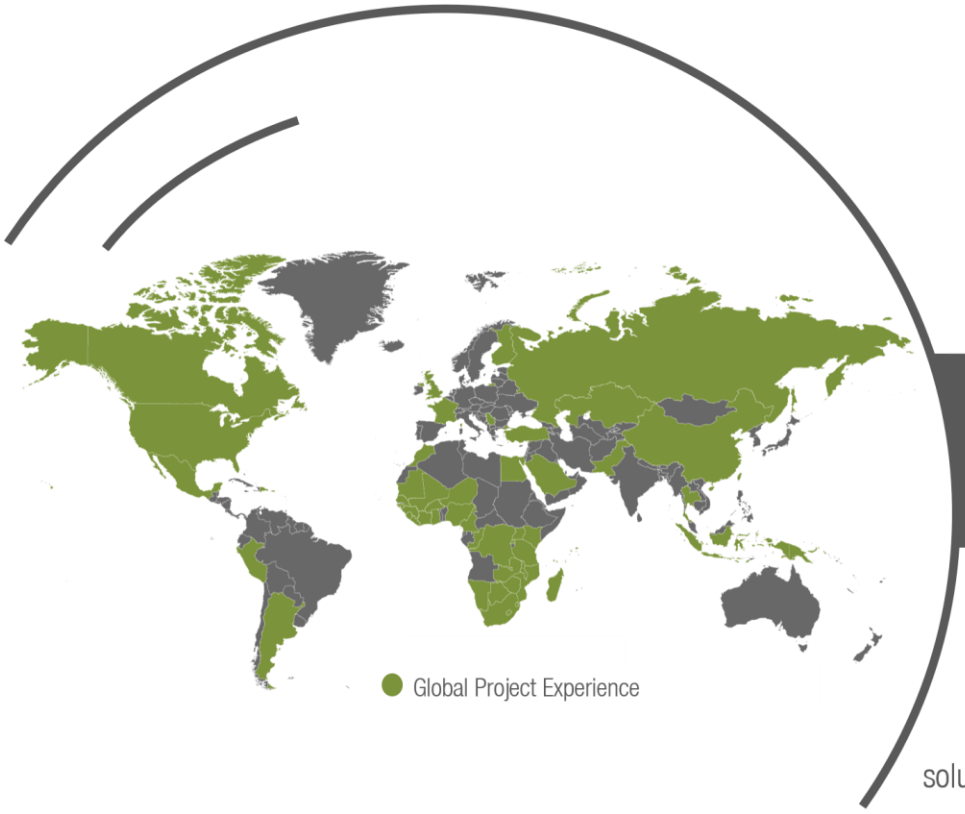

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Fauna and Flora Impact Assessment for the Proposed New Location of the Iphiva Substation, KwaZulu-Natal

Fauna and Flora Impact Assessment

Prepared for:
Margen Industrial Services CC

Project Number:
PEC7694

June 2023

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This document has been prepared by Digby Wells Environmental.

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Project Name:	Fauna and Flora Impact Assessment for the Proposed New Location of the Iphiva Substation, KwaZulu-Natal
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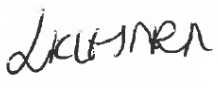
Name	Responsibility	Signature	Date
Lisa Hester	Field surveyor and report compiler		June 2023
Danie Otto	Technical review		June 2023

EXECUTIVE SUMMARY

Eskom SOC Limited (Eskom) undertook an Environmental Impact Assessment (EIA) process in 2017 in support of the "Northern KwaZulu-Natal Strengthening Project," which included the construction and operation of the Iphiva substation and two 400 kV powerlines, one between Normandie and Iphiva and the other between Iphiva and Duma.

Margen Industrial Services cc (Margen) appointed Pensu Environmental (Pensu) to undertake this EIA process, who then subsequently requested Digby Wells to undertake updated individual specialist studies in 2018 in support of the EIA. This report aims to identify and quantify the potential impacts on the terrestrial fauna and flora within the development of the proposed Iphiva substation and should be read in collaboration with the other specialist reports (including avifauna) undertaken as part of the environmental authorisation process.

The proposed Project is located west of Mkuze in Umkhanyakude District Municipality in the northern part of KZN. The study area consists of dispersed rural settlements and subsistence farming, while surrounding land use is comprised of formally protected areas and private game farms (including Manyoni Private Game Reserve and the Somkhanda Game Reserve).

The Project Area falls within the Zululand Lowveld of the Savanna Biome. The proposed and authorised locations are not located in any Important Bird Areas (IBA). According to the SAPAD, no protected areas are within the Project boundary. However, the proposed area is within 3 km of the Somkhanda Game Reserve and Zululand Rhino Reserve. These reserves are fenced and sustain a protected species such as Black Rhino, Leopard and Lion.

Three (3) vegetation communities have been identified in the Project Area and in the immediate surrounds:

- Riparian Habitat;
- Tree Savanna (Lowveld Bushveld); and
- Transformed Areas.

The majority of the Project Area is classified as Transformed Habitat and has been defined as Low sensitivity from an fauna and flora perspective. Moderate sensitivity can be observed in the Tree Savanna and Artificial Dam, while high sensitivity has been attributed to the Riparian areas along the boundaries of the Project Area and the peripheries of the woody vegetation found in the Lowveld Bushveld. According to the proposed layout of the substation, no High Sensitive areas will be impacted by the proposed development.

Seven (7) floral Species of Conservation of Concern (SCC) were identified within the Project boundary or within its immediate surroundings. Four (4) provincially protected species under the KwaZulu-Natal Nature Conservation Management Amendment Act of 1999 (Act No. 5 of 1999), namely *Crinum macowanii, Stapelia gigantea, Ammocharis coranica, Aloe marlothii* and *Aloe parvibracteata* were recorded in various locations. Additionally, two (2) nationally

protected tree species under the National Forestry Act of 1998 (Act No. 84 of 1998), namely *Sclerocarya birrea* subsp *caffra* and *Spirostachys africana* were recorded.

No faunal SCC were recorded during the field investigations, however the Avifauna Impact Assessment (Digby Wells Environmental 2022) has recorded a IUCN and Red Listed avifaunal species (namely White-backed Vulture (Critically Endangered), Bateleur (Endangered), Red-billed Oxpecker (Near Threatened) and Tawny Eagle (Vulnerable)) and the results should be interpreted with the findings of this report.

The impact assessment identified **Moderate** to **Minor** negative impacts to the fauna (excluding avifauna) and flora of the Project area. Impacts identified include:

- Direct loss of habitat types and biodiversity;
- Faunal mortalities and collisions;
- Loss of floral SCC; and
- Alien vegetation recruitment.

Recommendations and management measures are summarised below:

- Pre-screening prior to construction to identify any potential faunal species and faunal SCC within the development footprint;
- Ensure all protected flora are marked prior to vegetation clearance and the correct permits are attained with the affiliated government authorities or competent authority;
- Best practice management should be implemented to prevent further habitat degradation and erosion; and
- Ensure an Alien Invasive Eradication Plan is in place and executed for the duration of the Project.

Overall, it was concluded that with the necessary mitigation measures implemented, this development will have little impact on the fauna and flora characteristic of the area with minimal loss due to habitat destruction, loss of vegetation, and habitat disturbance. If the mitigation measures and recommendations are implemented throughout the project life correctly and timeously, there is no severe negative impacts anticipated for the development of this substation and its associated electrical components.

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ACRONYMS AND ABBREVIATIONS

AIP	Alien and Invasive Plant
BAPs	Biodiversity Actions Plans
BESS	Battery Energy Storage System
BDI	Biodiversity and Development Institute
CBA	Critical Biodiversity Areas
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and Environment
Digby Wells	Digby Wells Environmental
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EMA	Environmental Management Agency
EMF	Environmental Management Framework
EN	Endangered
ESA	Ecological Support Areas
EWT	Endangered Wildlife Trust
FI	Functional Integrity
Ha	Hectares
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Area
kg	Kilogram
km	Kilometre
km^2	Kilometre squared
kV	kilovolt
LLM	Lephalale Local Municipality
MAP	Mean Annual Precipitation
MAR	Mean Annual Rainfall
MVA	Megavolt Amperes
m	Meter
MW	Megawatt
NBA	National Biodiversity Assessment, 2018
NEM:BA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEWPOSA	New Plants of southern Africa
NFA	National Forests Act, 1998 (Act. No. 89 of 1998)
NT	Near Threatened
QDS	Quarter Degree Square
RR	Receptor Resilience
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
S&EIA	Scoping and Environmental Impact Assessment

TOPS	Threatened or Protected Species
TOPS Regulations	Threatened or Protected Species Regulations 152 of 2007
VU	Vulnerable

1. Introduction

Eskom SOC Limited (Eskom) undertook an Environmental Impact Assessment (EIA) process in 2017 in support of the "Northern KwaZulu-Natal Strengthening Project," which included the construction and operation of the Iphiva substation and two 400 kV powerlines, one between Normandie and Iphiva and the other between Iphiva and Duma.

Margen Industrial Services cc (Margen) appointed Pensu Environmental (Pensu) to undertake this EIA process, who then subsequently requested Digby Wells to undertake updated individual specialist studies in support of the EIA. This report is the Fauna and Flora aims to identify and quantify the potential impacts on the fauna and flora due to the development of the proposed Iphiva substation and should be read in collaboration with the avifauna and other specialist reports.

Digby Wells was previously appointed in 2017 by ILISO Consulting (Pty) Ltd *(hereinafter ILISO*) to conduct an EIA for Eskom's Northern KZN Strengthening Project, of which the Iphiva substation was one of the focus areas. The current assessment is for a proposed new location of the Iphiva Substation (i.e. the Project Area and "the Project") which is situated approximately 80 m west of the area previously authorised site for development. Therefore, this fauna and flora assessment is likely to inform the updates to the existing Environmental Management Programme Report (EMPr), which was authorised in 2017. The assessment aims to comply with national and provincial legislation with regards to biodiversity conservation. This report will provide mitigation measures for impacts that may arise from the project activities as they ate outlined in the document.

The Digby Wells specialists completed Draft Specialist Reports associated with the impact assessment component of the EIA process, including in-field assessments (pre-disturbance survey and site inspections), the identification and assessment of impacts and the completion of the draft reports.

Following the submission of the draft reports for review by Eskom, the Project layout was amended and now includes an additional potential site for the proposed substation. Additionally, Eskom is considering a new access road to the proposed updated layout. This infrastructure was not included in the previous impact assessments. The updated layout required additional assessment by the specialists. This report details the Fauna and Flora Impact Assessment for the proposed new location of the Iphiva substation and the associated access road and should be read in conjunction with the Avifauna and other specialist reports.

1.1. Background

As described in the 2017 Terrestrial Biodiversity Assessment (Digby Wells Environmental 2018), transmission powerlines transport electricity generated at power stations to predetermined locations. Over extended distances, transmission substations are required. At present, the Normandie and Impala Main Transmission Substations, approximately 80 km north-west of Pongola and 180 km south of Makhatini Flats respectively, supply northern KZN network. With an increase in electricity demand in this region of KZN, voltages are approaching unacceptably low levels. Furthermore, the network is experiencing high voltage

drops and thermal loading of the remaining network due to the contingencies on the main 132 kilovolt (kV) supplies.

Eskom recognises these constraints to the current network and proposed the implementation of the Northern KZN Strengthening Project ("the Project"). For this Project to be realised, Eskom is required to undertake an Environmental Authorisation (EA) process in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). This process was done for four separate applications, including two applications for 400 kV transmission lines, one for the 132 kv distribution line and one for the Iphiva Substation. All of them have been authorised, but the Iphiva Substation needs to be moved 80 m west due to the excessive expense of cut and fill required for the authorised site.

The proposed substation will comprise of the following:

- A total footprint of 600 x 600 m (i.e., 36 ha) will be required for the development, within a site-specific study area of 1km x 1 km. This footprint will include construction requirements and will be rehabilitated and fenced theoff.
- The 36-ha development footprint area includes provisions for an
    - 80 m high microwave radio communication mast,
    - oil and fuel storage facilities, and an oil bund to contain any accidental transformer oil spills.
- The proposed substation will comprise standard electrical equipment, including transformers, reactors, busbars, and isolators.

A new main access road will be established to provide access to the Iphiva Substation. The proposed road will be as follows:

- The main access road (gravel) will be approximately 6 - 7m wide and approximately 2.1km in length.
- It should be noted that the proposed project site will be accessed via a new proposed road from the P234 Gravel Road which branches off the N2 National Road. The proposed project location is approximately 9km north-west of the N2 National Road.

1.2. Project Location

The proposed project is located west of Mkuze in Umkhanyakude District Municiaplity in the northern part of KZN (Figure 1-1 and Figure 1-2). The study area consists of dispersed rural settlements and farming, while surrounding land use is made up of other rural settlements, formally protected areas for conservation and private game farms.

1.3. Project Description

A substation must be situated within proximity to an existing network, in this instance the existing 132 kV KZN network. It is envisaged that a total footprint of 400 x 400 metres (m) (i.e. 0.04 hectares (ha)) will be required for the development footprint, within a site-specific Project Area of 1 x 1 kilometres (km). The development footprint area includes provisions for an 80 m high microwave radio communication mast, oil and fuel storage facilities, and an oil bund to contain any accidental transformer oil spills.

The proposed substation will comprise standard electrical equipment, including but not limited to:

- Transformers;
- Reactors;
- Busbars; and
- Isolators.

The substation will accommodate three, 400 kV and seven, 132 kV powerlines entering/leaving the site in various directions. The proposed infrastructure is shown in Figure 1-2 and activities of the Project per phase are provided in Table 1-1 below. Construction is scheduled to commence in 2023 and will take approximately 24 months to complete.

Table 1-1: Project Phases and Associated Activities

Project Phase	Associated Activities
Construction Phase	• Vegetation clearing; • Surface clearing, levelling and terracing; • Laying of concrete foundations and other applicable works such as storm water drainage pipes, slabs, bund walls, control room and storage facilities; • Erection of steelworks; • Delivery and installations of transformers; and • Upgrade of access roads, and where applicable, water crossings.
Rehabilitation Phase	• Rehabilitation around areas disturbed by construction activities; and • Vegetation management around the substation.
Operational Phase	• Maintenance of substation.

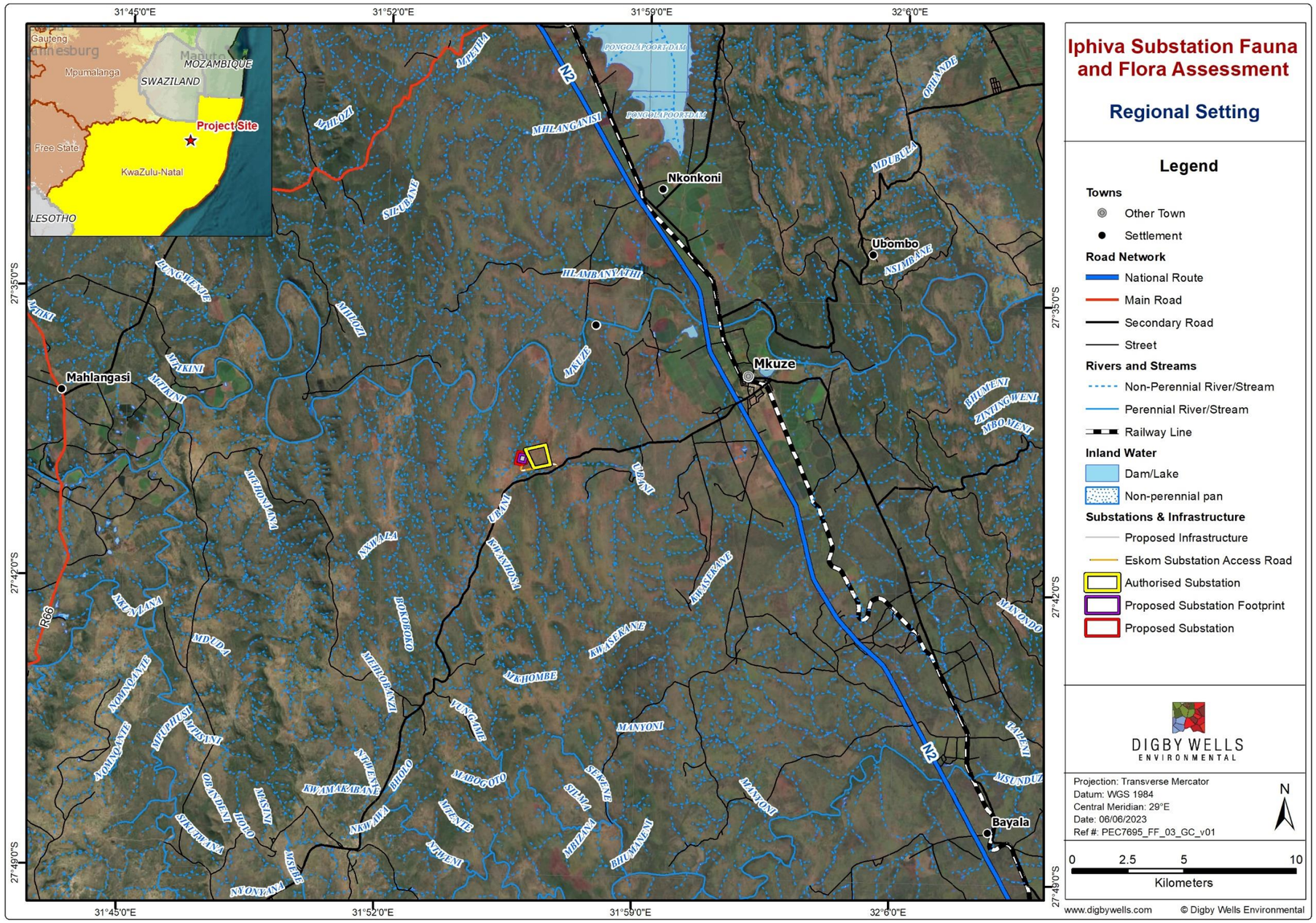


Figure 1-1: Regional Setting

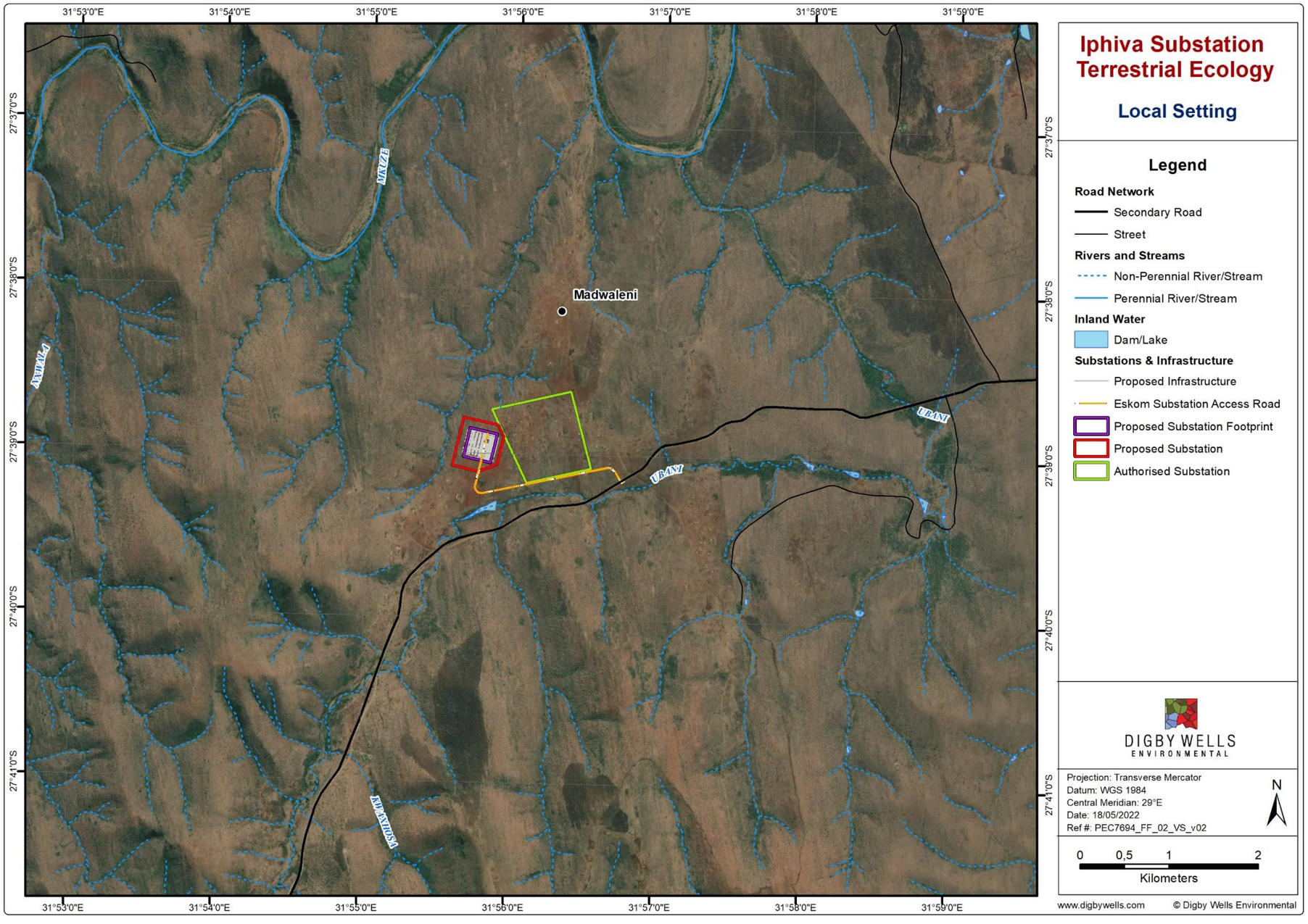


Figure 1-2: Local Setting

2. Relevant Legislation, Standards and Guidelines

The project is required to comply with all the obligations in terms of the provisions of the National legislation, regulations, guidelines and by-laws. The legislation and guidelines guiding the Fauna and Flora Assessment are detailed in Table 2-1 below.

Table 2-1: Applicable Legislation, Regulations, Guidelines and By-Laws

Legislation, Regulation, Guideline or By-Law	Applicability
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: • Alien and Invasive Species Lists, 2020 (terms of GNR 1003 in GG 43726 dated 18 September 2020 – effective from 18 October 2020); • Threatened and Protected Species Regulations; and • National list of Ecosystems Threatened and in need of protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GNR 1002, 9 December 2011).	• A Fauna and Flora Impact Assessment has been undertaken; • The Project activities will be set out to abide by the guidelines set out in NEM:BA; • Areas of concern will be indicated and possible alternatives to avoid these areas; and • Required mitigation measures will be included in the Environmental Management Plan (EMP) in this report.
KwaZulu-Natal Nature Conservation Management Act (Act No. 9 of 1997) The Nature Conservation Management Act provides institutional structures for nature conservation in KZN and establishes control and monitoring bodies and mechanisms. This also includes the provision for matters incidental thereto. The formation of Ezemvelo KZN Wildlife, a conservation agency, is one of the outcomes of this Act. Through the Guidelines for Biodiversity Impacts in KZN, 2003 (February 2013, Ezemvelo KZN Wildlife) Ezemvelo provides guidelines on baseline information requirements and the integration of specialist study results.	• A Fauna and Flora Impact Assessment has been undertaken; and • The guideline is one of many that provides guidance and minimum requirements for assessments of the state and provincial protection of the biodiversity and any sensitive areas that may occur.
KwaZulu-Natal Nature Conservation Management Amendment Act, 1999 (No. 5 of 1999)	• The Impact Assessment makes note of the protected

Legislation, Regulation, Guideline or By-Law	Applicability
This act amends the Nature Conservation Management Act above to insert additional definitions, amend the definition of the protected areas, to provide for the conservation of plants and animals and more.	species listed in this act.
SANBI, National Biodiversity Assessment (NBA) 2018 The NBA is a collaborative effort to synthesise the best available science on South Africa's biodiversity to inform policy and decision making in a range of sectors and contribute to national development priorities. It is used for the following: • The NBA is used to inform policy in the biodiversity sector, such as the National Biodiversity Framework and the National Protected Area Expansion Strategy, as well as informing policies and strategies of a range of other sectors that rely on natural resources, such as the water, agriculture and mining sectors. • The NBA provides information to help prioritise the often limited resources for managing and conserving our biodiversity – actions can focus on preventing further loss and degradation of ecosystems and ecological infrastructure, on consolidating and expanding the protected areas network; and on interventions require to restore areas in bad condition so they become functional again. • The NBA provides context and information that feeds into strategic planning processes such as strategic Environmental Assessments and bioregional planning. The NBA provides information for a range of national level reporting processes such as the South Africa Environment Outlook and ensures that the DEA has the necessary biodiversity information to meet the international reporting commitments to the Convention on Biological Diversity (CBD).	• The guideline provides practical guidance for determining the current state of the biodiversity and ecosystem identified within the area of interest as well as providing indication of threat status and protection level for both species and ecosystems.

3. Assumptions, Limitations and Exclusions

The compilation of this report is based on the following assumptions and limitations in Table 3-1.

Table 3-1: Limitations and Assumptions with Consequences of this Report

Assumptions and Limitations	Consequences
This Fauna and Flora study forms part of a larger EMPr and should be read in conjunction with the other related specialist studies. Furthermore, the efforts of this assessment will be used to update the existing EMPr due to the new proposed location of the substation.	This report does not include any other specialist studies other than the Fauna and Flora Assessment. Nor can it be used as a stand-alone report for operational and maintenance requirements.
This Fauna and Flora Impact Assessment was conducted during April 2022.	Findings, recommendations, and conclusions provided in this report are based on the authors' best scientific and professional knowledge, and information available at the time of compilation.
No form of this report may be amended or extended without the prior written consent of the author and/or a relevant reference to the report by the inclusion of an appropriately detailed citation. Any recommendations, statements, or conclusions drawn from or based on this report must cite or reference this report. Whenever such recommendations, statements or conclusions form part of the main report relating to the current investigation, this report must be included in its entirety.	The fauna and flora report cannot be used as a stand-alone report in the update of the EMPr, it should be read in conjunction with other specialist reports to determine best practice for the development of the project.
Site assessments were restricted to two days each between April 2022 and May 2023.	This assessment constitutes a high-level screening to identify the potential impacts to terrestrial biodiversity that may be present within the approved development footprint. This report is a not true reflection of the biodiversity currently present in the development footprint. The short time span and timing of the assess the terrestrial biodiversity resulted in inherent limitations. Similarly, April and May is the end of the dry season and is not the optimal surveying time for flora (optimal is between Nov – Feb). Therefore, the plant species list obtained during the assessment is not a true indication of what may occur and consequently some species may have been missed or not viewed. Many floral species, such as geophytic species, only flower after the rainy season. South Africa's diverse flora is characterized by many plant groups of which the species within a genus look vegetatively similar and can only be told apart if fruiting or flowering, therefore timing is important.

4. Details of the Specialists

The following is a list of Digby Wells' staff who were involved in the compilation of this report:

- Byron Bester has experience and a broad knowledge of various aspects of aquatic ecosystem assessment throughout South Africa and abroad (i.e. Botswana, Democratic Republic of Congo, Ghana, Namibia, and Zambia), including water quality assessment, sediment composition, fish biometric indices determination, histopathological fish health assessments and human health risk assessments via the consumptive pathway. He has completed numerous specialist aquatic biodiversity assessments in a wide range of sectors, including mining (e.g. coal, gold, platinum, titanium, etc.), industrial (e.g. smelters, brick-making projects, special economic zones, etc.), transport infrastructure upgrades (e.g. roads, airports, etc.), services infrastructure (e.g. powerline installations, bulk water pipelines, etc.), as well as mixed-use, residential and commercial developments. He attained his Master's degree in Aquatic Health from the University of Johannesburg by assessing the health status and edibility of selected fish species within various impoundments within the North West Province of South Africa. His passion for further research and exposure to water-related aspects of the natural system afforded him the opportunity to study at the renowned UNESCO-IHE Institute for Water Education in Delft, The Netherlands for a Special Programme in Environmental Science, for which he attained European Credit Transfer System points for the modules completed. He is currently registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. No. 400662/15) and is a member of the South African Society of Aquatic Scientists. Additionally, Byron has been accredited as a SASS5 River Health Programme practitioner with the Department of Water and Sanitation (previously Department of Water Affairs) since March 2012 and attended a number training sessions presented by the DWS for EcoStatus Determination and the River Ecosystem Monitoring Programme, describing the latest bioassessment tools in Present Ecological State (or Ecological Category) determination.
- **Lisa Hester** holds the position of Ecologist at Digby Wells Environmental in South Africa. She obtained her BSc Honour's degree in Ecology and Conservation from the University of Witwatersrand in South Africa. Her dissertation topic involved an in-depth ecological survey of the Croc River Mountain Conservancy in Nelspruit. Since completion of her studies, Lisa has worked on numerous fauna and flora biomonitoring reports both locally and internationally (including Australia, Mali and Botswana). Working on a multitude of surveys in various locations has allowed Lisa to engage upon a multi-faceted professional forum. Various scopes of work involving, ecological baseline assessments, ecological rehabilitation, wetland assessments, protected tree assessments and permit application, nest-box installations, environmental impact assessments, protected species surveys, bat surveys, species relocation and vegetation reports consists of her repertoire of work.

- **Jonathan Plaistowe** is an Assistant Ecologist in the Ecology and Atmospheric Sciences division at Digby Wells Environmental. He has a BSc in Applied Biology and Ecology & Evolution as well as a BSc (Hons) from the University of Cape Town (UCT). He is currently finishing his Masters of Science in Conservation Biology. Jonathan has experience with aquatic surveys, botanical surveys, small mammal trapping, camera-trapping and other biodiversity survey techniques across South Africa. He gained this experience through his university training, a semester program with the Organisation of Tropical Studies and a year of work experience partly with the Endangered Wildlife Trust and with the SANParks Cape Research Center. Jonathan is always seeking to develop a more holistic understanding of ecosystems and their impacts.

5. Methodology

This section presents the detailed methodology undertaken during the infield assessment and during the assessment of all impacts related to the project in terms of the avifauna.

5.1. Desktop Gap Analysis

The desktop review involved compiling relevant information for the greater study area from reliable resources, including historical studies and national and international databases. A previous assessment completed for the greater Northern Natal KZN Strengthening Project was used for part of the assessment (Digby Wells Environmental, Environmental Impact Assessment for Eskom's Northern KwaZulu-Natal Strengthening Project: Fauna and Flora Screening Assessment 2018). The aim of the desktop study is to identify the current biodiversity and ecosystem status of the area using the following resources:

Vegetation:

- Mucina and Rutherford (2006), expected vegetation type and community structure;
- South African National Botanical Institute (SANBI), Plants of southern Africa (POSA) list from SANBI (http://posa.sanbi.org/sanbi/Explore), potential species in the proposed development area/site area;

Ecosystem:

- Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) were extracted from the Zululand District Municipality Biodiversity Sector Plan (Elliot 2015).

Fauna:

- Potentially occurring mammal species through the Virtual Museum (http://vmus.adu.org.za/) run by the Biodiversity and Development Institute and Fitzpatrick Institute of African Ornithology, and The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (ww.ewt.org.za) (Child, et al. 2016);
- Potentially occurring herpetofauna species list through the Virtual Museum (http://vmus.adu.org.za/) run by the Biodiversity and Development Institute and Fitzpatrick Institute of African Ornithology, and the Atlas and Red List of Reptiles of

South Africa, Lesotho and Swaziland (Bates, et al. 2014), A Complete Guide to the Frogs of Southern Africa (Du Preez & Carruthers, 2009); Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Minter, et al. 2004); and

- Potentially occurring Lepidoptera species list through the Virtual Museum (http://vmus.adu.org.za/) run by the Biodiversity and Development Institute and Fitzpatrick Institute of African Ornithology, and the Conservation assessment of butterflies of South Africa, Lesotho and Swaziland (Mecenero, Ball, et al. 2013);
-

5.1.1. Species Conservation Status Repository

5.1.1.1. National Red Data Book

Red Data Books or RDBs, are lists of threatened plants and animals specific to a certain region. They are a vital source of information in guiding conservation decisions and have guided the literature review of this study. South Africa has produced 5 RDBs dealing with each of the following: birds, land mammals, fish (freshwater and estuarine only), reptiles and amphibians, and butterflies.

The conservation status of a plant or animal species is described by the following terms:

- EXTINCT: a specie for which there is a historical record, but which no longer exists in the area under review.
- ENDANGERED a specie in danger of extinction, and whose survival is unlikely if the factors causing its decline to continue.
- VULNERABLE a specie which it is believed will move into the endangered category if the factors causing its decline to continue.
- RARE a specie with small populations, which are not yet vulnerable or endangered, but which are at risk.

The term THREATENED is commonly used as a collective description for species which are endangered vulnerable or rare.

Some species are ENDEMIC, i.e., they are restricted to one region and occur nowhere else. A threatened endemic is a conservation priority.

Of special concern were protected plant and animal species. Listed species of flora and fauna are regarded as species whose representation in the wild has declined to such an extent that drastic action is needed to ensure their survival. Under anthropogenic pressure, the number of these species has reached levels where preservation management is needed, and conservation management will no longer be effective. The listing of these species under either International Union for the Conservation of Nature (IUCN) or CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), is regarded as a valuable starting point to initiate legally sanctioned management practices to bring the numbers of these species back to within acceptable numbers.

5.1.1.2. International Union for the Conservation of Nature

The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered, and Vulnerable).

The IUCN Red List also includes information on:

- Plants and animals that are categorized as Extinct or Extinct in the Wild;
- Taxa that cannot be evaluated because of insufficient information (i.e., are Data Deficient); and
- Plants and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., are Near Threatened).

The figure below shows the Current IUCN Red List categories. These categories include Critically Endangered (CR), Endangered (EN), and Vulnerable (VU), which are collectively known as the Threatened category, Near Threatened (NT), and Least Concern (LC) which are collectively known as Lower Risk.

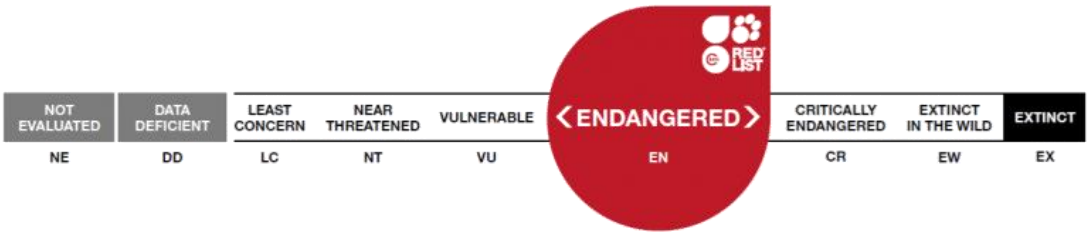


Figure 5-1: IUCN categories

Abbreviations and descriptions of each IUCN category are summarized in Table 5-1 below.

Plants and animals that have been evaluated to have a low risk of extinction are classified as Least Concern (IUCN.org).

Table 5-1: Description of IUCN Categories

IUCN Category	Abbreviation	Description
Extinct	EX	No surviving individuals of the species
Extinct in the Wild	EW	Known only to survive in captivity, or as a naturalized population outside its historic range.

IUCN Category	Abbreviation	Description
Critically Endangered	CR	At a very high risk of extinction.
Endangered	EN	High risk of extinction in the wild.
Vulnerable	VU	High risk of endangerment in the wild.
Near Threatened	NT	Likely to become endangered in the near future.
Least Concern	LC	Lowest risk. Does not qualify for a more at-risk category
Data Deficient	DD	Not enough data to make an assessment of its risk of extinction.
Not evaluated	NE	Has not yet been evaluated against the criteria.

5.1.1.3. Convention on International Trade in Endangered Species

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival (CITES.org).

CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species (CITES.org). Specimens are divided into the following appendices according to the restriction on trade.

Appendices I, II and III:

- Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
- Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
- Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. Changes to Appendix III follow a distinct procedure from changes to Appendices I and II, as each Party is entitled to make unilateral amendments to it.

5.1.1.4. *Threatened or Protected Species Regulations*

The Threatened or Protected Species Regulations 152 of 2007[1] ("TOPS Regulations") and the Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (TOPS Lists) were published in 2007, in terms of the NEM:BA (South Africa, 2007(a) and (b)) and have been amended since then. These regulations through NEM:BA Chapter 4 provides for the protection and sustainable use of listed Threatened or Protected Species (TOPS) species. NEM:BA restricts activities that may be carried out in respect of Threatened or Protected Species (TOPS).

5.2. Field Investigations

A Flora and Fauna assessment was initially conducted in April 2022 during the wet season. An additional site visit was carried out in May 2023 to account for layout changes. The data collected during this additional visit has been included in this report.

During the field survey, the area was thoroughly surveyed to identify different animal communities and plant species. However, camera traps and Sherman traps, which are typically used for animal detection, were not deployed due to the study area's proximity to roads and associated security concerns.

The methodology employed for the assessment of fauna and flora is described below..

5.2.1. Flora

A walkthrough of the site was undertaken to assess the vegetation. The survey included searches for protected and listed plant species and declared Alien Invasive Plants (AIPs), with the overall aim of producing a complete species list of all plant species present.

5.2.2. Mammals

A walkthrough of the site was done during the site survey, whereby mammal species were identified by visual sightings and using spoor, droppings and roosting sights and available habitat. Mammals were identified using the Smithers' Mammals of the Southern African field guide (Apps 2012).

5.2.3. Reptiles and Frogs

Comprehensive amphibian surveys can only be undertaken by nocturnal surveys throughout the wet season. This was beyond the current scope of the assessment and the area was surveyed for possible habitat for amphibian species. Direct / opportunistic observations were completed along trails or paths within the Project Area. Any herpetofauna species seen or heard along such paths or trails within the Project Area were identified and recorded.

[1] Amendment to the Threatened or Protected Species Regulations, 2007 - Government Notice R324 in Government Gazette 37596 dated 29 April 2014. Commencement date: 29 April 2014.

Another method used was to examine refuges using visual scanning of terrains to record smaller herpetofauna species, which often conceal themselves under rocks and in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, etc. Du Preez, *et al*. (2009) was used to confirm identification where necessary.

5.2.4. Invertebrates (Spiders, Scorpions and Butterflies)

A list of visually identified and observed invertebrate species was compiled during the field survey. However, due to their cryptic nature and habits, varied stages of life cycles, seasonal and temporal fluctuations within the environment, it is unlikely that all invertebrate species will have been recorded during the site assessment period. Nevertheless, the data gathered during the general invertebrate assessment along with the habitat analysis was deemed to provide an accurate indication of which invertebrate species are likely to occur in the study area.

6. Desktop Assessment and Regional Context

The table below gives a detailed description of the baseline ecological attributes for the Project Area. Following the table are the associated maps for the conservation aspects of the Project area.

Table 6-1: Regional Context of the Iphiva Substation Project Area

<table>
<tr><th colspan="2">Details of the project area in terms of Mucina & Rutherford (2012)</th><th colspan="2">Description of the vegetation type(s) relevant to the project area according to Mucina & Rutherford (2006)</th></tr>
<tr><td>BIOME</td><td>The Project area falls within a Savanna Biome. The Savanna Biome is found across South Africa, excluding the Western Cape. The Zululand Lowveld vegetation type is found in KwaZulu-Natal, Mpumalanga and Swaziland.</td><td>Altitude (m)</td><td>50 - 450 m</td></tr>
<tr><td>BIOREGION</td><td>The Project area falls within the Lowveld Bioregion.</td><td>Climate</td><td>There is summer rainfall with some rain in winter. Mean monthly maximum temperature is 38.5 °C in February, while the mean monthly minimum temperature is 7.8 °C in June.
<table>
<tr><th>MAP (mm)</th><th>MAT (°C)</th><th>MFD (Days)</th><th>MAPE (mm)</th><th>MASMS (%)</th></tr>
<tr><td>680</td><td>20.8</td><td>1</td><td>1898</td><td>75</td></tr>
</table></td></tr>
<tr><td>Regional Vegetation (Figure 6-1)</td><td>The Iphiva Substation Project Area is located in the Zululand Lowveld (Mucina and Rutherford 2012).</td><td>Geology & Soils</td><td>There are black-clay soils and duplex soils. These are derived from various clastic sediments of the Dwyka, Ecca, Beaufort and igneous rocks of the Lebombo Groups (all of the Karoo Supergroup). Well-drained soil forms also occur - especially on stony slopes. Land types include Fb and Ea, with some Db and Dc.</td></tr>
<tr><td rowspan="2">Important Bird Areas (IBAs) (Figure 6-2)</td><td rowspan="2">The proposed and authorised locations are not located in any IBAs. The nearest IBA (the Pongolapoort Nature Reserve) is 15 km away and the Mkuzi Game Reserve IBA is 20 km away.</td><td>Conservation</td><td>This vegetation type is considered Vulnerable with a conservation target of 19%. As of 2006, 26% of the vegetation type’s area has mainly been transformed for cultivation. Around 11% is conserved mainly in the Hluhluwe-iMfolozi Park and Phongolapoort Nature Reserve, while 1% is protected in the private Masibekela Wetland. There is additional protection due to private game farms and lodges. Erosion is low to high.</td></tr>
<tr><td colspan="2">Plant Species Characteristics of the Zululand Lowveld (Mucina and Rutherford 2012)</td></tr>
<tr><td>Protected Area (SAPAD, 2021) (Figure 6-3)</td><td>According to the SAPAD, no protected areas are within the Project boundary. However, the proposed area is within 3 km of the</td><td>Tall Trees</td><td>Sclerocarya birrea subsp. caffra (d), Senegalia burkei (d), S. nigrescens (d)</td></tr>
</table>

Details of the project area in terms of Mucina & Rutherford (2012)		Description of the vegetation type(s) relevant to the project area according to Mucina & Rutherford (2006)	
	Somkhanda Game Reserve and the **Manyoni Private Game Reserve** (formerly known as the Zululand Rhino Reserve**)**.	**Small Trees**	*Boscia albitrunca, Combretum apiculatum, C. molle, Ozoroa paniculosa, Phoenix reclinata, Schotia brachypetala, Senegalia senegal var. rostrata, S. welwitschii subsp. wel- witschii, Spirostachys africana, Teclea gerrardii, Vachellia tortilis subsp. heteracantha (d), V. gerrardii, V. natalitia, V. nilotica, Ziziphus mucronata.*
Threatened Ecosystems (Figure 6-4)	According to the IUCN Threatened Ecosystems database, the proposed project area does not overlap any threatened ecosystems. Part of the already authorised Project Area is considered **Vulnerable**.	**Succulent Trees**	*Aloe marlothii subsp. marlothii, Euphorbia grandidens, E. ingens.* Tall Shrubs*: Dichrostachys cinerea (d), Euclea divinorum (d), Coptosperma supra-axillare, Crotalaria monteiroi, Euclea crispa subsp. crispa, E. schimperi, Galpinia transvaalica, Gardenia volkensii, Gymnosporia maranguensis, G. senegalensis, Jatropha zeyheri, Lycium acutifolium, Olea europaea subsp. africana, Tarchonanthus parvicapitulatus, Tephrosia polystachya, Triumfetta pilosa var. tomentosa.*
		Low Shrubs	*Barleria obtusa, Crossandra greenstockii, Felicia muricata, Gymnosporia heterophylla, Indigofera trita subsp. sub- ulata, Justicia flava, J. protracta subsp. protracta, Melhania didyma, Orthosiphon serratus, Pearsonia sessilifolia, Ruellia cor- data, Sida serratifolia, Tetraselago natalensis.*
		Succulent Shrub	*Euphorbia grandicornis, E. trichadenia, E. vandermerwei. Soft Shrub: Pavonia columella.*
		Herbaceous Climbers	*Fockea angustifolia.*
KwaZulu-Natal Biodiversity Sector Plan (Figure 6-6 & Figure 6-5)) **C-Plan**	According to the KZN Conservation Plan, both the proposed and authorised Project areas overlap a **Critical Biodiversity Area (CBA) 1** Mandatory designation. CBA 1 are areas representing the only localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved i.e. there are no alternative sites available. Part of the proposed Project Area (top left corner) overlaps an **Irreplaceable CBA**. However, this is a small portion, whereas the authorised location overlaps a greater area of the irreplaceable CBA. Irreplaceable CBAs are areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of the ecosystems. Both locations do not overlap any ESA however, a **Corridor ESA** has been located within a 2 km proximity of the proposed substation.	**Graminoids**	*Dactyloctenium australe (d), Enteropogon monostachyus (d), Eragrostis capensis (d), E. curvula (d), E. racemosa (d), Heteropogon contortus (d), Panicum maximum (d), Sporobolus pyramidalis (d), Themeda triandra (d), Aristida bipartita, A. congesta, Bothriochloa insculpta, Chloris mossam- bicensis, Cymbopogon caesius, Digitaria natalensis, Leptochloa eleusine, Panicum deustum, Schizachyrium sanguineum, Setaria incrassata, Sporobolus nitens, Trachypogon spicatus, Tristachya leucothrix.*
		Herbs	*Acrotome hispida, Argyrolobium rupestre, Aspilia mossambicensis, Chamaecrista biensis, C. mimosoides, Corchorus asplenifolius, Felicia mossamedensis, Gerbera ambigua, Helichrysum rugulosum, Hibiscus pusillus, Kohautia virgata, Lotononis eriantha, Senecio latifolius, Stachys aethio- pica, Tragia meyeriana, Vernonia capensis.*
		Succulent Herb:	*Aloe parvibracteata*

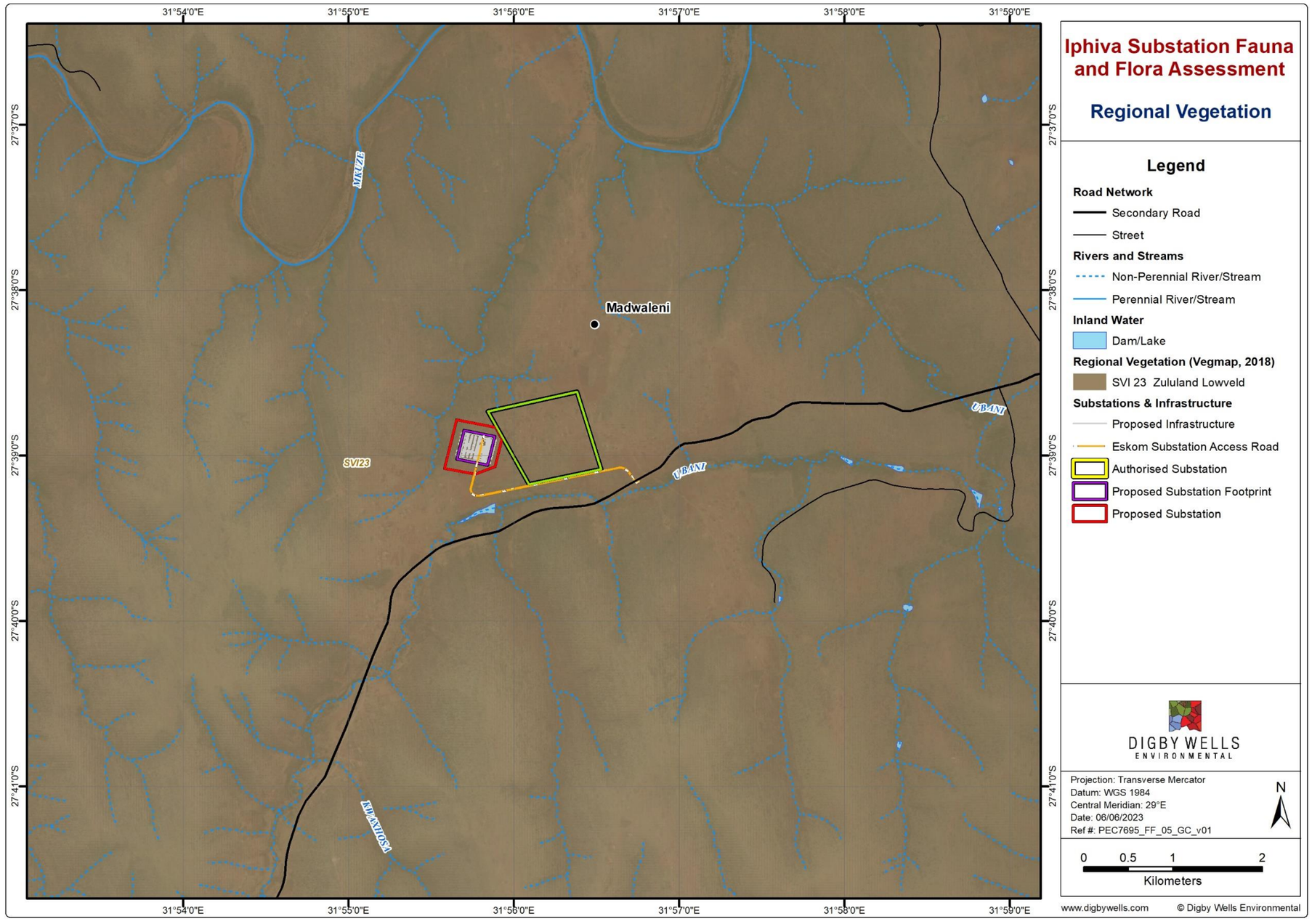


Figure 6-1: Regional Vegetation Map of the Iphiva Substation Project Area

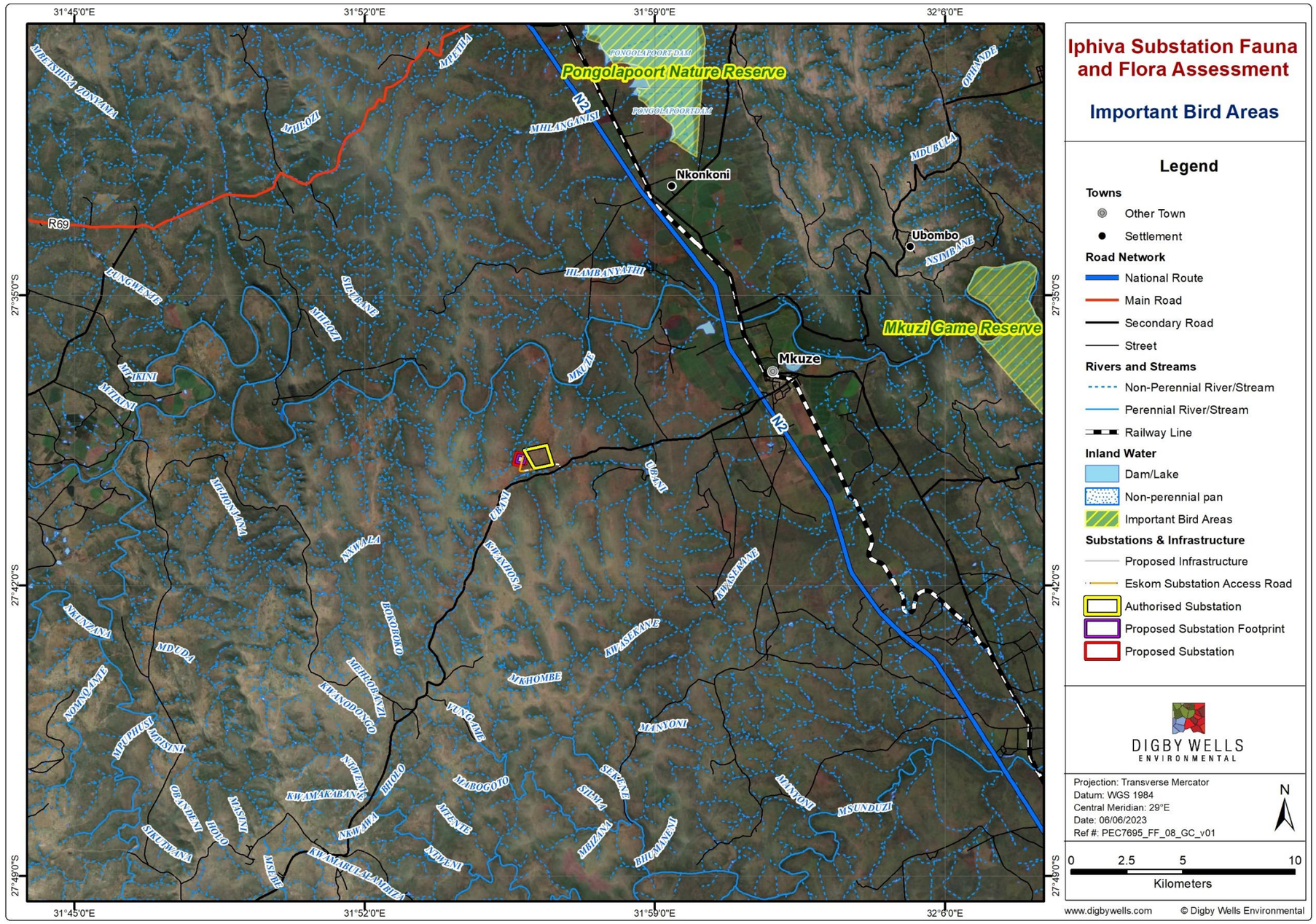


Figure 6-2: IBAs in proximity to the Iphiva Substation Project Area

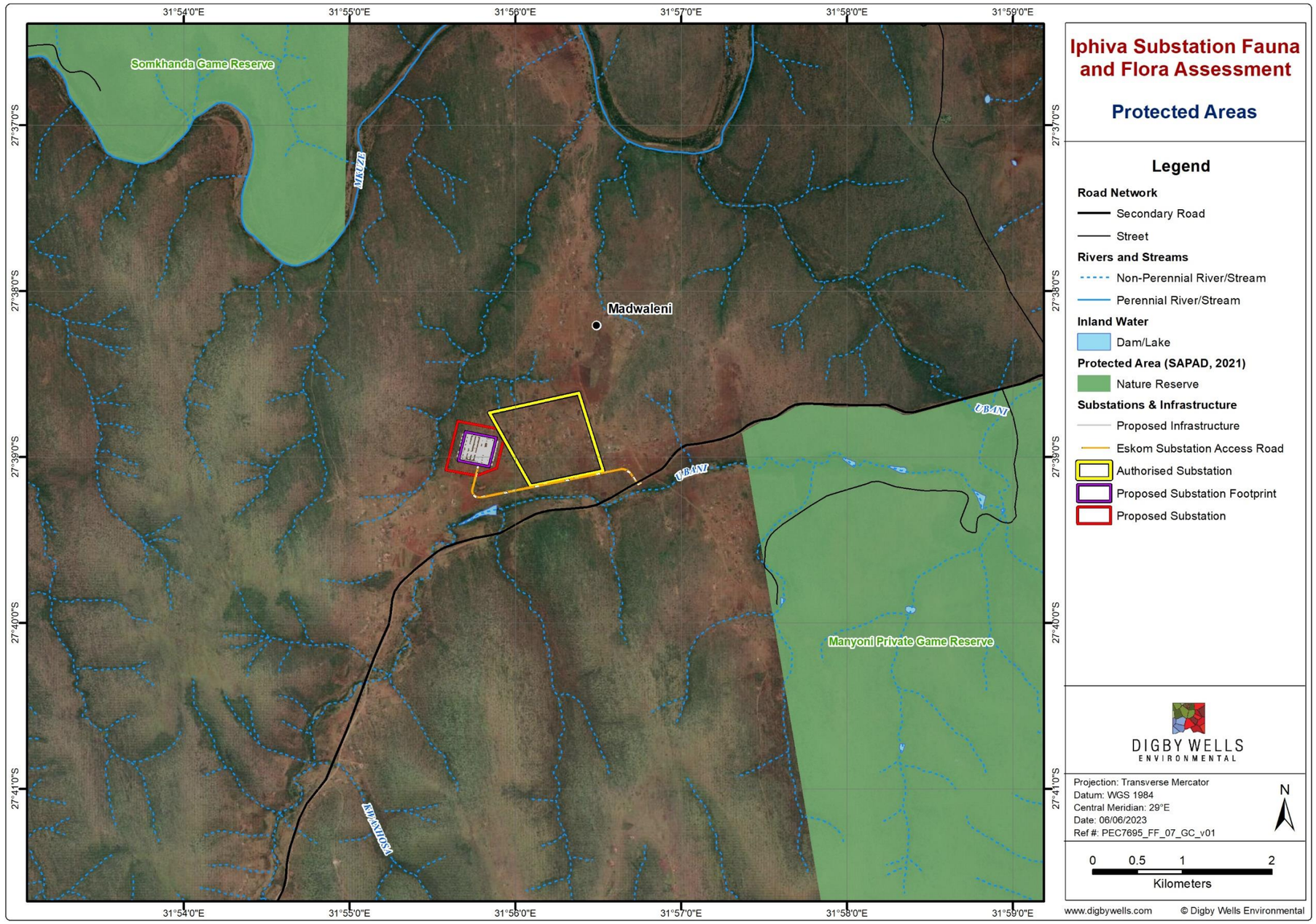


Figure 6-3: Protected Areas in proximity to the Iphiva Substation Project Area

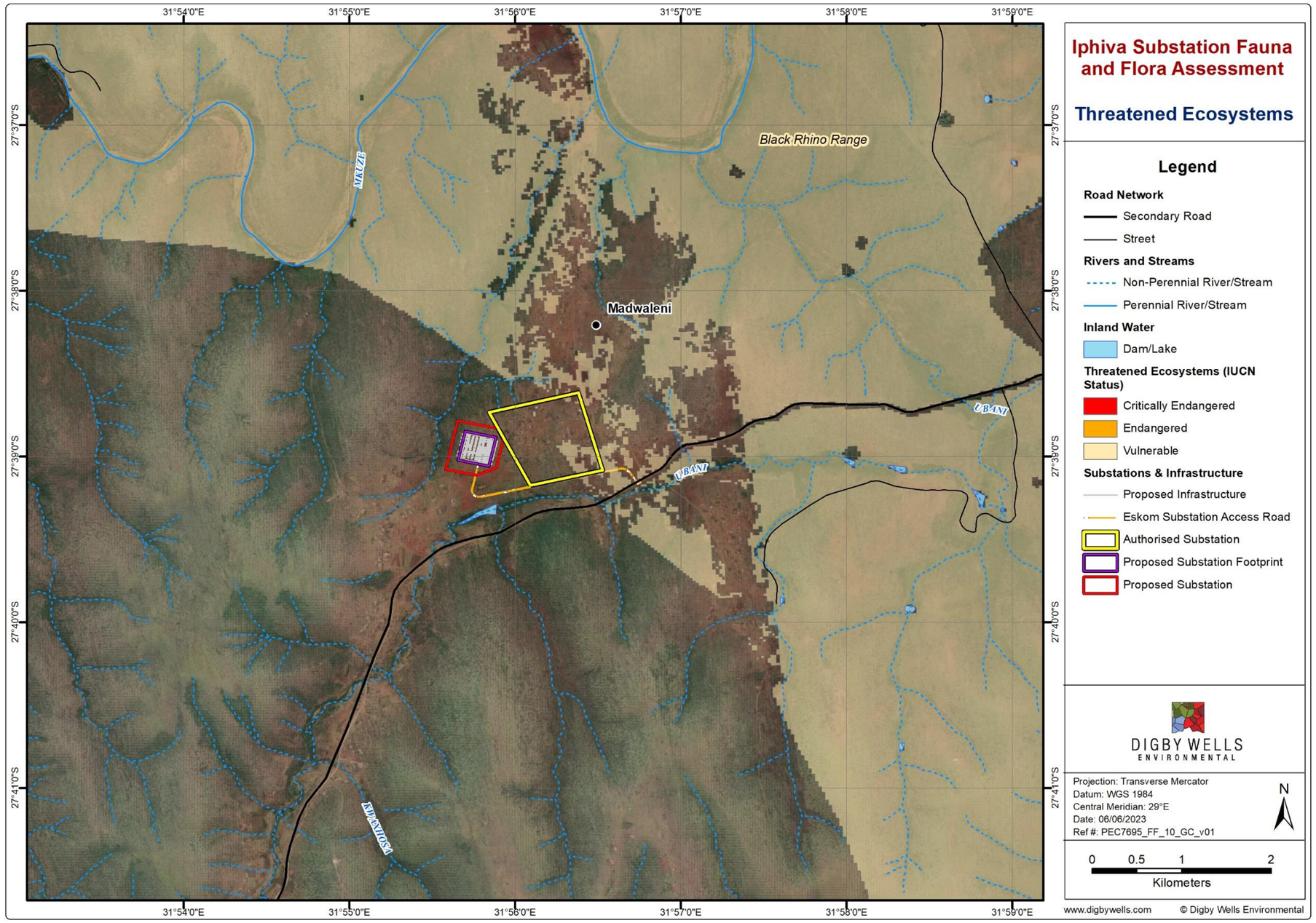


Figure 6-4: Threatened Ecosystems (2011) map of the Iphiva Substation Project Area

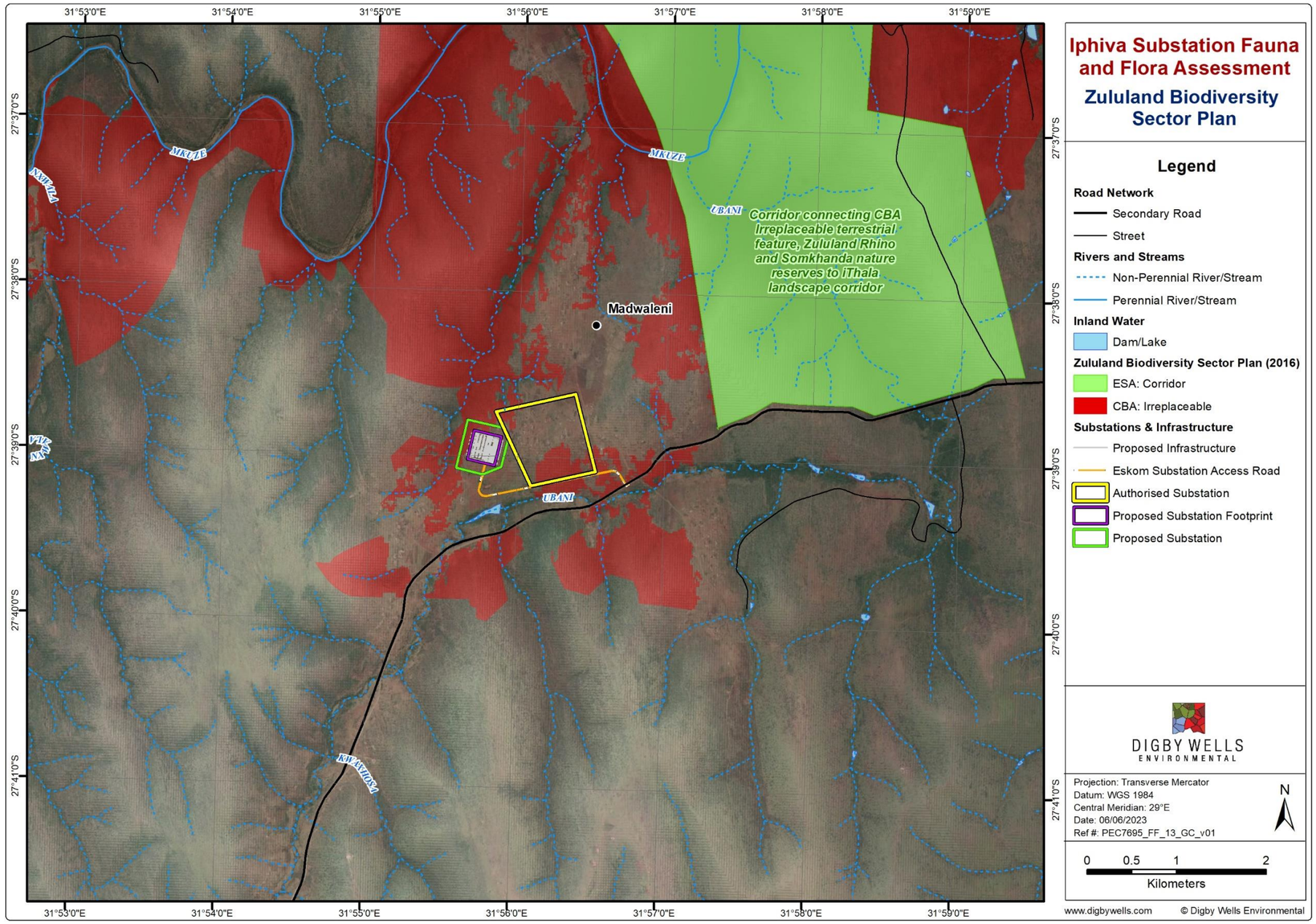


Figure 6-5: Zululand Biodiversity Sector Plan (Ezemvelo KZN Wildlife 2015)

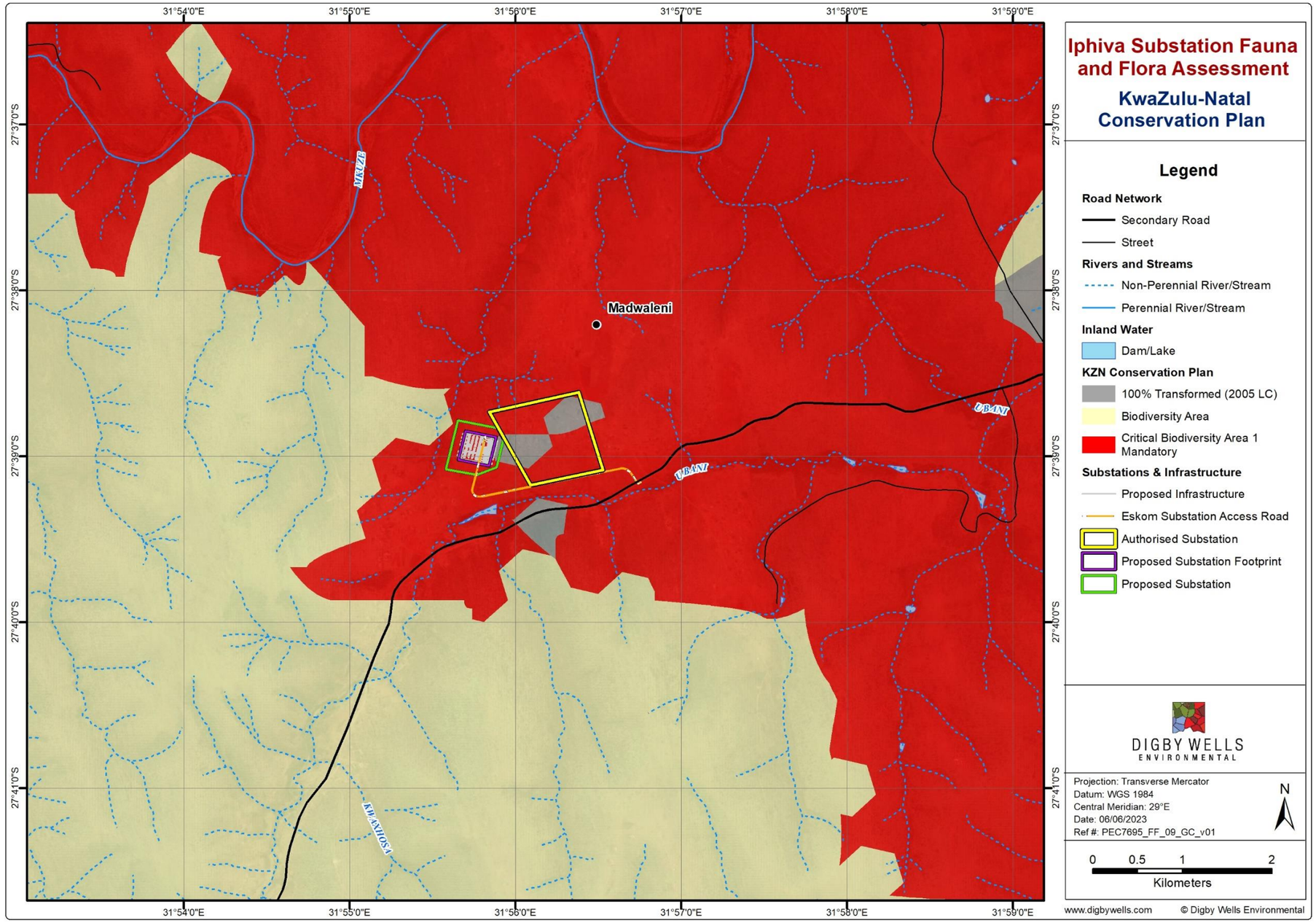


Figure 6-6: KwaZulu-Natal Conservation Plan map of the Iphiva Substation Project Area

6.1. Desktop Findings Discussion

The proposed substation falls within the Maputaland-Pondoland Centre of Endemism, which is a biodiversity hotspot. There are two Important Bird Areas (IBAs) in close proximity to the proposed substation namely, Pongola Nature Reserve and the Mkuze Game Reserve which forms part of the Isimangaliso Wetland Park. Collectively these IBAs would constitute some of the most avifaunal rich and diverse areas in South Africa. Many of the areas outside these IBAs will have similar habitat and species will not be restricted to the protected areas.

The Pongola Nature Reserve IBA is located 30 km south-east of Pongola town. The Pongola River flows in from the north-west and only a small section of the river lies inside the reserve. The vegetation predominantly consists of Zululand Lowveld (Mucina and Rutherford 2012). The associated wetlands are important for wetland-dependent birds such as the Pink-backed Pelican (*Pelecanus rufescens*) which has bred in the past, making this one of only two sites in South Africa where it does so. Globally threatened species include the endangered vulture species such as Lappet-faced Vulture (*Torgos tracheliotos*), White-headed Vulture (*Trigonoceps occipitalis*), White-backed Vulture (*Gyps africanus*) and Martial Eagle (*Polemaetus bellicosus*). Regionally threatened species are Marabou Stork *(Leptoptilos crumeniferus),* African Marsh Harrier (*Circus ranivorus*), African Grass Owl (*Tyto capensis*) and Tawny Eagle (*Aquila rapax*). This avifaunal sensitivity is further elaborated upon in the Avifaunal Assessment (Digby Wells, 2023).

There are two privately protected game reserves in close proximity to the proposed substation, namely the Manyoni Private Game Reserve and the Somkhanda Game Reserve. The Somkhanda Game Reserve is a community-owned game reserve that is run and managed in partnership by the Gumbi Community Wildlands Conservation Trust, Africa for Africa, Africa4 Wild and Pamco. Other partners involved in the reserve's conservation projects are: Wildlife Act Fund, KZN Wildlife and WWF. The Somkhanda Game Reserve also became the first community owned land to become a partner in the WWF/Ezemvelo Black Rhino Range Expansion Programme, and a population of endangered black rhino were introduced in 2007. Furthermore, Manyoni Private Game Reserve was formally proclaimed by the government as a Nature Reserve under the Protected Areas Act. Since the establishment of the reserve we have seen the reintroduction of lions, making Manyoni a Big 5 Reserve, and the reintroduction of endangered cheetahs and African wild dogs. In addition to endangered species conservation, Manyoni Private Game Reserve has a strong focus on conserving biodiversity, this includes the landscapes, ecosystems and processes upon which this biodiversity depends.

Congruently, the vicinity of the said protected areas in the relation to the proposed substation provide corridors and important habitat for restricted range and biome restricted species

7. Site-specific Results

This section discusses, in detail, the findings of the flora and fauna assessment conducted by Digby Wells in April 2022 and additional site in May 2023 to assess the updated Project layout.

7.1. Description of the Vegetation Communities

The site visits identified various vegetation communities within the Project area and are represented in Figure 7-1 below. The vegetation communities are described in detail in tabular formats below with accompanying representative photographs.

Most of the immediate area within the proposed substation has already incurred transformation from the surrounding community and is not representative of the regional vegetation. However, the immediate surroundings of the proposed substation sustain unique geological (such as drainage lines and surrounding undulating hills), geographical or topographical features of potential importance. A total of 63 floral species were recorded during the assessment and are presented in Table 7-1 below.

Table 7-1: Recorded Floral Species

Family	Species	Habitat Type	Conservation
Acanthaceae	*Baleria elegans orientalis*	Tree Savanna & Riparian	LC
Acanthaceae	*Justicia flava*	Tree Savanna	LC
Amaryllidaceae	***Ammocharis coranica***	**Tree Savanna**	**Protected**
Amaryllidaceae	***Crinum macowanii***	**Tree Savanna & Riparian**	**Protected**
Anacardiaceae	***Sclerocarya birrea subsp caffra***	**Tree Savanna & Riparian**	**Protected**
Anacardiaceae	*Ozoroa engleri*	Tree Savanna & Riparian	LC
Apocynaceae	*Cynanchum viminale*	Riparian	LC
Apocynaceae	***Stapelia gigantea***	**Tree Savanna & Riparian**	**Protected**
Asparagaceae	*Asparagus densiflorus*	Tree Savanna	LC
Asparagaceae	*Sanservia hyacinthoides*	Riparian	LC
Asphodelaceae	*Aloe marlothii*	Tree Savanna	LC
Asteracea	*Parthenium hysterophorus*	All	AIP
Asteracea	*Zinnia peruviana**	Tree Savanna	LC
Bignoniaceae	*Tecomaria capensis*	Tree Savanna & Riparian	LC
Boraginaceae	*Ehretia rigida*	Riparian	LC
Burseraceae	*Commiphora pyracanthoides*	Riparian	LC
Cactaceae	*Cereus jamacaru**	Tree Savanna	1b
Cactaceae	*Opuntia ficus-indica**	Tree Savanna	LC
Caesalpiniaceae	*Schotia brachypetala*	Riparian	LC
Caesalpiniaceae	*Schotia capitata*	Riparian	LC
Cannabaceae	*Celtis africana*	Riparian	LC
Celastraceae	*Gymnosporia buxifolia*	Riparian	LC
Convolvulaceae	*Ipomoea carnea ssp. fistulosa**	Riparian	LC

Family	Species	Habitat Type	Conservation
Cyperacea	*Cyperus articulatus*	Riparian	LC
Ebenaceae	*Euclea daphinoides*	Riparian	LC
Euphorbiaceae	*Euphorbia cooperi*	Tree Savanna	LC
Euphorbiaceae	*Euphorbia ingens*	Tree Savanna	LC
Euphorbiaceae	*Euphorbia tirucalli*	Tree Savanna	LC
Euphorbiaceae	***Spirostachys africana***	**Riparian**	**Protected**
Fabaceae	*Bolusanthus speciosus*	Riparian	LC
Fabaceae	*Dichrostachys cinerea*	Tree Savanna & Riparian	LC
Fabaceae	*Gleditsia triacanthos**	Tree Savanna	AIP
Fabaceae	*Indigofera velutina*	Tree Savanna	LC
Fabaceae	*Peltophorum africanum*	Tree Savanna & Riparian	LC
Fabaceae	*Senegalia burkei*	Tree Savanna	LC
Fabaceae	*Senna didymobotrya**	All	AIP
Fabaceae	*Vachellia nilotica*	Tree Savanna	LC
Fabaceae	*Vachellia tortilis*	Tree Savanna	LC
Fabaceae	*Vachellia xanthophloea*	Riparian	LC
Malvaceae	*Abutilon austro-africanum*	Riparian	LC
Malvaceae	*Hibiscus calyphyllus*	Riparian	LC
Malvaceae	*Melhania forbesii*	Tree Savanna	LC
Mimosaceae	*Senegalia nigrescens*	Riparian	LC
Moraceae	*Ficus albutilifolia*	Riparian	LC
Moraceae	*Ficus sycamorus*	Riparian	LC
Poaceae	*Aristida congesta*	Tree Savanna & Riparian	LC
Poaceae	*Cenchrus ciliaris*	Riparian	LC
Poaceae	*Eragrostis capensis*	Riparian	LC
Poaceae	*Melinis repens*	Tree Savanna & Riparian	LC
Poaceae	*Panicum eckloni*	Riparian	LC
Poaceae	*Panicum maximum*	Riparian	LC
Poaceae	*Urochloa mosambicensis*	Riparian	LC
Rhamnaceae	*Ziziphus mucronata*	Tree Savanna & Riparian	LC
Sapindaceae	*Hippobromus pauciflorus*	Riparian	LC
Sapindaceae	*Pappea capensis*	Riparian	LC
Tiliaceae	*Grewia flavescens*	Riparian	LC
Tiliaceae	*Grewia hexamita*	Riparian	LC
Tiliaceae	*Grewia lasiocarpa*	Riparian	LC
Verbenaceae	*Lantana camara**	Tree Savanna & Riparian	AIP
Vitacea	*Cissus quadrangularis*	Riparian	LC
Vitacea	*Cissus rotundifolia*	Riparian	LC
Poaceae	*Pennisetum clandestium**	Riparian	AIP

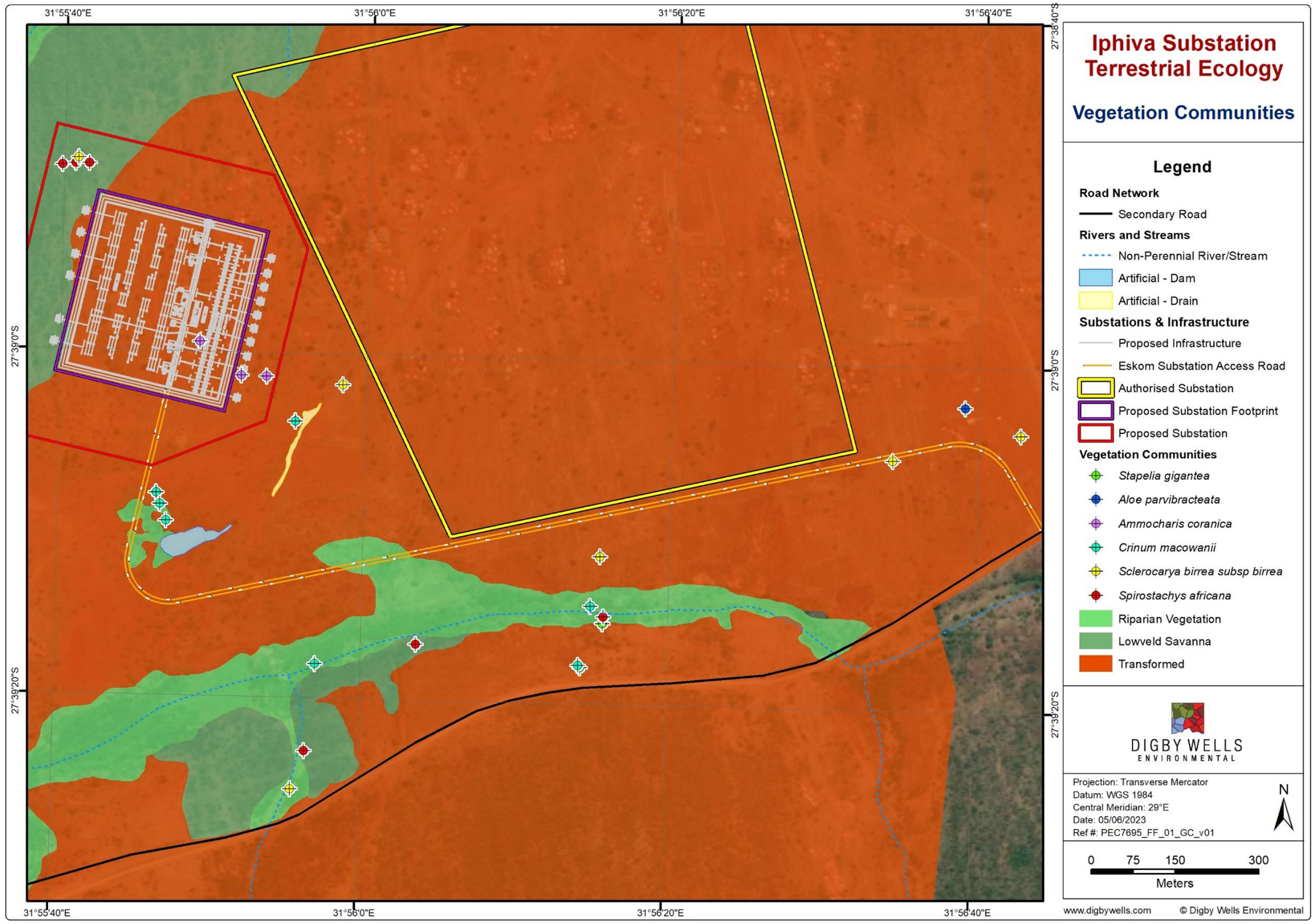


Figure 7-1: Vegetation Communities

7.1.1. Regional Vegetation

The Iphiva Substation Project Area falls within the Zululand Lowveld of the Savanna Biome (Mucina and Rutherford 2012), as illustrated in Figure 6-1. The Savanna Biome is one of the nine South African biomes and is found across South Africa, excluding the Western Cape. The Zululand Lowveld vegetation type is found in KwaZulu-Natal, Mpumalanga and Swaziland. Cultivation is the main threat to this biome and the vegetation type.

The Zululand Lowveld vegetation consists of various bushveld units: dense thickets of *Dichrostachys cinerea*, *Vachellia* and *Senegalia* species; park-like savanna with Vachellia tortilis; and tree-dominated woodland with broad-leaved open bushveld with *Sclerocarya birrea* subsp. *caffra and Senegalia nigrescens*. Overall, the vegetation occurs on extensively flat or slightly undulating landscapes.

7.1.2. Protected Flora

Of the potentially occurring species (shown in Appendix B), four floral SCC are expected to occur and are listed in Table 7-2. While these species are not listed on the SANBI Red List they are provincially protected under the seventh schedule of protected indiigous plants of the KwaZulu-Natal Nature Conservation Management Amendment Act of 1999 (Act No. 5 of 1999).

Ammocharis coranica is a herbaceous species found across South Africa in sunny and well-drained areas and was subsequently confirmed on site. The species is a slow grower and mature bulbs can be as much as 50 years old.

Table 7-2: Flora SCC that may occur within the Project Area

Family	Scientific Name	Red List Category	Provincially Protected Species
Amaryllidaceae	*Ammocharis coranica*	LC	Protected
Hyacinthaceae	*Albuca abyssinica*	LC	Protected
Hyacinthaceae	*Albuca* sp.	Not Evaluated	Protected
Hyacinthaceae	*Ledebouria humifusa*	LC	Protected

Several floral SCC were confirmed during the site visits and are listed in Table 7-3 below. Two trees, namely *Sclerocarya birrea* subsp *caffra* and *Spirostachys africana* are protected under the National Forestry Act of 1998 (Act No. 84 of 1998) (NFA) and two bulbous species, *Crinum macowanii* and *Ammocharis coranica* and two Aloes, *Aloe marlothii* and *Aloe parvibracteata* were recorded within the various vegetation communities. Figure 7-2, Figure 7-3 and Figure 7-4 exhibit the floral SCC recorded during the site visit.

The additional site visit confirmed the presence of an additional floral SCC, namely *Stapelia gigantea.* This species was confirmed in close proximity to the proposed road (see Figure 7-5). The locality of the few recorded floral SCC can be viewed in the vegetation communities' maps (Figure 7-1).

Table 7-3: Confirmed Floral SCC

Family	Scientific Name	NFA	Provincially Protected Species
Amaryllidaceae	*Crinum macowanii*	-	Protected
Amaryllidaceae	*Ammocharis coranica*	-	Protected
Asphodelaceae	*Aloe marlothii*	-	Protected
Asphodelaceae	*Aloe parvibracteata*	-	Protected
Anacardiaceae	*Sclerocarya birrea subsp caffra*	Protected	-
Euphorbiaceae	*Spirostachys africana*	Protected	-
Apocynaceae	*Stapelia gigantea*	-	Protected

Removal or damage of the species listed under the NFA would requires a license for the removal (*Sclerocarya birrea* subsp *caffra* and *Spirostachys africana*). Similarly, *Aloe parvibracteata, Aloe marlothii, Crinum macowanii, Stapelia gigantea* and *Ammocharis coranica* are specially protected in terms of the KZN Nature Conservation Management Act, and will require a permit in terms of the above Ordinance for the disturbance or removal of the plants. These permits are required prior to any development activities commence.

Figure 7-2: Left: *Ammocharis coranica*. Right: *Crinum macowanii*

Figure 7-3: Left: *Spirostachys africana*. Right: *Sclerocarya birrea* subsp *caffra*

Figure 7-4: Left: *Aloe parvibracteata.* Right: *Aloe marlothii*

Figure 7-5: *Stapelia gigantea*

7.1.3. Riparian Vegetation

Photograph	Description
 	**Classification**: Unchannelled Valley Bottom and Channelled Valley Bottom (Digby Wells Environmental 2022) **Flora SCC**: *Spirostachys africana, Sclerocarya birrea subsp caffra, Crinum macowanii* **Vegetation Characteristics**: This vegetation unit is found along the peripheries of the Project boundary (Figure 7-1). The vegetation varied depending on the width and depth of the channel. Large deep-rooted trees lined the larger channels and smaller shrubs and trees and lined the smaller channels. The drainage systems are seasonally influenced with varying water levels. The taller trees comprised of *Schotia brachypetala, **Spirostaychys africana**, Pappea capensis*, *Hippobromus pauciflorus* and *Ficus sycamorus*. Tall shrubs consisted of *Gymnosporia buxifolia, Grewia fravescens, G. hexamita*, *Commiphora pyracanthoides* and *Euclea daphinoides.* The herbaceous layer consisted of various herby forbs and grasses. The previously grazed banks of the wetland system are dominated by grass *Pennisetum clandestium* (Category 1b on the Alien and Invasive Species list 2020), with herbs including *Abutilon austro-africanum, Parthenium hysterophorus* and *Ipomoea carnea.* Much higher species diversity (as well as a unique composition) was observed in this vegetation community. The drainage lines act as important ecological corridors for numerous fauna and flora species.

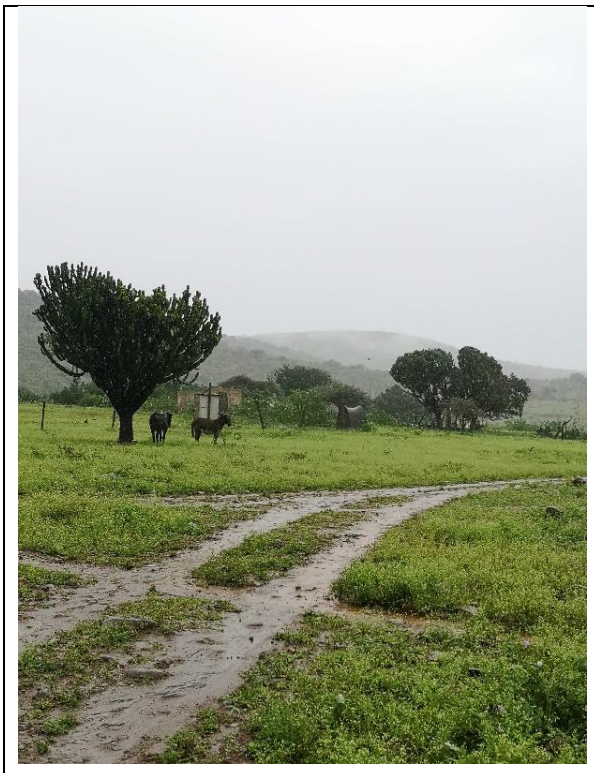
7.1.4. Tree Savanna (Lowveld Bushveld)

Photograph	Description
	Classification: Dense stands of trees **Flora SCC**: *Stapelia gigantea*

	**Vegetation Characteristics**: Dense shrub / tree cover forming almost closed canopies. Directly adjacent to the riparian areas. This Tree Savanna within the Project Area is very small and limited in extent and comprises of dense tall shrub / tree cover, forming an almost closed canopy in some areas. Open patches and peripheries of these woodlands contain shade loving grasses whilst the deeper shaded areas contain forbs with some possessing the ability to climb (such as *Cynanchum viminale*). The tall dense tree cover comprises of broad and compound leaved trees such as *Dichrostachys cinerea, Vachellia karroo, V, toritillis, Senegalia burkei, S. nigrescens* and *Commiphora pyracanthoides* The dominance in *Dichrostachys cinerea* and *Vachellia karroo,* indicates bush encroachment of areas previously overgrazed or disturbed. Varying densities of these encroaching species were found within this unit.

7.1.5. Transformed Areas

Photograph	Description
	**Classification**: Roads, homesteads, kraals and plantations. **Floral SCC**: *Ammocharis coranica, Sclerocarya birrea* subsp *caffra, Aloe marlothii*
	Vegetation Characteristics: This community encompasses majority of the Project area. It is the area predominantly utelised by the surrounding communities and consists of mostly cleared areas, with single-standing large trees such as *Sclerocarya birrea subsp caffra, Peltophorum africanum, Ozoroa engleri,* and succulent tree *Aloe marlothii* and *Euphorbia ingens, E. cooperi.* Low density permanent structures, including gravel roads, homesteads consisting of houses, and kraals are present. Various invasive species were noted within he transformed habitat, they are discussed in more detail in Section 7.1.6 below.



7.1.6. Alien Invasive Species

South Africa has seen a rise of Alien Invasive Plants (AIPs)species by 15%, increasing from 1,637 to 1,880 (of which a third are declared invasive). According to the report of the Status of Biological Invasions and Management in South Africa, the current estimates suggest the ecological cost of invasive species to be more than R6.5 billion each year (Creecy, 2021). The main costs associated with losses are the decline in ecosystem services, such as water, grazing potential and agricultural crop loss.

Invasive trees (AIPs) induce high risks associated with the water table. It is said that invasive trees have been known to use up 3-5% of South Africa's surface water runoff each year. Invasive trees have also known to increase the risk and intensity of veld fires, with a 15% more fuel burnt in invaded areas (Creecy, 2021). The economic impact from the loss of biodiversity is linked to the collapse of ecosystem services such as the provision of freshwater and grazing. Currently, if AIPs are not controlled, around 70% of grazing lands will be impacted. This will decline the natural rangelands for livestock production, thereby threatening rural livelihoods and food production.

The NEM:BA (Act 10 of 2004); Alien and Invasive Species Regulations 2020 (GNR 1003 in GG 43726 dated 18 September 2020 – effective from 18 October 2020), legally governs the management of AIPs. To ensure legislative compliance, AIPs which may have established need to be adequately managed per the requirements of the legal categories into which they fall. The categorisation of listed AIPs is significant as the regulations ascribe differing obligations vis-à-vis each Category.

The NEM:BA Alien and Invasive Species Regulations (2020) categories are summarised in Table 7-4 below and the identified AIPs are listed in Table 7-5.

Table 7-4: Summary of NEM:BA Alien and Invasive Species Regulations (2020) Categories

Category	Compulsory Eradication by the Landowner	Compulsory Control by the Landowner (Prevent Species from Spreading)	Permit Required for Restricted Species	Compliance with Invasive Species Management Plan
Category 1a	X	X	X	X
Category 1b			X	X
Category 2		X	X	X (if applicable)
Category 3				X (if applicable)

An additional three AIP species were recorded in the 2023 assessment tallying the total to 13. Ten species have a NEM:BA category listing 1b, which will require controlled management. These species were prominent within the transformed and disturbed areas throughout the Project area. They were seen along roadsides, riverbanks and drainage lines, and on the edges of the homesteads, kraals and fences. The recorded AIPs are listed in below in Table 7-5 and species photographed during site visit are presented in Figure 7-6.

Table 7-5: Recorded AIPs

Family	Species	Habitat	Category
Asteracea	*Parthenium hysterophorus*	All	Invasive
Agave	*Agave sisalana*	Transformed	2
Apocynaceae	*Catharanthus roseus*	Transformed	1b
Cactaceae	*Opuntia ficus-inidca*	Transformed	1b
Cactaceae	*Opuntia aurantiaca*	Transformed	1b
Asteracea	*Zinnia peruviana*	Transformed	Invasive
Cactaceae	*Cereus jamacaru*	Tree Savanna	1b
Convolvulaceae	*Ipomoea carnea ssp. fistulosa*	Riparian	1b
Fabaceae	*Gleditsia triacanthos*	Tree Savanna	1b
Fabaceae	*Senna didymobotrya*	All	1b
Verbenaceae	*Lantana camara*	Tree Savanna & Riparian	1b
Poaceae	*Pennisetum clandestium*	Riparian	1b
Asteraceae	*Xanthium strumarium*	Riparian	1b

Figure 7-6: from left to right (*Opuntia aurantiaca, O. ficus-indica, Agave sisalana,* and *Xanthium strumarium*

7.2. Fauna

The proposed project is located within 2731CB Quarter Degree Square (QDS) in South Africa. South African National Biodiversity Institute (SANBI) datasets were overlaid on the QDS to determine the availability of Red Data species or species of conservation concern (SCC). The Virtual Museum (http://vmus.adu.org.za/) has generated potential SCC that may occur within the region and the relevant species are discussed below in the succeeding headings.

7.2.1. Mammals

Within the identified QDS of the Project Area (2731CB), the Virtual Museum (http://vmus.adu.org.za/) identified 15 mammal SCC that may potentially occur on site (Table 7-6). Of these SCC, three are considered Endangered species, including the Roan Antelope (*Hippotragus equinus*), Oribi (*Ourebia ourebi*) and African Wild Dog (*Lycaon pictus*). However, these species are most likely to be present only in the protected areas that are in the surrounding areas.

All the expected species are listed in Appendix C.

Table 7-6: Mammal SCC that may occur within the Project Area

Scientific name	Common name	Red List category	Habitat Preferences	Possibility of Occurrence
Damaliscus lunatus lunatus	(Southern African) Tsessebe	VU	Tsessebes are grazers in grasslands, open plains, and lightly wooded savannas	Unlikely

Scientific name	Common name	Red List category	Habitat Preferences	Possibility of Occurrence
Hippotragus equinus	Roan Antelope	EN	The Roan Antelope inhabit lightly wooded country and grasslands, they also prefer wooded savanna to woodlands	Unlikely
Ourebia ourebi	Oribi	EN	They occur in a variety of habitats from savanna, floodplains and tropical grasslands. Recently burnt areas often attract Oribi	Unlikely
Lycaon pictus	African Wild Dog	EN	Preferably African Wild dogs will utilize woodlands and broken woodland habitats. They can also be found in open plains as well as open savanna woodland. They tend to avoid Montane forests however utilize the adjacent montane grasslands	Possible
Loxodonta africana	African Bush Elephant	VU	Elephants occur in a wide variety of habitats from open grassland to forested regions including open arid savanna or desert, and the contrasting wet areas of marshes and lake shores, from sea level to mountainous regions above the snowlines	Unlikely
Acinonyx jubatus	Cheetah	VU	Cheetahs can be found in a wide range of habitats and ecoregions, ranging from dry forest and thick scrub through to grassland and hyper-arid deserts, such as the Sahara. They are only absent from tropical and montane forest.	Unlikely
Leptailurus serval	Serval	NT	Servals are mostly found in and around marshland, well-watered long-grass savannah environments, and are particularly associated with reed beds and other riparian vegetation types. Servals can penetrate dense forest along waterways and through grassy patches and are able to tolerate agricultural areas to some extent, provided cover is available and appropriate wetland habitat	Possible
Panthera pardus	Leopard	VU	Leopards prefer riparian woodland and koppies and avoid grassland. Preferential selection for riparian woodland is likely driven by prey distribution. Koppies are often selected by leopard as den sites for young cubs and/or vantage points to locate prey.	Possible
Crocuta crocuta	Spotted Hyaena	NT	Hyaenas are widespread and found in most habitats. Spotted hyenas are found in all habitats, including savannas, grasslands, woodlands, forest edges, sub-deserts, and even mountains up to 4,000 meters.	Unlikely
Hyaena brunnea	Brown Hyena	NT	Brown hyenas prefer to den in arid to semi-arid grassland and savanna biomes at no higher than 1500 m in elevation but	Possible

Scientific name	Common name	Red List category	Habitat Preferences	Possibility of Occurrence
			are also found in desert regions that receive less than 100 mm of rain annually. Den sites are typically located in sandy areas near large rocks or vegetative cover, which provides relief from the heat	
Otomys auratus	Southern African Vlei Rat	NT	It is known from grassland and marshes in fynbos and thicket habitats. It generally occurs in areas of dense vegetation cover and higher moisture content. It also occurs in pine plantations.	Unlikely
Otomys laminatus	KwaZulu Vlei Rat	NT	Occurs in montane grasslands on xeric or mesic soils, either dry or wet, typically amidst piles of loose stones or boulders, both natural and man-made (for example, stone walls).	Possible
Aonyx capensis	African Clawless Otter	NT	Their list of preferred habitats is wide-ranging – from rivers to rocky shores, estuaries or mangroves – but access to permanent freshwater is crucial, with otters only venturing to marine habitats when fresh water is within reach	Unlikely
Crocidura mariquensis	Swamp Musk Shrew	NT	It has a requirement for a wetland habitat and occurs in reed beds and semi-aquatic vegetation, in the vicinity of rivers and lakes and in seasonally flooded areas, with a marked preference for marshes and swamps.	Unlikely
NT = Near Threatened, EN = Endangered, VU = Vulnerable				

Mammals form a vital component of ecosystems. Not only are they important for nutrient cycling, habitat modification, consumers of plants and seed dispersal but they're also a considerable component of predators in healthy ecosystems.

The site visit in 2022 recorded a low species count, which was limited to only Grey Duiker (*Sylvicarpa grimmia*), Scrub Hare (*Lepus saxatilis*) and African Civet (*Civettictis civetta*). Similarly the site visit in 2023 recorded additional mammal species including Slender Mongoose (*Herpestes sanguineus*), single-striped grass mouse (*Lemniscomys rosalia*), and Vervet monkey (*Chlorocebus pygerythus*). Impala (*Aepyceros melampus*) were noted on a neighbouring property and within close proximity to the Project.

The low species count may be attributed to the habitat degradation via anthropogenic activities within the area and region. The vegetation units have been transformed and cleared, there are notable signs of overgrazing and bush encroachment in the Tree Savanna and Transformed vegetation community. The local community sustain livestock in the area and evidence of domestic and hunting dogs were present. Du Plessis (2014) considers dogs to be a formidable factor in the threat of small and large mammals (see Figure 7-7 of hunting dogs observed on site in 2023). Collectively, the transformation of the landscape and current agropastoral activities all contribute to the low mammal species count within the Project area.

KZN is home to a wide diversity of bat species. 39 of the 58 bat species found in South Africa can be found in the province. There are several bat SCC that may occur in the region, they are listed along with their associated habitat preferences in Table 7-7 below.

Figure 7-7: Hunting dogs

Table 7-7: Potential Bat Species

Common Name	Scientific Name	NEM:BA	IUCN	Habitat preference
Sundevall's roundleaf bat	*Hipposideros caffer*	DD	LC	-
Anchieta's pipistrelle	*Hypsugo anchietae*	NT	LC	Afromontane forest, coastal forest or bushveld
Damara woolly bat	*Kerivoula argentata*	EN	LC	Moist savanna habitats (including bushveld) (Taylor 2000). Roosting sites include deserted weaver bird nests, among clusters of leaves, on the bark of trees, and on traditional houses (rondavels).
Lesser woolly bat	*Kerivoula lanosa*	NT	LC	Variety of habitats, ranging from lowland tropical moist forest, to dry woodland, and both dry and moist savanna. Animals have often been encountered roosting in abandoned bird nests
Botswana long-eared bat (Near Endeminc)	*Laephotis botswanae*	VU	LC	Dry and moist savanna, and heathland habitats. It is often found in the vicinity of rivers. This species is prefers habitats at higher elevations (Happold and Happold 1997). It is reported to occur under the bark of trees, usually in pairs
De Winton's long-eared bat	*Laephotis wintoni*	VU	LC	Dry savanna, mediterranean like shrubby vegetation, and high altitude grassland, and bushveld
Lesser long-fingered bat (Endemic)	*Miniopterus fraterculus*	NT	LC	Distribution in KwaZulu-Natal indicates a wide range of habitats from drier Valley bushveld and Lowveld to moister Mistbelt (including forest habitats), where suitable cover is present in the form of caves, overhangs, and unused mine and railway tunnels. Roosts in caves, overhangs, disused mines, railway tunnels and similar habitats (Skinner 2005). In KwaZulu-Natal it has been found in damp sandstone caves, a solution cave of poorly consolidated glacio-fluvial boulder clay, a rocky overhang over a forest stream, a rock fissure, a railway tunnel as well as from unused mine adits (entrances).
Greater long-fingered bat	*Miniopterus natalensis*	NT	NT	Dry and moist savanna, and Mediterranean-type shrubby vegetation. It is generally a cave roosting species also found in similar habitats such as disused mines.

Common Name	Scientific Name	NEM:BA	IUCN	Habitat preference
Rufous mouse-eared bat	*Myotis bocagii*	DD	LC	-
Temminck's hairy bat	*Myotis tricolor*	NT	LC	Dry and moist savanna, and Mediterranean-type shrubby vegetation. The species roosts in caves and abandoned mines. It appears to prefer larger caves that are relatively undisturbed, usually ones that contain large pools of water
	Myotis welwitschii	NT	LC	Tropical dry forest, montane tropical moist forest, both dry and moist savanna, shrublands, and high altitude grassland. Animals have been encountered roosting in buildings, caves and dense vegetation (including rolled banana leaves).
-	*Neoramicia nana*	LC	LC	-
Cape serotine bat	*Neoromicia capensis*	LC	LC	
Rendall's serotine bat	*Neoromicia rendalli*	CR	LC	Natural habitats are dry savanna, moist savanna, subtropical or tropical dry shrubland, and subtropical or tropical moist shrubland
Hairy slit-faced bat	*Nycteris hispida*	NT	LC	Moist savanna, dry savanna, papyrus swamps and marsh. Colonies roost in hollow trees, dense bushes, caves, holes in termite colonies and similar habitats. Colonies range in size from individual and pairs of animals to up to 20 bats
Large-eared free-tailed bat	*Otomops martiensseni*	VU	NT	Moist forest to semi-arid environments, and in some instances have been found to be common in urban and suburban areas, foraging in areas of intensive agricultural operations, roost in caves, disused tunnels, trees, hollows and on vegetation.
Blasius's horseshoe bat	*Rhinolophus blasii*	VU	NT	Summer roosts are situated in natural and artificial underground sites, with attics also being used in the northern part of the range. In winter, it hibernates in underground sites. This species is considered to be sedentary (Hutterer et al. 2005).
Geoffroy's horseshoe bat	*Rhinolophus clivosus*	NT	LC	Savanna woodland, Mediterranean type shrubland, dry (and possibly moist) savanna, open grasslands and semi-desert to even more arid environments. Roosting has been recorded

Common Name	Scientific Name	NEM:BA	IUCN	Habitat preference
				in caves, rock cervices, disused mines, and various rural and urban buildings
Darling's horseshoe bat	*Rhinolophus darlingi*	NT	LC	Savanna and savanna-woodland type habitats. It is dependent on caves, mines, broken rocky areas, buildings and similar structures as roost sites
Swinny's horseshoe bat	*Rhinolophus swinnyi*	EN	NT	Moist montane rainforest, and dry and moist savanna. Populations are dependent on caves, mines and similar habitats for roosting. It appears to be sparsely distributed in parts of its range
Light-winged lesser house bat	*Scotoecus albofuscus*	VU	DD	Occurs in dry savanna habitats
CR = Critically Endangered, EN = Endangered, NT= Near Threatened, VU = Vulnerable, DD = Data Deficient, LC = Least Concern,				

7.2.2. Reptiles

Reptiles are ectothermic (cold-blooded) meaning their internal basal temperature is influenced by their surrounding external environment and as a result, reptiles are dependent on environmental heat sources. Thus, many reptiles regulate their body temperatures by basking in the sun, or warmer surfaces (or substrates). Substrates are an important determining factor for identifying which habitats are suitable for which species of reptile. The weather conditions during the site assessment were not conducive for successful reptile sampling as it was overcast and raining. This most likely impacted the sample collection and as a result, no reptile species were recorded. Additionally, majority of the Project boundary is within a previously disturbed area with very little to no basal vegetation, this inherently means that there is no adequate cover for small terrestrial reptiles.

While no reptiles were recorded in 2022, the 2023 site visit recorded a African striped skink (*Trachylepsis striata*), tropical house gecko (*Hemidactylus mabouia*) and variable skink (*Trachylepsis varia*) (see Figure 7-8 and Figure 7-9). There is suitable habitat present for reptile species in the immediate surrounds and within the riparian areas providing arboreal habitat for numerous reptile species.

Of the potentially occurring vulnerable species. The ADU has listed two reptile SCC that may occur within the region, namely the large-scaled grass lizard and Nile crocodile. Their criteria are discussed further in Table 7-8 below.

A total of 55 reptiles are expected to occur within the QDS. Appendix D lists all potentially occurring reptiles that may feature within the Project area.

Table 7-8: Potential Reptile SCC

Species	Conservation Status	Habitat Requirements	Potential of Occurrence
Chamaesaura macrolepis (large-scaled grass lizard)	NT	It is commonly found amongst grasslands, including the Highveld Grasslands.	Unlikely
Crocodylus niloticus (Nile crocodile)	VU	Nile crocodiles may be able to tolerate an extremely broad range of habitat types, including small brackish streams, fast flowing rivers, swamps, dams, and tidal lakes and estuaries. They are often found in waters adjacent to various open habitats such as savanna or even semi-desert but can also acclimate to well-wooded swamps, extensively wooded riparian zones, waterways of other woodlands and the perimeter of forests	Unlikely

Figure 7-8: *Trachylepsis striata*

Figure 7-9: *Hemidactylus mabouia*

7.2.3. Amphibians

Amphibians are viewed to be good indicators of changes to the whole ecosystem as they are sensitive to changes in the aquatic and terrestrial environments (Waddle, 2006). Most species of amphibians are dependent on the aquatic environment for reproduction. Additionally, amphibians are sensitive to water quality and ultraviolet radiation because of their permeable skin (Gerlanc 2005).

According to Carruthers (2009), frogs occur throughout southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore, a collection of amphibians associated with the Grassland and Bushveld biome will all choose to breed under the prevailing biotic and abiotic features present. Furthermore, niche differentiation is encountered by means of geographic

location within the biome, this differentiation includes, banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the area of interest.

Two amphibians were recorded within the artificial dam within the Project area, African clawed frog (*Xenopus laevis*) and grey foam-nest tree frog (*Chiromantis xerampelina)* (Figure 7-10), common synanthropic species that copes well in modified anthropogenic habitats and areas. Amphibians expected to occur on site are listed in the Appendix E (http://sarca.adu.org.za/). No protected amphibian species are expected to occur on site.

Figure 7-10: Grey foam-nest frog

7.2.4. Invertebrates

Butterflies are a good indication of the various habitats available in a specific area (Woodhall, 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope (specific habitat requirements with populations concentrated in a small area) species which may be very specialised (Woodhall, 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and to identify. It is for this reason that Lepidoptera (moths and butterflies) will be used as the primary focus for the invertebrate survey.

There are 88 invertebrate species recorded from various databases that could occur within the Project site (see Appendix F). No invertebrate SCC are expected to occur, however, there is existing information regarding the distribution of a rare butterfly that was recorded in the area in 2007. This information was obtained from a survey conducted by the Lepidopterist's Society of Southern Africa on properties associated with the Manyoni Private Nature Reserve. It is not well understood if the species will be impacted by the Project as the complete distribution is not well known or verified yet. The rare butterfly is the *Anthene minima.* The species was listed as rare in the Red Data Book published by CSIR in 1989 (Mecenero, Edge and Staude, Southern African Lepidoptera Conservation Assessment (SALCA) 2015).

This is the only locality that the society are aware of, in which the rare butterfly *Anthene minima* can still be found. Over the past twenty years this species has been recorded here on a regular basis, while it has not been recorded from anywhere else during this period. The species was listed as rare in the Red Data Book published by CSIR in 1989 (SALCA, 2015).

Furthermore, there is also a geometrid moth *Nychiodes tyttha,* which occurs widely but rarely in eastern and south eastern Africa. In South Africa so far this species has only been found in the Manyoni Private Nature Reserve (formerly Zululand Rhino Reserve). For the family Geometridae alone, there are records for 101 species found in the reserve. The society has

embarked on an atlassing project called SABCA (South African Butterfly Conservation Assessment) in partnership with SANBI and the Avian Demography Unit of Cape Town University. It is hoped that this project will in future increase our knowledge on the distribution of butterflies (SALCA, 2015).

The table below (Table 7-9) lists the invertebrates recorded during the site assessment, no invertebrate SCC were recorded. Images of the recorded invertebrates are presented in Figure 7-11 below.

Table 7-9: Recorded Invertebrates

Family	Species	Common Name
Achatinidae	*Lissachatina immaculata*	Giant Blonde Snails
Acrididae	*Cyrtacanthacris tatarica*	Brown-spotted Locust
Araneidae	*Trichonephila inaurata*	Redleg Orbweaver
Araneidae	*Trichonephila senegalensis*	Banded-legged Orbweaver
Bethylidae		Flat Wasp
Carabidae	*Graphipterus sp*	Ground Beetle
Geomitridae	*Epigynopteryx termininota*	Geomitrid moths
Gryllidea		Field Cricket
Nymphalinae	*Papilio demodocus*	Citrus Swallowtail
Nymphalinae	*Junonia natalica*	Natal Pansy
Nymphalinae	*Danaus chrysippus*	Plain Tiger Butterfly
Nymphalinae	*Bicyclus anynana*	Squinting Bush Brown
Nymphalinae	*Byblia ilithyia*	Spotted Joker
Pieridae	*Nepheronia buquetii*	Plain Vagrant
Pisauridae		Funnel Spiders
Pyrgomorphidae	*Phymateus baccatus*	Redwart Milkweed Locust
Pyrgomorphidae	*Zonocerus elegans*	Elegant Grasshoper
Salticidae		Jumping Spider
Scolopendridae	*Ethmostigmus trigonopodus*	Blue-legged centipede
Spirostreptidae	*Archispirostreptus gigas*	Millipede
Tenebrionidae	*Eurchora sp*	Dirttoks
Termitidae	*Cryptotermes spp*	Termites

Figure 7-11:Left to right: Redwart milkweed locust, harvester termites, Funnel spider nest, ground beetle, Giant Blonde Snail, Millipede, and Redleg Orbweaver

8. Sensitivity mapping and conservation importance

Based on the findings of the desktop survey and field assessment, this report defines the sensitivity and conservation importance based on the following criteria:

8.1. Ecological Sensitivity

The ecological sensitivity for each habitat was determined from two criteria; the ecological function and its conservation importance. The table below (Table 8-1) describes the sensitivity criteria. They are defined as follows:

- **Ecological Function:** the ecological function describes the intactness of the structure and function of an ecosystem in terms of the relationship between plant/animal assemblages and the surrounding abiotic environment. It also refers to the degree of ecological connectivity between systems within a landscape. Therefore, systems with a high degree of landscape connectivity among each other are perceived to be more sensitive.
- **Conservation Importance:** The conservation importance of the site gives an indication of the necessity to conserve areas based on factors such as the importance of the site on a national and/or provincial scale, and on the ecological state of the area (degraded or pristine). This is determined by the presence of a high diversity, rare or endemic species/areas that are protected by legislation.

Table 8-1: Sensitivity Criterion

Ecological Function	
Class	**Description**
High	Ecosystems with either low inherent resistance or resilience towards disturbance factors, or highly dynamic systems that are considered important for the maintenance of ecosystem integrity. Most of these systems represent late succession ecosystems with high connectivity with other important ecological systems.
Moderate	These systems occur at disturbances of low-medium intensity and representative of secondary succession stages with some degree of connectivity with other ecological systems.
Low	Degraded and highly disturbed systems with little ecological function.
Conservation Importance	
High	Ecosystems with high species diversity and usually provide suitable habitat for a number of threatened species. These areas should be protected.
Moderate	Ecosystems with intermediate levels of species diversity without any threatened species.
Low	Areas with little or no conservation potential and usually species poor (most species are usually exotic).

8.2. Sensitivity Findings

After identifying vegetation communities and delineating their respective boundaries, the various vegetation communities defined for the study site were further assessed qualitatively in terms of their ecological condition in order to estimate relative habitat sensitivity.

The majority of the Project Area which consists of the Transformed Habitat, has been assessed as being of **Low** sensitivity from a fauna and flora perspective. This is due to the transformation of the landscape and the current agropastoral activities, such as livestock rearing and presence of home dwellings. Many of the recorded AIPs were found within this unit and were associated with the surrounding housing dwellings. The land had been subjected to intense grazing by the communities' livestock and have subsequently endured signs of trampling, which has exacerbated erosion is some of the areas.

Although majority of the existing bushveld has been removed or cut down, several floral SCC have flourished in the cleared areas, such as *Ammocharis coranica* and *Aloe Marlothii*. A few lone-standing large *Scelrocary birrea subsp caffra* have been left to sustain the surrounding

community and are apparent in the Project boundary. However, the area does not resemble the regional vegetation and is characterised with habitat transformation and low fauna and flora diversity and abundance, as well as dominated by pioneering AIPs.

Moderate sensitivity can be observed in the Tree Savanna (Lowveld Bushveld) and the Artificial Dam within the Transformed area. This is fairly limited in extent and can be observed in isolated patches along the peripheries of the Project boundary. They are extensions of surrounding bushveld which are connected to more unique and sensitive habitats (i.e. Riparian Habitat). They provide shelter and provide niche habitat for numerous cryptic faunal species. The relative abundance and diversity of species was higher than that of the transformed areas.

The Artificial Dam provides water for the livestock among other faunal species, it sustains the animals within the area and provides foraging for all domains of species. The combination of its connection to sensitive habitats and the structural vegetative composition warrants the Moderate sensitivity rating.

High sensitivity has been attributed to the Riparian areas along the boundaries of the Project Area and the peripheries of the woody vegetation found in the Lowveld Bushveld. Riparian habitats offer unique features for all faunal species due to its ability to provide sustenance and shelter for all domains of animals. The Riparian Habitat experiences fluctuating water levels altering the vegetation composition and species flow. Deep-rooted tall trees become well established along the banks and offer nesting, roosting and perching sites for numerous raptors and piscivorous birds (see Avifaunal Impact Assessment, 2022).

Additionally, two (2) nationally protected trees were identified within this habitat, namely *Spirostachys* africana and *Sclerocarya birrea* subsp *caffra,* as well as a higher floral species abundance and diversity was recorded within the adjacent riparian areas next to the Project area.

From the described sensitive areas and the location of the proposed development footprint area (according to the proposed facility layout) relative to these areas, it can be concluded that the majority of the proposed development will occur within a Low sensitivity area with some encroachment into Medium sensitive areas. However, the development within these Medium areas is regarded as acceptable, as this will not have a significant impact on local habitat diversity with most of these species encountered within these Medium sensitivity areas, moving into adjacent similar habitats.

Overall, it was concluded that with the necessary mitigation measures implemented in this development will have little impact on the terrestrial biodiversity character of the area with minimal loss due to habitat destruction, and disturbance.

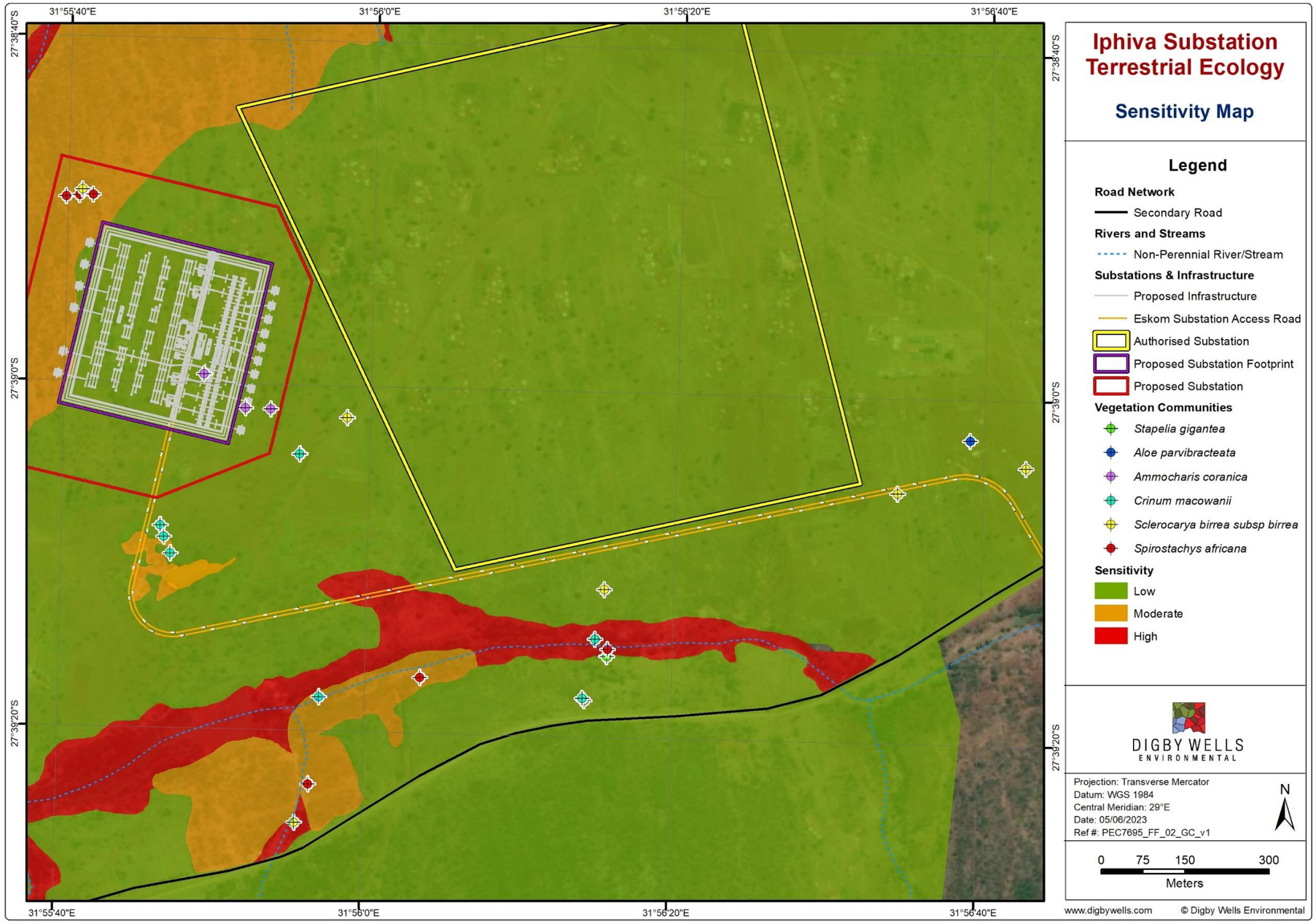


Figure 8-1: Sensitivity Map

9. Impact Assessment

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided in Appendix A. The development of a substation and the associated infrastructure should not take longer than one year. Once the construction is finalised it is a fixed structure and may undergo routine maintenance thereafter. Therefore, the only impacts that are identified on the terrestrial biodiversity occur during the development phase only as the vegetation will be cleared and various habitat will be lost. This phase is the only phase discussed in the impact assessment and suitable mitigation measures are recommended below.

9.1. Development Phase

Activities during the Development Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 9-1.

Table 9-1: Construction Phase Interactions and Impacts of Activity

Interaction	Impact
• Vegetation clearing and infrastructure construction; • Surface clearing; • Upgrade of roads;	• Direct loss of habitat types and biodiversity; and • Loss of floral SCC (protected species); • Alien vegetation recruitment; • Loss of faunal habitat; • Potential faunal casualties.

9.1.1. Impact Description

The construction of surface infrastructure which will include access roads, sub-station and ancillary infrastructure will affect the current habitat types present. With the clearing of vegetation and road upgrade, habitat will be removed; and if not mitigated, indigenous vegetation will be replaced by fast growing alien and weed vegetation, degrading the general habitat quality. This impact can be greatly reduced with the correct implementation of an alien management plan.

The increased traffic will pose a risk of collision with susceptible fauna. Tortoises, snakes and amphibians are particularly susceptible to collisions, however many other species are also at risk such as Aardwolf, Rabbits/hares, Steenbok and Porcupine, particularly at night. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. However, many of these impacts can be effectively managed or mitigated.

9.1.1.1. Management Objectives

Management objectives will be to prevent the loss of important/protected fauna and flora species specifically those with Regional Red Listing and IUCN Red List status. To achieve this objective, the mitigation measures proposed in this report must be implemented.

The destruction of the habitat/vegetative cover must be limited, this can be achieved by restricting the removal and disturbance of vegetation to those areas essential for the infrastructure placements, particularly in areas with high sensitivity (see Figure 8-1). The habitats identified in close proximity to the Project must be preserved, this includes areas not directly affected by the Project activities. Rehabilitation Plans must be initiated during the construction to minimise the expansion of disturbed areas, or through encroachment of alien species

9.1.1.2. Management Measures

The following management measures are recommended:

- A screening assessment must be undertaken to locate and mark all floral SCC prior to construction of any infrastructure (see Table 7-3). The necessary permits for removal, relocation or destruction must be obtained from the relevant government authorities. A relocation strategy must be approved by the relevant provincial authorities prior to removal and relocation of protected species.
- Where possible, large trees must be avoided during the clearing activities.
- An Alien Eradication and Management Plan must be prepared and implemented to preserve natural habitat and prevent the spread of invasives. Such a strategy will entail the identification of areas where infestation occurs. Thereafter, specific eradication measures can be prescribed for the species present.
- Rehabilitation of disturbed areas should take place as soon as practicably possible. All bare patches of soil should be vegetated , preferably with pioneer species which will colonise the disturbed areas.
- Vehicle and equipment should arrive on site in clean condition, free of soil and vegetative matter.
- All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species;
- Construction activity should be restricted to the immediate footprint of the infrastructure.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of SCC.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- Site access should be controlled and no unauthorised persons should be allowed onto the site.

- All personnel should undergo an initial environmental induction with regards to fauna and in particular awareness about not harming or collecting species, such as snakes or tortoises.
- The illegal collection, hunting or harvesting of animals at the site should be strictly forbidden.
- Excavated holes and trenches should not be left open for extended period of time as fauna may fall in and become trapped
- As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas where they may be killed or injured.
- Community awareness should be implemented, as part of the stakeholder engagement procedure to create biodiversity awareness.

9.1.1.3. Impact Ratings

Impacts associated with the construction phase are presented below in Table 9-2.

Table 9-2: Construction Phase Interactions and Impacts of Activity Rating: Vegetation Clearance

Activity, and Interaction: Vegetation clearing and infrastructure construction and loss of habitat for fauna.			
• Direct loss of vegetation cover, biodiversity and habitats; • Alien invasive proliferation; • Loss of faunal habitat. • Increased risk of injury or mortality from collision with vehicles due to increased traffic. • Increased risk of illegal hunting, poaching, persecution or harvesting of fauna.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Permanent (7)	A permanent and total loss of 33 ha of largely low sensitivity habitat will occur.	Moderate (negative) - 84
Extent	Limited (2)	Vegetation clearance and habitat loss is limited to the proposed substation area only	
Severity	Moderate Loss (3)	Majority of the area proposed for clearing is within already transformed habitat, yet floral SCC are present.	
Probability	Definite (7)	The clearing of the vegetation is definite	
Nature	Negative		
Mitigation measures			

Loss of vegetation:

- Limit degradation and destruction of natural environment to designated Project area by keeping the footprint of the disturbed areas to the minimum and within designated areas only. Re-vegetate open areas to limit erosion, which will also aid in water infiltration and flood attenuation.
- Avoid other sensitive landscapes, such as wetland areas that were encountered on the site. See Digby Wells Wetland Impact Assessment 2023 for the delineation of the Hydro-Geomorphic (HGM) units.
- Manage nationally restricted AIP species by ensuring the removal of vegetation during construction and operation are controlled so that no open areas occur.

Loss of habitat:

- All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed.
- All construction vehicles should adhere to a low-speed limit (30km/h) to avoid collisions with susceptible species.
- Night driving must be avoided where possible.
- Site access should be controlled and no unauthorized persons should be allowed onto the site.
- All personnel should undergo an initial environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes or tortoises.
- The illegal collection, hunting or harvesting of animals at the site should be strictly forbidden.
- No animals such as dogs or cats to be allowed on site other than those of the landowners.
- Personnel should not be allowed to wander off the construction site.
- No open fires should be permitted outside of designated areas.
- Any fauna directly threatened by the construction activities should be removed to a safe location by the environmental control officer or other suitably qualified person.

Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Permanent (7)	Vegetation within the demarcated unit will be removed.	Minor (negative) - 44
Extent	Limited (2)	Interactions and impacts can be limited with mitigation measures	
Intensity	Minor Loss (2)	The area demarcated for clearing is already transformed, so no major losses of indigenous vegetation types.	
Probability	Probable (4)	Habitats will be removed however the scale of the activity is small and can be easily mitigated to prevent negative impacts.	
Nature	Negative		

Table 9-3: Construction Phase Interactions and Impacts of Activity Rating: Loss of floral SCC

Activity, and Interaction: Loss of SCC (protected species)			
• Loss of floral SCC.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Permanent (7)	Loss floral species/vegetation will occur within the footprints of infrastructure.	Moderate (negative) - 91
Extent	Limited (2)	Species/habitat loss will only occur within the project site.	
Severity	Serious Loss (4)	Floral SCC are present in the development footprint	
Probability	Definite (7)	The clearing of the vegetation is definite	
Nature	Negative		
Mitigation measures			
• Limit degradation and destruction of natural environment to designated Project area by keeping the footprint of the disturbed areas to the minimum and within designated areas only. Re-vegetate open areas to limit erosion, which will also aid in water infiltration and flood attenuation. Avoid sensitive landscapes such as Riparian Vegetation. See Digby Wells Wetland Impact Assessment 2023, for HGM unit delineations. • Applications for permits for removal of certain plants, where required by provincial authorities. If plant SSC are to be removed, they should be either translocated to a similar habitat to the donor site or relocated to a nursery, i.e. a Rescue and Relocation Plan should be prepared and implemented prior to construction.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Permanent (7)	The vegetation within the footprint will be lost and SCC will be removed.	Moderate (negative) - 84
Extent	Limited (2)	If contractors adhere to mitigation such as to limit the footprint of disturbance to only essential areas.	
Intensity	Moderate Loss (3)	Mitigation can lessen the impact and relocation of SCC can offset the loss.	
Probability	Definite (7)	The are floral SCC within the proposed substation.	
Nature	Negative		

9.2. Rehabilitation and Operational Phase

9.2.1. Impact Description

As the construction phase comes to end, the final measures to close off the construction will be done. Rehabilitation of the stripped areas will be done and the substation will be operational. A few adverse risks are associated with the operation and rehabilitation of the Project.

Although the rehabilitation will improve the biodiversity relative to construction, the impact will still be negative relative to the baseline conditions of the area. There are many different species in the vegetation communities of the Project area, which will be hard to restore. The degree of the impacts will depend on the type of flora being used in the rehabilitation process and whether protected or SCC species are used or not. Restoration of the area through such steps requires more work but leads to improved ecosystem functioning of the overall area relative to past phases of the Project.

9.2.1.1. Management Objectives

Management objectives will be to prevent the loss of important/protected landscapes and species of plants and animals (such as those with Red Data Status) in the process of removing any associated infrastructure for the development. Additionally, this phase will need to rehabilitate the disturbed areas, prevent the spread of AIPs and restore the functionality of the area as best as possible.

9.2.1.2. Management Actions

Further training should be given to onsite staff on which plants and animal SCC may occur on site and how they may be identified. Awareness of these SCC, biodiversity and health and safety (H&S) guidelines will help to mitigate impacts, such as roadkill. Several SCC plants have been located in and very close to the areas of development. These species, should they remain in the areas surrounding the infrastructure, should be protected when the infrastructure is removed.

Destruction and disturbance of vegetation, such as through site clearing or dumping of building waste, should be limited to essential areas and minimised. Illegal dumping sites should be prohibited as they are prone to alien vegetation recruitment.

Rehabilitation of disturbed areas should take place within a week of decommissioning or finalisation of construction, all bare patches of soil should be vegetated, preferably with indigenous pioneer species which will colonise open and disturbed areas relatively quickly, and prevent erosion and alien vegetation establishing. Indigenous flora specific to the Project area, recorded before the Construction Phase, should be used in order to return some functional integrity to the area.

Alien vegetation management must continue so to preserve natural habitat by reducing the number of AIPs in the Project Area. Such a plan will likely follow on from the previous phases but may still need to identify new locations of AIP establishment and their extent of infestation

before eradication measures can be prescribed. Various NEM:BA category listed invasives species are present on site and will need to be controlled and managed (see Section 7.1.6) to prevent further sprawl.

9.2.1.3. *Impact Ratings (Before and After Mitigation)*

Impacts associated with the decommissioning of infrastructure and rehabilitation of the Project Area are presented in Table 9-4.

Table 9-4: Rehabilitation Phase Interactions, and Impacts of Activity Rating

Activity and Interaction: Operation of substation			
Impact Description: • AIP establishment and proliferation; • Faunal causalities; and • Loss of natural vegetation.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	4	Impacts can be managed during the Operation Phase.	Minor (negative) – 55
Extent	3	Impacts could extend beyond the site	
Intensity	4	The spread of AIPs and death of animals can lead to the loss of important species and lower ecosystem function.	
Probability	5	These impacts have been observed in other cases	
Nature	Negative	Negative impact (-)	
Mitigation measures			
• Enforce health and safety protocols, such as speed limits, to minimise faunal casualties; • Prohibit heavy vehicles or machinery from driving in undisturbed vegetation units. All vehicles must remain on demarcated roads within the Project footprint; • Prohibit any staff from driving at night; • Ensure the AIP management plan is implemented to monitor the spread of invasive plants; • Rehabilitate disturbed areas concurrently to minimise AIP proliferation and erosion. Ensure road sides are regularly checked for AIP proliferation; • Restrict the footprint of the Project Area to essential areas from a design perspective; and • Vegetate bare land surfaces to limit erosion from surface runoff associated with infrastructure areas. Revegetate disturbed areas immediately after construction.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	2	The impact will occur on a small scale, specifically during rehabilitation and monitoring.	Negligible (negative) - 28
Extent	1	The impact is limited only to specific areas, provided that mitigation measures are implemented.	
Intensity	2	Minor loss, and/or effects to biological or physical resources not affecting ecosystem functioning.	
Probability	4	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative	Negative impact (-)	
Rehabilitation of disturbed areas			
Impact Description: Change in vegetation community and the faunal and floral diversity of the area.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	7	Impacts would be indefinite.	Minor (negative) – 50
Extent	2	Impacts would be limited to the immediate surroundings.	
Intensity	3	Erosion and the use of wrong plants could harm communities.	
Probability	5	These impacts have been observed in other cases	
Nature	Negative	Negative impact (-)	
Mitigation measures			
• Prohibit any disturbance of areas being rehabilitated; • Implement AIP monitoring and removal; and • Use plant species that are indigenous to the vegetation communities of the Project Area and that were found there before the construction process.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	5	Vegetation communities may return to their original state over time should mitigation measures be implemented.	Minor (negative) -36

Extent	2	The impact will be limited to the site.	
Intensity	2	Changes in the vegetation community will be minor if mitigation measures are implemented.	
Probability	4	There is a <50% probability that rehabilitation will be successful	
Nature	Negative	Negative impact (-)	

10. Environmental Management Plan

The suggested Environmental Management Plan (EMP) for each stage of the proposed Project is described in Table 10-1 below.

Table 10-1: Environmental Management Plan

Phase	Project Activity	Potential Impacts	Mitigation Measures	Mitigation Type	Period for Implementation

Construction Phase	Vegetation clearing.
	Surface clearing, levelling and terracing.
	Laying of concrete foundations
	Erection of steelworks.
	Delivery and installations of transformers.
		• Loss of vegetation and habitat for fauna species;
		• Loss of floral SCC;
		• Fragmentation to the habitat;
		• Alien invasive proliferation.
			• Conduct a pre-construction inspection to identify floral SCC (protected species). Species like *Ammocharis coranica and Crinum macowanii* species within the development footprint must be searched and rescued. They can be replanted and re-established post construction. Permits from the relative governing authorities are required before construction commences to cut, destroy or remove all the protected floral species within the Project area. An additional site investigation is required to search and demarcate the protected flora within the proposed development. Consultation with the authorities are required for the permit application process and a suitable action for the removal may be required for the authorities.
			• Large trees should be avoided as far as practicable during clearing activities.
			• A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following:
			  ○ No off-road driving;
			  ○ Maximum use of existing roads, where possible;
			  ○ Measures to control noise and dust according to latest best practice;
			  ○ Restricted access to the rest of the property; and
			  ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint, including limiting vegetation clearance to an absolute minimum.
			• The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.
			• The Riparian and Wetland habitats should be suitably buffered from any construction activities, as dictated by the Digby Wells Wetland Impact Assessment 2022.
			• Conduct regular AIP inspections following significant rainfall, and depending on results, implement appropriate management actions.
			• Erosion prevention is key thus runoff must be controlled, and managed by use of proper stormwater management measures.
				Control and Mitigation Measures	Life of Construction Phase

Rehabilitation	Rehabilitation of bare and exposed areas.	• Fragmentation to the habitat; • Change in vegetation community and the faunal and floral diversity of the area. • Alien invasive proliferation.	• All AIPs on site should be removed timeously and follow up monitoring and removal plan should be initiated once construction is completed. AIPs should be removed as seedlings before they reach seed-bearing age. AIPs can establish on a site after removal for up to 2-7 years, therefore appropriate monitoring must take place. • Minimise any disturbance of areas undergoing rehabilitation. • Use plant species that are indigenous to the vegetation type and that were found there before the construction process. This will increase the likelihood of the area's functional integrity to return to a state similar to that of before the Construction Phase. • Re-establish faunal habitats that have been removed. For example, bird and bat boxes can be installed. Raptor posts can be installed to replace tall trees that have been removed.	Control and Mitigation Measures	Life of Rehabilitation

Phase	Project Activity	Potential Impacts	Mitigation Measures	Mitigation Type	Period for Implementation
Operation	Operation of the substation.	• Accidental faunal casualties; • Continued habitat fragmentation and barrier to movement; • Alien invasive proliferation.	• All AIPs on site should be removed timeously and follow up monitoring and removal plan should be initiated once construction is completed. AIPs should be removed as seedlings before they reach seed-bearing age. AIPs can establish on a site after removal for up to 2-7 years, therefore appropriate monitoring must take place. • All vehicle and personnel movement should be restricted to the construction areas. Preventing staff from moving to unnecessary areas surrounding project footprint would ensure that animals have habitat to stay in and move through. • Enforce health and safety protocols, such as speed limits, to minimise faunal casualties. Prohibit vehicles from driving at night, unless absolutely necessary, ensure speed limits are adhered to and vehicles are equipped with adequate lighting; • SCC outside the Project Area should not be removed and areas known to have SCC should be avoided. SCC should be monitored. • Deploy anti-poaching units to prevent poaching of fauna and flora in the project area if necessary. • Prohibit heavy vehicles or machinery from driving in undisturbed vegetation units. All vehicles must remain on demarcated roads within the Project footprint.	Control and Mitigation Measures	Life of the Project

11. Cumulative Impacts

Broad-Scale Ecological Process

Ecological corridors allow for the dispersal and movement of plants and animals across the landscape. This is a vital ecosystem process as it allows for pollination and gene flow. At the large scale, the connectivity of the site is good. The proposed development would not have a significant impact on gene flow of flora or fauna.

The use of existing access roads and servitudes, combined with the use of erosion control measures and the position of the substation in the transformed area, the proposed development is unlikely to significantly increase any negative impact on the region. The cumulative impact on ecological processes, such as moisture, soil/sedimentation, fire regimes and ecological corridors is considered to be of low significance.

Conservation Objectives

Majority of the proposed Project is within a CBA 1 (see Regional Context Table 6-1) and very small portion is within an Irreplaceable CBA. Although, the Zululand District Municipality: Biodiversity Sector Plan (BSP) database identifies these biodiversity features to meet conservation targets, there has been extensive transformation of the area and is not representative of the regional vegetation type. Furthermore, the proposed substation does not traverse any ESA or NPAES. The presence of the existing home dwellings and the ongoing land use activities such as the agropastoral activities (incl. subsistence cultivation and livestock-rearing) contribute to the unsuitability of the area being incorporated into National Protected Areas in the foreseeable future. The footprint of the proposed substation is relatively small in extent (33 ha) and its proposed locality is within a transformed area, it is unlikely that the proposed development will not likely compromise the future conservation objectives, ecological function or the biodiversity value of these areas if mitigation measures are adhered to.

12. Conclusion and Recommendations

The Fauna and Flora Impact Assessment aims to identify the potential impacts on the terrestrial biodiversity and their supporting ecosystems due to the proposed development. This report should be read in conjunction with the wetlands and avifaunal, and other specialist reports.

The development footprint does overlap with ESAs, CBAs and NPAES Focus Areas, however, the proposed substation is situated in an area that has been subject to transformation. This means that the development would not compromise the ecological functioning or the long-term conservation value of the area. Vegetation types are not intact within the proposed substation footprint, however the surrounding vegetation types are largely intact with very little prospect of long-term transformation through the current land-use practises, the species and habitats found within them are therefore fairly widespread and not unique to the Project site. The impact of the proposed substation, access road and ancillary infractructure is considered to be low and acceptable following mitigation.

This report accepts the economic need of the Eskom expansion and is in support of this strategy. The aim of this report is to comply with NEMA (GG 43110, GNR 320, 20 March 2020), and all Provincial and National environmental legislation with regards to biodiversity when describing the activity and the impact that will have on the natural environment. The impact assessment has resulted in Moderate and Minor impacts to the fauna and flora of the proposed Project area.

The following actions are recommended to reduce potential impacts to fauna and flora of the proposed Project area (Table 12-1):

Table 12-1: Recommendations for identified impacts

Possible Impacts	Recommendations	Person Responsible
Loss of Fauna species	• The area must be screened before construction activities. If potential fauna SCC are recorded prior to construction, the faunal SCC species must be located and relocated, if possible, before the construction phase.	Field specialist, and Environmental Officer (EO)

Loss of Flora SCC	• The field survey recorded five (5) provincially protected and two (2) nationally protected flora species within the Project area and in its immediate surrounds (see Table 7-3).
	• A Pre-screening assessment will need to take place prior to construction in order to map and quantify the protected flora that will require permits.
	  ○ Permits for the removal or destruction of provincially protected species will need to be acquired via consultation with Ezemvelo KZN Wildlife (KZN Nature Conservation).
	  ○ Permits for the removal or destruction of nationally protected species will need to be obtained via consultation with the Department of Forestry Fisheries and Environment (DFFE). These permits will need to obtained prior to any construction activities.
	  ○ A rescue and relocation plan for the floral SCC will need to be prepared and implemented prior to any construction activities. This will involve a walk down if the entire project footprint to mark and count the identified floral SCC. Recommendations to relocate and remove will be included in this plan.
		Botanical specialist, and Environmental Officer (EO)

Loss of Vegetation cover	• It is recommended that a rescue and relocation of the flora and protected flora within the development footprint be undertaken. Where possible avoid large trees and replant	Botanical Specialist, and EO

Possible Impacts	Recommendations	Person Responsible
	the removed vegetation within the nearby vicinity of the area.	
Habitat and landscape fragmentation and edge effects.	• Restriction of vehicle movement over sensitive areas to reduce degradation of untouched areas, if any. • Ensure earth moving equipment contain no soil or vegetative material before entering the site as a means to prevent AIP sprawl. • Minimise unnecessary removal of the natural vegetation cover outside the development footprint. • After rehabilitation the area must be fenced, and animals (cattle and goats) should be kept off the area until the vegetation is self-sustaining and established. • Creating biodiversity awareness for the Eskom employees will help prevent further degradation of the habitat and the loss of flora SCC.	Ecological Specialist, and EO

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Appendix A: Impact assessment Methodology

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in, which is extracted from. The description of the significance ratings is discussed in.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Impact Assessment Parameter Ratings

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and/or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain/Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/ Region Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures/items of cultural significance.	Average to intense natural and/or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare/improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very limited/Isolated Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely/None: Expected never to happen. <1% probability.

Probability/Consequence Matrix

Probability \ Significance	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Significance Rating Description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and/or social environment.	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and/or social environment.	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and/or social environment.	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and/or social environment.	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe changes.	Moderate (negative) (-)

Score	Description	Rating
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

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Appendix B: Expected Plant Species

Family	Scientific Name	Common Name	Red List Category	Provincially Protected Species
Aizoaceae	*Delosperma lebomboense*		LC	
Aizoaceae	*Delosperma pachyrhizum*		LC	
Aizoaceae	*Mesembryanthemum cordifolium*		Not listed	
Amaryllidaceae	*Ammocharis coranica*	Ammocharis	LC	Protected
Anacardiaceae	*Searsia dentata*	Nana-berry	LC	
Anomodontaceae	*Anomodon pseudotristis*		Not listed	
Apocynaceae	*Gomphocarpus physocarpus*	Balloon Cottonbush	LC	
Araliaceae	*Cussonia arenicola*	Sand Cabbage-tree	LC	
Araliaceae	*Cussonia natalensis*	Cabbage Tree	LC	
Araliaceae	*Cussonia spicata*	Cabbage Tree	LC	
Araliaceae	*Cussonia zuluensis*	Zulu Cabbage-tree	LC	
Asphodelaceae	*Bulbine frutescens*	Snake Flower	LC	
Aspleniaceae	*Asplenium aethiopicum*	African Spleenwort	LC	
Asteraceae	*Calostephane divaricata*	Wing-stemmed Daisy	LC	
Asteraceae	*Hilliardiella elaeagnoides*	Bicoloured Vernonia	LC	
Asteraceae	*Kleinia fulgens*		LC	
Asteraceae	*Senecio viminalis*		LC	
Asteraceae	*Sonchus wilmsii*		LC	
Cactaceae	*Opuntia ficus-indica*	Prickly-pear	Not evaluated	
Capparaceae	*Maerua juncea* subsp. *crustata*	Bush-cherry	LC	
Convolvulaceae	*Ipomoea sinensis* subsp. *blepharosepala*	Purple-throated Ipomoea	LC	
Convolvulaceae	*Merremia* sp.			
Cucurbitaceae	*Coccinia rehmannii*	Wild Cucumber	LC	
Cyperaceae	*Cyperus textilis*	Mat Sedge	LC	
Dryopteridaceae	*Polystichum pungens*	Prickly Shieldfern	LC	
Entodontaceae	*Entodon macropodus*		Not listed	

Family	Scientific Name	Common Name	Red List Category	Provincially Protected Species
Fabaceae	*Dichrostachys cinerea* subsp. *africana* var. *setulosa*	Kalahari Christmas Tree	Not evaluated	
Fabaceae	*Rhynchosia densiflora* subsp. *chrysadenia*		LC	
Fabaceae	*Vachellia tortilis* subsp. *heteracantha*	Curly-pod Acacia	LC	
Hyacinthaceae	*Albuca abyssinica*		LC	Protected
Hyacinthaceae	*Albuca* sp.		Not listed	Protected
Hyacinthaceae	*Ledebouria humifusa*		LC	Protected
Lophocoleaceae	*Lophocolea difformis*		Not listed	
Loranthaceae	*Agelanthus gracilis*		LC	
Loranthaceae	*Agelanthus kraussianus*	Lighted Matches	LC	
Malpighiaceae	*Acridocarpus natalitius* var. *natalitius*	Moth-fruit	Not evaluated	
Malvaceae	*Hibiscus dongolensis*	Dongola Hibiscus	LC	
Malvaceae	*Hibiscus trionum*		Not listed	
Meteoriaceae	*Papillaria africana*		Not listed	
Neckeraceae	*Orthostichella pandurifolia*		Not listed	
Orthotrichaceae	*Cardotiella secunda*		Not listed	
Orthotrichaceae	*Macromitrium serpens*		Not listed	
Orthotrichaceae	*Schlotheimia ferruginea*		Not listed	
Poaceae	*Aristida bipartita*	Rolling Three-awned Grass	LC	
Poaceae	*Bothriochloa insculpta*	Pinhole Grass	LC	
Poaceae	*Brachiaria eruciformis*	Sweet Signal Grass	LC	
Poaceae	*Brachiaria serrata*	Red-Topped Signal Grass	LC	
Poaceae	*Cenchrus ciliaris*	African Foxtail	LC	
Poaceae	*Chloris virgata*	Sweet Grass	LC	
Poaceae	*Cymbopogon caesius*		LC	
Poaceae	*Digitaria argyrograpta*	Silver Finger Grass	LC	

Family	Scientific Name	Common Name	Red List Category	Provincially Protected Species
Poaceae	*Digitaria eriantha*	Pongola Finger Grass	LC	
Poaceae	*Diheteropogon amplectens* var. *amplectens*		LC	
Poaceae	*Enneapogon cenchroides*	Common Nine-awned Grass	LC	
Poaceae	*Enneapogon scoparius*	Bottlebrush Grass	LC	
Poaceae	*Eragrostis cilianensis*	Grey Love Grass	LC	
Poaceae	*Eragrostis curvula*	African Love Grass	LC	
Poaceae	*Eragrostis heteromera*		LC	
Poaceae	*Fingerhuthia africana*	Thimble Grass	LC	
Poaceae	*Leptochloa eleusine*		LC	
Poaceae	*Leptochloa fusca* subsp. *fusca*		Not listed	
Poaceae	*Panicum coloratum*		Not listed	
Poaceae	*Panicum deustum*	Bufalo Grass	LC	
Poaceae	*Schmidtia pappophoroides*	Sand Quick Grass	LC	
Poaceae	*Setaria incrassata*		LC	
Poaceae	*Sorghum versicolor*		LC	
Poaceae	*Sporobolus ioclados*		LC	
Poaceae	*Themeda triandra*	Angle Grass	LC	
Poaceae	*Tragus berteronianus*	Burgrass	LC	
Poaceae	*Tricholaena monachne*	Blue Seed Tricholaena	LC	
Poaceae	*Trichoneura grandiglumis*	Rolling Grass	LC	
Poaceae	*Urelytrum agropyroides*		LC	
Poaceae	*Urochloa panicoides*	Annual Signal Grass	LC	
Polypodiaceae	*Pleopeltis macrocarpa*		LC	
Porellaceae	*Porella capensis*		Not listed	
Pottiaceae	*Trichostomum brachydontium*		Not listed	
Pteridaceae	*Cheilanthes multifida* var. *multifida*		LC	
Ptychomitriaceae	*Ptychomitrium exaratifolium*		Not listed	
Racopilaceae	*Racopilum capense*		Not listed	
Ruscaceae	*Eriospermum mackenii* subsp. *galpinii*		Not evaluated	

Family	Scientific Name	Common Name	Red List Category	Provincially Protected Species
Santalaceae	*Thesium virens*		DD	
Santalaceae	*Viscum obovatum*		LC	
Santalaceae	*Viscum subserratum*		LC	
Santalaceae	*Viscum verrucosum*	Mistletoe	LC	
Sematophyllaceae	*Sematophyllum brachycarpum*		Not listed	
Sematophyllaceae	*Sematophyllum sphaeropyxis*		Not listed	
Vitaceae	*Rhoicissus tridentata* subsp. *cuneifolia*		Not evaluated	

Appendix C: Expected Mammal Species

Family	Scientific name	Common name	Red list category
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	Least Concern (2016)
Bovidae	*Aepyceros melampus*	Impala	Least Concern
Bovidae	*Alcelaphus buselaphus*	Hartebeest	
Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	Least Concern (2008)
Bovidae	*Connochaetes taurinus*	Blue Wildebeest	Least Concern (ver 3.1, 2017)
Bovidae	*Connochaetes taurinus taurinus*		Least Concern (2016)
Bovidae	*Damaliscus lunatus lunatus*	(Southern African) Tsessebe	Vulnerable (2016)
Bovidae	*Hippotragus equinus*	Roan Antelope	Endangered (2016)
Bovidae	*Kobus ellipsiprymnus ellipsiprymnus*		Least Concern (2016)
Bovidae	*Oreotragus oreotragus*	Klipspringer	Least Concern (2016)
Bovidae	*Ourebia ourebi*	Oribi	Endangered
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern (2016)
Bovidae	*Redunca arundinum*	Southern Reedbuck	Least Concern (2016)
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	Least Concern
Bovidae	*Sylvicapra grimmia*	Bush Duiker	Least Concern (2016)
Bovidae	*Syncerus caffer*	African Buffalo	Least Concern (2008)
Bovidae	*Taurotragus oryx*	Common Eland	Least Concern (2016)
Bovidae	*Tragelaphus angasii*	Nyala	Least Concern (2016)
Bovidae	*Tragelaphus scriptus*	Bushbuck	Least Concern
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern (2016)
Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern (2016)
Canidae	*Canis sp.*	Jackals and Wolves	
Canidae	*Lycaon pictus*	African wild dog	Endangered (2016)
Canidae	*Vulpes chama*	Cape Fox	Least Concern (2016)
Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern (2016)
Elephantidae	*Loxodonta africana*	African Bush Elephant	Vulnerable A2a (2008)
Equidae	*Equus quagga*	Plains Zebra	Least Concern (2016)
Felidae	*Acinonyx jubatus*	Cheetah	Vulnerable (2016)
Felidae	*Caracal caracal*	Caracal	Least Concern (2016)
Felidae	*Felis silvestris*	Wildcat	Least Concern (2016)
Felidae	*Leptailurus serval*	Serval	Near Threatened (2016)
Felidae	*Panthera pardus*	Leopard	Vulnerable (2016)
Giraffidae	*Giraffa giraffa giraffa*	South African Giraffe	Least Concern (2016)
Gliridae	*Graphiurus (Graphiurus) murinus*	Forest African Dormouse	Least Concern

Family	Scientific name	Common name	Red list category
Herpestidae	*Atilax paludinosus*	Marsh Mongoose	Least Concern (2016)
Herpestidae	*Herpestes sanguineus*	Slender Mongoose	Least Concern (2016)
Herpestidae	*Ichneumia albicauda*	White-tailed Mongoose	Least Concern (2016)
Herpestidae	*Mungos mungo*	Banded Mongoose	Least Concern (2016)
Hipposideridae	*Hipposideros caffer*	Sundevall's Leaf-nosed Bat	Least Concern (2016)
Hyaenidae	*Crocuta crocuta*	Spotted Hyaena	Near Threatened (2016)
Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened (2015)
Hyaenidae	*Proteles cristata*	Aardwolf	Least Concern (2016)
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern
Molossidae	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	Least Concern (2016)
Muridae	*Aethomys ineptus*	Tete Veld Aethomys	Least Concern (2016)
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	Least Concern
Muridae	*Grammomys cometes*	Mozambique Grammomys	Least Concern (2016)
Muridae	*Grammomys dolichurus*	Common Grammomys	Least Concern (2016)
Muridae	*Lemniscomys rosalia*	Single-Striped Lemniscomys	Least Concern (2016)
Muridae	*Mastomys coucha*	Southern African Mastomys	Least Concern (2016)
Muridae	*Mastomys natalensis*	Natal Mastomys	Least Concern (2016)
Muridae	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	Least Concern
Muridae	*Otomys angoniensis*	Angoni Vlei Rat	Least Concern (2016)
Muridae	*Otomys auratus*	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)
Muridae	*Otomys laminatus*	KwaZulu Vlei Rat	Near Threatened (2016)
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern (2016)
Mustelidae	*Aonyx capensis*	African Clawless Otter	Near Threatened (2016)
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern (2016)
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	Least Concern (2016)
Nesomyidae	*Steatomys krebsii*	Kreb's African Fat Mouse	Least Concern (2016)
Nycteridae	*Nycteris thebaica*	Egyptian Slit-faced Bat	Least Concern (2016)
Orycteropodidae	*Orycteropus afer*	Aardvark	Least Concern (2016)
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	Least Concern (2016)
Pteropodidae	*Epomophorus wahlbergi*	Wahlberg's Epauletted Fruit Bat	Least Concern (2016)
Rhinolophidae	*Rhinolophus blasii*	Blasius's Horseshoe Bat	Near Threatened (2016)
Rhinolophidae	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	Least Concern (2016)
Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	Least Concern (2016)
Soricidae	*Crocidura flavescens*	Greater Red Musk Shrew	Least Concern (2016)

Family	Scientific name	Common name	Red list category
Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew	Near Threatened (2016)
Soricidae	*Crocidura silacea*	Lesser Gray-brown Musk Shrew	Least Concern (2016)
Soricidae	*Myosorex varius*	Forest Shrew	Least Concern (2016)
Suidae	*Phacochoerus africanus*	Common Warthog	Least Concern (2016)
Suidae	*Potamochoerus porcus*	Red River Hog	
Thryonomyidae	*Thryonomys swinderianus*	Greater Cane Rat	Least Concern (2016)
Vespertilionidae	*Eptesicus (Eptesicus) hottentotus*	Long-tailed Serotine	Least Concern
Vespertilionidae	*Miniopterus fraterculus*	Lesser Long-fingered Bat	Least Concern (2016)
Vespertilionidae	*Miniopterus natalensis*	Natal Long-fingered Bat	Least Concern (2016)
Vespertilionidae	*Myotis tricolor*	Temminck's Myotis	Least Concern (2016)
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	Least Concern (2016)
Vespertilionidae	*Neoromicia nana*	Banana Pipistrelle	Least Concern
Vespertilionidae	*Scotophilus dinganii*	Yellow-bellied House Bat	Least Concern (2016)
Viverridae	*Genetta tigrina*	Cape Genet (Cape Large-spotted Genet)	Least Concern (2016)

Appendix D: Expected Reptile Species

Family	Scientific name	Common name	Red list category
Agamidae	*Acanthocercus atricollis*	Southern Tree Agama	Least Concern (SARCA 2014)
Agamidae	*Agama aculeata distanti*	Distant's Ground Agama	Least Concern (SARCA 2014)
Chamaeleonidae	*Chamaeleo dilepis*	Common Flap-neck Chameleon	Least Concern (SARCA 2014)
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	Least Concern (SARCA 2014)
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern (SARCA 2014)
Colubridae	*Dispholidus typus typus*	Boomslang	Least Concern (SARCA 2014)
Colubridae	*Philothamnus hoplogaster*	South Eastern Green Snake	Least Concern (SARCA 2014)
Colubridae	*Philothamnus semivariegatus*	Spotted Bush Snake	Least Concern (SARCA 2014)
Colubridae	*Telescopus semiannulatus semiannulatus*	Eastern Tiger Snake	Least Concern (SARCA 2014)
Colubridae	*Thelotornis capensis capensis*	Southern Twig Snake	Least Concern (SARCA 2014)
Cordylidae	*Chamaesaura macrolepis*	Large-scaled Grass Lizard	Near Threatened (SARCA 2014)
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	Least Concern (SARCA 2014)
Cordylidae	*Platysaurus intermedius natalensis*	Natal Flat Lizard	Least Concern (SARCA 2014)
Cordylidae	*Smaug swazicus*	Swazi Dragon Lizard	
Crocodylidae	*Crocodylus niloticus*	Nile Crocodile	VU (SARCA 2014); LC (global, IUCN 2019)
Elapidae	*Elapsoidea boulengeri*	Boulenger's Garter Snake	Least Concern (SARCA 2014)
Elapidae	*Elapsoidea sundevallii decosteri*	De Coster's Garter Snake	
Elapidae	*Naja mossambica*	Mozambique Spitting Cobra	Least Concern (SARCA 2014)
Gekkonidae	*Chondrodactylus turneri*	Turner's Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Hemidactylus mabouia*	Common Tropical House Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Homopholis wahlbergii*	Wahlberg's Velvet Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus maculatus*	Spotted Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus vansoni*	Van Son's Gecko	Least Concern (SARCA 2014)
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)

Family	Scientific name	Common name	Red list category
Gerrhosauridae	*Matobosaurus validus*	Common Giant Plated Lizard	Least Concern (SARCA 2014)
Gerrhosauridae	*Tetradactylus africanus*	Eastern Long-tailed Seps	Least Concern (SARCA 2014)
Lacertidae	*Nucras ornata*	Ornate Sandveld Lizard	Least Concern (SARCA 2014)
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	Least Concern (SARCA 2014)
Lamprophiidae	*Atractaspis bibronii*	Bibron's Stiletto Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Duberria lutrix lutrix*	South African Slug-eater	Least Concern (SARCA 2014)
Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis subtaeniatus*	Western Yellow-bellied Sand Snake	Least Concern (SARCA 2014)
Leptotyphlopidae	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake	
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	
Leptotyphlopidae	*Leptotyphlops sp.*		
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Not evaluated
Pelomedusidae	*Pelusios sinuatus*	Serrated Hinged Terrapin	Least Concern (SARCA 2014)
Scincidae	*Scelotes mirus*	Montane Dwarf Burrowing Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis homalocephala*	Red-sided Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis margaritifera*	Rainbow Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis striata*	Striped Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis varia sensu lato*	Common Variable Skink Complex	Least Concern (SARCA 2014)
Testudinidae	*Kinixys natalensis*	Natal Hinged Tortoise	Least Concern (SARCA 2014)
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern (SARCA 2014)

Family	Scientific name	Common name	Red list category
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern (SARCA 2014)
Varanidae	*Varanus niloticus*	Water Monitor	Least Concern (SARCA 2014)
Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern (SARCA 2014)
Viperidae	*Causus rhombeatus*	Rhombic Night Adder	Least Concern (SARCA 2014)

Appendix E: Expected Amphibian Species

Family	Scientific name	Common name	Red list Category
Brevicepitidae	*Breviceps mossambicus*	Mozambique Rain Frog	Least Concern
Bufonidae	*Schismaderma carens*	Red Toad	Least Concern
Bufonidae	*Sclerophrys capensis*	Raucous Toad	Least Concern
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern (IUCN, 2016)
Hyperoliidae	*Hyperolius marmoratus*	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)
Hyperoliidae	*Hyperolius marmoratus taeniatus*	Painted Reed Frog (subsp. taeniatus)	Least Concern (IUCN ver 3.1, 2013)
Hyperoliidae	*Hyperolius tuberilinguis*	Tinker Reed Frog	Least Concern
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	Least Concern
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	Least Concern (IUCN, 2013)
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Ptychadenidae	*Ptychadena anchietae*	Plain Grass Frog	Least Concern
Ptychadenidae	*Ptychadena nilotica*	Nile Grass Frog	Least Concern
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern (2017)
Pyxicephalidae	*Cacosternum nanum*	Bronze Caco	Least Concern (2013)
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	Least Concern
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	Least Concern

Appendix F: Expected Invertebrate Species

Family	Scientific name	Common name	Red list Category
Erebidae	*Bareia incidens*		
Erebidae	*Cortyta canescens*		
Erebidae	*Euproctis bicolor*		
Erebidae	*Metarctia lateritia*		
Eupterotidae	*Phiala pretoriana*		
Hesperiidae	*Acleros mackenii mackenii*	Macken's dart	Least Concern (SABCA 2013)
Hesperiidae	*Calleagris kobela*	Pondo dark flat	Least Concern (SABCA 2013)
Hesperiidae	*Eretis umbra umbra*	Small marbled elf	Least Concern (SABCA 2013)
Hesperiidae	*Gegenes pumilio gambica*	Dark dodger	Least Concern (SABCA 2013)
Hesperiidae	*Netrobalane canopus*	Buff-tipped skipper	Least Concern (SABCA 2013)
Hesperiidae	*Pelopidas mathias*	Black-branded swift	Least Concern (SABCA 2013)
Hesperiidae	*Sarangesa motozi*	Forest elfin	Least Concern (SABCA 2013)
Hesperiidae	*Spialia depauperata australis*	Wandering sandman	Least Concern (SABCA 2013)
Hesperiidae	*Spialia spio*	Mountain sandman	Least Concern (SABCA 2013)
Lycaenidae	*Aloeides henningi*	Hillside russet	Least Concern (SABCA 2013)
Lycaenidae	*Anthene amarah amarah*	Black-striped ciliate blue	Least Concern (SABCA 2013)
Lycaenidae	*Anthene definita definita*	Steel-blue-ciliate blue	Least Concern (SABCA 2013)
Lycaenidae	*Axiocerses amanga amanga*	Bush scarlet	Least Concern (SABCA 2013)
Lycaenidae	*Axiocerses tjoane tjoane*	Eastern scarlet	Least Concern (SABCA 2013)
Lycaenidae	*Azanus jesous*	Topaz babul blue	Least Concern (SABCA 2013)
Lycaenidae	*Azanus mirza*	Pale babul blue	Least Concern (SABCA 2013)
Lycaenidae	*Azanus moriqua*	Black-bordered babul blue	Least Concern (SABCA 2013)
Lycaenidae	*Azanus ubaldus*	Velvet-spotted babul blue	Least Concern (SABCA 2013)
Lycaenidae	*Cacyreus lingeus*	Bush bronze	Least Concern (SABCA 2013)
Lycaenidae	*Cacyreus virilis*	Mocker bronze	Least Concern (SABCA 2013)
Lycaenidae	*Chilades trochylus*	Grass jewel blue	Least Concern (SABCA 2013)

Family	Scientific name	Common name	Red list Category
Lycaenidae	*Cigaritis natalensis*	Natal silverline	Least Concern (SABCA 2013)
Lycaenidae	*Deudorix antalus*	Brown playboy	Least Concern (SABCA 2013)
Lycaenidae	*Deudorix dinochares*	Apricot playboy	Least Concern (SABCA 2013)
Lycaenidae	*Durbania amakosa ayresi*	Amakoza rocksitter	Least Concern (SABCA 2013)
Lycaenidae	*Hemiolaus caeculus caeculus*	Azure hairstreak	Least Concern (SABCA 2013)
Lycaenidae	*Hypolycaena philippus philippus*	Purple-brown hairstreak	Least Concern (SABCA 2013)
Lycaenidae	*Iolaus silarus silarus*	Straight-line sapphire	Least Concern (SABCA 2013)
Lycaenidae	*Lampides boeticus*	Pea blue	Least Concern (SABCA 2013)
Lycaenidae	*Leptomyrina gorgias gorgias*	Lilac-based black-eye	Least Concern (SABCA 2013)
Lycaenidae	*Leptotes pirithous pirithous*	Common zebra blue	Least Concern (SABCA 2013)
Lycaenidae	*Leptotes* sp.		
Lycaenidae	*Myrina silenus ficedula*	Common fig tree blue	Least Concern (SABCA 2013)
Lycaenidae	*Oraidium barberae*	Dwarf blue	Least Concern (SABCA 2013)
Lycaenidae	*Uranothauma nubifer nubifer*	Black heart	Least Concern (SABCA 2013)
Lycaenidae	*Zintha hintza hintza*	Hintza pierrot	Least Concern (SABCA 2013)
Lycaenidae	*Zizeeria knysna knysna*	African grass blue	Least Concern (SABCA 2013)
Nymphalidae	*Acraea natalica*	Black-based acraea	Least Concern (SABCA 2013)
Nymphalidae	*Brakefieldia perspicua perspicua*	Marsh patroller	Least Concern (SABCA 2013)
Nymphalidae	*Byblia anvatara acheloia*	African joker	Least Concern (SABCA 2013)
Nymphalidae	*Byblia ilithyia*	Spotted joker	Least Concern (SABCA 2013)
Nymphalidae	*Cassionympha cassius*	Rainforest dull brown	Least Concern (SABCA 2013)
Nymphalidae	*Catacroptera cloanthe cloanthe*	Pirate	Least Concern (SABCA 2013)
Nymphalidae	*Charaxes varanes varanes*	Pearl charaxes	Least Concern (SABCA 2013)
Nymphalidae	*Coenyra hebe*	Zulu shadefly	Least Concern (SABCA 2013)
Nymphalidae	*Danaus chrysippus orientis*	African plain tiger	Least Concern (SABCA 2013)
Nymphalidae	*Junonia natalica natalica*	Brown commodore	Least Concern (SABCA 2013)

Family	Scientific name	Common name	Red list Category
Nymphalidae	*Neptis saclava marpessa*	Spotted sailer	Least Concern (SABCA 2013)
Nymphalidae	*Pardopsis punctatissima*	Polka dot	Least Concern (SABCA 2013)
Nymphalidae	*Phalanta eurytis eurytis*	Forest leopard	Least Concern (SABCA 2013)
Nymphalidae	*Phalanta phalantha aethiopica*	African leopard	Least Concern (SABCA 2013)
Nymphalidae	*Precis archesia archesia*	Garden inspector	Least Concern (SABCA 2013)
Nymphalidae	*Protogoniomorpha parhassus*	Common Mother-of-pearl	Least Concern (SABCA 2013)
Nymphalidae	*Pseudonympha magoides*	False silver-bottom brown	Least Concern (SABCA 2013)
Nymphalidae	*Stygionympha wichgrafi williami*	Wichgraf's hillside brown	Least Concern (SABCA 2013)
Nymphalidae	*Telchinia esebria*	Dusky telchinia	Least Concern (SABCA 2013)
Nymphalidae	*Telchinia serena*	Dancing telchinia	Least Concern (SABCA 2013)
Nymphalidae	*Vanessa cardui*	Painted lady	Least Concern (SABCA 2013)
Papilionidae	*Papilio demodocus demodocus*	Citrus swallowtail	Least Concern (SABCA 2013)
Papilionidae	*Papilio nireus lyaeus*	Narrow green-banded swallowtail	Least Concern (SABCA 2013)
Pieridae	*Belenois aurota*	Pioneer caper white	Least Concern (SABCA 2013)
Pieridae	*Belenois creona severina*	African caper white	Least Concern (SABCA 2013)
Pieridae	*Belenois gidica abyssinica*	African veined white	Least Concern (SABCA 2013)
Pieridae	*Colotis auxo auxo*	Sulphur orange tip	Least Concern (SABCA 2013)
Pieridae	*Colotis euippe omphale*	Southern round-winged orange tip	Least Concern (LC)
Pieridae	*Dixeia pigea*	Small ant-heap white	Least Concern (SABCA 2013)
Pieridae	*Eronia cleodora*	Vine-leaf vagrant	Least Concern (SABCA 2013)
Pieridae	*Eurema brigitta brigitta*	Broad-bordered grass yellow	Least Concern (SABCA 2013)
Pieridae	*Eurema hecabe solifera*	Lowveld yellow	Least Concern (SABCA 2013)
Pieridae	*Mylothris agathina agathina*	Eastern dotted border	Least Concern (SABCA 2013)
Pieridae	*Mylothris rueppellii haemus*	Twin dotted border	Least Concern (SABCA 2013)
Saturniidae	*Aurivillius sp.*		
Uraniidae	*Epiplema reducta*		

Family	Scientific name	Common name	Red list Category
Araneidae	*Araneidae*	Araneid orb-web spiders	
Araneidae	*Gasteracantha sp.*	Kite spiders	
Eresidae	*Eresidae*	Velvet spiders	
Idiopidae	*Idiopidae*		