THE TERRESTRIAL ECOLOGY & WETLAND BASELINE & IMPACT ASSESSMENTS FOR THE PROPOSED BECRUX TWO SOLAR PV DEVELOPMENT

Sasolburg, 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 and also a wetland assessment for the establishment of a 10MW$_{ac}$ solar photovoltaic (PV) energy facility, Becrux Two. The following is as per the project description provided by Savanna environmental:

“Becrux Solar PV Project Two (Pty) Ltd is proposing to develop a 10MW Solar Photovoltaic (PV) Energy Facility and associated infrastructure on Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250, located 4 km southeast of the town Sasolburg (Figure 1-1)., within jurisdiction of the Metsimaholo Local Municipality and the Fezile Dabi District Municipality in the Free State Province. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited at its Sasolburg operations.

Power generated at the facility will be delivered to Sasol Limited by feeding into the grid through a Wheeling Agreement signed with Eskom and/or direct embedded generation. To evacuate the generated power to Sasol Limited, an 11kV overhead power line will be established to connect the proposed 11kV onsite containerised/non-containerised substation to the existing Becrux Substation. A grid connection corridor up to 200m wide, extending up to ~400m around the footprint of the Becrux Substation, and up to 500m in length, has been identified for the assessment and suitable placement of the grid connection infrastructure within the corridor. This corridor will provide for the avoidance of sensitive environment areas and features and allow for the micro-siting of the overhead power line within the corridor.

A development area of up to ~30ha and a development footprint of up to ~19.99ha have been identified within the project site (~339.87ha) by Becrux Solar PV Project Two (Pty) Ltd for the development of the Becrux Two Solar PV Energy Facility. Infrastructure associated with the Solar PV Energy Facility will include the following:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the panels.
- 11kV onsite containerised/non-containerised substation.
- 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Becrux Substation.
- Main access gravel road and internal gravel roads.
- Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- Site office, workshop area, storage area, and laydown area.
- Fire break and fencing around the site, including an access gate (Figure 1-2).”

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”.

This assessment has ALSO been completed in accordance with the requirements of the published General Notice (GN) 509 by the Department of Water and Sanitation (DWS), and Appendix 6 of the EIA

Regulations, 2014 (Government Notice (GN) R 982 of 2014, as amended). GN509 was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016 and provides for the authorisation of Section 21(c) & (i) water uses in terms of a General Authorisation (GA) as opposed to a full water use license. A water use (or potential) qualifies for a GA under GN 509 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM), and the risk class is determined to be LOW. This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation going forward.

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 towns.

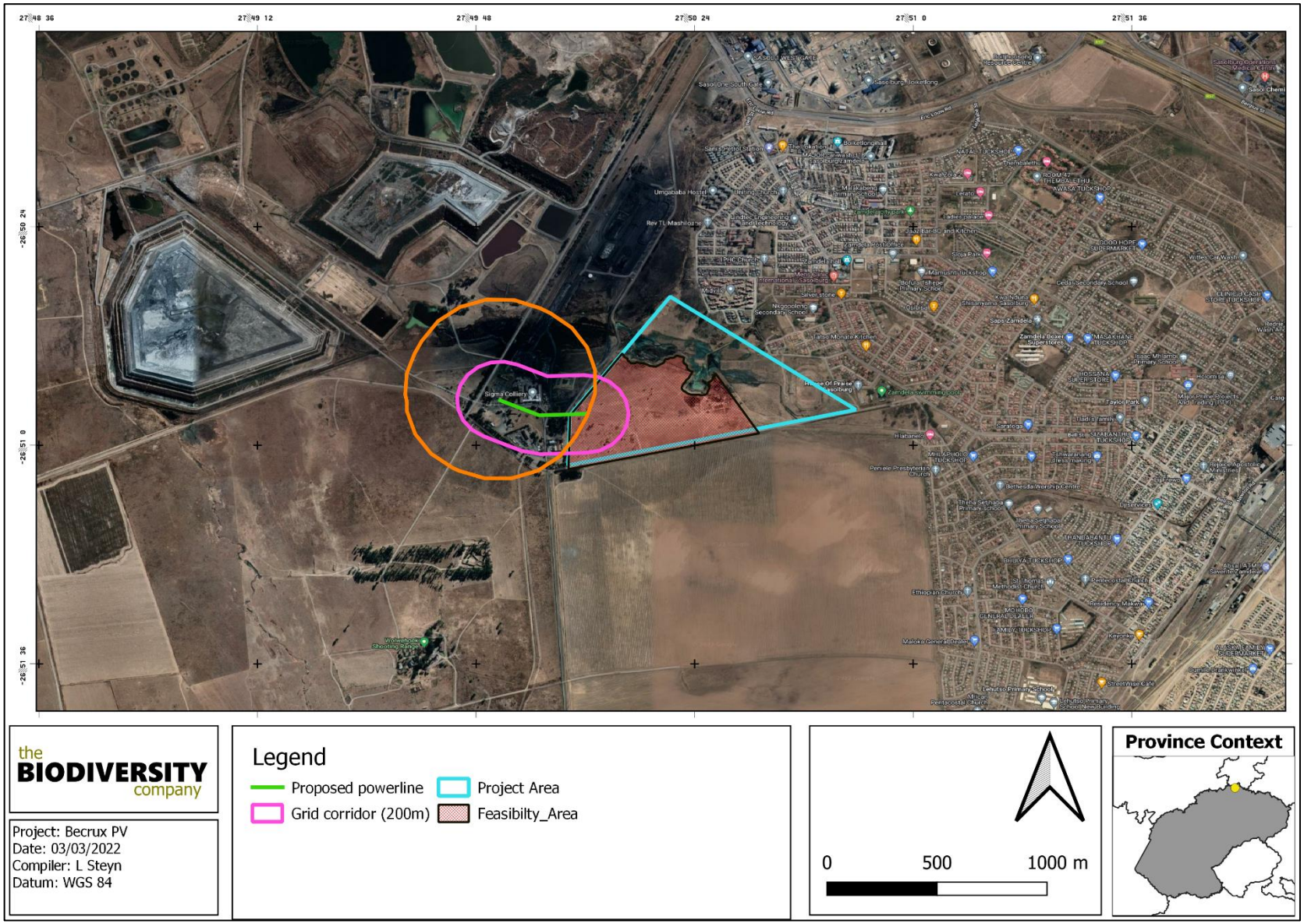


Figure 1-2 The various components of the project

1.2 Specialist Details

Report Name	**THE TERRESTRIAL ECOLOGY & WETLAND BASELINE & IMPACT ASSESSMENTS FOR THE PROPOSED BECRUX TWO SOLAR PV DEVELOPMENT**
Reference	**Becrux PV**
Submitted to	savannah environmental
Report Writer (Desktop)	**Lindi Steyn**  Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from basic Assessments to Environmental Impact Assessments following IFC standards.
Report Writer (Fauna and Flora)	**Martinus Erasmus**  Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015. Martinus is Cand. Sci. Nat. registered (118630) is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.
Report Writer/Reviewer (Wetland)	**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; and

- Hydrological Setting:

  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

  - Strategic Water Source Areas (SWSAs) (Le Maitre *et al*, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.

  - National Freshwater Ecosystem Priority Areas (NFEPA) – The NFEPA spatial data has been incorporated in the above mentioned SAIIAE spatial data set. However, to ensure that this data sets are considered we included it as the Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al*., 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

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.

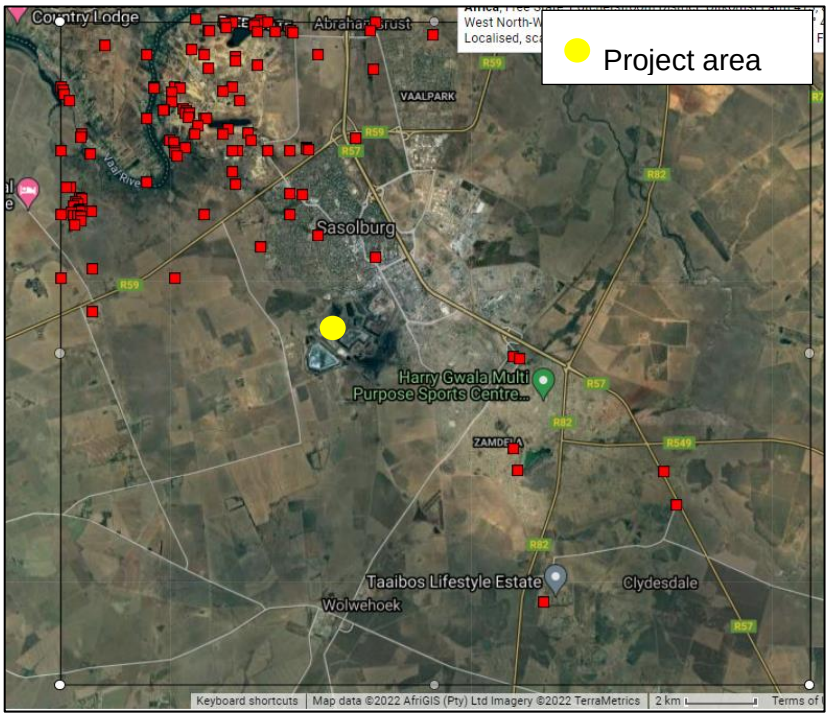


Figure 3-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

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

Two field surveys were undertaken for the project. Table 3-1 summarises the timing and period of the surveys undertaken

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

Survey Number	Season	Date/s	Comments

2	Wet (Summer)	9 February 2022 & 1-2 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).

3.3 Wetland Assessment

The wetland areas are delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 3-2. The outer edges of the wetland areas were identified by considering the following four specific indicators:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
    - The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile because of prolonged and frequent saturation; and
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

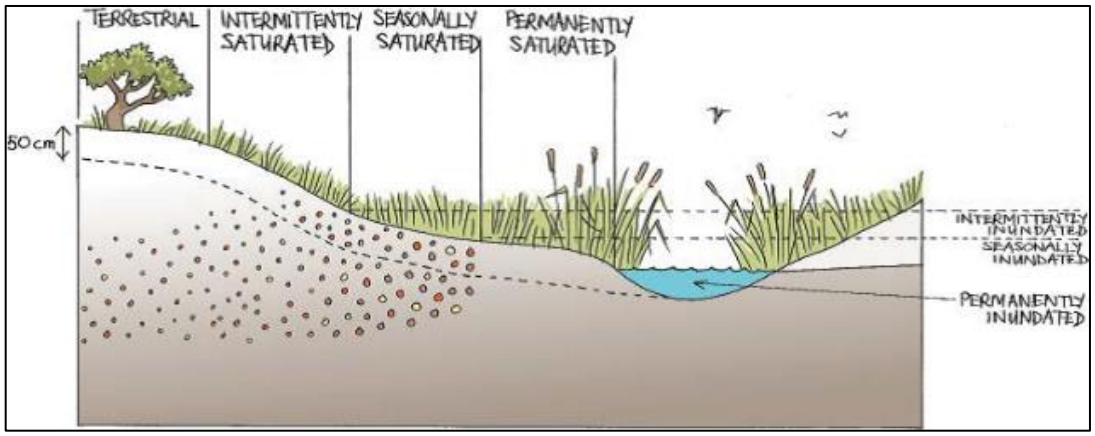


Figure 3-2 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al. 2013)

3.3.1 Delineation

The wetland indicators described above are used to determine the boundaries of the wetlands within the project area. These delineations are illustrated by means of maps accompanied by descriptions.

3.3.2 Ecological Classification and Description

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and also includes structural features at the lower levels of classification (Ollis et al., 2013).

3.3.3 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. Eco Services serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines described in WET-EcoServices (Kotze et al. 2008). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 3-2).

Table 3-2 Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

3.3.4 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 3-3.

Table 3-3 The Present Ecological Status categories (Macfarlane, et al., 2008)

Impact Category	Description	Impact Score Range	PES
None	**Unmodified, natural**	**0 to 0.9**	**A**
Small	**Largely Natural** with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	**1.0 to 1.9**	**B**
Moderate	**Moderately Modified.** A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	**2.0 to 3.9**	**C**
Large	**Largely Modified.** A large change in ecosystem processes and loss of natural habitat and biota has occurred.	**4.0 to 5.9**	**D**
Serious	**Seriously Modified.** The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable.	**6.0 to 7.9**	**E**
Critical	**Critical Modification.** The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	**8.0 to 10**	**F**

3.3.5 Importance and Sensitivity

The importance and sensitivity of water resources is determined in order to establish resources that provide higher than average ecosystem services, biodiversity support functions are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category as listed in Table 3-4 (Rountree and Kotze, 2013).

Table 3-4 Description of Importance and Sensitivity categories

EIS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	**A**
High	2.1 to 3.0	**B**
Moderate	1.1 to 2.0	**C**
Low Marginal	< 1.0	**D**

3.3.6 Determining Buffer Requirements

The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane et al., 2014) was used to determine the appropriate buffer zone for the proposed activity.

3.3.7 Risk Assessment

The Department of Water and Sanitation (DWS) risk matrix assesses impacts in terms of consequence and likelihood. The significance of the impact is calculated according to Table 3-5.

Table 3-5 Significance ratings matrix

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s)impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

3.4 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 3-6 and Table 3-7, respectively.

Table 3-6 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 3-7 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 3-8.

Table 3-8 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 3-9.

Table 3-9 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 3-10.

Table 3-10 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 3-11.

Table 3-11 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.

3.5 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 two short term wet season surveys 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;
- Areas characterised by external wetland indicators have been the focus for this assessment. Areas lacking these characteristics have not been focussed on;
- Fieldwork was only achieved within the proposed infrastructure areas, with desktop assessments being concluded for the remaining extent within the 500 m regulated area;
- Despite wetland indicators being identified within selected transformed and cultivated areas, the accuracy of delineating the extent of these wetland areas is compromised due to the disturbances to these areas. Wet areas within these areas could not be delineated with any appreciable level of confidence and desktop data was considered to facilitate the delineation. A Google Earth time series depicting the extent of disturbances is presented in Figure 3-3; 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.

Figure 3-3 A Google Earth time series depicting the land cover disturbances for the feasibility area

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 Least Concern ecosystem	4.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Poorly Protected Ecosystem	4.1.1.2
Protected Areas	Irrelevant – 1.7 km to Leeuwenspruit Private Nature Reserve	-

Renewable Energy Development Zones	Relevant - The project area is 36 km for the closest REDZ	4.1.1.3
Powerline Corridor	Relevant- The project area falls just outside the Central Corridor	4.1.1.4
Critical Biodiversity Area	Relevant – The project area overlaps with a degraded and other natural area.	4.1.1.5
National Protected Areas Expansion Strategy	Relevant – The project area is 2.2 km from a NPAES protected area	4.1.1.6
Important Bird and Biodiversity Areas	Irrelevant – Located 45 km from the Suikerbosrand Nature Reserve IBA	-
South African Inventory of Inland Aquatic Ecosystems	Relevant - The project area overlaps with a LC NBA wetland but does not overlap with any rivers	4.1.1.7
National Freshwater Priority Area	Relevant – The project area overlaps with FEPA wetlands and a non-FEPA river.	4.1.1.8
Strategic Water Source Areas	Irrelevant - The project area is 155 km from the closest SWSA	-
Coordinated Waterbird Count	Relevant – 10 km from a CWAC site	4.1.1.9
Coordinated Avifaunal Road Count	Relevant – Close to 2 known routes	4.1.1.10

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 LC ecosystem (Figure 4-1).

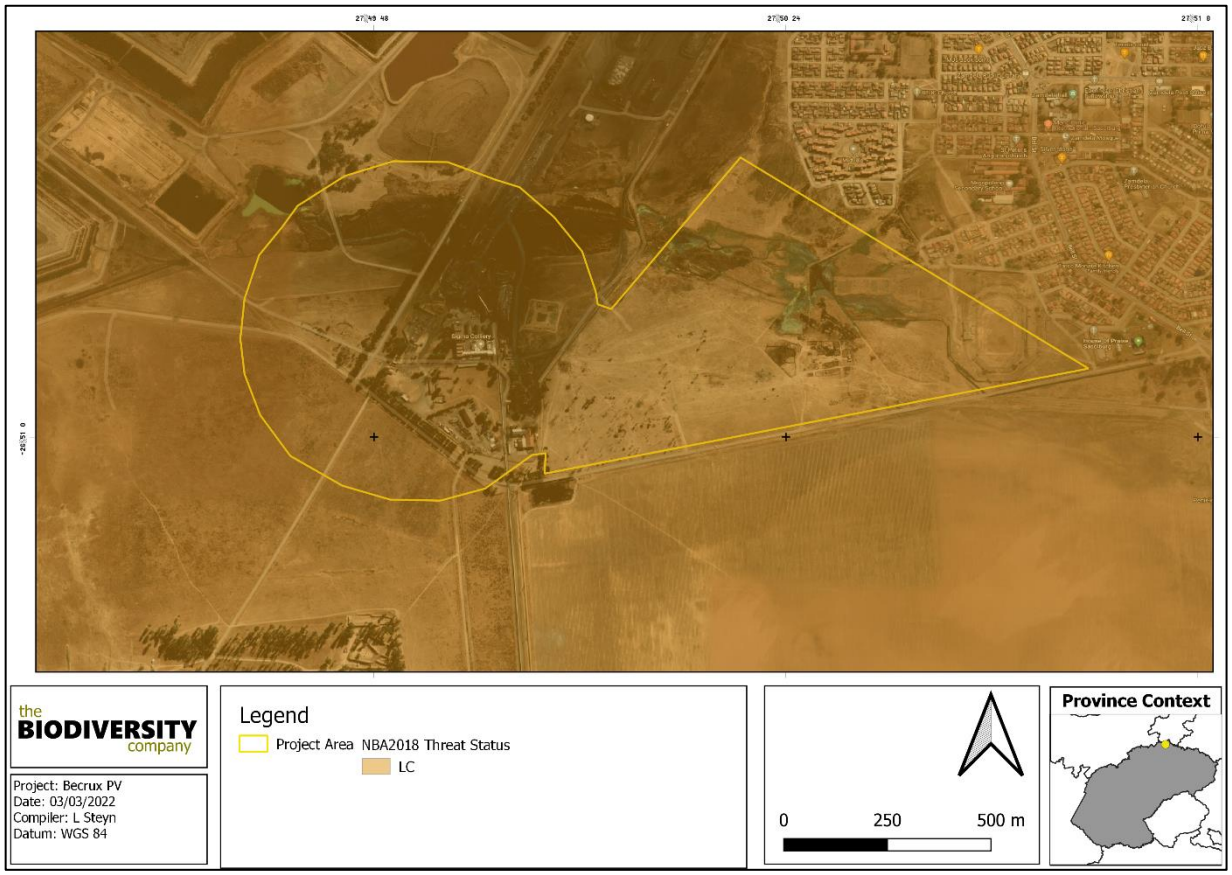


Figure 4-1 Map illustrating the ecosystem threat status associated with the project area.

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 PP ecosystem (Figure 4-2).

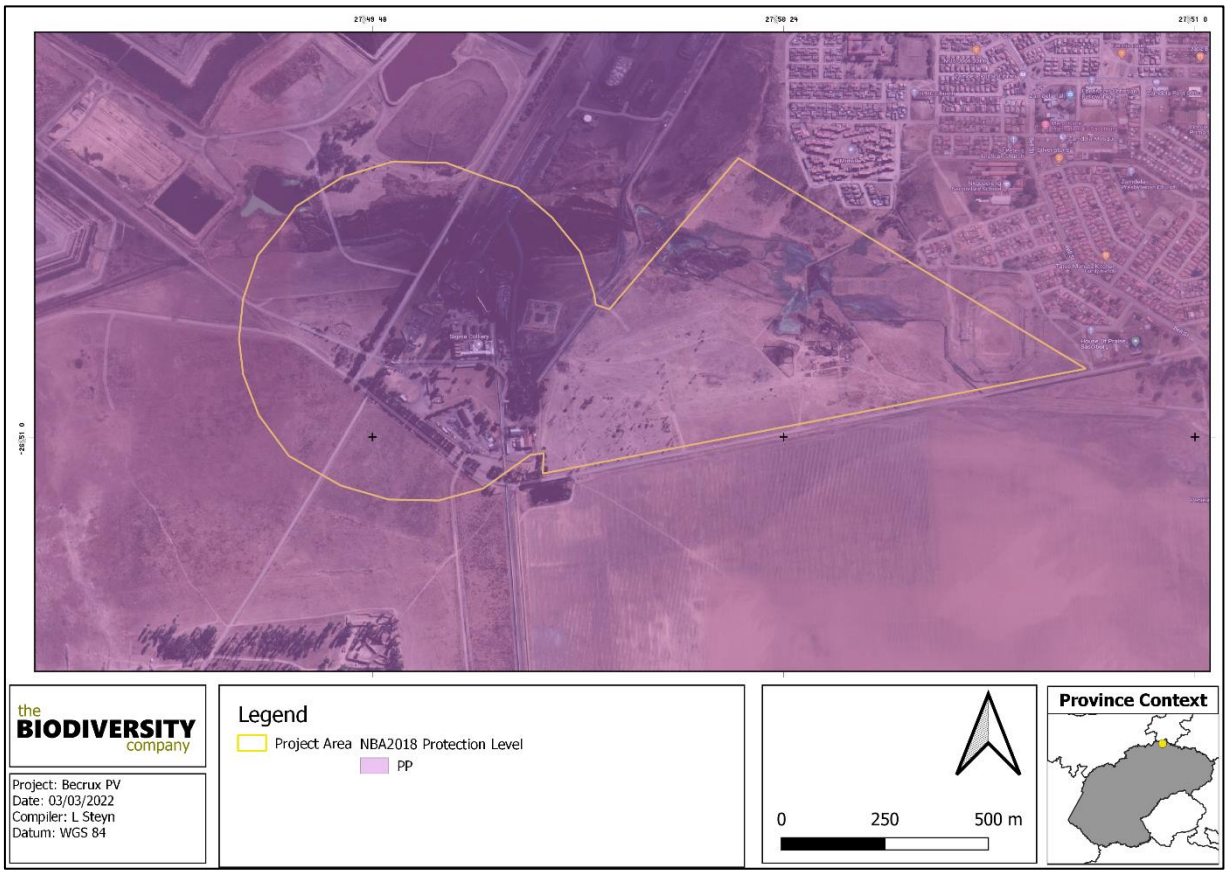


Figure 4-2 Map illustrating the ecosystem protection level associated with the project area

4.1.1.3 Renewable Energy Development Zones (REDZ)

In 2018, the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 Renewable Energy Development Zones (REDZs) important for the development of large-scale wind and solar photovoltaic facilities were identified. An additional 3 sites were included in Government Notice No. 144 published on 26 February 2021. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

More detailed information can be obtained from https://egis.environment.gov.za/redz. Information here includes the Government Notice No. 145 in Government Gazette No. 44191 that specifies the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large-scale wind and solar photovoltaic energy facilities in REDZs. The project area is 36 km from the closest Klerksdorp REDZ (Figure 4-3).

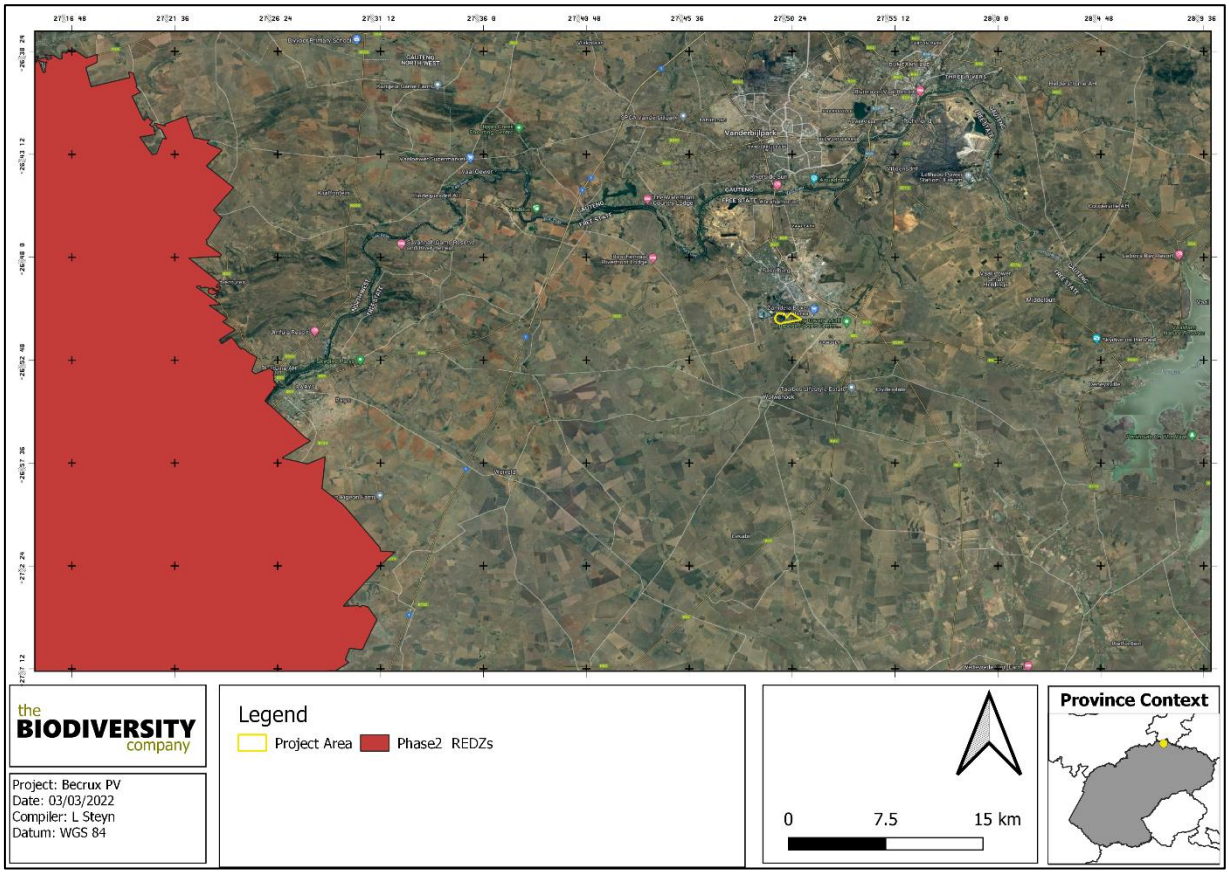


Figure 4-3 The project area in relation to the Renewable Energy Development Zone spatial data.

4.1.1.4 Strategic Transmission Corridors (EGI)

On the 16 February 2018, Minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi. The project area falls just outside the Central Corridor of the Strategic Transmission Corridors (Figure 4-4).

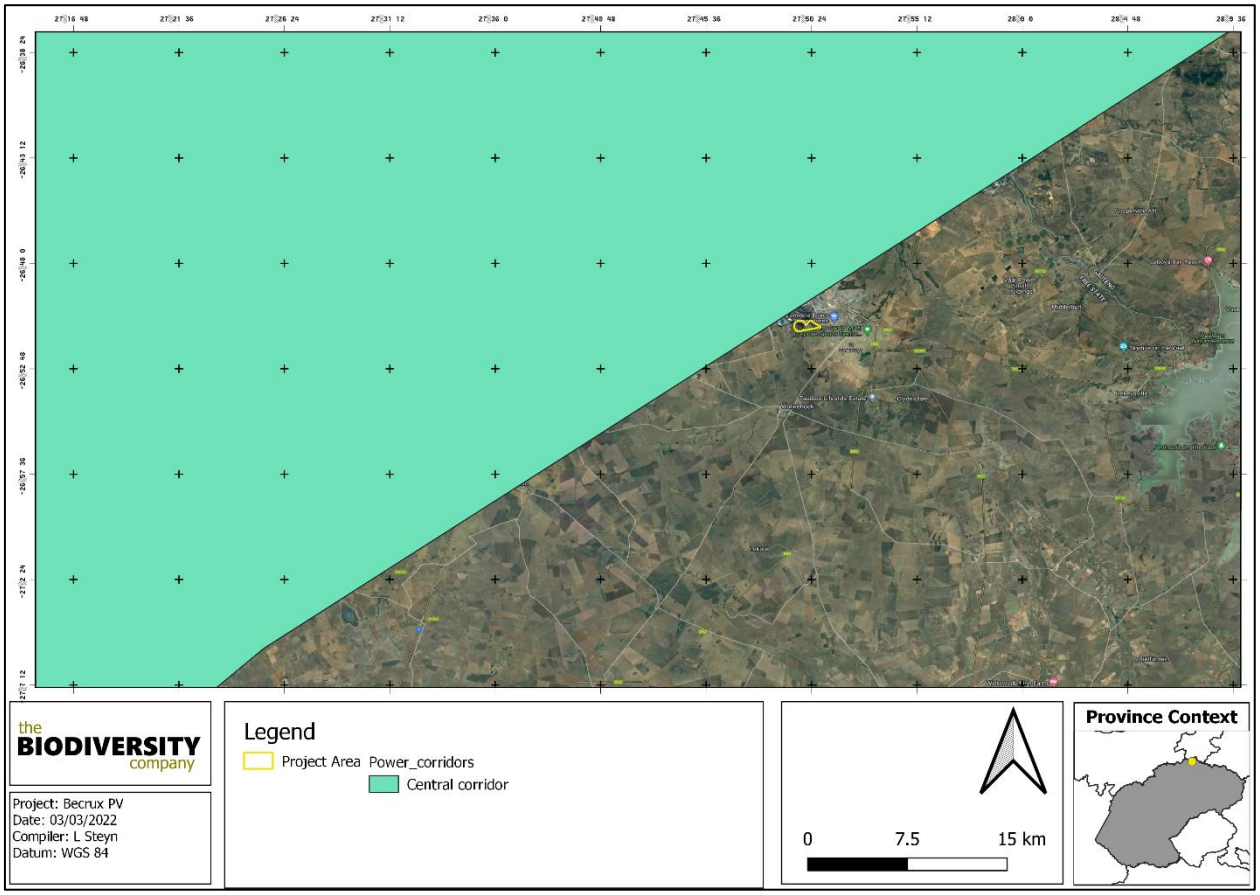


Figure 4-4 The project area in relation to the power corridors.

4.1.1.5 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 4-5 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with a degraded and other natural area.

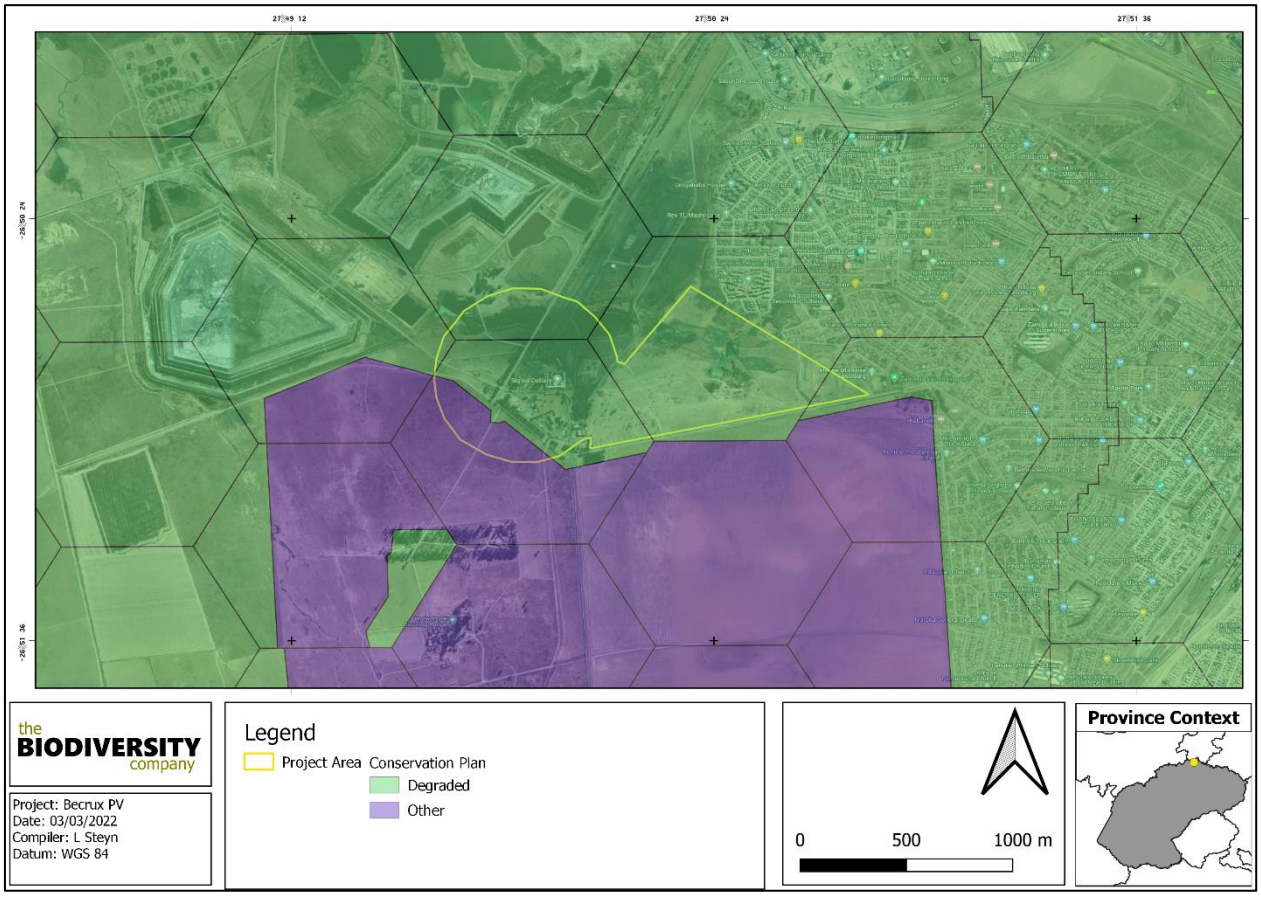


Figure 4-5 Map illustrating the locations of CBAs in the project area

4.1.1.6 National Protected Areas Expansion Strategy

National Protected Areas 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 fine-scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area is 2.2 km from a NPAES area as can be seen in Figure 4-6.

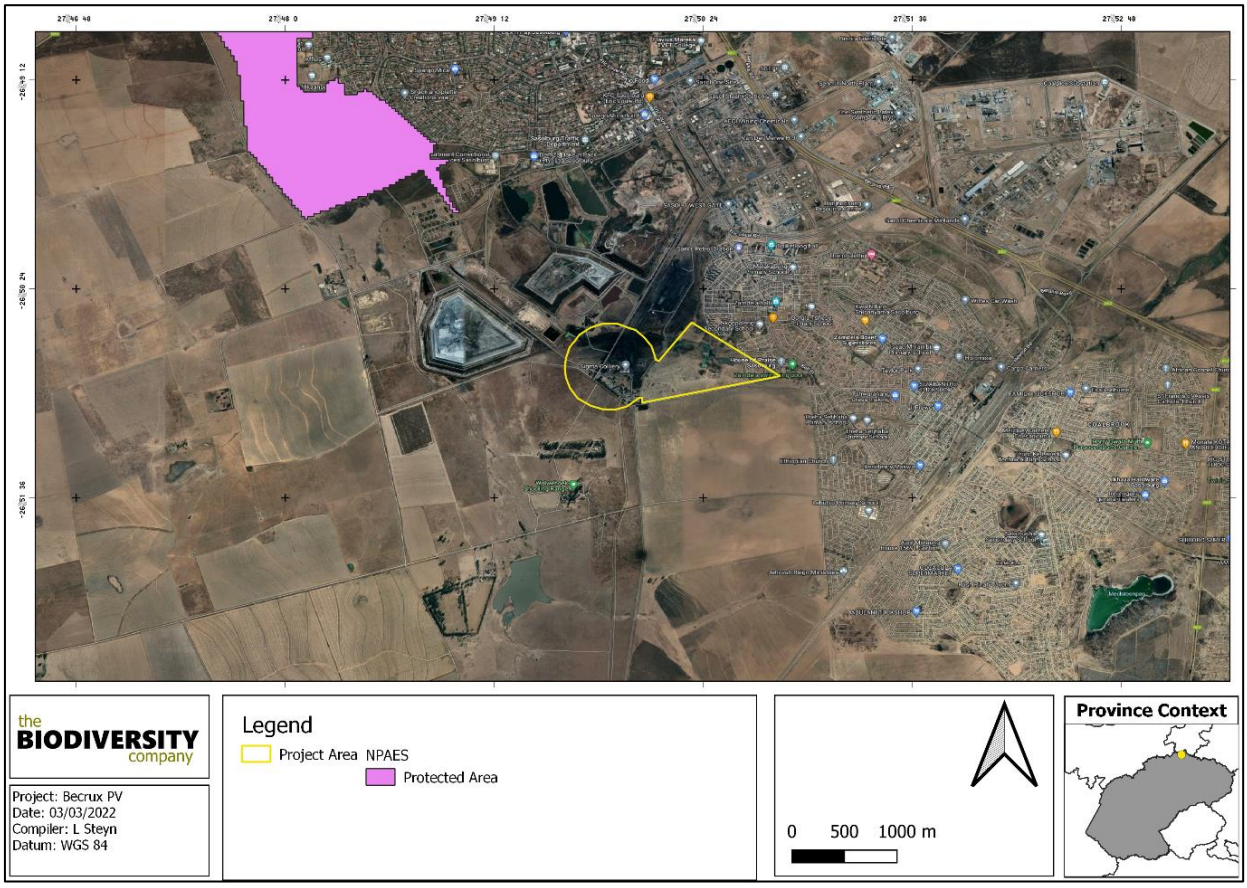


Figure 4-6 The project area in relation to the National Protected Areas Expansion Strategy

4.1.1.7 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem Threat Status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LC, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). The project area overlaps with a LC (Least Concern) NBA wetland but does not overlap with any rivers (Figure 4-7).

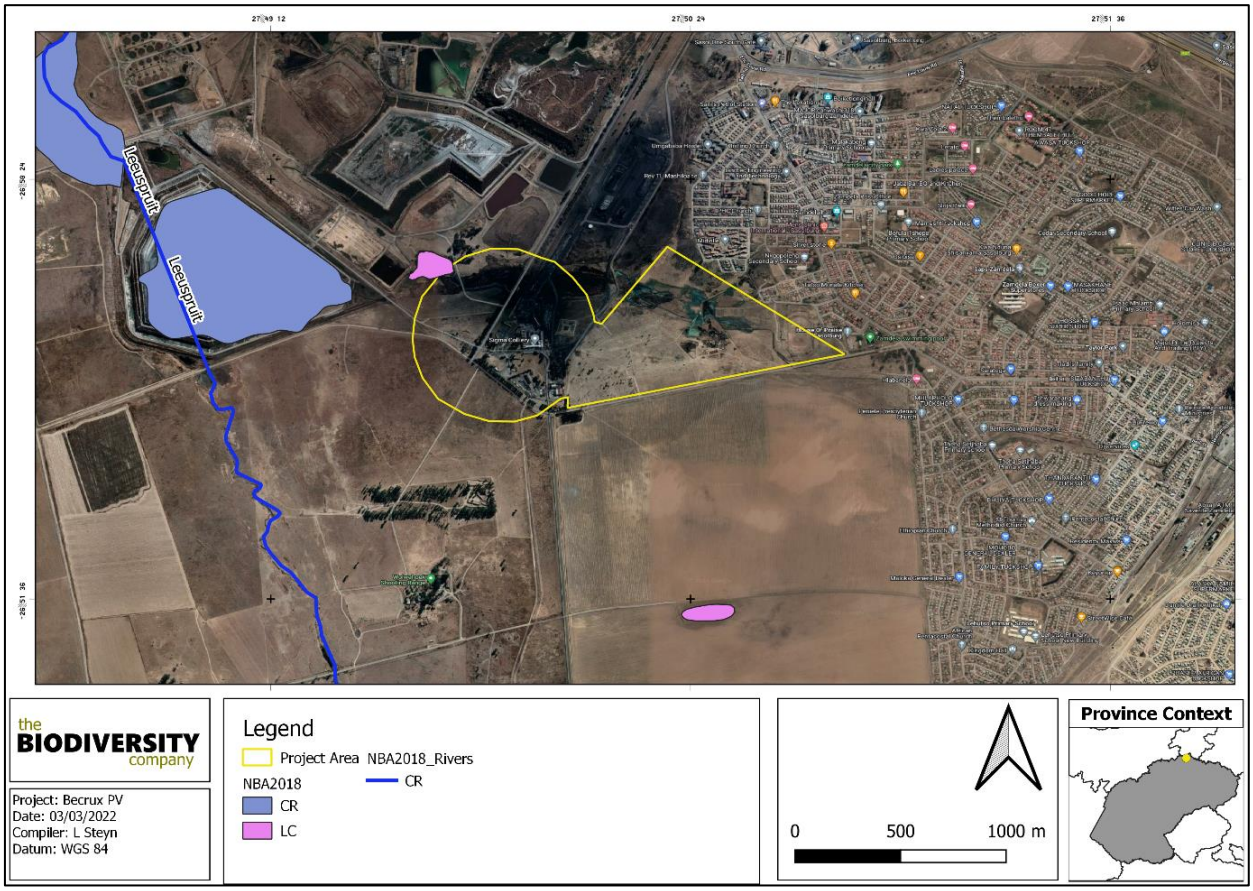


Figure 4-7 Map illustrating ecosystem threat status of rivers and protection level of wetland ecosystems in the project area

4.1.1.8 National Freshwater Ecosystem Priority Area Status

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

Figure 4-8 shows the project area overlaps with unclassified FEPA wetlands.

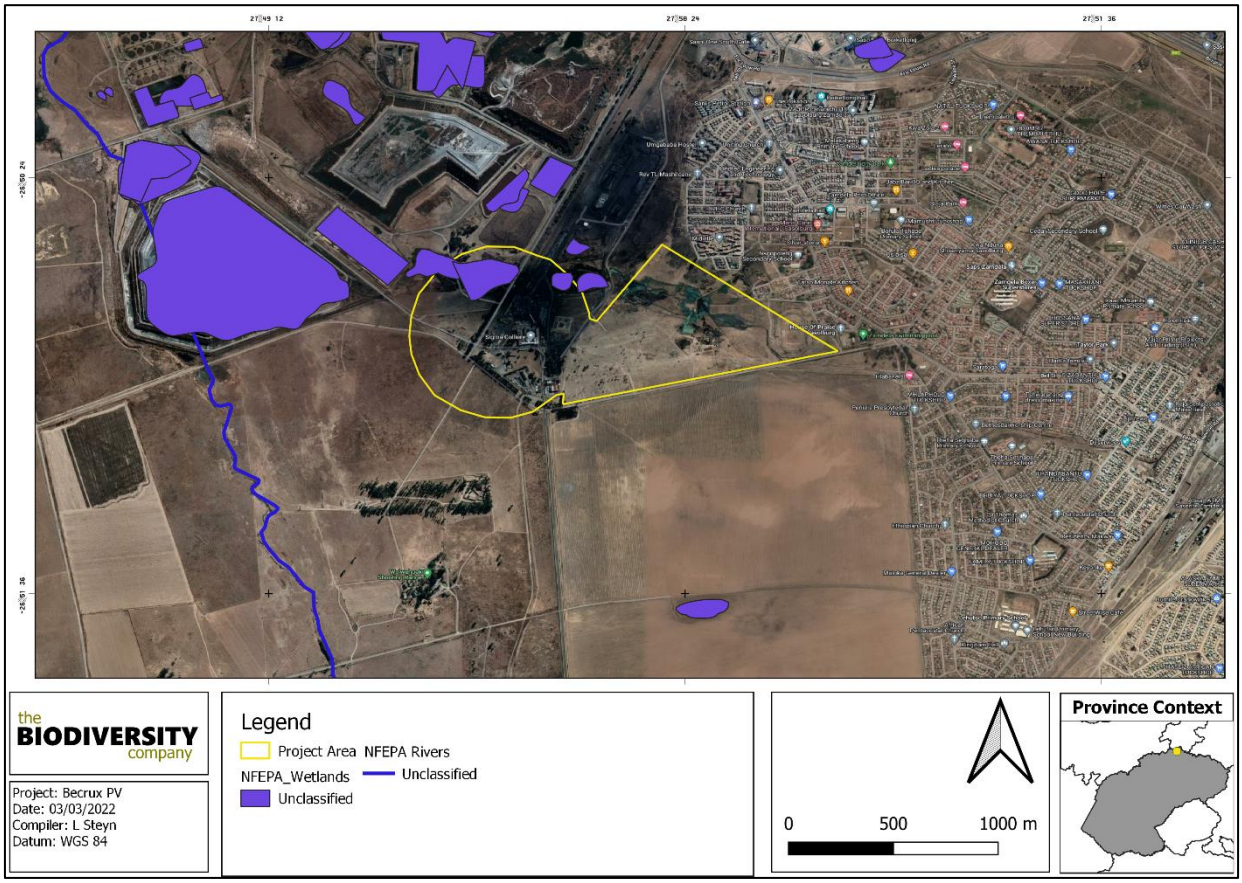


Figure 4-8 The project area in relation to the National Freshwater Ecosystem Priority Areas.

4.1.1.9 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 Vaal River Taaibosspruit to Suikerbos (26452752) site is the closest CWAC to the project area, it is approximately 10km north east. This site was registered in 2016 as a Coordinated Waterbird count site. The count is performed by boat on Vaal River from Stonehaven-on-Vaal to Taaibosspruit and up the navigable part of the Taaibosspruit. Sixty-nine (69) birds were recorded in the water bird counts since 2016 (Table 4-10).

Figure 4-9 ***The closest Coordinated Waterbird Count site (Vaal River Taaibosspruit to Suikerbos (26452752)) to the project area***

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

Taxonomic name	Common name	Average reporting rate
Actitis hypoleucos	Sandpiper, Common	1.00
Actophilornis africanus	Jacana, African	1.00
Alopochen aegyptiaca	Goose, Egyptian	142.38
Anas capensis	Teal, Cape	1.50
Anas erythrorhyncha	Teal, Red-billed	15.57
Anas hybrid		2.00
Anas platyrhynchos	Mallard	2.00
Anas platyrhynchos	Duck, Domestic	3.00
Anas sparsa	Duck, African Black	12.77
Anas undulata	Duck, Yellow-billed	54.75
Anhinga rufa	Darter, African	22.46
Anser anser	Goose, Domestic	2.50
Ardea alba	Egret, Great	2.00
Ardea cinerea	Heron, Grey	1.40
Ardea goliath	Heron, Goliath	5.27
Ardea intermedia	Egret, Intermediate	1.00
Ardea melanocephala	Heron, Black-headed	3.50
Ardea purpurea	Heron, Purple	2.57
Ardeola ralloides	Heron, Squacco	5.18
Asio capensis	Owl, Marsh	1.00
Bostrychia hagedash	Ibis, Hadada	54.46
Bubulcus ibis	Egret, Western Cattle	34.45

Butorides striata	Heron, Striated	2.40
Calidris minuta	Stint, Little	1.00
Calidris pugnax	Ruff	19.33
Ceryle rudis	Kingfisher, Pied	5.78
Charadrius pecuarius	Plover, Kittlitz's	1.00
Charadrius tricollaris	Plover, Three-banded	1.33
Chlidonias hybrida	Tern, Whiskered	18.67
Chlidonias leucopterus	Tern, White-winged	6.60
Chroicocephalus cirrocephalus	Gull, Grey-headed	22.00
Circus ranivorus	Harrier, African Marsh	1.00
Corythornis cristatus	Kingfisher, Malachite	10.67
Dendrocygna bicolor	Duck, Fulvous Whistling	6.50
Dendrocygna viduata	Duck, White-faced Whistling	8.09
Egretta ardesiaca	Heron, Black	2.33
Egretta garzetta	Egret, Little	3.00
Fulica cristata	Coot, Red-knobbed	24.30
Gallinago nigripennis	Snipe, African	5.50
Gallinula chloropus	Moorhen, Common	8.73
Haliaeetus vocifer	Eagle, African Fish	3.40
Himantopus himantopus	Stilt, Black-winged	4.50
Hydroprogne caspia	Tern, Caspian	4.63
Ixobrychus minutus	Bittern, Little	3.78
Megaceryle maxima	Kingfisher, Giant	4.25
Microcarbo africanus	Cormorant, Reed	21.75
Motacilla capensis	Wagtail, Cape	10.33
N/A N/A	Duck, Unidentified	7.50
Nycticorax nycticorax	Heron, Black-crowned Night	4.25
Phalacrocorax lucidus	Cormorant, White-breasted	8.33
Phoeniconaias minor	Flamingo, Lesser	4.00
Phoenicopterus roseus	Flamingo, Greater	45.00
Platalea alba	Spoonbill, African	1.67
Plectropterus gambensis	Goose, Spur-winged	36.54
Plegadis falcinellus	Ibis, Glossy	18.90
Podiceps cristatus	Grebe, Great Crested	3.00
Podiceps nigricollis	Grebe, Black-necked	2.00
Porphyrio madagascariensis	Swamphen, African	2.00
Rallus caerulescens	Rail, African	1.00
Recurvirostra avosetta	Avocet, Pied	9.00
Spatula hottentota	Teal, Blue-billed	4.00
Spatula smithii	Shoveler, Cape	4.13

Tachybaptus ruficollis	Grebe, Little	15.25
Tadorna cana	Shelduck, South African	1.50
Threskiornis aethiopicus	Ibis, African Sacred	4.90
Tringa nebularia	Greenshank, Common	1.00
Vanellus armatus	Lapwing, Blacksmith	134.23
Vanellus senegallus	Lapwing, African Wattled	12.27
Zapornia flavirostra	Crake, Black	3.14

4.1.1.10 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 4-10 shows that the project area lies close to two of the routes.

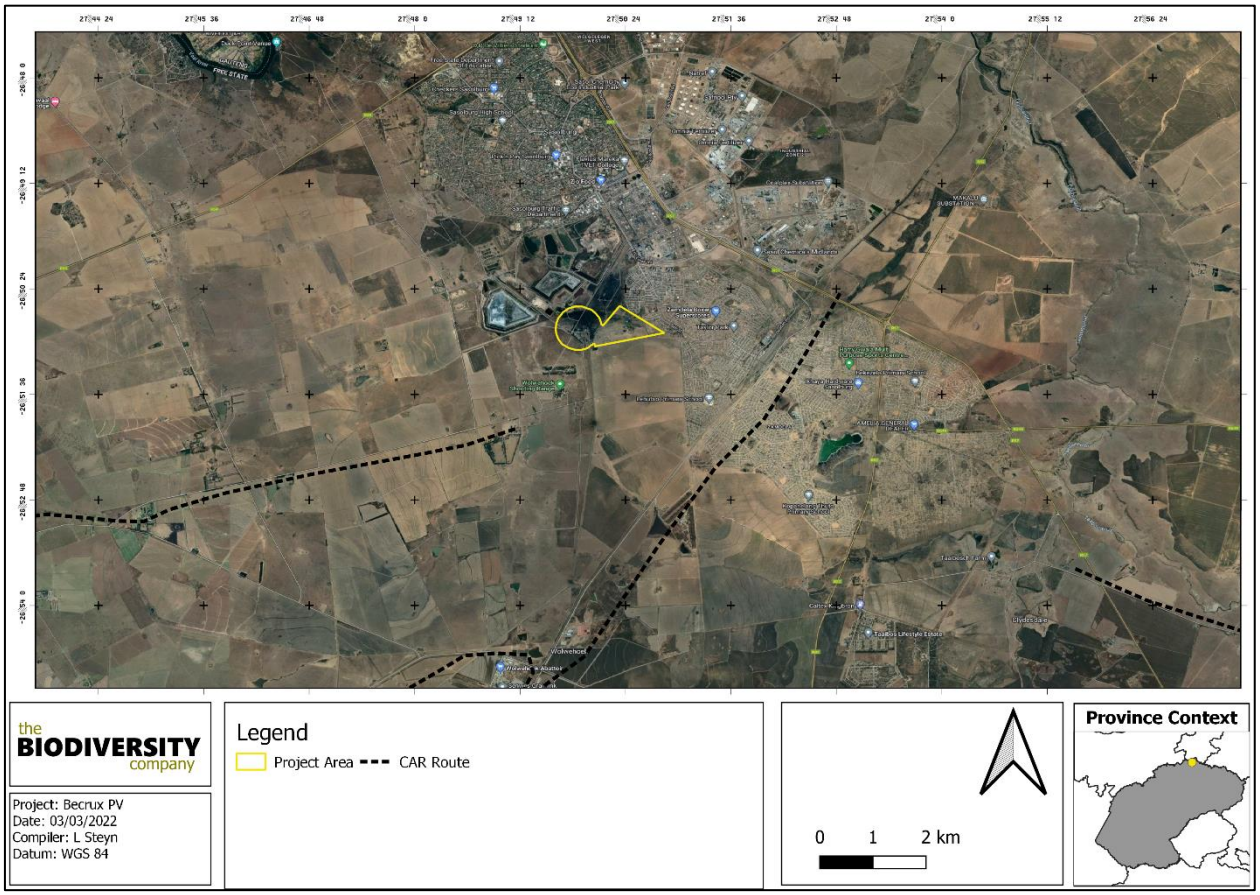


Figure 4-10 The project area in relation to the nearby CAR routes

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

a) Seasonal precipitation; and

b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

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

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

On a fine-scale vegetation type, the project area overlaps with the Central Free State Grassland vegetation type (Figure 4-11).

Figure 4-11 Map illustrating the vegetation type associated with the project area

4.1.2.1.1 Central Free State Grassland

The Central Free State Grassland comprises undulating plains supporting short grassland, in natural conditions dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats.

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 **Central Free State Grassland** vegetation type (d= dominant):

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

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

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

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

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

Conservation Status of the Vegetation Type

The national conservation target is 24%. Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. The conservation status of this vegetation community was listed by Mucina and Rutherford (2006) as Vulnerable.

4.1.2.2 Expected Flora Species

The Plants of southern Africa (POSA) database indicates that 574 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. Four (4) species of conservation concern (SCC, as per the IUCN), based on their conservation status, could be expected to occur within the project area and are provided in Table 4-3 below.

Table 4-3 Threatened flora species that may occur within the project area.

Family	Taxon	Author	IUCN	Ecology
Apiaceae	*Alepidea attenuata*	Weim.	NT	Indigenous
Asphodelaceae	*Kniphofia typhoides*	Codd	NT	Indigenous; Endemic
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Fabaceae	*Indigofera hybrida*	N.E.Br.	VU	Indigenous; Endemic

4.1.3 Faunal Assessment

4.1.3.1 Amphibians

Based on the International Union for Conservation of Nature (IUCN) Red List Spatial Data and AmphibianMap, 21 amphibian species are expected to occur within the area (Appendix B). One (1) is regarded as threatened (Figure 4-3).

Table 4-4 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

The 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. Giant Bull Frog 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, 65 reptile species are expected to occur within the area (Appendix C). Three (3) are regarded as threatened (Table 4-5). No habitat is present in the project area for any of the SCC.

Table 4-5 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)	
Chamaesaura aenea	Coppery Grass Lizard	NT	LC	Low
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Homoroselaps dorsalis	Striped Harlequin Snake	NT	LC	Low

4.1.3.3 Mammals

The IUCN Red List Spatial Data lists 67 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. Eleven (11) of these expected species are regarded as threatened (Table 4-6), seven of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

Table 4-6 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
Crocidura maquassiensis	Makwassie musk shrew	VU	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Moderate
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	White-tailed Rat	VU	EN	Moderate

Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low

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 seasonal wetland on the edge of the project area which could provide suitable habitat, the species were given a moderate likelihood of occurrence.

Hydrictis maculicollis (Spotted-necked Otter) inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes (IUCN, 2017). Suitable habitat may be available in the wetland area to the northwest of the project area.

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.

Mystromys albicaudatus (White-tailed Rat) is listed as VU on a regional basis and EN on a global scale. It is relatively widespread across South Africa and Lesotho; the species is known to occur in shrubland and grassland areas. A major requirement of the species is black loam soils with good vegetation cover. Although the vegetation type is suitable, no black loam seems to be present on site, therefore the likelihood of occurrence of this species is rated as moderate.

4.1.4 Avifauna

The SABAP2 Data lists 321 avifauna species that could be expected to occur within the area (Appendix E). Twenty-four (24) of these expected species are regarded as threatened (Table 4-7). Eighteen 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 4-7 Threatened avifauna species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Calidris ferruginea	Sandpiper, Curlew	LC	NT	Moderate
Ciconia abdimii	Stork, Abdim's	NT	LC	Low
Ciconia episcopus	Stork, Woolly-necked	Unlisted	NT	Low
Circus macrourus	Harrier, Pallid	NT	NT	Low
Circus maurus	Harrier, Black	EN	EN	Low
Circus ranivorus	Marsh-harrier, African	EN	LC	Moderate
Coracias garrulus	Roller, European	NT	LC	Moderate
Eupodotis caerulescens	Korhaan, Blue	LC	NT	Low
Eupodotis senegalensis	Korhaan, White-bellied	VU	LC	Low
Falco biarmicus	Falcon, Lanner	VU	LC	High
Falco vespertinus	Falcon, Red-footed	NT	NT	High
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Low

Gorsachius leuconotus	Night Heron, White-backed	VU	LC	Low
Grus paradisea	Crane, Blue	NT	VU	Low
Gyps africanus	Vulture, White-backed	CR	CR	Low
Mirafra cheniana	Lark, Melodious	LC	NT	Low
Mycteria ibis	Stork, Yellow-billed	EN	LC	Low
Oxyura maccoa	Duck, Maccoa	NT	VU	Low
Phoeniconaias minor	Flamingo, Lesser	NT	NT	Low
Phoenicopterus roseus	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	EN	Low
Rostratula benghalensis	Painted-snipe, Greater	NT	LC	Moderate
Sagittarius serpentarius	Secretarybird	VU	EN	Low
Tyto capensis	Grass-owl, African	VU	LC	Low

Calidris ferruginea (Curlew Sandpiper) is migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic and may be seen in parts of South Africa during winter. During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and saltpans (IUCN, 2017). Some small portions of suitable habitat are present in the north western side of the project area. The likelihood of occurrence of this species was therefore rated as moderate.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins. There are some somewhat disturbed wetlands in the project area, and thus the occurrence of *C. ranivorus* in the project area is therefore considered to be moderate.

Coracias garrulous (European Roller) is a winter migrant from most of South-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller has a preference for bushy plains and dry savannah areas (IUCN, 2017). There is a moderate chance of this species occurring in the project area as they prefer to forage in open/disturbed agricultural areas.

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.

Falco vespertinus (Red-footed Falcon) is known to breed from eastern Europe and northern Asia to north-western China, heading south in the non-breeding season to southern Angola and southern Africa. Within southern Africa it is locally uncommon to common in Botswana, northern Namibia, central Zimbabwe and the area in and around Gauteng, South Africa (Hockey *et al,* 2005). The habitat it generally prefers is open habitats with scattered trees, such as open grassy woodland, wetlands, forest fringes and croplands. Many of these habitats are present in the project area and thus the likelihood of occurrence is rated as high.

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

4.2 Field Assessment

The following sections provide the results from the field survey for the proposed development that was undertaken on the 9 February 2022 & 1-2 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. A total of 92 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 4-10). 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 4-12.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 4-8 Trees, shrub and herbaceous plant species recorded in the project area

Scientific Name	Common Names	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Acer palmatum	Japanese Maple			Naturalized exotic
Afrosciadium magalismontanum		LC	Not Endemic	
Agave sisalana	Sisal hemp			NEMBA Category 2
Amaranthus hybridus subsp. hybridus	Pigweed			Naturalized exotic
Arctotis arctotoides	Botterblom	LC	Not Endemic	
Argemone ochroleuca	Mexican poppy			NEMBA Category 1b.
Aristida congesta subsp *barbicollis*	Aapstertsteekgras	LC	Not Endemic	
Asparagus cooperi	Haakdoring	LC	Not Endemic	
Berkheya echinacea	Iphungula	LC	Not Endemic	
Berkheya pinnatifida subsp. stobaeoides		LC	Not Endemic	
Bidens pilosa	Black Jack			Naturalized exotic weed
Canna indica	Indian Shot			NEMBA Category 1b
Celtis sinensis	Chinese Hackberry			Naturalized exotic
Cestrum parqui	Chilean cestrum			NEMBA Category 1b.
Chironia palustris subsp. palustris	Bitterwortel	LC	Not Endemic	
Chloris pycnothrix	Orchard Grass	LC	Not Endemic	
Chloris virgata	Blue Grass	LC	Not Endemic	
Chlorophytum cooperi	Cooper's anthericum	LC	Not Endemic	
Cirsium vulgare	Spear Thistle,		Naturalised; Invasive	NEMBA Category 1b
Combretum erythrophyllum	River Bushwillow	LC	Not Endemic	
Commiphora africana		LC	Not Endemic	
Conyza bonariensis	Flax-leaf Fleabane			Naturalized exotic
Cotula anthemoides	Umhlonyane (z)	LC	Not Endemic	
Cycnium tubulosum subsp. tubulosum	Vlei ink-flower	LC	Not Endemic	

Cymbopogon caesius	Broad-leaved turpentine grass	LC	Not Endemic	
Cynodon dactylon	Couch Grass, Quick Grass	LC	Not Endemic	
Cyperus congestus	Hedgehog Sedge	LC	Not Endemic	
Datura ferox	Large Thorn Apple			NEMBA Category 1b.
Digitaria eriantha	Common Finger Grass	LC	Not Endemic	
Echinochloa jubata		LC	Not Endemic	
Eragrostis chloromelas	Blue Love Grass	LC	Not Endemic	
Eragrostis curvula	Weeping Love Grass	LC	Not Endemic	
Eragrostis gummiflua	Gum Grass	LC	Not Endemic	
Eragrostis obtusa	Kwaggakweek	LC	Not Endemic	
Eragrostis superba	Flat-Seed Love Grass	LC	Not Endemic	
Eucalyptus camaldulensis	Red River Gum			NEMBA Category 1b
Felicia muricata	Taai-Astertjie	LC	Not Endemic	
Ficus carica	Common Fig			Food Plant
Flaveria bidentis	Smelter's-bush			NEMBA Category 1b.
Gomphocarpus fruticosus subsp. fruticosus		LC	Indigenous	
Gomphrena celosioides	Bachelors Button			Naturalized exotic
Grevillea robusta	Australian silver oak			Naturalized exotic
Haplocarpha scaposa	False gerbera	LC	Not Endemic	
Helichrysum nudifolium var. nudifolium	Hottentot's tea	LC-Protected	Not Endemic	
Helichrysum rugulosum	Marotole (SS)	LC-Protected	Not Endemic	
Hermannia depressa	Roadside Doll's Rose	LC	Not Endemic	
Hibiscus aethiopicus	Common Dwarf Wild Hibiscus	LC	Not Endemic	
Hibiscus trionum	Bladderweed,			Naturalized exotic
Hilliardiella oligocephala	Bicoloured-leaved Vernonia	LC	Not Endemic	
Hyparrhenia hirta	Thatch Grass	LC	Not Endemic	

Hyperthelia dissoluta	Yellowthatching Grass	LC	Not Endemic	
Ledebouria luteola	Highveld African hyacinth	LC	Not Endemic	
Lippia rehmannii	Beukesbossie	LC	Not Endemic	
Marsilea macrocarpa	Waterklawer	LC	Not Endemic	
Melia azedarach	Chinaberry tree			NEMBA Category 1b.
Mirabilis jalapa	Four o Clock			NEMBA Category 1b.
Nerium oleander	Oleander			NEMBA Category 1b.
Oenothera stricta subsp. stricta	Common evening-primrose			Naturalized exotic
Oxalis depressa	Bolila		Not Endemic	
Panicum maximum	Guinea grass	LC	Not Endemic	
Paspalum dilatatum	Dallis Grass	LC	Not Endemic	
Pennisetum clandestinum	Kikuyu Grass			NEMBA Category 1b in protected areas and wetlands.
Persicaria lapathifolia	Pale smartweed			Naturalized exotic
Pinus pinaster	Cluster pine			NEMBA Category 1b.
Platanus acerifolia	London plane			Naturalized exotic
Polypogon monspeliensis	Rabbit's foot			Naturalized exotic
Populus alba	Poplar			NEMBA Category 2
Populus deltoides	Necklace poplar			Naturalized exotic
Quercus robur	English Oak			Naturalized exotic
Robinia pseudoacacia	Black locust			NEMBA Category 1b.
Salix babylonica var. babylonica	Weeping Willow			Naturalized exotic
Schinus terebinthifolius	Brazilian Pepper Tree			NEMBA Category 3
Schkuhria pinnata	Dwarf Marigold			Naturalized exotic
Schoenoplectus tabernaemontani	Soft-stemmed club-bulrush	LC	Not Endemic	
Searsia lancea	Karee	LC	Not Endemic	
Selago densiflora		LC	Not Endemic	

Senecio inornatus		LC	Not Endemic	
Setaria pumila	Yellow bristle-grass	LC	Not Endemic	
Setaria sphacelata var. sericea	Golden Bristle Grass	LC	Not Endemic	
Solanum campylacanthum	Apple of Sodom	LC	Not Endemic	
Sporobolus africanus	Ratstail Dropseed; Rush Grass	LC	Not Endemic	
Stoebe plumosa	Bankrupt Bush	LC	Not Endemic	
Tagetes minuta	Khaki Weed			Naturalized exotic
Tamarix ramosissima	Pink tamarisk			NEMBA Category 1b.
Themeda triandra	Angle Grass	LC	Not Endemic	
Trifolium repens	White Clover			Naturalized exotic
Typha capensis	Bulrush	LC	Not Endemic	
Vachellia karroo	Sweet Thorn, Cape Gum	LC	Not Endemic	
Verbena astrigera	Roadside Verbena			Naturalized exotic
Verbena bonariensis	Purple Top			NEMBA Category 1b.
Verbena brasiliensis	Brazilian vervain			NEMBA Category 1b.
Zinnia peruviana	Peruvian zinnia			Naturalized exotic

Figure 4-12 ***Photographs illustrating some of the flora recorded within the assessment area. A) Chironia palustris subsp. palustris, B) Afrosciadium magalismontanum, C) Helichrysum rugulosum (Protected, SANBI 2017) and D) Helichrysum nudifolium (Protected, SANBI 2017).***

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 on the 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.

Sixteen (16) 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 with section 75 of the NEMBA, as stated above.

4.2.2 Faunal Assessment

Herpetofauna 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 4-9). 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 4-9) (Figure 4-13). None of the herpetofauna species recorded are regarded as threatened.

Table 4-9 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

Figure 4-13 Photographs illustrating some of the amphibian species recorded within the assessment area. A) Bubbling Kassina (Kassina senegalensis)

4.2.2.2 Mammals

Three (3) mammal species were observed during the survey of the project area (Table 4-10) based on either direct observation or the presence of visual tracks and signs (Table 4-10). None of the species recorded are regarded as SCC.

Table 4-10 Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Xerus inauris	Cape Ground Squirrel	LC	LC

Figure 4-14 ***Photographs illustrating some of the mammal species recorded within the assessment area. A) Yellow Mongoose (Cynictis penicillata), B) Cape Ground Squirrel (Xerus inauris) and C) Common Mole-rat (Cryptomys hottentotus) mound.***

4.2.3 Avifauna

Fifty-one (51) 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 Laughing doves had the highest abundance, followed by the Southern Red Bishops and the Cape Turtle Doves (Table 4-11). None of the species recorded were SCCs. Some of the species recorded on site are shown in Figure 4-15.

Table 4-11 ***Dominant avifaunal species recorded within the project area during the survey as defined as those species whose relative abundances cumulatively account for more than 70.2% of the overall abundance shown alongside the frequency with which a species was detected.***

Taxon	Common Name	Regional	IUCN (2022)	Abundance	Frequency
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC	0,156	5,882
Euplectes orix	Bishop, Southern Red	Unlisted	LC	0,085	3,922
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC	0,071	5,882
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC	0,052	7,843
Gallinago nigripennis	Snipe, African	Unlisted	LC	0,047	3,922
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC	0,038	1,961
Saxicola torquatus	Stonechat, African	Unlisted	LC	0,038	3,922
Acridotheres tristis	Myna, Common	Unlisted	LC	0,033	5,882
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC	0,033	3,922
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC	0,028	1,961
Columba livia	Dove, Rock	Unlisted	LC	0,024	1,961
Cypsiurus parvus	Palm-swift, African	Unlisted	LC	0,024	1,961

Alopochen aegyptiaca	Goose, Egyptian	Unlisted	LC	0,019	1,961
Apus caffer	Swift, White-rumped	Unlisted	LC	0,019	3,922
Gallinula chloropus	Moorhen, Common	Unlisted	LC	0,019	3,922
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC	0,019	3,922

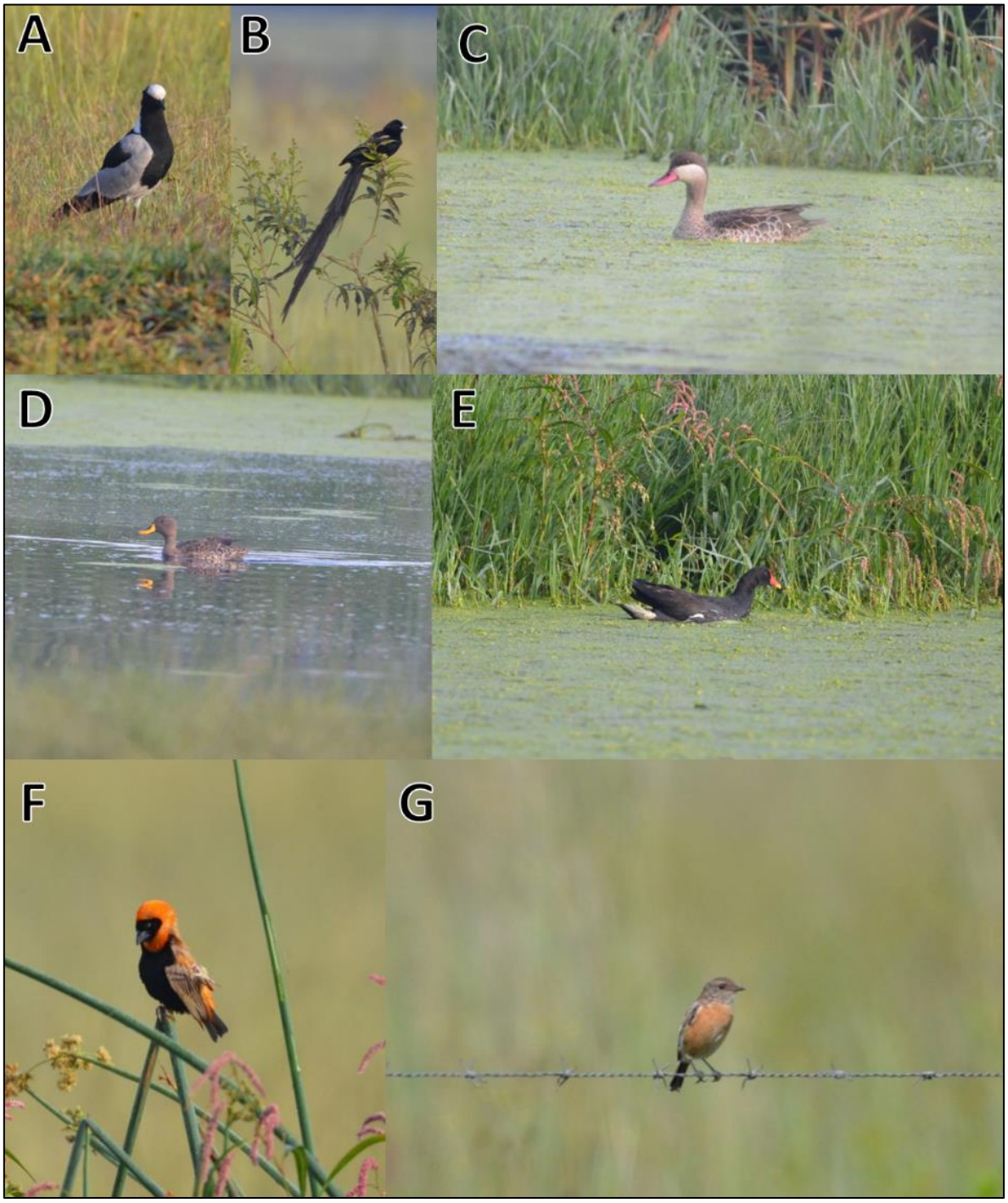


Figure 4-15 ***Some of the birds recorded in the project area: A) Blacksmith Lapwing, B) Long-tailed Widowbird, C) Red-billed Teal, D) Yellow-billed Duck, E) Common Moorhen, F) Southern Red-Bishop and E) African Stonechat***

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 insectivorous diurnal ground feeders (IGD) (Figure 4-16). Granivores that feed on the ground (GGD) made up the second highest group, followed by herbivorous water feeders (HWD). The feeding groups collaborate the main habitat divisions found in the project area i.e., grasslands and water resource areas.

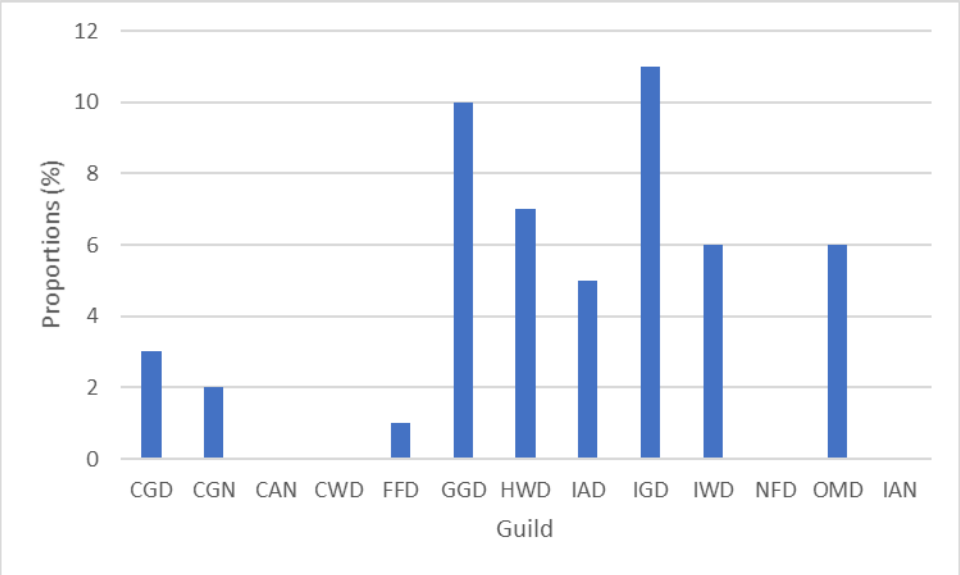


Figure 4-16 ***Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GCD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal.***

4.2.3.2 Nest Analysis

Two types of nests were observed, namely, the nests of the Southern Masked Weavers and the White-browed Sparrow Weavers. Neither of these species are highly territorial and should move their nesting sites. It is however preferable that the construction does not take place during the breeding season (September to March), if feasible. The nests were found in trees spread out through the project area (Figure 4-17) and during the construction phase, these trees will be removed, resulting in the death of the chicks. If the construction phase is done during the winter season, the impact on these species will be minimal.

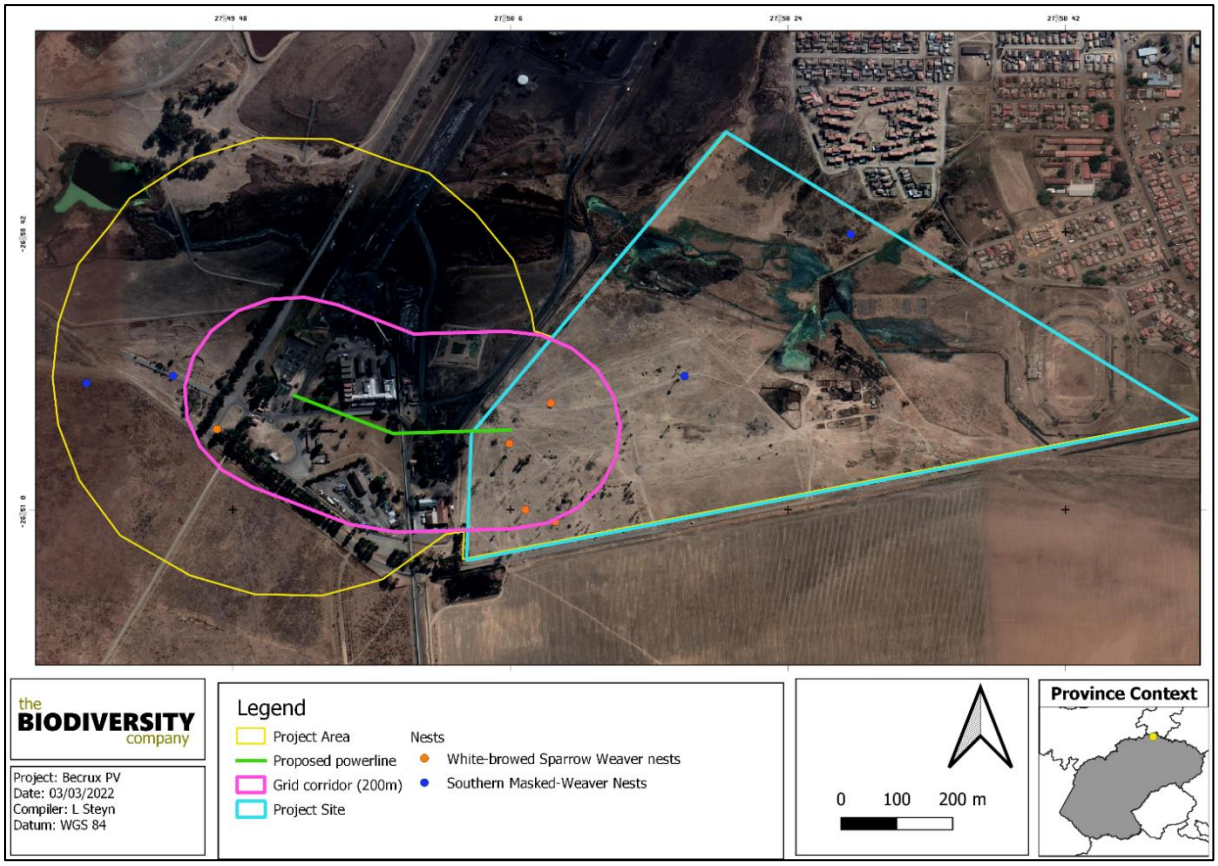


Figure 4-17 Nest locations

4.2.3.3 Risk Species

Eleven species were found that would be regarded as high-risk species (Table 4-12 and Figure 4-18). High risk species are species that are regarded as collision prone species and species that would have a high electrocution risk on powerline. 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 powerline poses a collision risk for larger birds.

Table 4-12 High risk species found in the surveys.

Taxon	Common Name	*Collisions*	*Electrocutions*
Alopochen aegyptiaca	Goose, Egyptian	X	X
Anas erythrorhyncha	Teal, Red-billed	X	
Anas sparsa	Duck, African Black	X	
Anas undulata	Duck, Yellow-billed	X	
Ardea melanocephala	Heron, Black -headed	X	X
Bostrychia hagedash	Ibis, Hadeda	X	X
Buteo vulpinus	Buzzard, Steppe	X	X
Numida meleagris	Guineafowl, Helmeted	X	X
Plectropterus gambensis	Goose, Spur-winged	X	X
Plegadis falcinellus	Ibis, Glossy	X	x
Threskiornis aethiopicus	Ibis, African Sacred	X	X

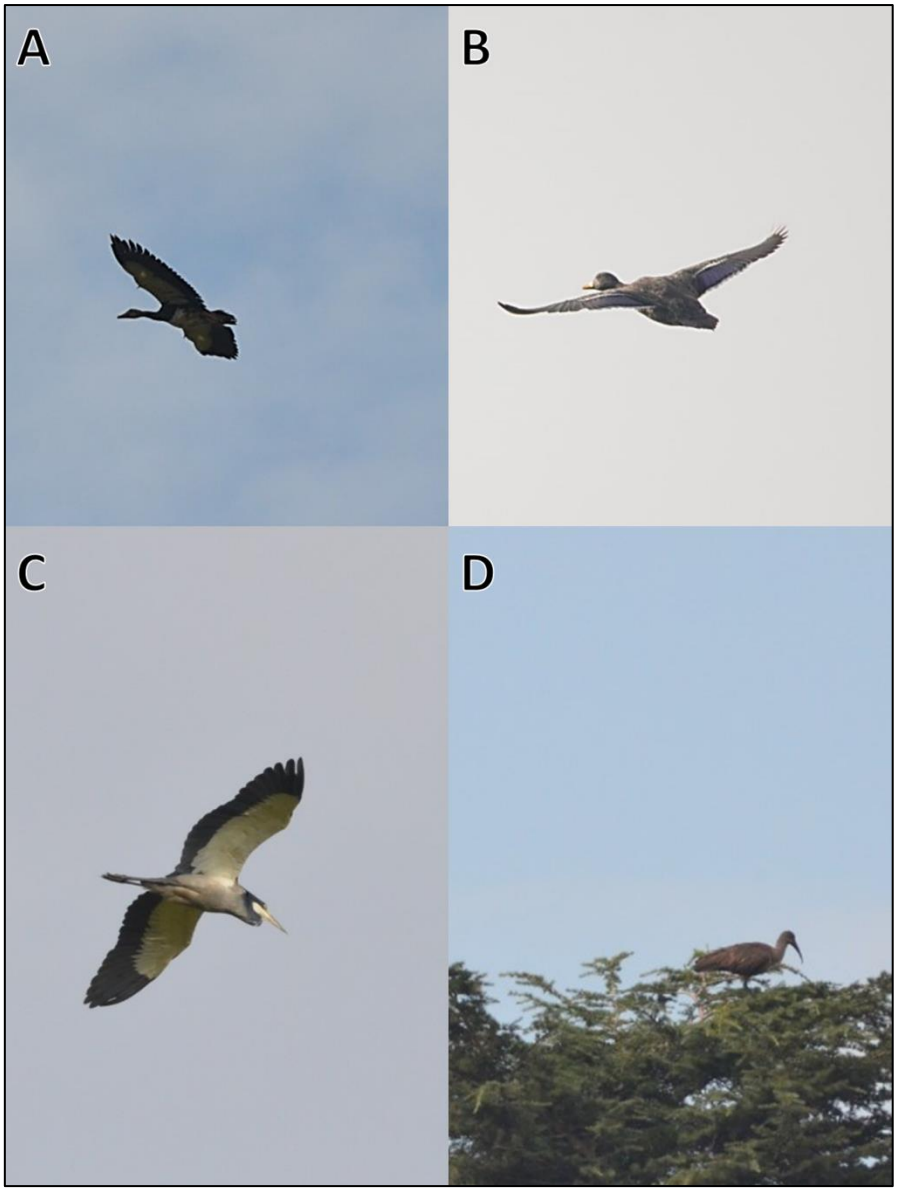


Figure 4-18 Some of the risk species observed in the project area; A) Spur-winged Goose, B) Yellow-billed Duck, C) Black-headed Heron and D) Hadeda Ibis

4.3 Wetland Assessment

4.3.1 Background

Aerial imagery of the site, dating back to 1948 was consulted in order to facilitate the identification and delineation of wetlands, and to also note the land use changes in the area. Historical imagery from 1948 (Figure 4-19) clearly indicates a watercourse flowing from east to west through the area, with a dam located in the western area.

An ecological wetland assessment (Digby Wells, 2018) was completed for the Sasol Mining Sigma Colliery ash backfilling project. The assessment identified and assessed an unchanneled valley bottom wetland and adjoining seepage areas in the project area. The integrity of the systems was determined to be seriously modified. These findings were considered to supplement the requirements of the project.

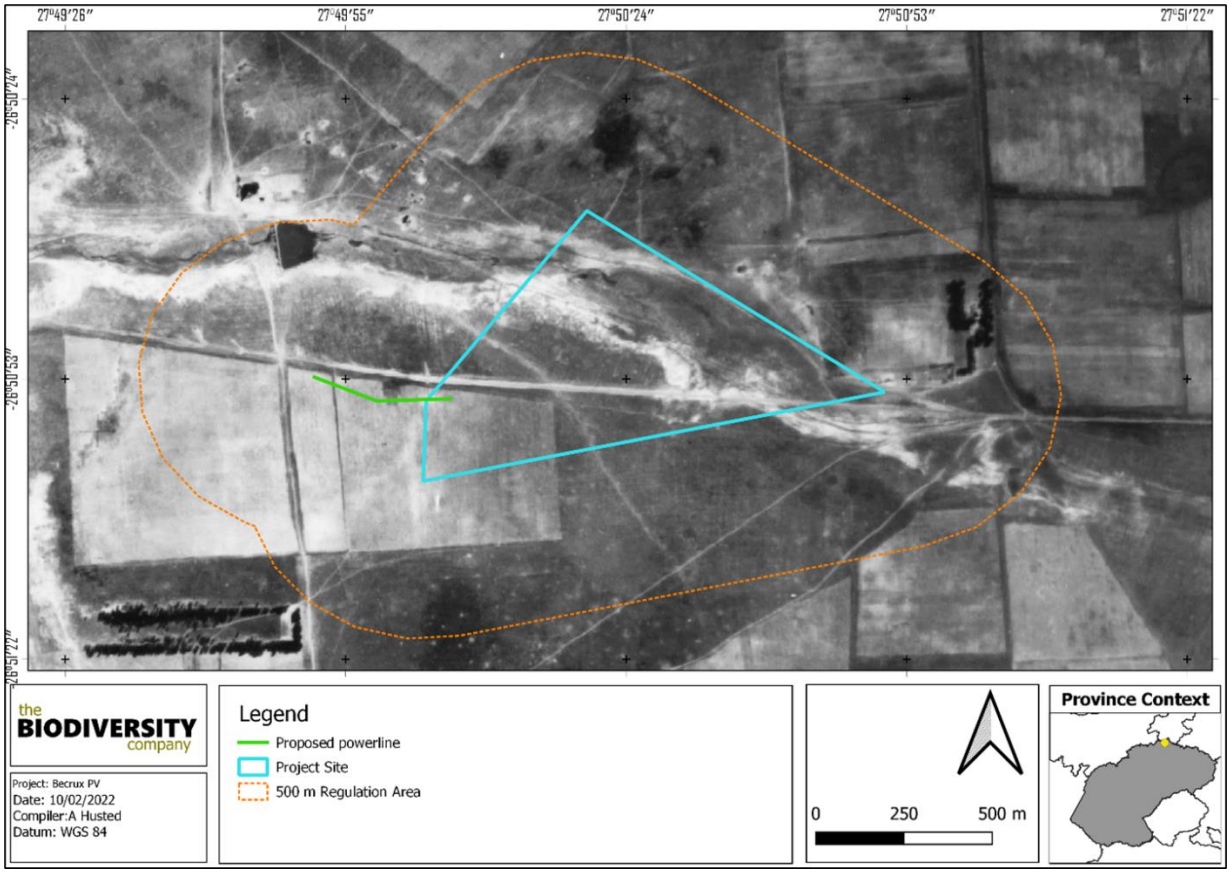


Figure 4-19 The historical imagery of the project area from 1955

4.3.2 Terrain

The terrain of the regulation area has been analysed to determine potential areas where wetlands are more likely to accumulate (due to convex topographical features, preferential pathways, or more gentle slopes).

4.3.2.1 Slope

The slope percentage of the project area has been calculated and is illustrated in Figure 4-20. Most of the regulated area is characterised by a slope percentage between 0 and 10%. This illustration indicates a uniform topography with gentle slopes being present within the project area.

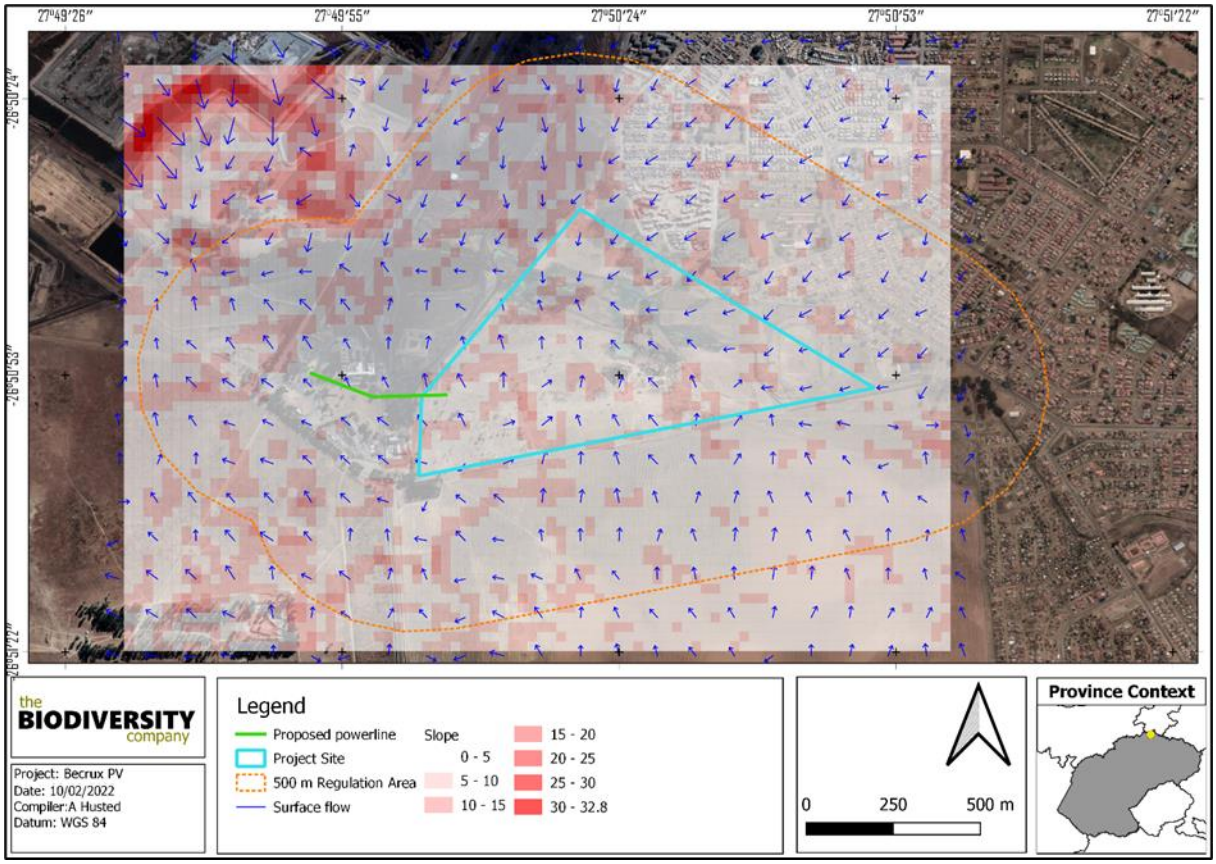


Figure 4-20 Slope percentage map for the regulated area

4.3.2.2 Digital Elevation Model

The Digital Elevation Model (DEM) of the project area (Figure 4-21) indicates an elevation of 1 450 to 1 502 Metres Above Sea Level (MASL). The lower laying areas (generally represented in dark blue) represent the areas that will have the highest potential to be characterised as wetlands.

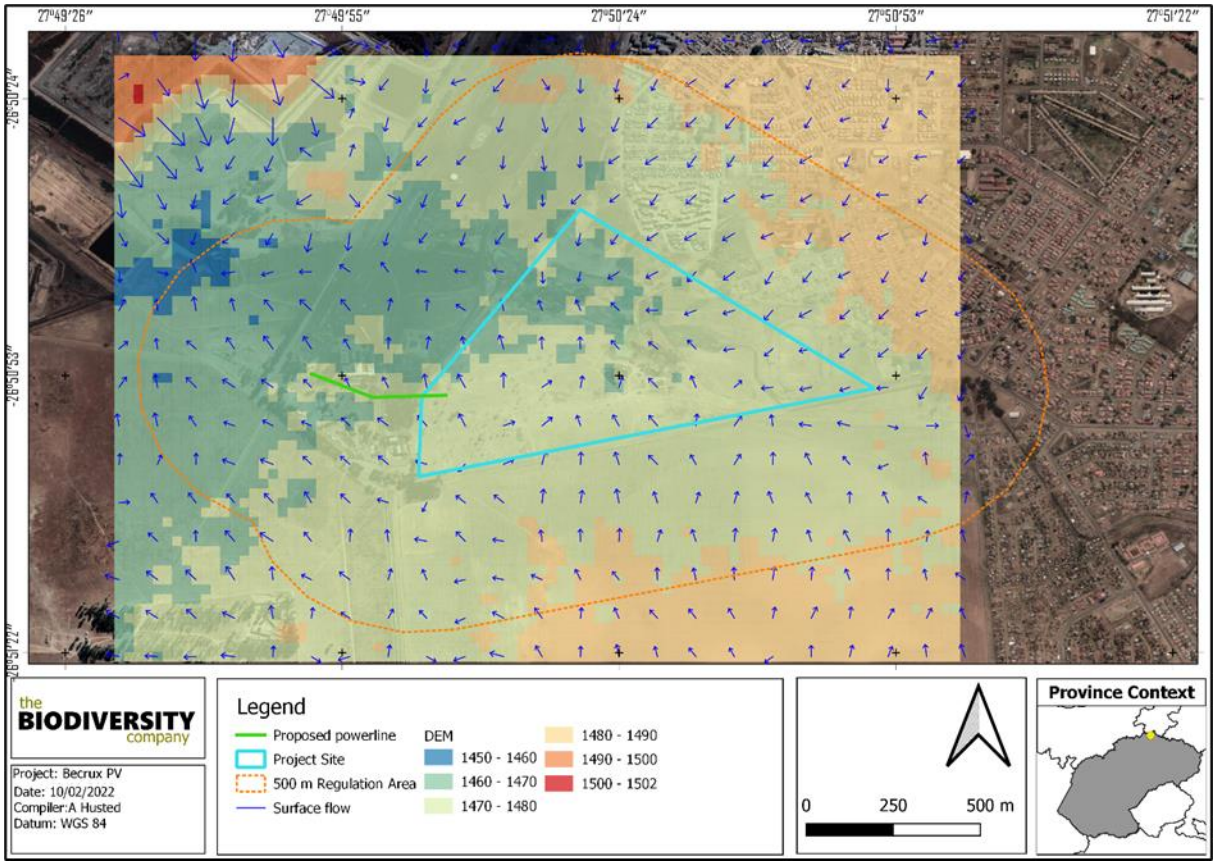


Figure 4-21 Digital Elevation Model of the regulated area

4.3.3 Delineation

Wetland systems were identified and delineated for the project (Figure 4-25). These comprised both natural and artificial systems, with the artificial systems consisting of impoundments/dams and drainage features. The dams are located adjacent to and also within the valley bottom wetland, creating a disruption to the system. The location of these artificial systems in proximity to the wetland has been indicated, but the reach of the valley bottom wetland was holistically considered for the functional assessment. The drainage features are also numerous and are located across the catchment area. The two hydrogeomorphic (HGM) types identified for the project include an unchanneled valley bottom wetland associated with an unnamed tributary of the Leeuspruit system, and hillslope seepage areas. Photographs of the identified resources are presented in Figure 4-22.

Four soil forms were identified throughout the area, namely, Avalon, Longlands, Westleigh and Rensburg, with the Avalon soil form being the most dominant soil form. Various hydromorphic soil forms were also identified, which were mostly dominated by the Rensburg soil form.

Figure 4-22 ***Photographs of the delineated resources.*** A & B) Unchanneled valley bottom, C & D) Seepage areas, D) Drainage channels

The level 1-4 classification for these HGM units, as per the national wetland classification system (Ollis et al., 2013), is presented in (Table 4-13). A map showing the extent of these wetlands is shown in Figure 4-25.

Table 4-13 ***Wetland classification as per SANBI guideline (Ollis et al. 2013)***

Wetland System	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Highveld	Dry Highveld Grassland Group 4	Valley Floor	Unchanneled valley bottom	N/A	N/A
HGM 2	Inland	Highveld	Dry Highveld Grassland Group 4	Slope	Seep	Without channelled outflow	N/A

4.3.4 Wetland Types

Unchanneled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows. Figure 4-23 presents a diagram of the relevant HGM unit, showing the dominant movement of water into, through and out of the system.

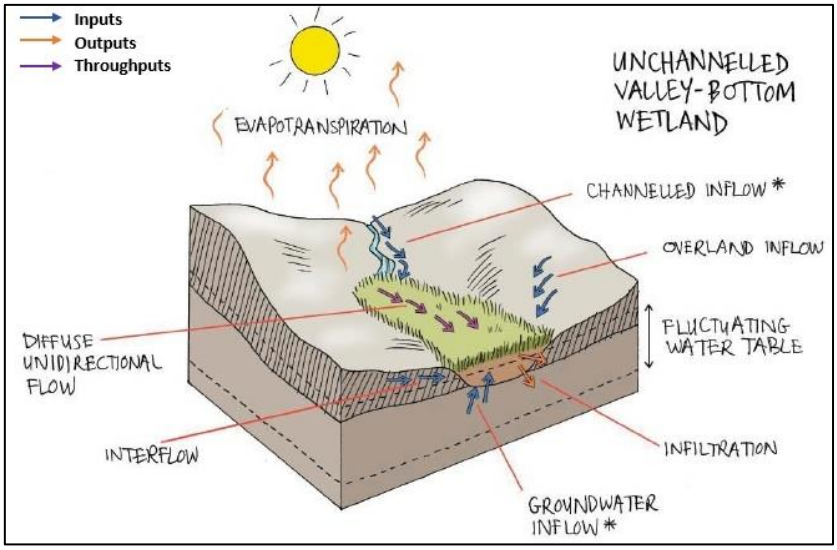


Figure 4-23 Amalgamated diagram of a typical unchanneled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

The hillslope seeps are located within slopes, as mentioned in Figure 4-24. Isolated hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys. Figure 4-24 illustrates a diagram of the hillslope seeps, showing the dominant movement of water into, through and out of the system.

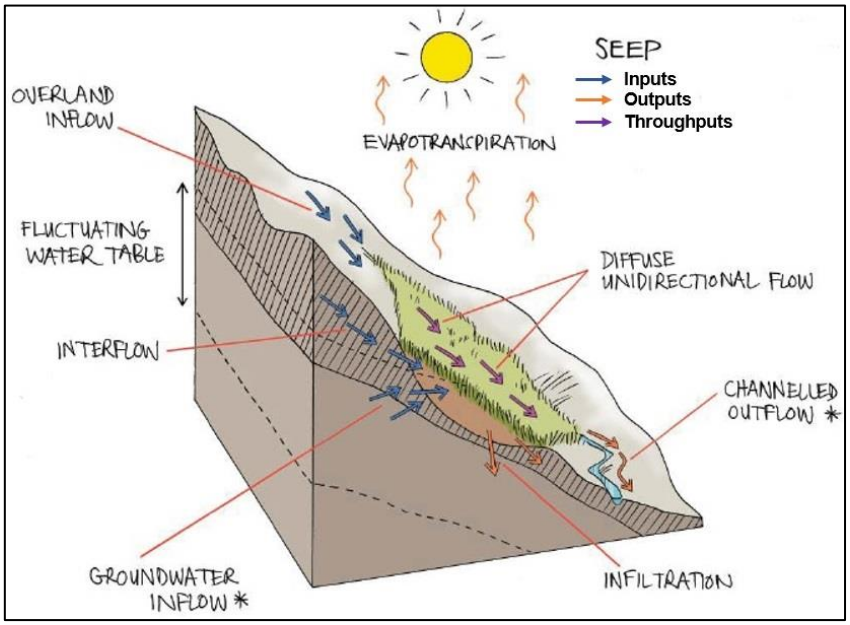


Figure 4-24 Amalgamated diagram of the HGM type, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

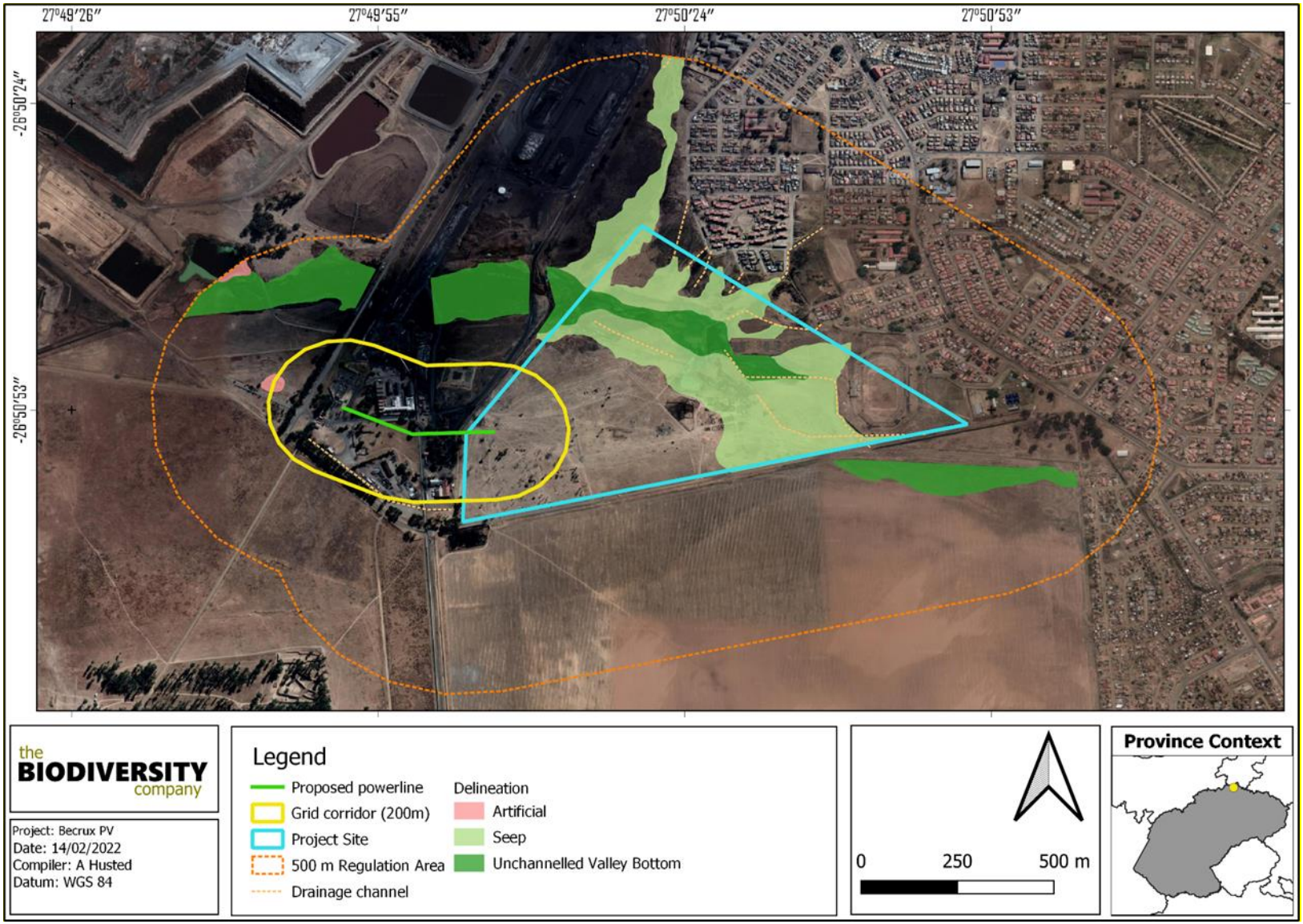


Figure 4-25 The delineated wetland systems

4.3.5 Ecosystem Services

Unchanneled valley-bottoms are characterised by sediment deposition, a gentle gradient with streamflow generally being spread diffusely across the wetland, ultimately ensuring prolonged saturation levels and high levels of organic matter. The assimilation of toxicants, nitrates and phosphates are usually high for unchanneled valley-bottom wetlands, especially in cases where the valley is fed by sub-surface interflow from slopes. The shallow depths of surface water within this system adds to the degradation of toxic contaminants by means of sunlight penetration.

Hillslope seeps are well documented by (Kotze et al., 2009) to be associated with sub-surface ground water flows. These systems tend to contribute to flood attenuation given their diffuse nature. This attenuation only occurs while the soil within the wetland is not yet fully saturated. The accumulation of organic material and sediment contributes to prolonged levels of saturation due to this deposition slowing down the sub-surface movement of water. Water typically accumulates in the upper slope (above the seep). The accumulation of organic matter additionally is essential in the denitrification process involved with nitrate assimilation. Seeps generally also improve the quality of water by removing excess nutrient and inorganic pollutants originating from agriculture, industrial or mine activities. The diffuse nature of flows ensures the assimilation of nitrates, toxicants and phosphates with erosion control being one of the EcoServices provided very little by the wetland given the nature of a typical seep's position on slopes.

The ecosystem services provided by the wetlands identified within the project area were assessed and rated using the WET-EcoServices method (Kotze et al. 2008) (Table 4-14). In respect of the project area, the unchannelled valley bottom wetland (HGM 1) overall scored Intermediate in terms of its wetland ecosystem services, and the seepage wetland (HMG 2) scored Moderately Low. The wetlands are considered relatively important for regulating and supporting benefits, such as flood attenuation and water quality enhancement, although these are compromised. The wetlands are considered moderately important from a biodiversity maintenance perspective, taking into consideration the loss to natural areas as a result of the changing land uses. The valley bottom system is in an altered state but is considered important for supporting avifauna.

Neither of the wetlands are considered important in terms of their direct provisioning of harvestable resources and cultivated foods for humans as the systems are not actively cultivated. The wetlands are also not considered important from a tourism and recreation perspective.

Table 4-14 Summary of the ecosystem services scores

Wetland Unit					HGM 1	HGM 2
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation		2.2	1.5
			Streamflow regulation		1.7	1.5
			Water Quality enhancement benefits	Sediment trapping	1.5	1.0
				Phosphate assimilation	1.6	1.1
				Nitrate assimilation	1.8	1.1
				Toxicant assimilation	1.9	1.0
				Erosion control	1.8	1.3
			Carbon storage		1.6	1.0
	Direct Benefits	Biodiversity maintenance			2.4	1.3
		Provisioning benefits	Provisioning of water for human use		1.0	0.5
			Provisioning of harvestable resources		0.0	0.0
			Provisioning of cultivated foods		0.0	0.0

Cultural benefits	Cultural heritage	0.0	0.0
	Tourism and recreation	0.0	0.0
	Education and research	0.0	0.0
Overall		16.3	11.7
Average		**1.2**	**0.8**

4.3.6 Wetland Health

The present ecological state (PES) of the wetlands identified within the study area is provided in Table 4-15. Overall, the valley bottom wetland and the adjacent seepage areas were determined to be in a critically modified (class F) to seriously modified (class E) state, respectively. The site in general, and the catchment have been transformed due to the local mining activities and the development of the catchment area. Photographs of some impact sources are presented in Figure 4-26. Aspects identified that have contributed to the impacted state of the systems include the following:

- The disruption in hydrological connectivity due to activities taking place within the wetlands;
- The changes to the hydrological regimes caused by dams being placed within flow paths and the diversion of flows;
- The placement of infrastructure within the wetlands, and the expanse of development into the periphery of wetland areas;
- Small-scale agricultural practices which contribute to impaired water quality;
- The dumping of solid waste;
- The discharge of raw sewerage into the systems; and
- The infestation of alien vegetation in the catchment area.

Table 4-15 Summary of the scores for the wetland PES

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	**Score**	**Rating**	**Score**	**Rating**	**Score**
HGM 1	F: Critically Modified	9.5	F: Critically Modified	9.5	D: Largely Modified	5.2
Overall PES Score	8.3		Overall PES Class		F: Critically Modified	
Wetland	**Hydrology**		**Geomorphology**		**Vegetation**	
	Rating	**Score**	**Rating**	**Score**	**Rating**	**Score**
HGM 2	E: Seriously Modified	7.5	D: Largely Modified	5.5	D: Largely Modified	5.0
Overall PES Score	6.2		Overall PES Class		E: Seriously Modified	

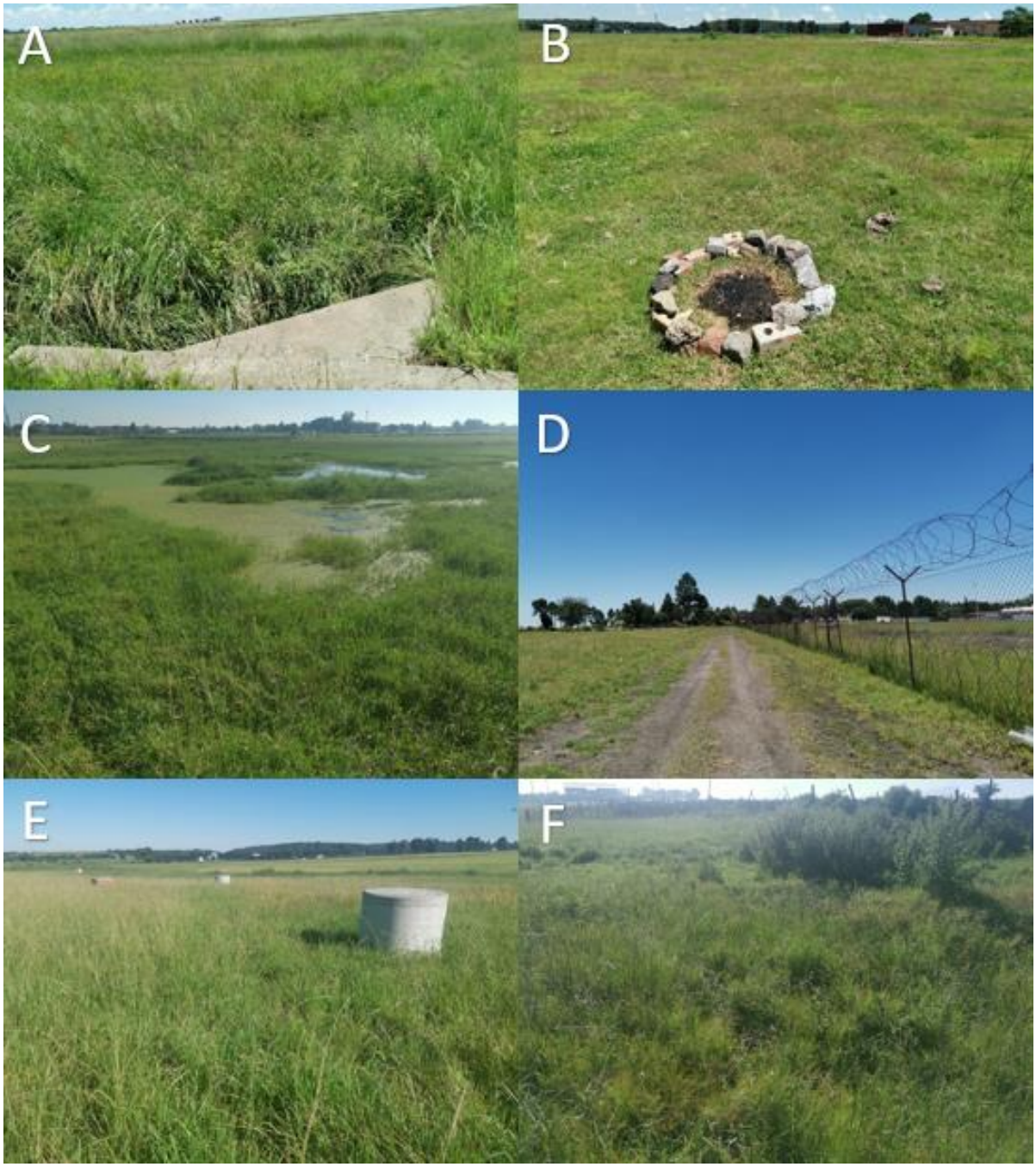


Figure 4-26 ***Photographs of impact sources.*** A) Surface flow diversions, B) Encroach into the catchment area, C) Dams and eutrophic inputs, D) Mining activities, E) Infrastructure placement in wetlands, F) Alien vegetation and agricultural practices

4.3.7 Ecological Importance and Sensitivity

The results of the ecological importance and sensitivity (IS) assessment are shown in

Table 4-16. At a regional scale, the NFEPA Wetveg database recognises unchanneled valley bottom wetlands and seepage types within the Dry Highveld Grassland Group 4 as Critically Endangered and Not Protected (Nel and Driver, 2012). None of the wetlands within the area are recognised as priority NFEPA wetlands. The overall ecological importance and sensitivity of the systems was determined to be moderate. The following was also considered for the EIS description. The project area:

- Is not located in a Strategic Water Source Area;

- Does not overlap any CBAs or ESAs; and
- Is located in a Vulnerable vegetation type.

Table 4-16 Ecological Importance and Sensitivity results for the wetland areas

HGM Type	Wet Veg			NBA Wetlands		SWSA (Y/N)	Calculated IS
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018		
HGM 1	Dry Highveld Grassland Group 4	Critically Endangered	Not Protected	F	Critically Endangered	No	Moderate
HGM 2		Critically Endangered	Not Protected	E	Critically Endangered	No	Moderate

4.3.8 Buffer Analysis

The “Buffer zone guidelines for wetlands, rivers and estuaries” (Macfarlane et al., 2014) was used to determine the appropriate wetland buffer zone for the proposed project.

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another. A buffer zone has been prescribed for this project to serve as a “barrier” between the proposed development and the wetland systems. This buffer area would only be applicable to wetland areas that will not be lost due to the project.

The wetland buffer zone tool was used to calculate the appropriate buffer required for the proposed solar development. The model shows that the largest risk posed by the project during the construction phase is that of “increased sediment inputs and turbidity”. During the operational phase, the flow patterns being altered (increase flood peaks); increased sediment inputs; and altered water quality are high risks. These risks are based on what could threaten the wetland and what buffer would be required at a desktop level. A buffer zone was suggested of 22 m (Table 4-17), this buffer is calculated assuming mitigation measures are applied. However, taking into consideration the threat status of the wetlands, it is recommended that a conservative approach be opted for the wetland systems and a minimum buffer width of 30 m be implemented.

Table 4-17 Post-mitigation buffer requirement

Required Buffer after mitigation measures have been applied	
Solar PV	22 m

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.

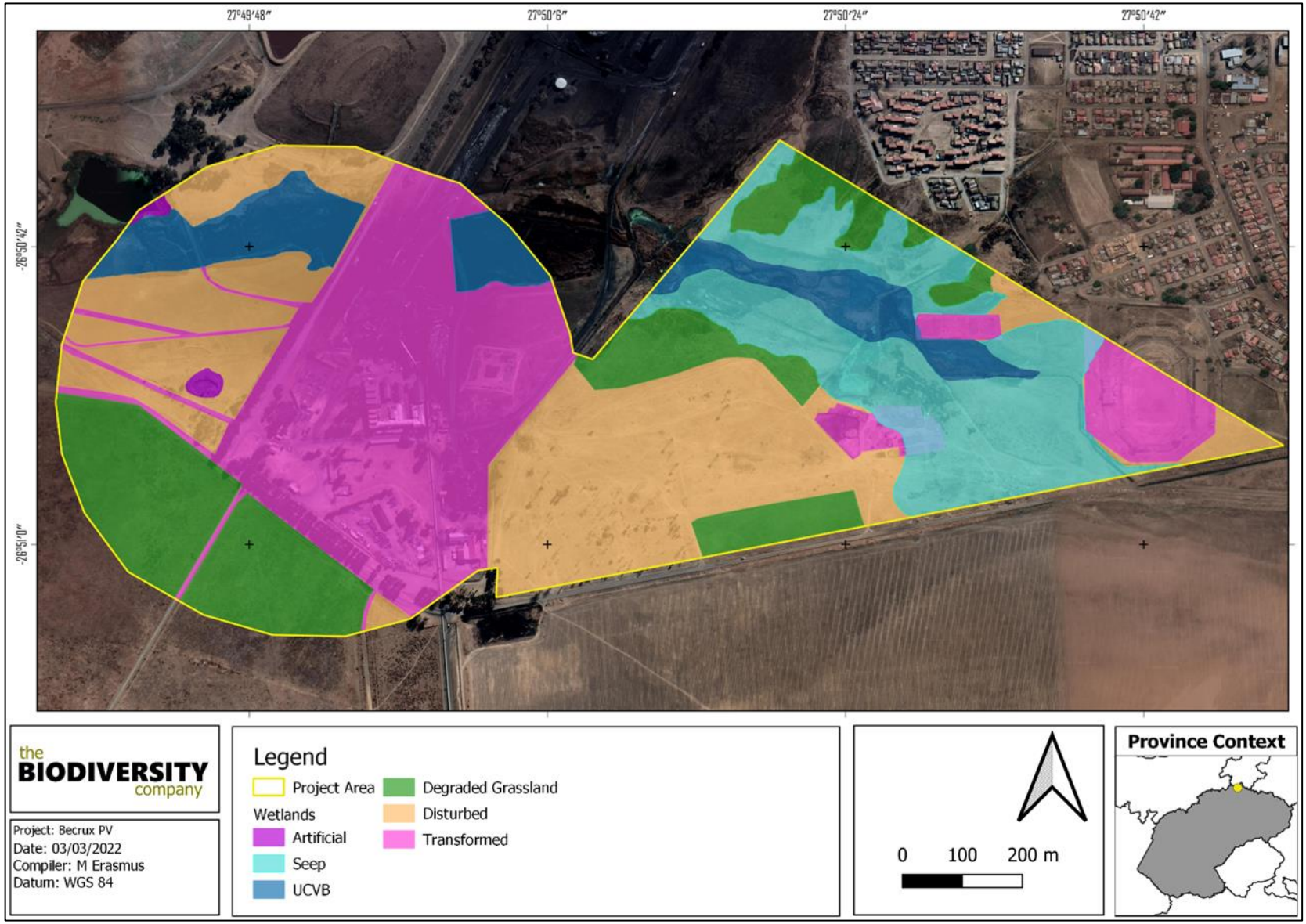


Figure 5-1 Habitats identified in the project area.

5.1.1 Degraded Grassland

Central Free State 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 is 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. The habitat indicators that are known to show 'unhealthy' Dry Highveld Grassland such as grassland dominated by karroid shrubs, or the absence of endangered animal species are present.

The main ecological characteristics of these dry highveld grasslands, which the Central Free State is classified as, include (SANBI, 2013):

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

This habitat unit can thus be regarded as important, not only within the local landscape, but also regionally; it acts as a greenland, used for habitat, foraging area and movement corridor for fauna. The habitat sensitivity of the Dry Highveld Grassland is regarded as medium, mainly due to the role of this habitat to biodiversity within a very fragmented local landscape.

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. These habitats are represented in the wetland section. 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 comprises 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 are not entirely transformed but are in a constant modified state as they 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 powerlines. 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 Low, (Figure 5-9) while the fauna sensitivity was rated as 'High'. The high sensitivity for the fauna was based on the high likelihood of the Marsh Harrier and moderate likelihood of African Grass Owls, Spotted Necked Otter and Oribi. The avifauna sensitivity was derived to be "Low".

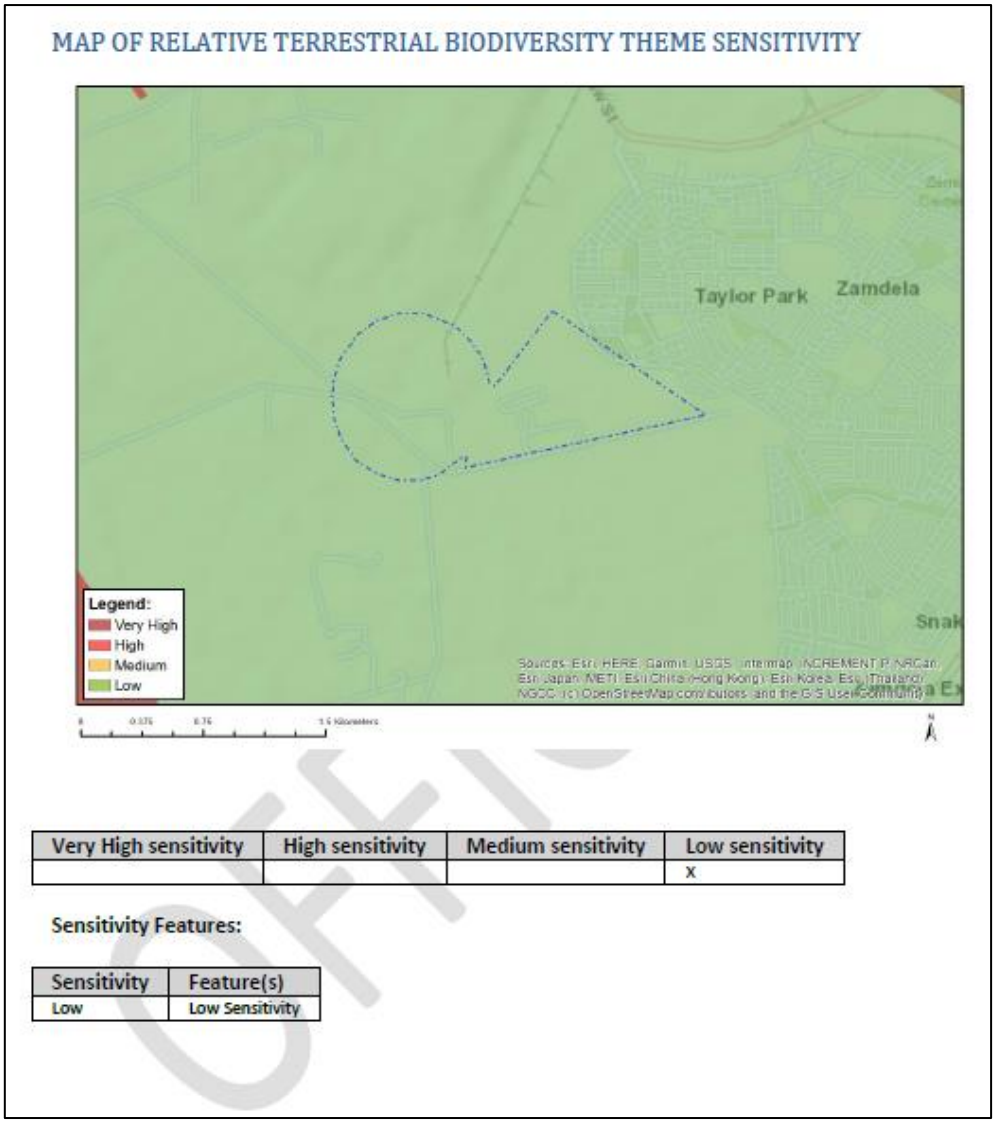
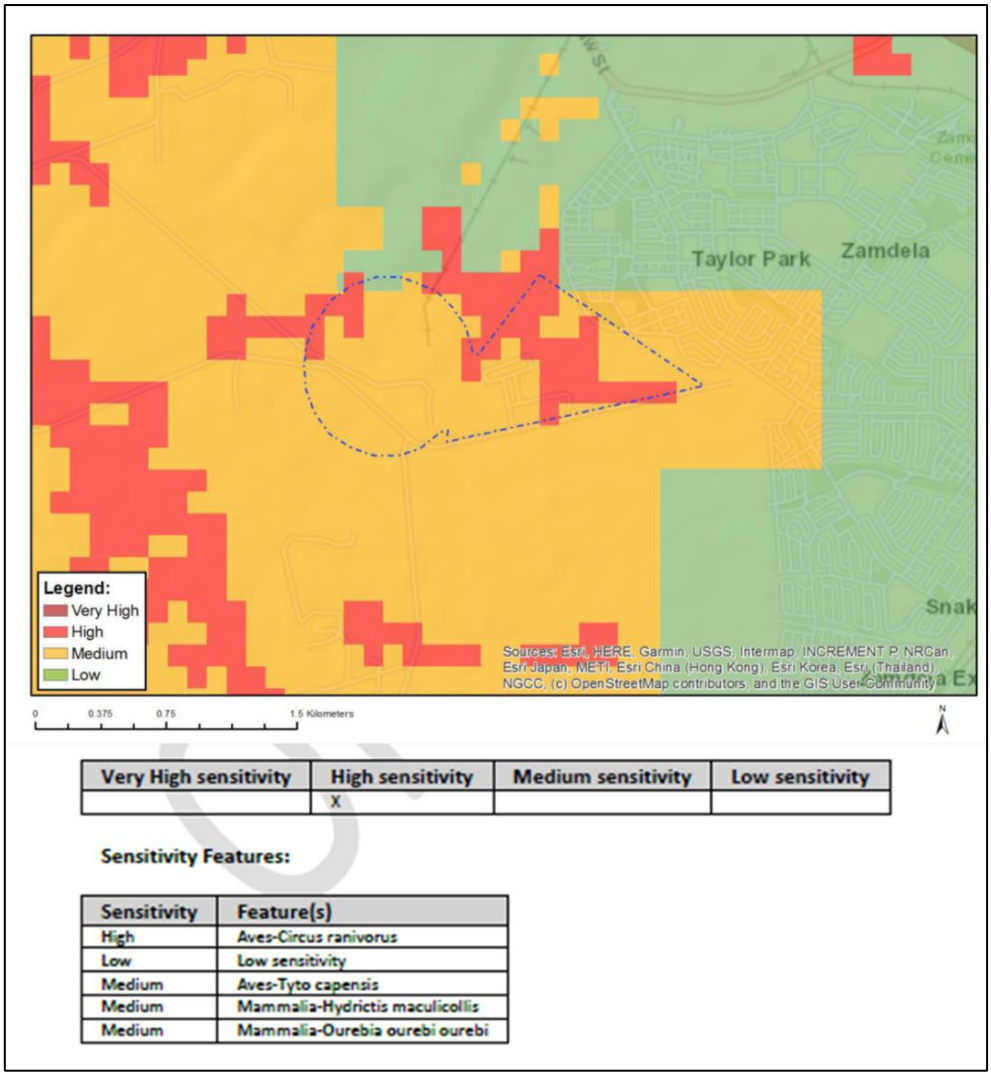


Figure 5-9 ***Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.***

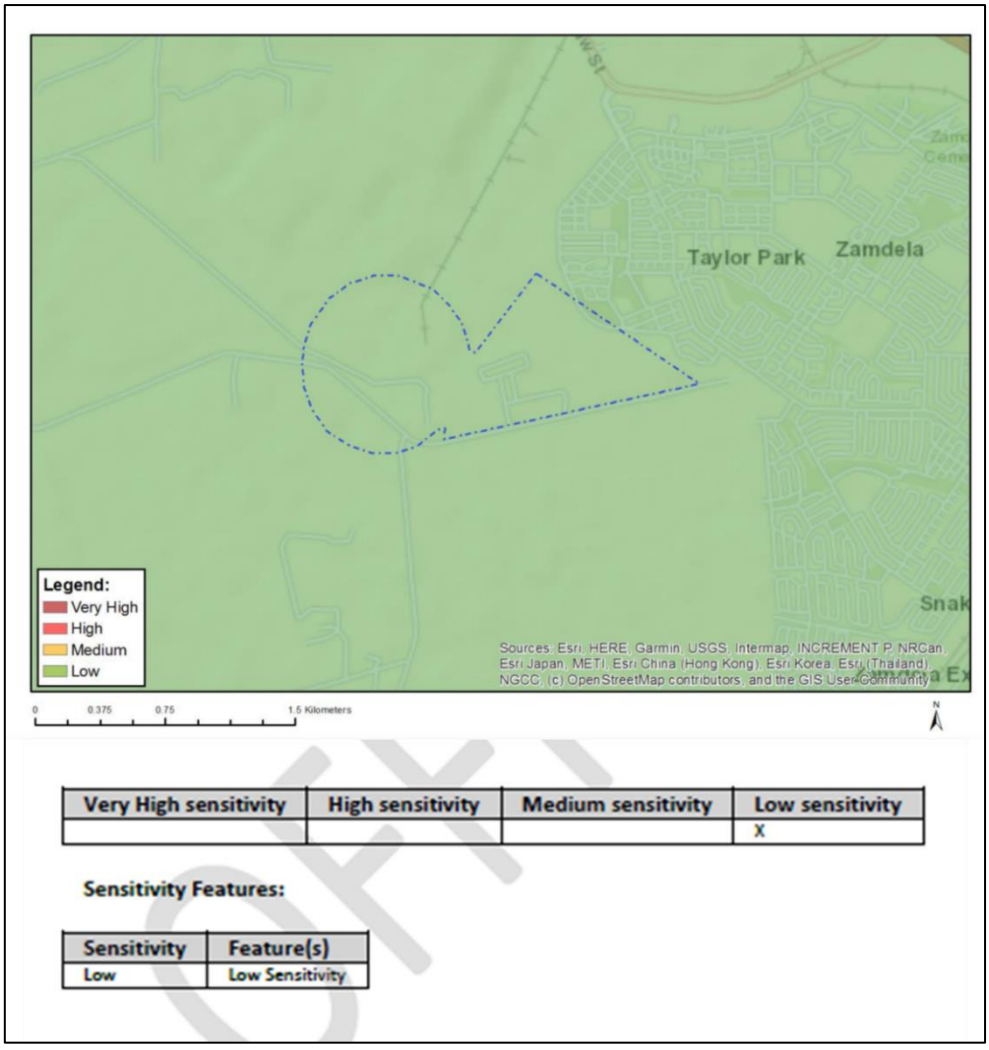


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
Low	Low sensitivity
Medium	Aves-Tyto capensis
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi

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



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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

The location and extent of these habitats are illustrated in Figure 5-1. Based on the criteria provided in Section 3.4 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
Degraded Grassland and artificial Wetlands	Low	Medium	Low	Low	Medium
Disturbed Grassland	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.

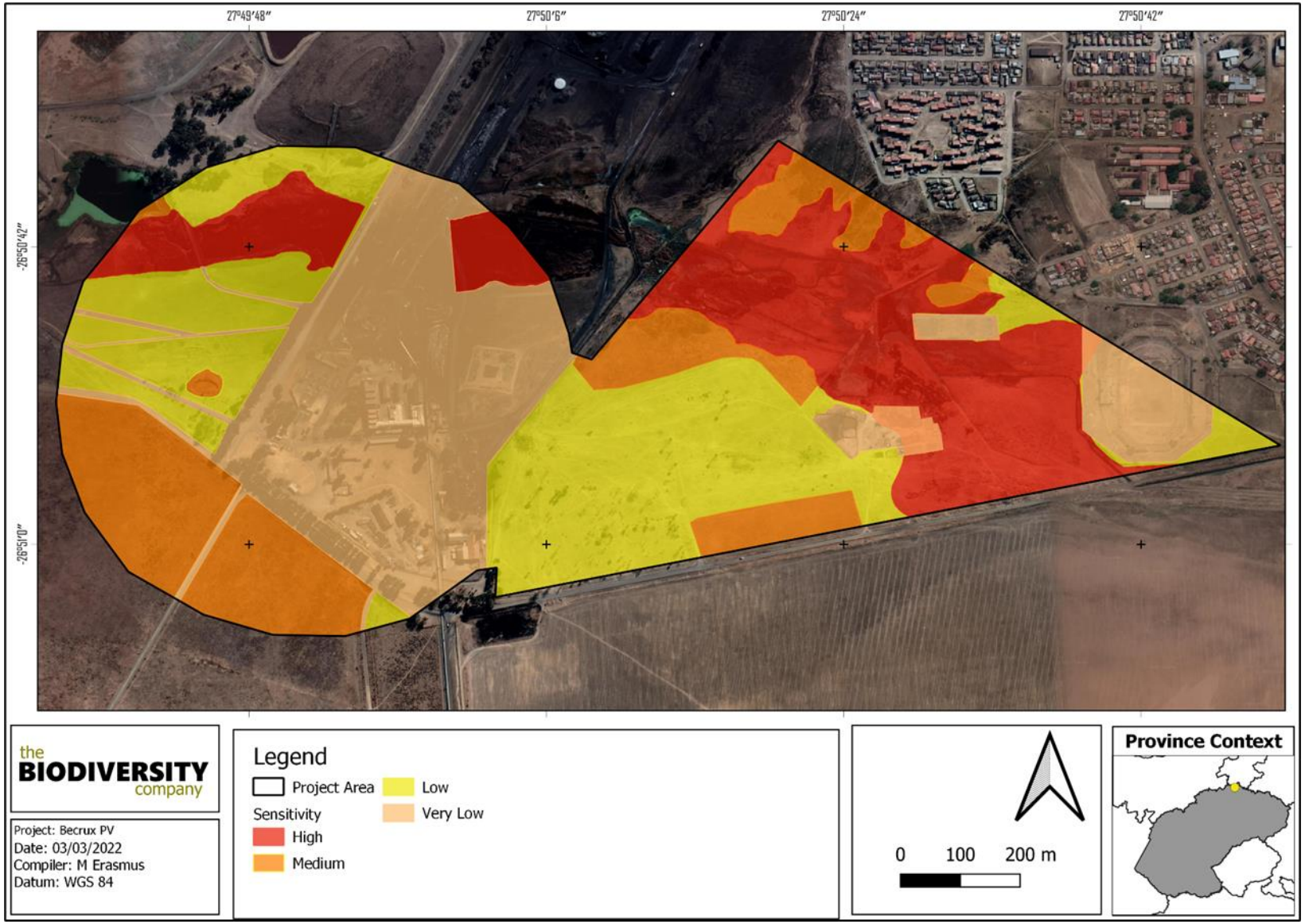


Figure 5-12 Sensitivity of the project area

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 was 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;
- Powerlines;
- Air pollution from the nearby mining;
- Alien and/or Invasive Plants (IAP); and
- Fences and associated maintenance.

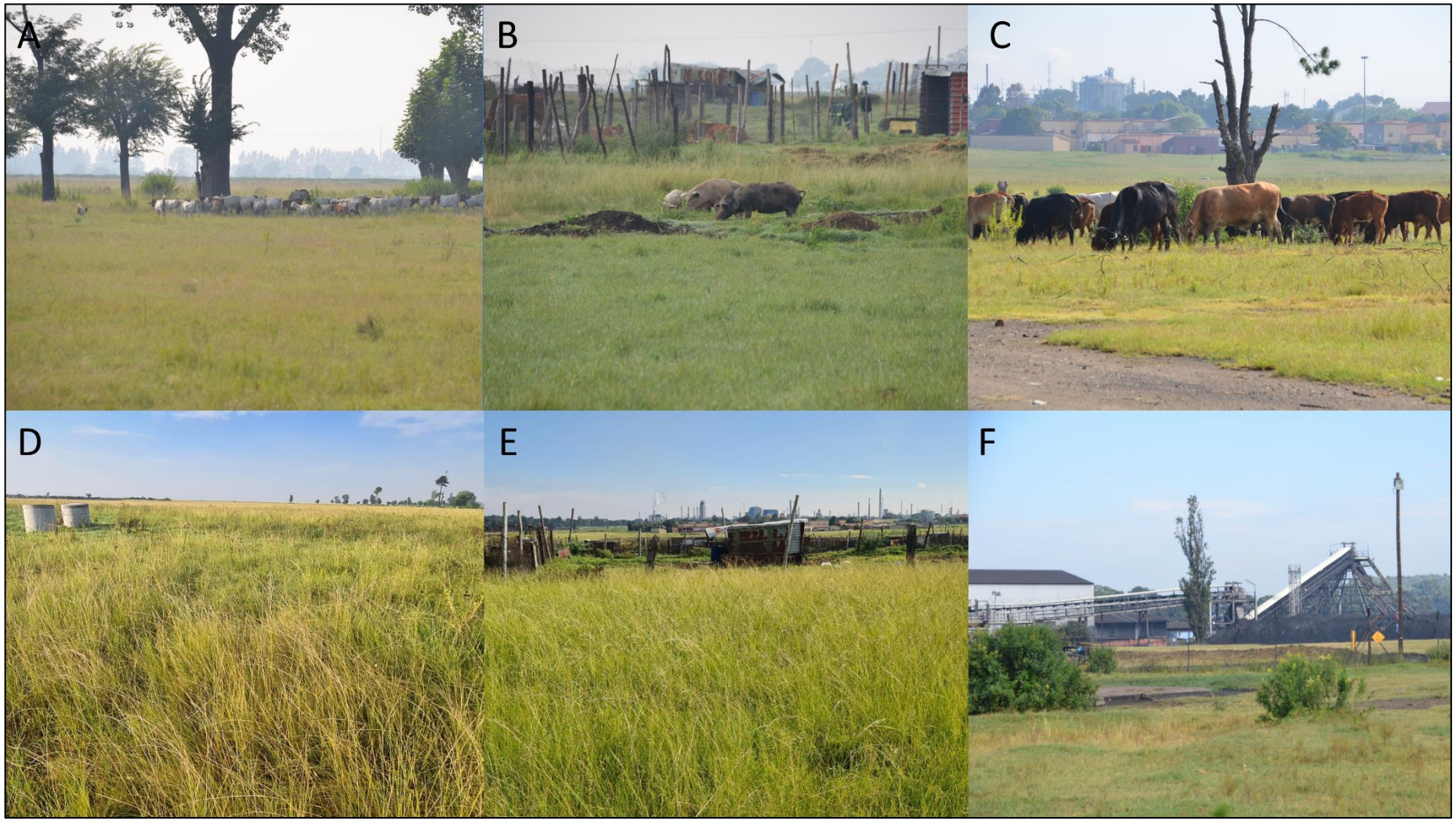


Figure 6-1 ***Some of the identified impacts within the project area; A,B &C) Livestock (Goats, Pigs and Cattle), D) Existing Sewage Transport Infrastructure, E) Informal livestock pens and F) Mine operations).***

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 was 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. The project area in relation to the sensitivity can be seen in Figure 6-2.

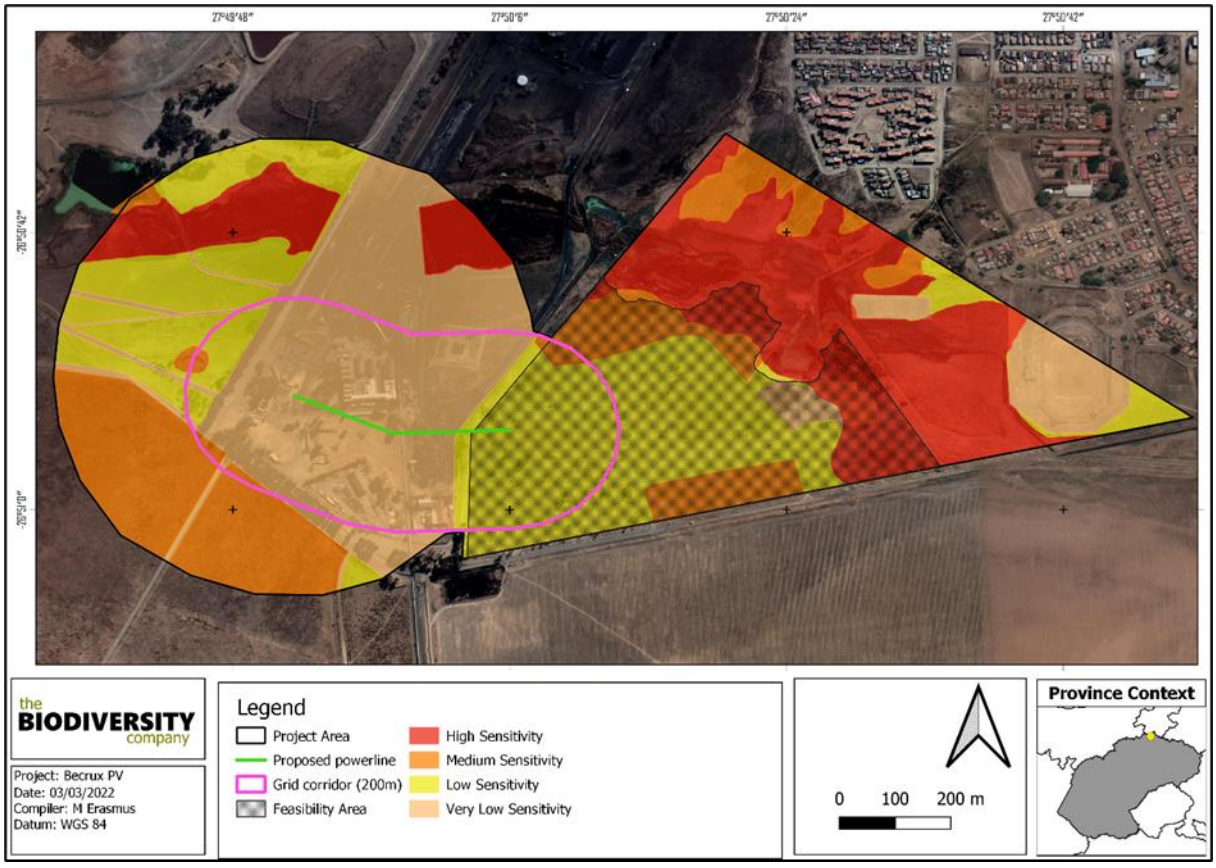


Figure 6-2 Project sensitivity overlaid with proposed layout.

6.1.3 Alternatives Considered

No alternatives were provided for the development.

6.1.4 Loss of Irreplaceable Resources

- 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	Increase in rodent populations and associated disease risk
	Pollution of water resources due to dust effects, chemical spills, etc.	
	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,	Operation of machinery (Large earth moving machinery, vehicles)	Disruption/alteration of ecological life cycles due to noise
		Loss of ecosystem services

migration, feeding) due to noise, dust and light pollution.	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.	An appropriate/adequate fire management plan needs 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 the implementation 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 habitats (including wetlands), ecosystems and vegetation community (Table 6-3),
- Introduction of alien species, especially plants (Table 6-4);
- Destruction of protected plant species (Table 6-5);
- Displacement of the faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) (Table 6-6);
- Collection of eggs, nest destruction and poaching (Table 6-7).

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

Impact Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including 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)	Probable (3)
Significance	**High (64)**	**Low (15)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation:		
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 (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
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 (64)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for relocation.	
Mitigation:		
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 (48)**	**Low (10)**
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 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:
Collection of eggs, nest destruction and 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 (60)**	**Low (16)**
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. • Construction must take place in the winter months as much is feasible.		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

6.1.7.3 Operation Phase

It is anticipated that daily activities associated with the operation phase will lead 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. Moving maintenance and mining vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

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 SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration) (Table 6-10);
- Collisions with PV panels, associated powerlines and connection lines and fences (Table 6-11); and
- Electrocution by solar plant connections and powerline (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	**Medium (52)**	**Low (10)**
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 Biodiversity Management Outcomes		
Residual Impacts		
There is still some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.		

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 (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
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 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 (39)**	**Low (12)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
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 PV panels, associated powerlines and 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 (64)**	**Medium (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • 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 the 11kV lines. • If any powerlines/connection lines from existing lines to the facility are to be placed above ground, they must be marked with industry standard bird flight diverters. • Fencing mitigations: o Top 2 strands must be smooth wire o Routinely retention loose wires o Minimum 30cm between wires o Place markers on fences		
Residual Impacts:		
Some collisions of avifauna might still occur regardless of mitigation		

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

Nature:		
Electrocution by solar plant connections and powerline		
	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 (64)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used. This would involve using the existing/approved pylons and associated infrastructure for different lines. • Ensure that monitoring is sufficiently frequent (preferably monthly) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible. • During the first year of operation, quarterly reports summarizing interim findings should be complied by the developer and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.		
Residual Impacts:		
Electrocutions 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 the activity reduces, and the rehabilitation measures are implemented. Should the powerline 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 SCC) due to disturbance (road collisions, noise, dust, vibration) (Table 6-14);
- Collisions with powerline and PV solar panels (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 (60)**	**Low (5)**
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 (64)**	**Medium (36)**
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 undertaken 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.
- The 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 monitored correctly no residual impacts should be present.

Table 6-15 Decommissioning activities impacts on the terrestrial biodiversity

Nature:

Electrocution by solar plant connections and powerline

	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 (64)**	**Low (28)**
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 powerline and solar panels 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, 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	**Low (27)**	**Medium (33)**
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 they 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	Responsible Party	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, Contractor	Environmental Control Officer	Monthly
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 to within the low/medium sensitivity areas. No further loss of very high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
Existing access routes, especially roads must be made use of.	Construction/Operational Phase	Contractor/Operator, Environmental Officer & Design Engineer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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 where possible. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Contractor/Operator, Environmental Officer & Design Engineer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation where possible 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	Post-construction/Operational phase	Contractor/Operator, Environmental Officer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	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	Construction/Operational Phase	Environmental Officer & Contractor/Operator	Environmental Control Officer during construction and the	Monthly

emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. 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.			developer's Environmental Officer during operation	
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.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Construction/Operational Phase	Environmental Officer & Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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. High 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.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
Environmentally friendly dust suppressants must be utilised	Construction/Operational phase	Environmental Officer & Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
The duration of construction phase should be kept to a minimum and must take place as much is feasible in the winter to avoid disturbing avifauna.	Construction	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly

Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Responsible Party	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 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.	Construction Phase	Developer, Environmental Officer, Contractor	Environmental Control Officer	Monthly
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
The duration of the construction phase should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly
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, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
No trapping, killing, or poisoning of any wildlife is to be allowed.	Construction/Operational Phase	Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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, Contractor/Operator & Design Engineer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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.	Construction/Operational Phase	Health and Safety Officer. Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation

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.				
Any holes/deep excavations must be dug and planned in a progressive manner and shouldn't be left open overnight unless appropriate demarcation is in place; • Should the holes be left open overnight, they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Environmental Control Officer	Monthly
Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.	Construction/Operational Phase	Environmental Officer & Contractor/Operator, Engineer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
Monitoring of the OHL route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.	Operation	Environmental Officer & Operator	developer's Environmental Officer	Monthly for the first year of operation
The design of the proposed PV must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.,* 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Environmental Control Officer	Monthly
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	Environmental Control Officer	Monthly
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	Environmental Control Officer	Monthly
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/Operator, Engineer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects (Horvath *et al,* 2010). Consider the use of bird deterrent devices to limit collision risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Environmental Control Officer	Monthly
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Responsible Party	Frequency
Compilation of and implementation of an alien vegetation management plan.	Construction/Operation Phase	Project manager, Environmental Officer & Contractor/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Twice a year

The footprint area 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/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
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.	Construction/Operational Phase	Environmental Officer & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
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	Construction/Operational Phase	Environmental Officer & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly

Management outcome: Dust

Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Responsible Party	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	Construction/Operation Phase	Contractor/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly

Management outcome: Waste management

Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Responsible Party	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Construction/Operation Phase	Environmental Officer & Contractor/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
Litter, spills, fuels, chemicals and human waste in and around the project area must be contained. Waste must be stored in designated areas, within suitable containers. Waste must be disposed of at licenced facilities.	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.	Construction/Operation Phase	Environmental Officer & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly

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	Construction/Operation Phase	Environmental Officer, Contractor/Operator & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
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	Construction/Operation Phase	Environmental Officer, Contractor/Operator & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
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 where possible.	Construction/Operation Phase	Environmental Officer, Contractor/Operator & Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
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" areas to be avoided.	Construction/Operation Phase	Health and Safety Officer	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. • Reduce dust generated by earth moving machinery through wetting the soil surface and putting up speed limit signs as well as speed bumps built to force slow speeds. •	Construction/Operation Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly
A stormwater management plan must be compiled and implemented.	Construction/Operation Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and developer's Environmental Officer during operation	Monthly

6.2 Risk Assessment

A risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998) to investigate the level of risk posed by proposed the project, namely the installation of a solar PV facility and grid connection. The risks posed by the proposed development to wetlands within the project area are provided in Table 6-18 for scenarios with and without mitigation. Three levels of risk have been identified and determined for the overall risk assessment, these include low, medium and high risk. High risks are not applicable although the feasibility area overlaps with delineated wetland areas. These seepage areas that are likely to be directly affected by the development are also in a seriously modified state, with the extent of these disturbed areas presented in Figure 6-3. These disturbances include former dwelling areas, sports fields and more recently livestock holding areas. It is referable that the extent of the wetland area and associated buffer be avoided for the development, but these transformed areas may be considered should the feasibility of the project require this.

It has been assumed for the purposes of the risk assessment that the 30 m buffer width will be adhered to. Medium risk refers to wetland areas that are either on the periphery of the infrastructure and at an indirect risk. Low risks are wetland systems beyond the project area that would be avoided, or wetland areas that could be avoided if feasible. The medium risks were the priority for the risk assessment, focussing on the expected potential for these indirect risks. The significance of all post-mitigation risks was determined to be low.

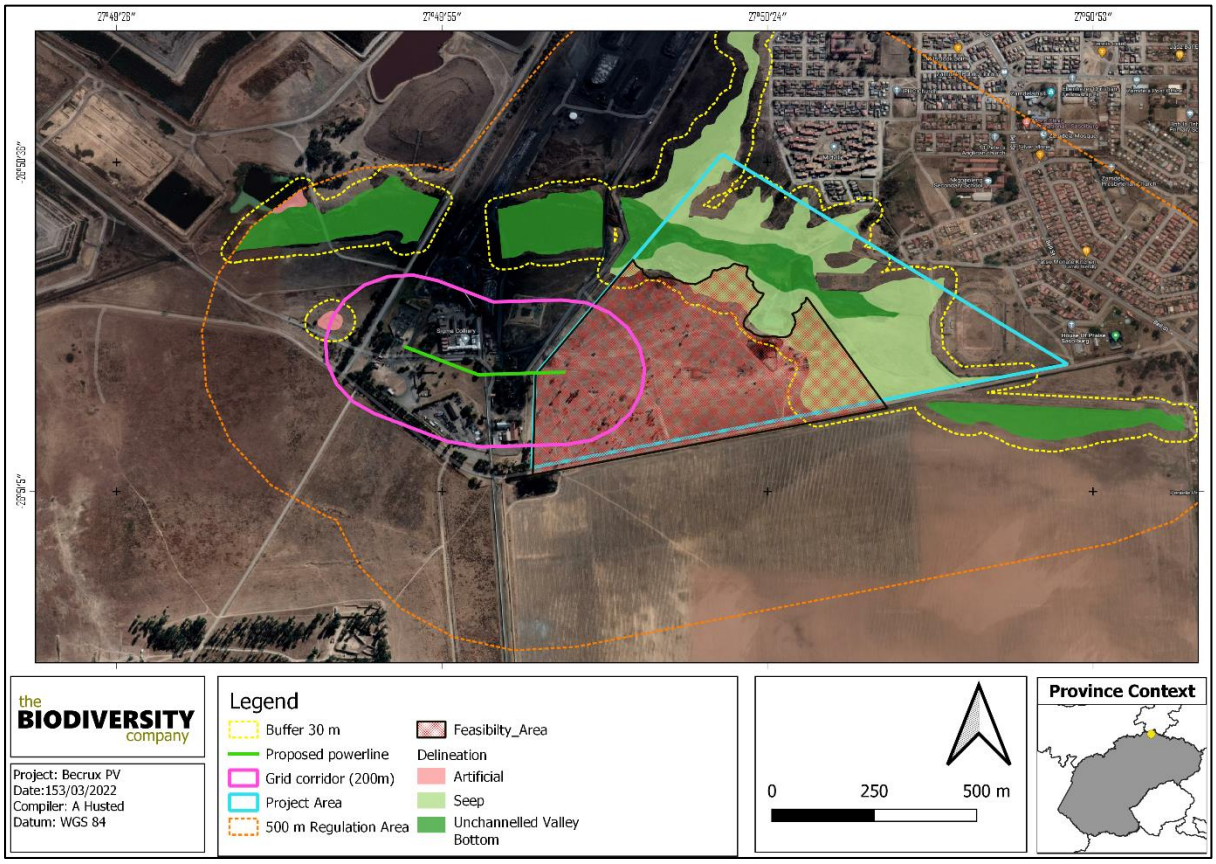


Figure 6-3 The extent of disturbed land cover for the feasibility area

Table 6-18 DWS Risk Impact Matrix for the proposed development (Andrew Husted Pr Sci Nat 400213/11)

Activity	Aspect	Impact	Severity: Mitigation	Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
Construction																			
Site clearing and preparation.	Wetland disturbance / loss.	Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility.	Without	3	2	3	2	2.5	2	3	7.5	3	4	1	1	9	68	**M**	• Demarcate and avoid all wetlands and the associated 30 m buffer area. • Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 30 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan. • All activities (including driving) must adhere to the 30 m buffer area. • Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs). • All alien vegetation along the transmission servitude should be managed in terms of Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. • Landscape and re-vegetate all denuded areas as soon as possible.
			With	2	1	2	1	1.5	2	3	6.5	3	3	1	1	8	52	**L**	

Activity	Aspect	Impact	Mitigation	Severity: Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
	Water runoff from construction site.	Increased erosion and sedimentation.	Without	3	3	2	2	2.5	2	3	7.5	3	3	1	2	9	68	M	• Limit construction activities near (< 50m) the wetlands to winter where possible when rain is least likely to wash concrete and sand into the wetland. Activities in hydromorphic soils can become messy during the height of the rainy season and construction activities should be minimised during these times to minimise unnecessary soil disturbances.
			With	2	2	1	1	1.5	2	2	5.5	3	2	1	1	7	39	L	• Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.
		Potential contamination of wetlands with machine oils and construction materials.	Without	1	3	2	2	2	1	2	5	3	3	1	2	9	45	L	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. • No activities are permitted within the wetland and associated buffer areas.
			With	1	1	1	1	1	1	2	4	1	2	1	2	6	24	L	
Operation																			
Operation of the solar facility.	Hardened surfaces.	Potential for increased stormwater runoff leading to	Without	2	2	2	2	2	3	2	7	3	3	1	2	9	63	M	• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels.

Activity	Aspect	Impact	Severity: Mitigation	Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
		Increased erosion and sedimentation.	With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	• Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible. • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels.
	Contamination.	Potential for increased contaminants entering the wetland systems.	Without	2	3	2	2	2.3	3	2	7.3	3	3	1	2	9	65	M	• Where possible, minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.
			With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	
Closure																			
Decommissioning of the solar facility.	Rehabilitation.	Potential loss or degradation of nearby wetlands through inappropriate closure.	Without	2	2	3	2	2.3	2	3	7.3	3	3	1	1	8	58	M	• Develop and implement a rehabilitation and closure plan. • Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species.
			With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	

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 ground truth 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.

No significant impacts from a terrestrial ecology perspective area expected subject to the implementation the recommended mitigation measures, especially pertaining to wetlands, as much of the areas have been found to be modified. No faunal component of significance was observed, which further reduced the impact significance of the development on terrestrial biodiversity.

Historically, mining and the land use has led to the deterioration of these habitats. The classification of project area as degraded and other natural area is corroborated.

7.2 Wetland Ecology

Natural and artificial wetland systems were identified and delineated for the project, with the artificial systems consisting of impoundments/dams and drainage features. The two natural wetland types identified for the project include an unchanneled valley bottom wetland associated with an unnamed tributary of the Leeuspruit system, and hillslope seepage areas.

The unchannelled valley bottom wetland overall scored Intermediate in terms of its wetland ecosystem services, and the seepage wetland scored Moderately Low. Overall, the unchanneled valley bottom wetland and the adjacent seepage areas were determined to be in a critically modified (class F) to seriously modified (class E) state, respectively. The overall ecological importance and sensitivity of the systems was determined to be moderate. Taking into consideration the Critically Endangered threat status of the wetlands, it is recommended that a conservative approach be opted for the wetland systems and a minimum buffer width of 30 m be implemented.

7.3 Recommendations

The following recommendations should be considered for the authorisation:

- A stormwater management plan must be developed and implemented for the project. This plan must advise the return of clean water to the adjacent watercourses;
- Avoid all delineated wetland areas, and adhere 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;
- In the event the development cannot adhere to the 30 m buffer area, it is recommended that a wetland rehabilitation plan be implemented for the remaining wetlands within the project area; and
- The High sensitivity area should be avoided.

7.4 Risk Assessment

A risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). High risks are not applicable although the feasibility area overlaps with delineated wetland areas. These seepage areas that are likely to be directly affected by the development are also in a seriously modified state. Medium risk refers to wetland areas that are either on the periphery of the infrastructure and at an indirect risk. Low risks are wetland systems beyond the project area that would

be avoided, or wetland areas that could be avoided, if feasible. The significance of all post-mitigation risks was determined to be low, this is also based on the assumption that a 30 m buffer could be achieved. Based on the expectant low risks, a General Authorisation is permissible for the project.

7.5 Impact Statement

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

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- 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, but there is still a possibility of impacts occurring. 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.

Family	Taxon	Author	IUCN	Ecology
Euphorbiaceae	*Acalypha angustata*	Sond.	LC	Indigenous
Sapindaceae	*Acer negundo*	L.		Not indigenous; Naturalised; Invasive
Amaranthaceae	*Achyranthes aspera var. aspera*	L.		Not indigenous; Naturalised
Amaranthaceae	*Achyranthes aspera var. pubescens*	L.		Indigenous
Amaranthaceae	*Achyranthes aspera var. sicula*	L.		Indigenous
Lamiaceae	*Acrotome inflata*	Benth.	LC	Indigenous
Apiaceae	*Afrosciadium magalismontanum*	(Sond.) P.J.D.Winter	LC	Indigenous
Poaceae	*Agrostis avenacea*	C.C.Gmel.	NE	Not indigenous; Naturalised
Poaceae	*Agrostis eriantha var. eriantha*	Hack.	LC	Indigenous
Poaceae	*Agrostis lachnantha var. lachnantha*	Nees	LC	Indigenous
Lamiaceae	*Ajuga ophrydis*	Burch. ex Benth.	LC	Indigenous
Hyacinthaceae	*Albuca setosa*	Jacq.	LC	Indigenous
Hyacinthaceae	*Albuca tortuosa*	Baker	LC	Indigenous; Endemic
Hyacinthaceae	*Albuca virens subsp. arida*	(Ker Gawl.) J.C.Manning & Goldblatt	LC	Indigenous
Hyacinthaceae	*Albuca virens subsp. virens*	(Ker Gawl.) J.C.Manning & Goldblatt	LC	Indigenous
Rosaceae	*Alchemilla woodii*	Kuntze	LC	Indigenous
Apiaceae	*Alepidea attenuata*	Weim.	NT	Indigenous
Alismataceae	*Alisma plantago-aquatica*	L.	NE	Not indigenous; Naturalised; Invasive
Asphodelaceae	*Aloe davyana*	Schonland		Indigenous; Endemic
Asphodelaceae	*Aloe subspicata*	(Baker) Boatwr. & J.C.Manning		Indigenous
Amaranthaceae	*Amaranthus hybridus subsp. hybridus*	L.		Not indigenous; Naturalised
Lythraceae	*Ammannia baccifera*	L.		Indigenous
Amaryllidaceae	*Ammocharis coranica*	(Ker Gawl.) Herb.	LC	Indigenous
Poaceae	*Andropogon appendiculatus*	Nees	LC	Indigenous
Rubiaceae	*Anthospermum rigidum subsp. pumilum*	Eckl. & Zeyh.	LC	Indigenous
Rubiaceae	*Anthospermum rigidum subsp. rigidum*	Eckl. & Zeyh.	LC	Indigenous
Aponogetonaceae	*Aponogeton junceus*	Lehm.	LC	Indigenous
Scrophulariaceae	*Aptosimum indivisum*	Burch. ex Benth.	LC	Indigenous
Apocynaceae	*Araujia sericifera*	Brot.		Not indigenous; Naturalised; Invasive
Asteraceae	*Arctotis arctotoides*	(L.f.) O.Hoffm.	LC	Indigenous
Asteraceae	*Arctotis microcephala*	(DC.) Beauverd	LC	Indigenous
Asteraceae	*Arctotis venusta*	Norl.	LC	Indigenous

Poaceae	*Aristida adscensionis*	L.	LC	Indigenous
Poaceae	*Aristida congesta subsp. congesta*	Roem. & Schult.	LC	Indigenous
Poaceae	*Aristida diffusa subsp. burkei*	Trin.	LC	Indigenous
Poaceae	*Aristida junciformis subsp. junciformis*	Trin. & Rupr.	LC	Indigenous
Poaceae	*Aristida scabrivalvis subsp. scabrivalvis*	Hack.	LC	Indigenous
Poaceae	*Aristida sciurus*	Stapf	LC	Indigenous
Poaceae	*Aristida sp.*			
Poaceae	*Aristida stipitata subsp. spicata*	Hack.	LC	Indigenous
Poaceae	*Aristida vestita*	Thunb.	LC	Indigenous
Poaceae	*Arundinella nepalensis*	Trin.	LC	Indigenous
Apocynaceae	*Asclepias eminens*	(Harv.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias gibba var. gibba*	(E.Mey.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias gibba var. media*	(E.Mey.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias meyeriana*	(Schltr.) Schltr.	LC	Indigenous
Cyperaceae	*Ascolepis capensis*	(Kunth) Ridl.	LC	Indigenous
Asparagaceae	*Asparagus cooperi*	Baker	LC	Indigenous
Asparagaceae	*Asparagus laricinus*	Burch.	LC	Indigenous
Apocynaceae	*Aspidoglossum interruptum*	(E.Mey.) Bullock	LC	Indigenous
Amaranthaceae	*Atriplex semibaccata*	R.Br.		Not indigenous; Naturalised; Invasive
Salviniaceae	*Azolla filiculoides*	Lam.	NE	Not indigenous; Naturalised; Invasive
Iridaceae	*Babiana hypogaea*	Burch.	LC	Indigenous
Elatinaceae	*Bergia pentheriana*	Keissl.	LC	Indigenous
Asteraceae	*Berkheya pinnatifida subsp. ingrata*	(Thunb.) Thell.	LC	Indigenous; Endemic
Asteraceae	*Berkheya pinnatifida subsp. stobaeoides*	(Thunb.) Thell.	LC	Indigenous
Apiaceae	*Berula thunbergii*	(DC.) H.Wolff	LC	Indigenous
Poaceae	*Bewsia biflora*	(Hack. ex Schinz) Gooss.	LC	Indigenous
Acanthaceae	*Blepharis espinosa*	E.Phillips	LC	Indigenous
Poaceae	*Brachiaria serrata*	(Thunb.) Stapf	LC	Indigenous
Poaceae	*Bromus catharticus*	Vahl	NE	Not indigenous; Naturalised; Invasive
Bryaceae	*Bryum dichotomum*	Hedw.		Indigenous
Bryaceae	*Bryum sp.*			
Scrophulariaceae	*Buddleja auriculata*	Benth.	LC	Indigenous
Asphodelaceae	*Bulbine abyssinica*	A.Rich.	LC	Indigenous
Asphodelaceae	*Bulbine favosa*	(Thunb.) Schult. & Schult.f.	LC	Indigenous
Asphodelaceae	*Bulbine narcissifolia*	Salm-Dyck	LC	Indigenous
Cyperaceae	*Bulbostylis burchellii*	(Ficalho & Hiern) C.B.Clarke	LC	Indigenous
Cyperaceae	*Bulbostylis hispidula subsp. pyriformis*	(Vahl) R.W.Haines	LC	Indigenous

Cyperaceae	*Bulbostylis humilis*	(Kunth) C.B.Clarke	LC	Indigenous
Cyperaceae	*Carex glomerabilis*	V.I.Krecz.	LC	Indigenous
Cannabaceae	*Celtis africana*	Burm.f.	LC	Indigenous
Apiaceae	*Centella asiatica*	(L.) Urb.	LC	Indigenous
Caryophyllaceae	*Cerastium arabidis*	E.Mey. ex Fenzl	LC	Indigenous
Ceratophyllaceae	*Ceratophyllum demersum var. demersum*	L.	LC	Indigenous
Apocynaceae	*Ceropegia incana*	(R.A.Dyer) Bruyns		Indigenous; Endemic
Solanaceae	*Cestrum parqui*	L'Her.		Not indigenous; Naturalised; Invasive
Fabaceae	*Chamaecrista biensis*	(Steyaert) Lock	LC	Indigenous
Amaranthaceae	*Chenopodium album*	L.		Not indigenous; Naturalised; Invasive
Gentianaceae	*Chironia krebsii*	Griseb.	LC	Indigenous
Gentianaceae	*Chironia palustris subsp. palustris*	Burch.	LC	Indigenous
Poaceae	*Chloris gayana*	Kunth	LC	Indigenous
Poaceae	*Chloris pycnothrix*	Trin.	LC	Indigenous
Poaceae	*Chloris virgata*	Sw.	LC	Indigenous
Agavaceae	*Chlorophytum cooperi*	(Baker) Nordal	LC	Indigenous
Agavaceae	*Chlorophytum fasciculatum*	(Baker) Kativu	LC	Indigenous
Asteraceae	*Chrysocoma obtusata*	(Thunb.) Ehr.Bayer	LC	Indigenous
Asteraceae	*Cineraria lyratiformis*	Cron	LC	Indigenous
Cucurbitaceae	*Citrullus lanatus*	(Thunb.) Matsum. & Nakai	LC	Indigenous
Cleomaceae	*Cleome gynandra*	L.	LC	Indigenous
Cleomaceae	*Cleome maculata*	(Sond.) Szyszyl.	LC	Indigenous
Cleomaceae	*Cleome monophylla*	L.	LC	Indigenous
Cleomaceae	*Cleome rubella*	Burch.	LC	Indigenous
Peraceae	*Clutia pulchella var. pulchella*	L.	LC	Indigenous
Combretaceae	*Combretum erythrophyllum*	(Burch.) Sond.	LC	Indigenous
Commelinaceae	*Commelina africana var. krebsiana*	L.	LC	Indigenous
Commelinaceae	*Commelina benghalensis*	L.	LC	Indigenous
Commelinaceae	*Commelina livingstonii*	C.B.Clarke	LC	Indigenous
Nyctaginaceae	*Commicarpus pentandrus*	(Burch.) Heimerl	LC	Indigenous
Convolvulaceae	*Convolvulus sagittatus*	Thunb.	LC	Indigenous
Convolvulaceae	*Convolvulus thunbergii*	Roem. & Schult.	LC	Indigenous
Asteraceae	*Conyza podocephala*	DC.		Indigenous
Malvaceae	*Corchorus asplenifolius*	Burch.	LC	Indigenous
Apocynaceae	*Cordylogyne globosa*	E.Mey.	LC	Indigenous
Rubiaceae	*Cordylostigma virgatum*	(Willd.) Groeninckx & Dessein		Indigenous
Caryophyllaceae	*Corrigiola litoralis subsp. litoralis*	L.	NE	Indigenous

Asteraceae	*Cotula anthemoides*	L.	LC	Indigenous
Asteraceae	*Cotula microglossa*	(DC.) O.Hoffm. & Kuntze ex Kuntze	LC	Indigenous; Endemic
Asteraceae	*Cotula sp.*			
Acanthaceae	*Crabbea acaulis*	N.E.Br.	LC	Indigenous
Acanthaceae	*Crabbea hirsuta*	Harv.	LC	Indigenous
Crassulaceae	*Crassula campestris*	(Eckl. & Zeyh.) Endl. ex Walp.	LC	Indigenous
Crassulaceae	*Crassula vaillantii*	(Willd.) Roth		Not indigenous; Naturalised
Amaryllidaceae	*Crinum bulbispermum*	(Burm.f.) Milne-Redh. & Schweick.	LC	Indigenous
Fabaceae	*Crotalaria distans subsp. distans*	Benth.	LC	Indigenous
Fabaceae	*Crotalaria virgulata subsp. grantiana*	Klotzsch	LC	Indigenous
Convolvulaceae	*Cuscuta campestris*	Yunck.		Not indigenous; Naturalised; Invasive
Araliaceae	*Cussonia paniculata subsp. sinuata*	Eckl. & Zeyh.	LC	Indigenous
Commelinaceae	*Cyanotis speciosa*	(L.f.) Hassk.	LC	Indigenous
Apiaceae	*Cyclospermum leptophyllum*	(Pers.) Sprague ex Britton & P.Wilson		Not indigenous; Naturalised
Orobanchaceae	*Cycnium tubulosum subsp. tubulosum*	(L.f.) Engl.	LC	Indigenous
Poaceae	*Cymbopogon caesius*	(Hook. & Arn.) Stapf	LC	Indigenous
Poaceae	*Cymbopogon dieterlenii*	Stapf ex E.Phillips	LC	Indigenous
Poaceae	*Cymbopogon pospischilii*	(K.Schum.) C.E.Hubb.	NE	Indigenous
Poaceae	*Cynodon dactylon*	(L.) Pers.	LC	Indigenous
Cyperaceae	*Cyperus difformis*	L.	LC	Indigenous
Cyperaceae	*Cyperus eragrostis*	Lam.		Not indigenous; Naturalised
Cyperaceae	*Cyperus esculentus var. esculentus*	L.	LC	Indigenous
Cyperaceae	*Cyperus longus var. tenuiflorus*	L.	NE	Indigenous
Cyperaceae	*Cyperus margaritaceus var. margaritaceus*	Vahl	LC	Indigenous
Cyperaceae	*Cyperus marginatus*	Thunb.	LC	Indigenous
Cyperaceae	*Cyperus semitrifidus*	Schrad.	LC	Indigenous
Cyperaceae	*Cyperus tenax*	Boeckeler	LC	Indigenous
Cyperaceae	*Cyperus usitatus*	Burch.	LC	Indigenous
Amaryllidaceae	*Cyrtanthus breviflorus*	Harv.	LC	Indigenous
Poaceae	*Dactyloctenium giganteum*	Fisher & Schweick.	LC	Indigenous
Solanaceae	*Datura ferox*	L.		Not indigenous; Naturalised; Invasive
Aizoaceae	*Delosperma herbeum*	(N.E.Br.) N.E.Br.	LC	Indigenous
Aizoaceae	*Delosperma sp.*	L.Bolus		
Asteraceae	*Denekia capensis*	Thunb.	LC	Indigenous
Apiaceae	*Deverra burchellii*	(DC.) Eckl. & Zeyh.	LC	Indigenous
Caryophyllaceae	*Dianthus basuticus subsp. basuticus*	Burtt Davy	NE	Indigenous

Caryophyllaceae	*Dianthus micropetalus*	Ser.	LC	Indigenous
Scrophulariaceae	*Diclis sp.*			
Asteraceae	*Dicoma anomala subsp. anomala*	Sond.	LC	Indigenous
Iridaceae	*Dierama mossii*	(N.E.Br.) Hilliard	LC	Indigenous
Poaceae	*Digitaria argyrograpta*	(Nees) Stapf	LC	Indigenous
Poaceae	*Digitaria brazzae*	(Franch.) Stapf	LC	Indigenous
Poaceae	*Digitaria ciliaris*	(Retz.) Koeler	NE	Not indigenous; Naturalised
Poaceae	*Digitaria eriantha*	Steud.	LC	Indigenous
Poaceae	*Digitaria sanguinalis*	(L.) Scop.	NE	Not indigenous; Naturalised
Poaceae	*Digitaria setifolia*	Stapf	LC	Indigenous
Poaceae	*Digitaria ternata*	(A.Rich.) Stapf	LC	Indigenous
Poaceae	*Digitaria tricholaenoides*	Stapf	LC	Indigenous
Ebenaceae	*Diospyros austroafricana var. microphylla*	De Winter	LC	Indigenous
Ebenaceae	*Diospyros lycioides subsp. lycioides*	Desf.	LC	Indigenous
Hyacinthaceae	*Dipcadi gracillimum*	Baker	LC	Indigenous
Hyacinthaceae	*Dipcadi marlothii*	Engl.	LC	Indigenous
Hyacinthaceae	*Dipcadi viride*	(L.) Moench	LC	Indigenous
Brassicaceae	*Diplotaxis muralis*	(L.) DC.		Not indigenous; Naturalised; Invasive
Fabaceae	*Dolichos angustifolius*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Dolichos linearis*	E.Mey.	LC	Indigenous
Hyacinthaceae	*Drimia calcarata*	(Baker) Stedje	LC	Indigenous
Hyacinthaceae	*Drimia intricata*	(Baker) J.C.Manning & Goldblatt	LC	Indigenous
Hyacinthaceae	*Drimia sp.*			
Acanthaceae	*Dyschoriste setigera*	(Pers.) J.C.Manning & Goldblatt	LC	Indigenous
Amaranthaceae	*Dysphania carinata*	(R.Br.) Mosyakin & Clemants		Not indigenous; Naturalised; Invasive
Poaceae	*Echinochloa colona*	(L.) Link	LC	Indigenous
Poaceae	*Echinochloa crus-galli*	(L.) P.Beauv.	LC	Indigenous
Poaceae	*Echinochloa jubata*	Stapf	LC	Indigenous
Cyperaceae	*Eleocharis dregeana*	Steud.	LC	Indigenous
Fabaceae	*Elephantorrhiza elephantina*	(Burch.) Skeels	LC	Indigenous
Poaceae	*Eleusine coracana subsp. africana*	(L.) Gaertn.	LC	Indigenous
Poaceae	*Elionurus muticus*	(Spreng.) Kunth	LC	Indigenous
Poaceae	*Enneapogon cenchroides*	(Licht. ex Roem. & Schult.) C.E.Hubb.	LC	Indigenous
Equisetaceae	*Equisetum ramosissimum subsp. ramosissimum*	Desf.	LC	Indigenous
Poaceae	*Eragrostis chloromelas*	Steud.	LC	Indigenous
Poaceae	*Eragrostis curvula*	(Schrad.) Nees	LC	Indigenous
Poaceae	*Eragrostis gummiflua*	Nees	LC	Indigenous

Poaceae	*Eragrostis lappula*	Nees	LC	Indigenous
Poaceae	*Eragrostis lehmanniana var. lehmanniana*	Nees	LC	Indigenous
Poaceae	*Eragrostis mexicana subsp. virescens*	(Hornem.) Link	NE	Not indigenous; Naturalised
Poaceae	*Eragrostis obtusa*	Munro ex Ficalho & Hiern	LC	Indigenous
Poaceae	*Eragrostis pallens*	Hack.	LC	Indigenous
Poaceae	*Eragrostis plana*	Nees	LC	Indigenous
Poaceae	*Eragrostis planiculmis*	Nees	LC	Indigenous
Poaceae	*Eragrostis sclerantha subsp. sclerantha*	Nees	LC	Indigenous
Poaceae	*Eragrostis sp.*			
Poaceae	*Eragrostis superba*	Peyr.	LC	Indigenous
Poaceae	*Eragrostis tef*	(Zuccagni) Trotter	NE	Not indigenous; Naturalised
Poaceae	*Eragrostis trichophora*	Coss. & Durieu	LC	Indigenous
Asteraceae	*Erigeron bonariensis*	L.		Not indigenous; Naturalised; Invasive
Asteraceae	*Erigeron canadensis*	L.		Not indigenous; Naturalised; Invasive
Asteraceae	*Erigeron primulifolius*	(Lam.) Greuter		Not indigenous; Naturalised; Invasive
Eriocaulaceae	*Eriocaulon dregei*	Hochst.	LC	Indigenous; Endemic
Fabaceae	*Eriosema squarrosum*	(Thunb.) Walp.	LC	Indigenous
Ruscaceae	*Eriospermum abyssinicum*	Baker		Indigenous
Brassicaceae	*Erucastrum austroafricanum*	Al-Shehbaz & Warwick	LC	Indigenous
Fabaceae	*Erythrina zeyheri*	Harv.	LC	Indigenous
Myrtaceae	*Eucalyptus camaldulensis*	Dehnh.		Not indigenous; Cultivated; Naturalised; Invasive
Ebenaceae	*Euclea crispa subsp. crispa*	(Thunb.) Gurke	LC	Indigenous
Hyacinthaceae	*Eucomis autumnalis subsp. clavata*	(Mill.) Chitt.	NE	Indigenous
Euphorbiaceae	*Euphorbia inaequilatera var. inaequilatera*	Sond.	NE	Indigenous
Euphorbiaceae	*Euphorbia striata*	Thunb.	LC	Indigenous
Asteraceae	*Euryops sp.*			
Exormothecaceae	*Exormotheca holstii*	Steph.		Indigenous
Convolvulaceae	*Falkia oblonga*	Bernh. ex C.Krauss	LC	Indigenous
Asteraceae	*Felicia fascicularis*	DC.	LC	Indigenous
Asteraceae	*Felicia muricata subsp. muricata*	(Thunb.) Nees	LC	Indigenous
Poaceae	*Festuca caprina*	Nees	LC	Indigenous
Poaceae	*Festuca scabra*	Vahl	LC	Indigenous
Cyperaceae	*Ficinia stolonifera*	Boeckeler	LC	Indigenous
Asteraceae	*Flaveria bidentis*	(L.) Kuntze		Not indigenous; Naturalised; Invasive
Oleaceae	*Fraxinus angustifolia*	Vahl		Not indigenous; Naturalised; Invasive
Cyperaceae	*Fuirena pubescens*	(Poir.) Kunth		Indigenous

Cyperaceae	*Fuirena pubescens var. pubescens*	(Poir.) Kunth	LC	Indigenous
Cyperaceae	*Fuirena stricta var. stricta*	Steud.	LC	Indigenous
Fumariaceae	*Fumaria muralis subsp. muralis*	Sond. ex W.D.J.Koch		Not indigenous; Naturalised; Invasive
Funariaceae	*Funaria hygrometrica*	Hedw.		Indigenous
Asteraceae	*Galinsoga parviflora*	Cav.		Not indigenous; Naturalised; Invasive
Rubiaceae	*Galium capense subsp. garipense*	Thunb.	NE	Indigenous
Asteraceae	*Gamochaeta antillana*	(Urb.) Anderb.		Not indigenous; Naturalised; Invasive
Asteraceae	*Gazania krebsiana subsp. arctotoides*	Less.	LC	Indigenous
Asteraceae	*Gazania krebsiana subsp. krebsiana*	Less.	LC	Indigenous
Asteraceae	*Gazania krebsiana subsp. serrulata*	Less.	LC	Indigenous
Asteraceae	*Geigeria aspera var. aspera*	Harv.	LC	Indigenous
Asteraceae	*Gerbera ambigua*	(Cass.) Sch.Bip.	LC	Indigenous
Gisekiaceae	*Gisekia pharnaceoides var. pharnaceoides*	L.	LC	Indigenous
Iridaceae	*Gladiolus antholyzoides*	Baker	LC	Indigenous; Endemic
Iridaceae	*Gladiolus crassifolius*	Baker	LC	Indigenous
Iridaceae	*Gladiolus papilio*	Hook.f.	LC	Indigenous
Iridaceae	*Gladiolus permeabilis subsp. edulis*	D.Delaroche	LC	Indigenous
Iridaceae	*Gladiolus sericeovillosus subsp. calvatus*	Hook.f.	LC	Indigenous
Iridaceae	*Gladiolus sericeovillosus subsp. sericeovillosus*	Hook.f.	LC	Indigenous
Asteraceae	*Gnaphalium confine*	Harv.	LC	Indigenous
Thymelaeaceae	*Gnidia fastigiata*	Rendle	LC	Indigenous
Thymelaeaceae	*Gnidia nodiflora*	Meisn.	LC	Indigenous; Endemic
Apocynaceae	*Gomphocarpus fruticosus subsp. fruticosus*	(L.) W.T.Aiton	LC	Indigenous
Amaranthaceae	*Gomphrena celosioides*	Mart.		Not indigenous; Naturalised
Amaranthaceae	*Guilleminea densa*	(Humb. & Bonpl. ex Schult.) Moq.		Not indigenous; Naturalised; Invasive
Celastraceae	*Gymnosporia buxifolia*	(L.) Szyszyl.	LC	Indigenous
Orchidaceae	*Habenaria epipactidea*	Rchb.f.	LC	Indigenous
Amaryllidaceae	*Haemanthus montanus*	Baker	LC	Indigenous
Asteraceae	*Haplocarpha scaposa*	Harv.	LC	Indigenous
Asteraceae	*Helichrysum argyrosphaerum*	DC.	LC	Indigenous
Asteraceae	*Helichrysum caespititium*	(DC.) Harv.	LC	Indigenous
Asteraceae	*Helichrysum callicomum*	Harv.	LC	Indigenous
Asteraceae	*Helichrysum lineare*	DC.	LC	Indigenous
Asteraceae	*Helichrysum nudifolium var. nudifolium*	(L.) Less.	LC	Indigenous
Asteraceae	*Helichrysum paronychioides*	DC.	LC	Indigenous

Asteraceae	*Helichrysum rugulosum*	Less.	LC	Indigenous
Asteraceae	*Helichrysum subglomeratum*	Less.	LC	Indigenous
Malvaceae	*Hermannia coccocarpa*	(Eckl. & Zeyh.) Kuntze	LC	Indigenous
Malvaceae	*Hermannia cordata*	(E.Mey. ex E.Phillips) De Winter	LC	Indigenous; Endemic
Malvaceae	*Hermannia depressa*	N.E.Br.	LC	Indigenous
Malvaceae	*Hermannia tomentosa*	(Turcz.) Schinz ex Engl.	LC	Indigenous
Amaranthaceae	*Hermbstaedtia odorata var. aurantiaca*	(Burch.) T.Cooke	NE	Indigenous
Amaranthaceae	*Hermbstaedtia odorata var. odorata*	(Burch.) T.Cooke	NE	Indigenous
Iridaceae	*Hesperantha longicollis*	Baker	LC	Indigenous
Poaceae	*Heteropogon contortus*	(L.) Roem. & Schult.	LC	Indigenous
Malvaceae	*Hibiscus aethiopicus var. ovatus*	L.	LC	Indigenous
Malvaceae	*Hibiscus microcarpus*	Garcke	LC	Indigenous
Malvaceae	*Hibiscus pusillus*	Thunb.	LC	Indigenous
Malvaceae	*Hibiscus trionum*	L.		Not indigenous; Naturalised
Asteraceae	*Hilliardiella elaeagnoides*	(DC.) Swelank. & J.C.Manning		Indigenous
Araliaceae	*Hydrocotyle sp.*			
Poaceae	*Hyparrhenia hirta*	(L.) Stapf	LC	Indigenous
Poaceae	*Hyparrhenia quarrei*	Robyns	LC	Indigenous
Asteraceae	*Hypochaeris brasiliensis*	(Less.) Griseb.		Not indigenous; Naturalised
Asteraceae	*Hypochaeris microcephala var. albiflora*	(Sch.Bip.) Cabrera		Not indigenous; Naturalised
Asteraceae	*Hypochaeris radicata*	L.		Not indigenous; Naturalised
Hypoxidaceae	*Hypoxis acuminata*	Baker	LC	Indigenous
Hypoxidaceae	*Hypoxis angustifolia var. buchananii*	Lam.	LC	Indigenous
Hypoxidaceae	*Hypoxis filiformis*	Baker	LC	Indigenous
Hypoxidaceae	*Hypoxis hemerocallidea*	Fisch., C.A.Mey. & Ave-Lall.	LC	Indigenous
Hypoxidaceae	*Hypoxis iridifolia*	Baker	LC	Indigenous
Hypoxidaceae	*Hypoxis rigidula var. rigidula*	Baker	LC	Indigenous
Hypoxidaceae	*Hypoxis sp.*			
Poaceae	*Imperata cylindrica*	(L.) P.Beauv.		Indigenous
Fabaceae	*Indigofera dimidiata*	Vogel ex Walp.	LC	Indigenous
Fabaceae	*Indigofera evansiana*	Burtt Davy	LC	Indigenous
Fabaceae	*Indigofera hilaris*	Eckl. & Zeyh.		Indigenous
Fabaceae	*Indigofera hybrida*	N.E.Br.	VU	Indigenous; Endemic
Fabaceae	*Indigofera torulosa var. angustiloba*	E.Mey.	LC	Indigenous; Endemic
Fabaceae	*Indigofera vicioides subsp. vicioides*	Jaub. & Spach	LC	Indigenous
Convolvulaceae	*Ipomoea bathycolpos*	Hallier f.	LC	Indigenous; Endemic
Convolvulaceae	*Ipomoea bolusiana*	Schinz	LC	Indigenous

Convolvulaceae	*Ipomoea crassipes var. crassipes*	Hook.	LC	Indigenous
Convolvulaceae	*Ipomoea oenotheroides*	(L.f.) Raf. ex Hallier f.	LC	Indigenous
Convolvulaceae	*Ipomoea ommanneyi*	Rendle	LC	Indigenous
Cyperaceae	*Isolepis cernua var. cernua*	(Vahl) Roem. & Schult.	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia aurantiaca*	(Burch.) Hilliard	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia sp.*			
Juncaceae	*Juncus dregeanus subsp. dregeanus*	Kunth	LC	Indigenous
Juncaceae	*Juncus effusus*	L.	LC	Indigenous
Juncaceae	*Juncus exsertus*	Buchenau	LC	Indigenous
Juncaceae	*Juncus oxycarpus*	E.Mey. ex Kunth	LC	Indigenous
Juncaceae	*Juncus rigidus*	Desf.	LC	Indigenous
Kewaceae	*Kewa bowkeriana*	(Sond.) Christenh.	LC	Indigenous
Asphodelaceae	*Kniphofia porphyrantha*	Baker	LC	Indigenous
Asphodelaceae	*Kniphofia typhoides*	Codd	NT	Indigenous; Endemic
Poaceae	*Koeleria capensis*	(Steud.) Nees	LC	Indigenous
Rubiaceae	*Kohautia caespitosa subsp. brachyloba*	Schnizl.	LC	Indigenous
Rubiaceae	*Kohautia cynanchica*	DC.	LC	Indigenous
Rubiaceae	*Kohautia subverticillata subsp. subverticillata*	(K.Schum.) D.Mantell	LC	Indigenous
Cyperaceae	*Kyllinga alba*	Nees	LC	Indigenous
Cyperaceae	*Kyllinga erecta var. erecta*	Schumach.	LC	Indigenous
Asteraceae	*Lactuca inermis*	Forssk.	LC	Indigenous
Asteraceae	*Lactuca serriola*	L.		Not indigenous; Naturalised
Hydrocharitaceae	*Lagarosiphon major*	(Ridl.) Moss ex Wager	LC	Indigenous
Hydrocharitaceae	*Lagarosiphon muscoides*	Harv.	LC	Indigenous
Verbenaceae	*Lantana rugosa*	Thunb.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon burchellii*	Meisn.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon caffer*	Meisn.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon sericocephalus*	(Meisn.) J.C.Manning & Boatwr.	LC	Indigenous
Haloragaceae	*Laurembergia repens subsp. brachypoda*	P.J.Bergius	LC	Indigenous
Hyacinthaceae	*Ledebouria cooperi*	(Hook.f.) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria leptophylla*	(Baker) S.Venter	LC	Indigenous
Hyacinthaceae	*Ledebouria luteola*	Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria marginata*	(Baker) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria sp.*			
Hyacinthaceae	*Ledebouria undulata*	(Jacq.) Jessop ex Willd.	LC	Indigenous
Poaceae	*Leersia hexandra*	Sw.	LC	Indigenous
Fabaceae	*Leobordea divaricata*	Eckl. & Zeyh.	LC	Indigenous

Brassicaceae	*Lepidium bonariense*	L.		Not indigenous; Naturalised
Brassicaceae	*Lepidium schinzii*	Thell.	LC	Indigenous
Poaceae	*Leptochloa fusca*	(L.) Kunth	LC	Indigenous
Fabaceae	*Lessertia frutescens subsp. microphylla*	(L.) Goldblatt & J.C.Manning	LC	Indigenous
Rosaceae	*Leucosidea sericea*	Eckl. & Zeyh.	LC	Indigenous
Oleaceae	*Ligustrum sinense*	Lour.		Not indigenous; Cultivated; Naturalised; Invasive
Limeaceae	*Limeum fenestratum var. fenestratum*	(Fenzl) Heimerl	LC	Indigenous
Limeaceae	*Limeum pauciflorum*	Moq.	LC	Indigenous; Endemic
Limeaceae	*Limeum sp.*			
Limeaceae	*Limeum sulcatum var. sulcatum*	(Klotzsch) Hutch.	LC	Indigenous
Scrophulariaceae	*Limosella longiflora*	Kuntze	LC	Indigenous
Scrophulariaceae	*Limosella maior*	Diels	LC	Indigenous
Linaceae	*Linum thunbergii*	Eckl. & Zeyh.	LC	Indigenous
Verbenaceae	*Lippia scaberrima*	Sond.	LC	Indigenous
Fabaceae	*Listia heterophylla*	E.Mey.	LC	Indigenous
Asteraceae	*Litogyne gariepina*	(DC.) Anderb.	LC	Indigenous
Lobeliaceae	*Lobelia erinus*	L.	LC	Indigenous
Lobeliaceae	*Lobelia flaccida subsp. flaccida*	(C.Presl) A.DC.	LC	Indigenous
Lobeliaceae	*Lobelia sonderiana*	(Kuntze) Lammers	LC	Indigenous
Lobeliaceae	*Lobelia thermalis*	Thunb.	LC	Indigenous
Poaceae	*Lophacme digitata*	Stapf	LC	Indigenous
Poaceae	*Loudetia simplex*	(Nees) C.E.Hubb.	LC	Indigenous
Lunulariaceae	*Lunularia cruciata*	(L.) Dumort. ex Lindb.		Indigenous
Solanaceae	*Lycium hirsutum*	Dunal	LC	Indigenous
Malvaceae	*Malva neglecta*	Wallr.		Not indigenous; Naturalised
Scrophulariaceae	*Manulea buchneroides*	Hilliard & B.L.Burtt	LC	Indigenous
Scrophulariaceae	*Manulea paniculata*	Benth.	LC	Indigenous
Scrophulariaceae	*Manulea parviflora var. limonioides*	Benth.	LC	Indigenous; Endemic
Scrophulariaceae	*Manulea parviflora var. parviflora*	Benth.	LC	Indigenous
Marsileaceae	*Marsilea farinosa subsp. farinosa*	Launert	LC	Indigenous
Marsileaceae	*Marsilea macrocarpa*	C.Presl	LC	Indigenous
Fabaceae	*Medicago laciniata var. laciniata*	(L.) Mill.	NE	Not indigenous; Naturalised
Meliaceae	*Melia azedarach*	L.	NE	Not indigenous; Naturalised; Invasive
Melianthaceae	*Melianthus comosus*	Vahl	LC	Indigenous
Fabaceae	*Melolobium sp.*			
Oleaceae	*Menodora africana*	Hook.	LC	Indigenous

Convolvulaceae	*Merremia verecunda*	Rendle	LC	Indigenous
Phrymaceae	*Mimulus gracilis*	R.Br.	LC	Indigenous
Poaceae	*Monocymbium ceresiiforme*	(Nees) Stapf	LC	Indigenous
Lobeliaceae	*Monopsis decipiens*	(Sond.) Thulin	LC	Indigenous
Geraniaceae	*Monsonia angustifolia*	E.Mey. ex A.Rich.	LC	Indigenous
Geraniaceae	*Monsonia brevirostrata*	R.Knuth	LC	Indigenous
Iridaceae	*Moraea pallida*	(Baker) Goldblatt	LC	Indigenous
Iridaceae	*Moraea simulans*	Baker	LC	Indigenous
Iridaceae	*Moraea stricta*	Baker	LC	Indigenous
Moraceae	*Morus alba var. alba*	L.		Not indigenous; Naturalised
Haloragaceae	*Myriophyllum aquaticum*	(Vell.) Verdc.		Not indigenous; Cultivated; Naturalised; Invasive
Aizoaceae	*Nananthus sp.*			
Scrophulariaceae	*Nemesia fruticans*	(Thunb.) Benth.	LC	Indigenous
Scrophulariaceae	*Nemesia sp.*			
Asteraceae	*Nolletia ciliaris*	(DC.) Steetz	LC	Indigenous
Nymphaeaceae	*Nymphaea sp.*			
Onagraceae	*Oenothera stricta subsp. stricta*	Ledeb. ex Link		Not indigenous; Naturalised; Invasive
Onagraceae	*Oenothera tetraptera*	Cav.		Not indigenous; Naturalised; Invasive
Rubiaceae	*Oldenlandia rosulata var. rosulata*	K.Schum.	LC	Indigenous
Hyacinthaceae	*Ornithogalum flexuosum*	(Thunb.) U.Mull.-Doblies & D.Mull.-Doblies	LC	Indigenous
Asteraceae	*Osteospermum muricatum subsp. muricatum*	E.Mey. ex DC.	LC	Indigenous
Asteraceae	*Osteospermum scariosum var. scariosum*	DC.	NE	Indigenous
Oxalidaceae	*Oxalis corniculata*	L.		Not indigenous; Naturalised; Invasive
Oxalidaceae	*Oxalis obliquifolia*	Steud. ex A.Rich.	LC	Indigenous
Polygonaceae	*Oxygonum dregeanum subsp. canescens*	Meisn.	NE	Indigenous; Endemic
Polygonaceae	*Oxygonum dregeanum subsp. canescens*	Meisn.	NE	Indigenous
Polygonaceae	*Oxygonum dregeanum subsp. swazicum*	Meisn.	LC	Indigenous
Apocynaceae	*Pachycarpus schinzianus*	(Schltr.) N.E.Br.	LC	Indigenous
Poaceae	*Panicum kalaharense*	Mez	LC	Indigenous
Poaceae	*Panicum sp.*			
Papaveraceae	*Papaver aculeatum*	Thunb.	LC	Indigenous
Apocynaceae	*Parapodium costatum*	E.Mey.	LC	Indigenous
Poaceae	*Paspalum dilatatum*	Poir.	NE	Not indigenous; Naturalised; Invasive
Poaceae	*Paspalum urvillei*	Steud.	NE	Not indigenous; Naturalised; Invasive
Malvaceae	*Pavonia burchellii*	(DC.) R.A.Dyer	LC	Indigenous
Geraniaceae	*Pelargonium dolomiticum*	R.Knuth	LC	Indigenous

Geraniaceae	*Pelargonium grossularioides*	(L.) L'Her.	LC	Indigenous; Endemic
Geraniaceae	*Pelargonium luridum*	(Andrews) Sweet	LC	Indigenous
Geraniaceae	*Pelargonium malacoides*	R.Knuth		Indigenous
Poaceae	*Pennisetum thunbergii*	Kunth	LC	Indigenous
Rubiaceae	*Pentanisia angustifolia*	(Hochst.) Hochst.	LC	Indigenous
Apocynaceae	*Pentarrhinum insipidum*	E.Mey.	LC	Indigenous
Asteraceae	*Pentzia globosa*	Less.	LC	Indigenous
Poaceae	*Perotis patens*	Gand.	LC	Indigenous
Polygonaceae	*Persicaria amphibia*	(L.) Delarbre	LC	Not indigenous; Naturalised
Polygonaceae	*Persicaria lapathifolia*	(L.) Delarbre		Not indigenous; Naturalised; Invasive
Molluginaceae	*Pharnaceum brevicaule*	(DC.) Bartl.	LC	Indigenous
Poaceae	*Phragmites australis*	(Cav.) Steud.	LC	Indigenous
Phytolaccaceae	*Phytolacca heptandra*	Retz.	LC	Indigenous
Plantaginaceae	*Plantago lanceolata*	L.	LC	Indigenous
Plantaginaceae	*Plantago major*	L.		Not indigenous; Naturalised
Plantaginaceae	*Plantago virginica*	L.		Not indigenous; Naturalised
Asteraceae	*Platycarphella parvifolia*	(S.Moore) V.A.Funk & H.Rob.	LC	Indigenous; Endemic
Poaceae	*Pogonarthria squarrosa*	(Roem. & Schult.) Pilg.	LC	Indigenous
Caryophyllaceae	*Pollichia campestris*	Aiton	LC	Indigenous
Asteraceae	*Polydora angustifolia*	(Steetz) H.Rob.	LC	Indigenous
Polygalaceae	*Polygala amatymbica*	Eckl. & Zeyh.	LC	Indigenous
Polygalaceae	*Polygala hottentotta*	C.Presl	LC	Indigenous
Polygalaceae	*Polygala sp.*			
Polygonaceae	*Polygonum aviculare*	L.		Not indigenous; Naturalised
Polygonaceae	*Polygonum plebeium*	R.Br.	LC	Indigenous
Salicaceae	*Populus nigra var. italica*	L.		Not indigenous; Naturalised; Invasive
Portulacaceae	*Portulaca oleracea*	L.		Not indigenous; Naturalised
Portulacaceae	*Portulaca pilosa*	L.	LC	Not indigenous; Naturalised; Invasive
Portulacaceae	*Portulaca quadrifida*	L.	LC	Indigenous
Potamogetonaceae	*Potamogeton pectinatus*	L.	LC	Indigenous
Molluginaceae	*Psammotropha mucronata var. mucronata*	(Thunb.) Fenzl	LC	Indigenous
Asteraceae	*Pseudognaphalium luteoalbum*	(L.) Hilliard & B.L.Burtt	LC	Cryptogenic
Asteraceae	*Pseudognaphalium oligandrum*	(DC.) Hilliard & B.L.Burtt	LC	Indigenous
Cyperaceae	*Pycreus chrysanthus*	(Boeckeler) C.B.Clarke	LC	Indigenous
Cyperaceae	*Pycreus nitidus*	(Lam.) J.Raynal	LC	Indigenous
Rubiaceae	*Pygmaeothamnus zeyheri var. zeyheri*	(Sond.) Robyns	LC	Indigenous

Rosaceae	*Pyrus communis*	L.		Not indigenous; Naturalised
Ranunculaceae	*Ranunculus multifidus*	Forssk.	LC	Indigenous
Brassicaceae	*Raphanus raphanistrum*	L.		Not indigenous; Naturalised; Invasive
Apocynaceae	*Raphionacme hirsuta*	(E.Mey.) R.A.Dyer	LC	Indigenous
Apocynaceae	*Raphionacme velutina*	Schltr.	LC	Indigenous
Rhamnaceae	*Rhamnus prinoides*	L'Her.	LC	Indigenous
Fabaceae	*Rhynchosia adenodes*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Rhynchosia minima var. prostrata*	(L.) DC.	NE	Indigenous
Fabaceae	*Rhynchosia pedunculata*	M.M.le Roux & Moteetee		Indigenous; Endemic
Fabaceae	*Rhynchosia sp.*			
Fabaceae	*Rhynchosia totta var. totta*	(Thunb.) DC.	LC	Indigenous
Ricciaceae	*Riccia cavernosa*	Hoffm.		Indigenous
Rubiaceae	*Richardia brasiliensis*	Gomes	NE	Not indigenous; Naturalised
Apocynaceae	*Riocreuxia polyantha*	Schltr.	LC	Indigenous
Brassicaceae	*Rorippa fluviatilis var. caledonica*	(E.Mey. ex Sond.) R.A.Dyer	LC	Indigenous
Lamiaceae	*Rotheca hirsuta*	(Hochst.) R.Fern.	LC	Indigenous
Polygonaceae	*Rumex acetosella subsp. angiocarpus*	L.		Not indigenous; Naturalised
Polygonaceae	*Rumex conglomeratus*	Murb.	LC	Indigenous
Polygonaceae	*Rumex lanceolatus*	Thunb.	LC	Indigenous
Polygonaceae	*Rumex woodii*	N.E.Br.	LC	Indigenous
Aizoaceae	*Ruschia sp.*			
Salicaceae	*Salix babylonica var. babylonica*	L.		Not indigenous; Naturalised
Salicaceae	*Salix mucronata*	Thunb.		Indigenous
Salicaceae	*Salix mucronata subsp. mucronata*	Thunb.	LC	Indigenous
Amaranthaceae	*Salsola kali*	L.		Not indigenous; Naturalised; Invasive
Lamiaceae	*Salvia reflexa*	Hornem.		Not indigenous; Naturalised; Invasive
Lamiaceae	*Salvia runcinata*	L.f.	LC	Indigenous
Lamiaceae	*Salvia sp.*			
Dipsacaceae	*Scabiosa columbaria*	L.	LC	Indigenous
Hyacinthaceae	*Schizocarphus nervosus*	(Burch.) Van der Merwe	LC	Indigenous
Apocynaceae	*Schizoglossum nitidum*	Schltr.	LC	Indigenous
Asteraceae	*Schkuhria pinnata*	(Lam.) Kuntze ex Thell.		Not indigenous; Naturalised
Cyperaceae	*Schoenoplectus brachyceras*	(Hochst. ex A.Rich.) Lye	LC	Indigenous
Cyperaceae	*Schoenoplectus muricinux*	(C.B.Clarke) J.Raynal	LC	Indigenous
Cyperaceae	*Scirpoides burkei*	(C.B.Clarke) Goetgh., Muasya & D.A.Simpson	LC	Indigenous
Lamiaceae	*Scutellaria racemosa*	Pers.		Not indigenous; Naturalised; Invasive

Anacardiaceae	*Searsia dentata*	(Thunb.) F.A.Barkley	LC	Indigenous
Anacardiaceae	*Searsia erosa*	(Thunb.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia lancea*	(L.f.) F.A.Barkley	LC	Indigenous
Anacardiaceae	*Searsia pyroides var. gracilis*	(Burch.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia pyroides var. pyroides*	(Burch.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia rigida var. margaretae*	(Mill.) F.A.Barkley	LC	Indigenous; Endemic
Gentianaceae	*Sebaea bojeri*	Griseb.	LC	Indigenous
Gentianaceae	*Sebaea pentandra var. pentandra*	E.Mey.	LC	Indigenous
Convolvulaceae	*Seddera capensis*	(E.Mey. ex Choisy) Hallier f.	LC	Indigenous
Scrophulariaceae	*Selago burkei*	Rolfe	LC	Indigenous; Endemic
Scrophulariaceae	*Selago sp.*			
Asteraceae	*Senecio consanguineus*	DC.	LC	Indigenous
Asteraceae	*Senecio coronatus*	(Thunb.) Harv.	LC	Indigenous
Asteraceae	*Senecio erubescens var. crepidifolius*	Aiton	NE	Indigenous
Asteraceae	*Senecio erubescens var. erubescens*	Aiton	NE	Indigenous; Endemic
Asteraceae	*Senecio gregatus*	Hilliard	LC	Indigenous
Asteraceae	*Senecio harveianus*	MacOwan	LC	Indigenous
Asteraceae	*Senecio inaequidens*	DC.	LC	Indigenous
Asteraceae	*Senecio inornatus*	DC.	LC	Indigenous
Asteraceae	*Senecio laevigatus var. laevigatus*	Thunb.	LC	Indigenous; Endemic
Asteraceae	*Senecio polyodon var. polyodon*	DC.	LC	Indigenous
Asteraceae	*Senecio reptans*	Turcz.	LC	Indigenous; Endemic
Asteraceae	*Senecio sp.*			
Fabaceae	*Senna corymbosa*	(Lam.) H.S.Irwin & Barneby	NE	Not indigenous; Cultivated; Naturalised
Asteraceae	*Seriphium plumosum*	L.		Indigenous
Poaceae	*Setaria incrassata*	(Hochst.) Hack.	LC	Indigenous
Poaceae	*Setaria nigrirostris*	(Nees) T.Durand & Schinz	LC	Indigenous
Poaceae	*Setaria pumila*	(Poir.) Roem. & Schult.	LC	Indigenous
Poaceae	*Setaria sphacelata var. sphacelata*	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
Poaceae	*Setaria sphacelata var. torta*	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
Caryophyllaceae	*Silene burchellii subsp. pilosellifolia*	Otth ex DC.		Indigenous
Solanaceae	*Solanum campylacanthum*	Hochst. ex A.Rich.		Indigenous
Solanaceae	*Solanum chenopodioides*	Lam.		Not indigenous; Naturalised; Invasive
Solanaceae	*Solanum nigrum*	L.		Not indigenous; Naturalised
Asteraceae	*Sonchus integrifolius var. integrifolius*	Harv.	LC	Indigenous

Fabaceae	*Spartium junceum*	L.	NE	Not indigenous; Cultivated; Naturalised; Invasive
Caryophyllaceae	*Spergularia media*	(L.) C.Presl		Not indigenous; Naturalised
Caryophyllaceae	*Spergularia sp.*			
Poaceae	*Sporobolus conrathii*	Chiov.	LC	Indigenous
Lamiaceae	*Stachys hyssopoides*	Burch. ex Benth.	LC	Indigenous
Apocynaceae	*Stenostelma capense*	Schltr.	LC	Indigenous
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Poaceae	*Stiburus conrathii*	Hack.	LC	Indigenous
Orobanchaceae	*Striga gesnerioides*	(Willd.) Vatke	LC	Indigenous
Tamaricaceae	*Tamarix chinensis*	Lour.		Not indigenous; Naturalised; Invasive
Asteraceae	*Taraxacum ekmanii*	Dahlst.		Not indigenous; Naturalised
Fabaceae	*Tephrosia capensis var. capensis*	(Jacq.) Pers.	LC	Indigenous
Fabaceae	*Tephrosia lupinifolia*	DC.	LC	Indigenous
Lamiaceae	*Teucrium trifidum*	Retz.	LC	Indigenous
Thelypteridaceae	*Thelypteris confluens*	(Thunb.) C.V.Morton	LC	Indigenous
Poaceae	*Themeda triandra*	Forssk.	LC	Indigenous
Santalaceae	*Thesium costatum var. juniperinum*	A.W.Hill	LC	Indigenous
Santalaceae	*Thesium hirsutum*	A.W.Hill	LC	Indigenous; Endemic
Santalaceae	*Thesium impeditum*	A.W.Hill	LC	Indigenous
Santalaceae	*Thesium multiramulosum*	Pilg.	LC	Indigenous
Santalaceae	*Thesium resedoides*	A.W.Hill	LC	Indigenous
Santalaceae	*Thesium sp.*	L.		
Santalaceae	*Thesium spartioides*	A.W.Hill	LC	Indigenous
Asteraceae	*Tolpis capensis*	(L.) Sch.Bip.	LC	Indigenous
Asphodelaceae	*Trachyandra asperata var. asperata*	Kunth	LC	Indigenous
Asphodelaceae	*Trachyandra asperata var. macowanii*	Kunth	LC	Indigenous
Asphodelaceae	*Trachyandra asperata var. nataglencoensis*	Kunth	LC	Indigenous
Asphodelaceae	*Trachyandra laxa var. laxa*	(N.E.Br.) Oberm.	LC	Indigenous
Asphodelaceae	*Trachyandra saltii var. saltii*	(Baker) Oberm.	LC	Indigenous
Asphodelaceae	*Trachyandra sp.*			
Poaceae	*Trachypogon spicatus*	(L.f.) Kuntze	LC	Indigenous
Asteraceae	*Tragopogon dubius*	Scop.		Not indigenous; Naturalised
Poaceae	*Tragus berteronianus*	Schult.	LC	Indigenous
Poaceae	*Tragus racemosus*	(L.) All.	LC	Indigenous
Zygophyllaceae	*Tribulus terrestris*	L.	LC	Indigenous
Poaceae	*Trichoneura grandiglumis*	(Nees) Ekman	LC	Indigenous

Fabaceae	*Trifolium africanum var. africanum*	Ser.	NE	Indigenous
Fabaceae	*Trifolium africanum var. lydenburgense*	Ser.	NE	Indigenous
Fabaceae	*Trifolium repens*	L.	NE	Not indigenous; Naturalised
Poaceae	*Triraphis andropogonoides*	(Steud.) E.Phillips	LC	Indigenous
Poaceae	*Trisetopsis imberbis*	(Nees) Roser, A.Wolk & Veldkamp		Indigenous
Poaceae	*Tristachya leucothrix*	Trin. ex Nees	LC	Indigenous
Tropaeolaceae	*Tropaeolum majus*	L.		Not indigenous; Cultivated; Naturalised; Invasive
Alliaceae	*Tulbaghia leucantha*	Baker	LC	Indigenous
Typhaceae	*Typha capensis*	(Rohrb.) N.E.Br.	LC	Indigenous
Ulmaceae	*Ulmus minor*	Mill.		Not indigenous; Cultivated; Naturalised
Poaceae	*Urochloa brachyura*	(Hack.) Stapf	LC	Indigenous
Poaceae	*Urochloa panicoides*	P.Beauv.	LC	Indigenous
Asteraceae	*Ursinia nana subsp. leptophylla*	DC.	LC	Indigenous
Lentibulariaceae	*Utricularia arenaria*	A.DC.	LC	Indigenous
Fabaceae	*Vachellia karroo*	(Hayne) Banfi & Galasso	LC	Indigenous
Vahliaceae	*Vahlia capensis subsp. vulgaris*	(L.f.) Thunb.	NE	Indigenous
Valerianaceae	*Valeriana capensis var. capensis*	Thunb.	LC	Indigenous
Rubiaceae	*Vangueria pygmaea*	Schltr.	LC	Indigenous
Verbenaceae	*Verbena bonariensis*	L.		Not indigenous; Naturalised; Invasive
Verbenaceae	*Verbena officinalis*	L.		Not indigenous; Naturalised
Fabaceae	*Vicia hirsuta*	(L.) Gray	NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Vicia sativa subsp. sativa*	L.	NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Vicia sp.*			
Fabaceae	*Vigna comosa subsp. comosa*	Baker	NE	Not indigenous; Naturalised
Campanulaceae	*Wahlenbergia androsacea*	A.DC.	LC	Indigenous
Campanulaceae	*Wahlenbergia denticulata*	(Burch.) A.DC.		Indigenous
Campanulaceae	*Wahlenbergia denticulata var. transvaalensis*	(Burch.) A.DC.	LC	Indigenous; Endemic
Campanulaceae	*Wahlenbergia undulata*	(L.f.) A.DC.	LC	Indigenous
Araceae	*Wolffia arrhiza*	(L.) Horkel ex Wimm.	LC	Indigenous
Asteraceae	*Xanthium strumarium*	L.		Not indigenous; Naturalised; Invasive
Apocynaceae	*Xysmalobium parviflorum*	Harv. ex Scott-Elliot	LC	Indigenous
Rhamnaceae	*Ziziphus mucronata*	Willd.		Indigenous
Rhamnaceae	*Ziziphus zeyheriana*	Sond.	LC	Indigenous
Fabaceae	*Zornia milneana*	Mohlenbr.	LC	Indigenous

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Amietia fuscigula	Cape River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Chiromantis xerampelina	Southern Foam Nest Frog	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Phrynobatrachus natalensis	Snoring Puddle Frog	LC	LC
Ptychadena anchietae	Plain Grass Frog	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	NT	LC
Schismaderma carens	African Red Toad	LC	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys garmani	Olive Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys poweri	Power's Toad	LC	LC
Semnodactylus wealii	Rattling Frog	LC	LC
Strongylopus fasciatus	Striped Stream Frog	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna natalensis	Natal Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Xenopus laevis	Common Platanna	LC	LC

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acontias gracilicauda	Thin-tailed Legless Skink	LC	LC
Afroedura nivaria	Drankensberg Flat Gecko	LC	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC
Agama aculeata distanti	Eastern Ground Agama	LC	LC
Agama atra	Southern Rock Agama	LC	LC
Aparallactus capensis	Black-headed Centipede-eater	LC	LC
Atractaspis bibronii	Bibron's Stiletto Snake	LC	Unlisted
Bitis arietans arietans	Puff Adder	LC	Unlisted
Boaedon capensis	Brown House Snake	LC	LC
Causus rhombeatus	Rhombic Night Adder	LC	LC
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Chamaesaura aenea	Coppery Grass Lizard	NT	LC
Cordylus vittifer	Common Girdled Lizard	LC	LC
Crocodylus niloticus	Nile Crocodile	VU	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Dispholidus typus	Boomslang	LC	Unlisted
Duberria lutrix	Common Slug-eater	LC	LC
Elapsoidea sundevallii	Sundevall's Garter Snake	LC	Unlisted
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	Unlisted
Hemachatus haemachatus	Rinkhals	LC	LC
Hemidactylus mabouia	Common Tropical House Gecko	LC	Unlisted
Homoroselaps dorsalis	Striped Harlequin Snake	NT	LC
Homoroselaps lacteus	Spotted Harlequin Snake	LC	LC
Kinixys lobatsiana	Lobatse hinged-back Tortoise	LC	LC
Lamprophis aurora	Aurora House Snake	LC	LC
Leptotyphlops distanti	Distant's Tread Snake	LC	LC
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC	Unlisted
Lycodonomorphus inornatus	Olive House Snake	LC	LC
Lycodonomorphus laevissimus	Dusky-bellied Water Snake	LC	LC
Lycodonomorphus rufulus	Brown Water Snake	LC	Unlisted
Lycophidion capense capense	Cape Wolf Snake	LC	Unlisted
Lygodactylus capensis	Common Dwarf Gecko	LC	Unlisted
Lygodactylus ocellatus	Spotted Dwarf Gecko	LC	LC
Naja annulifera	Snouted Cobra	LC	Unlisted
Naja mossambica	Mozambique Spitting Cobra	LC	Unlisted
Naja nivea	Cape Cobra	LC	Unlisted
Nucras holubi	Holub's Sandveld Lizard	LC	Unlisted
Nucras intertexta	Spotted Sandveld Lizard	LC	Unlisted
Nucras lalandii	Delalande's Sandveld Lizard	LC	LC
Pachydactylus affinis	Transvaal Gecko	LC	LC
Pachydactylus capensis	Cape Gecko	LC	Unlisted
Panaspis wahlbergi	Wahlberg's Snake-eyed Skink	LC	Unlisted

Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	LC	Unlisted
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	Unlisted
Philothamnus semivariegatus	Spotted Bush Snake	LC	Unlisted
Prosymna ambigua	Angolan Shovel-snout	Unlisted	LC
Prosymna sundevallii	Sundevall's Shovel-snout	LC	LC
Psammophis brevirostris	Short-snouted Grass Snake	LC	Unlisted
Psammophis crucifer	Cross-marked Grass Snake	LC	LC
Psammophis trinasalis	Fork-marked Sand Snake	LC	Unlisted
Psammophylax rhombeatus	Spotted Grass Snake	LC	Unlisted
Psammophylax tritaeniatus	Striped Grass Snake	LC	LC
Pseudaspis cana	Mole Snake	LC	Unlisted
Python natalensis	Southern African Python	LC	Unlisted
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Smaug vandami	Van Dam's Dragon Lizard	LC	LC
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake	LC	Unlisted
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis damarana	Damara skink	Unlisted	LC
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis varia	Variable Skink	LC	LC
Varanus albigularis albigularis	Southern Rock Monitor	LC	Unlisted
Varanus niloticus	Water Monitor	LC	Unlisted

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

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

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

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Accipiter melanoleucus	Sparrowhawk, Black	Unlisted	LC
Accipiter minullus	Sparrowhawk, Little	Unlisted	LC
Accipiter ovampensis	Sparrowhawk, Ovambo	Unlisted	LC
Acridotheres tristis	Myna, Common	Unlisted	LC
Acrocephalus arundinaceus	Reed-warbler, Great	Unlisted	LC
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Acrocephalus palustris	Warbler, Marsh	Unlisted	LC
Acrocephalus schoenobaenus	Warbler, Sedge	Unlisted	LC
Acrocephalus scirpaceus	Warbler, Eurasian Reed	Unlisted	LC
Actitis hypoleucos	Sandpiper, Common	Unlisted	LC
Actophilornis africanus	Jacana, African	Unlisted	LC
Afrotis afraoides	Korhaan, Northern Black	Unlisted	LC
Alopochen aegyptiaca	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	LC
Amadina fasciata	Finch, Cut-throat	Unlisted	Unlisted
Amandava subflava	Waxbill, Orange-breasted	Unlisted	Unlisted
Amblyospiza albifrons	Weaver, Thick-billed	Unlisted	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas platyrhynchos	Duck, Mallard	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anastomus lamelligerus	Openbill, African	Unlisted	LC
Anhinga rufa	Darter, African	Unlisted	LC
Anser anser	Goose, Domestic	Unlisted	LC
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Anthus nicholsoni	Nicholson's pipit	Unlisted	LC
Anthus vaalensis	Pipit, Buffy	Unlisted	LC
Apalis thoracica	Apalis, Bar-throated	Unlisted	LC
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus barbatus	Swift, African Black	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Apus horus	Swift, Horus	Unlisted	LC
Ardea alba	Egret, Great	Unlisted	LC

Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea goliath	Heron, Goliath	Unlisted	LC
Ardea intermedia	Egret, Yellow-billed (Intermediate)	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Ardeola ralloides	Heron, Squacco	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Batis molitor	Batis, Chinspot	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bradypterus baboecala	Rush-warbler, Little	Unlisted	LC
Brunhilda erythronotos	Waxbill, Black Cheecked	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, Spotted	Unlisted	LC
Buteo buteo	Buzzard, Common (Steppe)	Unlisted	LC
Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Butorides striata	Heron, Green-backed	Unlisted	LC
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calidris ferruginea	Sandpiper, Curlew	LC	NT
Calidris minuta	Stint, Little	LC	LC
Calidris pugnax	Ruff	Unlisted	LC
Campethera abingoni	Woodpecker, Golden-tailed	Unlisted	LC
Cecropis abyssinica	Swallow, Lesser Striped	Unlisted	LC
Cecropis cucullata	Swallow, Greater Striped	Unlisted	LC
Centropus burchellii	Coucal, Burchell's	Unlisted	Unlisted
Cercotrichas leucophrys	Scrub-robin, White-browed	Unlisted	LC
Cercotrichas paena	Scrub-robin, Kalahari	Unlisted	LC
Certhilauda semitorquata	Lark, Eastern Long-billed	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Chalcomitra amethystina	Sunbird, Amethyst	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chlidonias leucopterus	Tern, White-winged	Unlisted	LC
Chloropicus namaquus	Woodpecker, Bearded	Unlisted	LC
Chroicocephalus cirrocephalus	Gull, Grey-headed	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC
Ciconia abdimii	Stork, Abdim's	NT	LC

Ciconia ciconia	Stork, White	Unlisted	LC
Ciconia episcopus	Stork, Woolly-necked	Unlisted	NT
Ciconia nigra	Stork, Black	VU	LC
Cinnyricinclus leucogaster	Starling, Violet-backed	Unlisted	LC
Cinnyris talatala	Sunbird, White-bellied	Unlisted	LC
Circaetus pectoralis	Snake-eagle, Black-chested	Unlisted	LC
Circus macrourus	Harrier, Pallid	NT	NT
Circus maurus	Harrier, Black	EN	EN
Circus pygargus	Montagu's Harrier	Unlisted	LC
Circus ranivorus	Marsh-harrier, African	EN	LC
Cisticola aberrans	Cisticola, Lazy	Unlisted	LC
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola chiniana	Cisticola, Rattling	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola lais	Cisticola, Wailing	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Clamator jacobinus	Cuckoo, Jacobin	Unlisted	LC
Colius colius	Mousebird, White-backed	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba arquatrix	Olive-pigeon, African	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Coracias garrulus	Roller, European	NT	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Corythornis cristatus	Kingfisher, Malachite	Unlisted	Unlisted
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Cossypha natalensis	Robin-chat, Red-capped	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Creatophora cinerea	Starling, Wattled	Unlisted	LC
Crecopsis egregia	Crake, African	Unlisted	LC
Crex crex	Crake, Corn	Unlisted	LC
Crinifer concolor	Go-away-bird, Grey	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra gularis	Seedeater, Streaky-headed	Unlisted	LC

Crithagra mozambica	Canary, Yellow-fronted	Unlisted	LC
Cuculus clamosus	Cuckoo, Black	Unlisted	LC
Cuculus solitarius	Cuckoo, Red-chested	Unlisted	LC
Curruca communis	Whitethroat, Common	Unlisted	LC
Curruca subcoerulea	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
Cursorius temminckii	Courser, Temminck's	Unlisted	LC
Cypsiurus parvus	Palm-swift, African	Unlisted	LC
Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna bicolor	Duck, Fulvous	Unlisted	LC
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC
Dendropicos fuscescens	Woodpecker, Cardinal	Unlisted	LC
Egretta ardesiaca	Heron, Black	Unlisted	LC
Egretta garzetta	Egret, Little	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emberiza capensis	Bunting, Cape	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Eremopterix leucotis	Sparrowlark, Chestnut-backed	Unlisted	LC
Eremopterix verticalis	Sparrowlark, Grey-backed	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes albonotatus	Widowbird, White-winged	Unlisted	LC
Euplectes ardens	Widowbird, Red-collared	Unlisted	LC
Euplectes axillaris	Widowbird, Fan-tailed	Unlisted	LC
Euplectes capensis	Bishop, Yellow	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Eupodotis caerulescens	Korhaan, Blue	LC	NT
Eupodotis senegalensis	Korhaan, White-bellied	VU	LC
Falco amurensis	Falcon, Amur	Unlisted	LC
Falco biarmicus	Falcon, Lanner	VU	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco peregrinus	Falcon, Peregrine	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Falco vespertinus	Falcon, Red-footed	NT	NT
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Glareola nordmanni	Pratincole, Black-winged	NT	NT

Gorsachius leuconotus	Night Heron, White-backed	VU	LC
Grus paradisea	Crane, Blue	NT	VU
Gymnoris superciliaris	Petronia, Yellow-throated	Unlisted	LC
Gyps africanus	Vulture, White-backed	CR	CR
Halcyon albiventris	Kingfisher, Brown-hooded	Unlisted	LC
Halcyon leucocephala	Kingfisher, Grey-headed	Unlisted	LC
Halcyon senegalensis	Kingfisher, Woodland	Unlisted	LC
Haliaeetus vocifer	Fish-eagle, African	Unlisted	LC
Hieraaetus pennatus	Eagle, Booted	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hippolais icterina	Warbler, Icterine	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo dimidiata	Swallow, Pearl-breasted	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Indicator indicator	Honeyguide, Greater	Unlisted	LC
Indicator minor	Honeyguide, Lesser	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Jynx ruficollis	Wryneck, Red-throated	Unlisted	LC
Lagonosticta rhodopareia	Firefinch, Jameson's	Unlisted	LC
Lagonosticta rubricata	Firefinch, African	Unlisted	LC
Lagonosticta senegala	Firefinch, Red-billed	Unlisted	LC
Lamprotornis bicolor	Starling, Pied	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Laniarius atrococcineus	Shrike, Crimson-breasted	Unlisted	LC
Laniarius ferrugineus	Boubou, Southern	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Lophaetus occipitalis	Eagle, Long-crested	Unlisted	LC
Lophoceros nasutus	Hornbill, African Grey	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Malaconotus blanchoti	Bush-shrike, Grey-headed	Unlisted	LC
Megaceryle maxima	Kingfisher, Giant	Unlisted	Unlisted
Melaenornis silens	Flycatcher, Fiscal	Unlisted	LC
Melaniparus cinerascens	Tit, Ashy	Unlisted	LC
Merops apiaster	Bee-eater, European	Unlisted	LC
Merops bullockoides	Bee-eater, White-fronted	Unlisted	LC
Merops hirundineus	Bee-eater, Swallow-tailed	Unlisted	LC

Merops persicus	Bee-eater, Blue-cheeked	Unlisted	LC
Merops pusillus	Bee-eater, Little	Unlisted	LC
Microcarbo africanus	Cormorant, Reed	Unlisted	LC
Micronisus gabar	Goshawk, Gabar	Unlisted	LC
Milvus aegyptius	Kite, Yellow-billed	Unlisted	Unlisted
Milvus migrans	Kite, Black	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Mirafra cheniana	Lark, Melodious	LC	NT
Mirafra fasciolata	Lark, Eastern Clapper	Unlisted	LC
Motacilla aguimp	Wagtail, African Pied	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Motacilla flava	Wagtail, Western Yellow	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	Unlisted	LC
Mycteria ibis	Stork, Yellow-billed	EN	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Myrmecocichla monticola	Wheatear, Mountain	Unlisted	LC
Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Nilaus afer	Brubru	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Nycticorax nycticorax	Night-Heron, Black-crowned	Unlisted	LC
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe familiaris	Chat, Familiar	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Onychognathus morio	Starling, Red-winged	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Oxyura maccoa	Duck, Maccoa	NT	VU
Pandion haliaetus	Osprey, Osprey	Unlisted	LC
Paragallinula angulata	Moorhen, Lesser	Unlisted	Unlisted
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Pavo cristatus	Peacock, Common	Unlisted	LC
Peliperdix coqui	Francolin, Coqui	Unlisted	LC
Pernis apivorus	Honey-buzzard, European	Unlisted	LC
Petrochelidon spilodera	Cliff-swallow, South African	Unlisted	LC
Phalacrocorax lucidus	Cormorant, White-breasted	Unlisted	LC
Phoeniconaias minor	Flamingo, Lesser	NT	NT
Phoenicopterus roseus	Flamingo, Greater	NT	LC
Phoeniculus purpureus	Wood-hoopoe, Green	Unlisted	LC

Phylloscopus trochilus	Warbler, Willow	Unlisted	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus cucullatus	Weaver, Village	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Podiceps cristatus	Grebe, Great Crested	Unlisted	LC
Podiceps nigricollis	Grebe, Black-necked	Unlisted	LC
Polemaetus bellicosus	Eagle, Martial	EN	EN
Polyboroides typus	Harrier-Hawk, African	Unlisted	LC
Porphyrio madagascariensis	Swamphen, African Purple	Unlisted	Unlisted
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Prodotiscus regulus	Honeybird, Brown-backed	Unlisted	LC
Psalidoprocne pristoptera	Saw-wing, Black	Unlisted	LC
Pternistis natalensis	Spurfowl, Natal	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Ptyonoprogne fuligula	Martin, Rock	Unlisted	Unlisted
Pycnonotus nigricans	Bulbul, African Red-eyed	Unlisted	LC
Pycnonotus tricolor	Bulbul, Dark-capped	Unlisted	Unlisted
Pytilia melba	Pytilia, Green-winged	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Rallus caerulescens	Rail, African	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Rhinopomastus cyanomelas	Scimitarbill, Common	Unlisted	LC
Rhinoptilus africanus	Courser, Double-banded	Unlisted	LC
Rhinoptilus chalcopterus	Courser, Bronze-winged	Unlisted	LC
Riparia cincta	Martin, Banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Riparia riparia	Martin, Sand	Unlisted	LC
Rostratula benghalensis	Painted-snipe, Greater	NT	LC
Sagittarius serpentarius	Secretarybird	VU	EN
Sarkidiornis melanotos	Duck, Comb	Unlisted	LC
Sarothrura rufa	Flufftail, Red-chested	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila gutturalis	Francolin, Orange River	Unlisted	LC
Scopus umbretta	Hamerkop, Hamerkop	Unlisted	LC

Spatula hottentota	Teal, Hottentot	Unlisted	LC
Spatula smithii	Shoveler, Cape	Unlisted	LC
Spermestes cucullata	Mannikin, Bronze	Unlisted	LC
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Sporopipes squamifrons	Finch, Scaly-feathered	Unlisted	LC
Stenostira scita	Flycatcher, Fairy	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Struthio camelus	Ostrich, Common	Unlisted	LC
Sturnus vulgaris	Starling, Common	Unlisted	LC
Sylvia borin	Warbler, Garden	Unlisted	LC
Sylvietta rufescens	Crombec, Long-billed	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tachymarptis melba	Swift, Alpine	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Tchagra australis	Tchagra, Brown-crowned	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Terpsiphone viridis	Paradise-flycatcher, African	Unlisted	LC
Thalassornis leuconotus	Duck, White-backed	Unlisted	LC
Thamnolaea cinnamomeiventris	Cliff-chat, Mocking	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Tockus leucomelas	Hornbill, Southern Yellow-billed	Unlisted	LC
Tockus rufirostris	Hornbill, Southern Red-billed	Unlisted	Unlisted
Trachyphonus vaillantii	Barbet, Crested	Unlisted	LC
Treron calvus	Green-pigeon, African	Unlisted	LC
Tricholaema leucomelas	Barbet, Acacia Pied	Unlisted	LC
Tringa glareola	Sandpiper, Wood	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Tringa stagnatilis	Sandpiper, Marsh	Unlisted	LC
Turdoides jardineii	Babbler, Arrow-marked	Unlisted	LC
Turdus libonyana	Thrush, Kurrichane	Unlisted	Unlisted
Turdus litsitsirupa	Thrush, Groundscraper	Unlisted	Unlisted
Turdus smithi	Thrush, Karoo	Unlisted	LC
Turnix sylvaticus	Buttonquail, Kurrichane	Unlisted	LC
Tyto alba	Owl, Barn	Unlisted	LC
Tyto capensis	Grass-owl, African	VU	LC
Upupa africana	Hoopoe, African	Unlisted	LC
Uraeginthus angolensis	Waxbill, Blue	Unlisted	LC

Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vanellus senegallus	Lapwing, African Wattled	Unlisted	LC
Vidua chalybeata	Indigobird, Village	Unlisted	LC
Vidua funerea	Indigobird, Dusky	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Vidua paradisaea	Paradise-whydah, Long-tailed	Unlisted	LC
Vidua regia	Whydah, Shaft-tailed	Unlisted	LC
Zapornia flavirostra	Crake, Black	Unlisted	LC
Zosterops pallidus	White-eye, Orange River	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC

9.6 Appendix F – Avifauna species recorded during the survey

Taxon	Common Name	Regional	IUCN	Abundance	Frequency (%)	Guild
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC	0,156	5,882	GGD
Euplectes orix	Bishop, Southern Red	Unlisted	LC	0,085	3,922	GGD
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC	0,071	5,882	GGD
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC	0,052	7,843	IWD
Gallinago nigripennis	Snipe, African	Unlisted	LC	0,047	3,922	IWD
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC	0,038	1,961	HWD
Saxicola torquatus	Stonechat, African	Unlisted	LC	0,038	3,922	IGD
Acridotheres tristis	Myna, Common	Unlisted	LC	0,033	5,882	OMD
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC	0,033	3,922	IGD
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC	0,028	1,961	IWD
Columba livia	Dove, Rock	Unlisted	LC	0,024	1,961	FFD
Cypsiurus parvus	Palm-swift, African	Unlisted	LC	0,024	1,961	IAD
Alopochen aegyptiaca	Goose, Egyptian	Unlisted	LC	0,019	1,961	HWD
Apus caffer	Swift, White-rumped	Unlisted	LC	0,019	3,922	IAD
Gallinula chloropus	Moorhen, Common	Unlisted	LC	0,019	3,922	HWD
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC	0,019	3,922	OMD
Anas undulata	Duck, Yellow-billed	Unlisted	LC	0,014	3,922	HWD
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC	0,014	3,922	OMD
Bubulcus ibis	Egret, Cattle	Unlisted	LC	0,014	3,922	IGD
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC	0,014	5,882	GGD
Hirundo rustica	Swallow, Barn	Unlisted	LC	0,014	1,961	IAD
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC	0,014	3,922	IAD
Passer domesticus	Sparrow, House	Unlisted	LC	0,014	1,961	GGD
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC	0,014	1,961	GGD
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC	0,009	1,961	OMD
Anas sparsa	Duck, African Black	Unlisted	LC	0,009	1,961	IWD
Ardea cinerea	Heron, Grey	Unlisted	LC	0,009	3,922	CWD
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC	0,009	3,922	IGD
Euplectes capensis	Bishop, Yellow	Unlisted	LC	0,009	1,961	GGD
Macronyx capensis	Longclaw, Cape	Unlisted	LC	0,009	1,961	IGD
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC	0,009	1,961	OMD
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC	0,009	1,961	GGD
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC	0,009	3,922	OMD
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC	0,009	1,961	GGD
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC	0,009	1,961	CDG
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted	0,005	1,961	IWD
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC	0,005	1,961	IGD

Actitis hypoleucos	Sandpiper, Common	Unlisted	LC	0,005	1,961	IWD
Buteo vulpinus	Buzzard, Steppe	Unlisted	Unlisted	0,005	1,961	CDG
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC	0,005	1,961	IGD
Cisticola lais	Cisticola, Wailing	Unlisted	LC	0,005	1,961	IGD
Delichon urbicum	House-martin, Common	Unlisted	LC	0,005	1,961	IAD
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC	0,005	1,961	CDG
Fulica cristata	Coot, Red-knobbed	Unlisted	LC	0,005	1,961	HWD
Microcarbo africanus	Cormorant, Reed	Unlisted	LC	0,005	1,961	CWD
Mirafra africana	Lark, Rufous-naped	Unlisted	LC	0,005	1,961	IGD
Motacilla capensis	Wagtail, Cape	Unlisted	LC	0,005	1,961	IGD
Netta erythrophthalma	Pochard, Southern	Unlisted	LC	0,005	1,961	HWD
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC	0,005	1,961	IGD
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC	0,005	1,961	HWD
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC	0,005	1,961	GGD