Merops apiaster*	0	IAD	0,059	38,889
Pied Crow	*Corvus albus*	0	OMD	0,004	11,111
Pririt Batis	*Batis pririt*	0	IGD	0,002	5,556
Lesser Kestrel	*Falco naumanni*	0	CGD	0,008	16,667
Green-winged Pytilia	*Pytilia melba*	0	GGD	0,002	5,556
Red-faced Mousebird	*Urocolius indicus*	0	FFD	0,010	16,667
White-rumped Swift	*Apus caffer*	0	IAD	0,015	11,111
African Red-eyed Bulbul	*Pycnonotus nigricans*	0	OMD	0,004	11,111
Diederik Cuckoo	*Chrysococcyx caprius*	0	IGD	0,002	5,556

Western Cattle Egret	*Bubulcus ibis*	0	IGD	0,011	16,667
Red-billed Quelea	*Quelea quelea*	0	GGD	0,190	38,889
Rattling Cisticola	*Cisticola chiniana*	0	IGD	0,002	5,556
Red-backed Shrike	*Lanius collurio*	0	IGD	0,006	16,667
Helmeted Guineafowl	*Numida meleagris*	0	OMD	0,027	5,556
Rufous-naped Lark	*Mirafra africana*	0	IGD	0,008	16,667
Green Wood-hoopoe	*Phoeniculus purpureus*	0	IGD	0,008	11,111
Egyptian Goose	*Alopochen aegyptiaca*	0	HWD	0,025	27,778
Brown-hooded Kingfisher	*Halcyon albiventris*	0	CWD	0,004	11,111
Willow Warbler	*Phylloscopus trochilus*	0	IGD	0,004	11,111
Crested Barbet	*Trachyphonus vaillantii*	0	FFD	0,004	11,111
African Fish Eagle	*Haliaeetus vocifer*	0	CGD	0,004	11,111
African Darter	*Anhinga rufa*	0	CWD	0,006	16,667
Cape White-eye	*Zosterops virens*	0	OMD	0,004	5,556
Lazy Cisticola	*Cisticola aberrans*	0	IGD	0,002	5,556
Crowned Lapwing	*Vanellus coronatus*	0	IGD	0,023	11,111
Fiscal Flycatcher	*Melaenornis silens*	0	OMD	0,002	5,556
Speckled Mousebird	*Colius striatus*	0	FFD	0,002	5,556
Lesser Grey Shrike	*Lanius minor*	0	IGD	0,004	11,111
Giant Kingfisher	*Megaceryle maxima*	0	CWD	0,002	5,556
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	0	IGD	0,002	5,556
Natal Spurfowl	*Pternistis natalensis*	0	OMD	0,002	5,556
African Black Duck	*Anas sparsa*	0	IWD	0,004	5,556
Black Crake	*Zapornia flavirostra*	0	OMD	0,002	5,556
Bar-throated Apalis	*Apalis thoracica*	0	IGD	0,004	5,556
African Wattled Lapwing	*Vanellus senegallus*	0	IGD	0,017	5,556
Cape Wagtail	*Motacilla capensis*	0	IGD	0,002	5,556
Malachite Kingfisher	*Corythornis cristatus*	0	CWD	0,002	5,556
Levaillant's Cisticola	*Cisticola tinniens*	0	IGD	0,002	5,556
Barn Swallow	*Hirundo rustica*	0	IAD	0,048	22,222
Cape Longclaw	*Macronyx capensis*	0	IGD	0,008	11,111
Red-eyed Dove	*Streptopelia semitorquata*	0	GGD	0,004	11,111
Black-throated Canary	*Crithagra atrogularis*	0	OMD	0,002	5,556
Spike-heeled Lark	*Chersomanes albofasciata*	0	IGD	0,010	5,556
Desert Cisticola	*Cisticola aridulus*	0	IGD	0,002	5,556