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Avifaunal Impact Assessment Process for the Proposed New Location of the Iphiva Substation, KwaZulu-Natal

Avifaunal Impact Assessment

Prepared for:

Margen Industrial Services CC

Project Number:

PEC7695

June 2022



This document has been prepared by Digby Wells Environmental.

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EXECUTIVE SUMMARY

Margen Industrial Services cc (hereinafter Margen) appointed Digby Wells Environmental (hereinafter Digby Wells) to update the existing Environmental Management Program (EMPr) of the proposed new location of the Iphiva Substation for Eskom Holdings SOC Ltd (hereinafter Eskom) in Northern KwaZulu-Natal (KZN).

In April of 2022, Digby Wells specialists identified and quantified potential impacts on the Avifauna (as well as Cultural Heritage, Terrestrial Fauna and Flora, and Wetlands) within the development of the proposed Iphiva substation. Following the submission of the draft impact reports in April, for review by Eskom, the Project layout was amended and now includes an additional potential site for the proposed substation, which avoids an artificial wetland system (dam and drainage line). Eskom is also considering a new access road to the proposed updated layout. This infrastructure was not included in the previous impact assessments. There this report addresses the changes incurred from the initial assessment and the updated layout.

The proposed Project is located west of Mkuze in Umkhanyakude District Municipality in the northern part of KZN (Figure 2 1 and Figure 2 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.

The proposed 400/132 kV substation will have a 600 m x 600 m footprint, with a 1km x 1km study area (33 ha). The site will be levelled before construction commences. The proposed substation will comprise standard electrical equipment, including but not limited to transformers, reactors, busbars and isolators. There will be a microwave radio communication mast that could be up to 70 m high. Oil and fuel storage facilities will be bounded and there will be an oil bund to contain any transformer oil spills. A non-lethal fence and security lighting will be built around the substation for safety and security reasons. The luminaire height is 4 m. There will be one (1) 400 kV powerline and seven (7) 132 kV powerlines that enter and leave the substation in various locations.

The Project area falls within the Zululand Lowveld of the Savanna Biome (Mucina and Rutherford 2006). 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. 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.

Four (4) major bird habitats have been identified in the Project area and in the immediate surrounds:

- Riparian Habitat;
- Artificial Dam with Woody Periphery;
- Tree Savanna (Lowveld Bushveld); and

- Transformed Areas.

The Project area supports a relatively low diversity and abundance of avifauna, which is to be expected in an area that is predominantly transformed. A total of 78 species were recorded in 2022 survey. No avian Species of Conservation Concern (SCC) were recorded within the Project area, however three (3) threatened birds of prey were recorded 12 km of the Project area in the Manyoni Private Game Reserve, namely **Bateleur (Endangered)**, **White-backed Vulture (Critically Endangered)** and **Tawny Eagle (Endangered)** (Taylor, Peacock and Wanless 2015)).

Preliminary Impacts

Potential impacts that may affect the potential avian SCC and other species include:

- Electrocutation;
- Collisions;
- Habitat Loss; and
- Disturbance.

The majority of the Project area which consists of the Transformed Habitat, has been assessed as being of Low sensitivity from an avifaunal perspective. Moderate sensitivity can be observed in the Lowveld Bushveld Tree Savanna and Artificial Dam. 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.

Recommendations and Conclusion

Overall, it was concluded that in implementing the necessary mitigation measures in this development, there will be little impact on the avifaunal character of the area with minimal loss due to habitat destruction, disturbance and collision. The recommendations provided in this report address potential avian mortalities through the prevention of bird collisions, degradation of sensitive habitat surroundings and electrocutions.

If the mitigation measures and recommendations are implemented throughout the Project life correctly and timeously, there are no severe negative impacts anticipated for the development of this substation and its associated electrical components.

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Appendix A: Expected Avifaunal Species
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ACRONYMS AND ABBREVIATIONS

AIP	Alien and Invasive Plant
ADU	Animal Demography Unit
BAPs	Biodiversity Actions Plans
BLSA	Birdlife South Africa
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
km²	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

Margen Industrial Services cc (*hereinafter Margen*) appointed Digby Wells Environmental (*hereinafter Digby Wells*) to update the existing Environmental Management Program (EMPr) of the proposed new location of the Iphiva Substation for Eskom Holdings SOC Ltd (*hereinafter Eskom*) in Northern KwaZulu-Natal (KZN). This report is the Avifaunal component of the broader EMPr.

Digby Wells was previously appointed in 2017 by ILISO Consulting (Pty) Ltd (*hereinafter ILISO*) to conduct an Environmental Impact Assessment (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) which is situated approximately 80 m west of the area previously authorised for development. Therefore, this avifauna assessment is an update of the EMPr 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 are 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 and access road. This infrastructure was not included in the previous impact assessments. The updated layout required additional assessment by the specialists. This report details the Avifauna Impact Assessment for the proposed new location of the Iphiva substation and the associated access road and should be read in conjunction with the fauna and flora and other specialist reports.

1.1. Background

As described in the 2017 Avifaunal Screening 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 unacceptable 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 Municipality 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. The proposed layout has been moved 50 meters northwest due to the high expense of cut and fill required for the already authorised site and to avoid the artificial dam and drain.

1.3. Project Description

The proposed 400/132 kV substation will have a 600 m x 600 m footprint, with a 1km x 1km study area (33 ha). The site will be levelled before construction commences. The proposed

substation will comprise standard electrical equipment, including but not limited to: transformers, reactors, busbars and isolators. There will be a microwave radio communication mast that could be up to 70 m high. Oil and fuel storage facilities will be bounded and there will be an oil bund to contain any transformer oil spills. A non-lethal fence and security lighting will be built around the substation for safety and security reasons. The luminaire height is 4 m. There will be one (1) 400 kV powerline and seven (7) 132 kV powerlines that enter and leave the substation in various locations.

1.3.1. Project Activities

Construction is scheduled to commence in 2023 and will take approximately 24 months to complete. Construction of the substation will consist of:

- Vegetation clearing;
- Upgrade/construction of access roads to accommodate heavy loads;
- Watercourse crossing may need to be upgraded
- Levelling and terracing of the surface;
- Construction of foundations and concrete works, including stormwater drainage pipes, slabs, bund walls, a control room and a small building and storage area;
- All open areas between the transformer plinths and other switchgear foundations will be covered with about a 100 mm layer of 25 – 38 mm crushed stone. Before laying the crushed stone, the ground surface is intensively treated to strict specification with insecticide and herbicide to prevent insect activity and the growth of weeds and other plants in the high voltage yard;
- Erection of steelworks; and
- Delivery and installation of transformers.

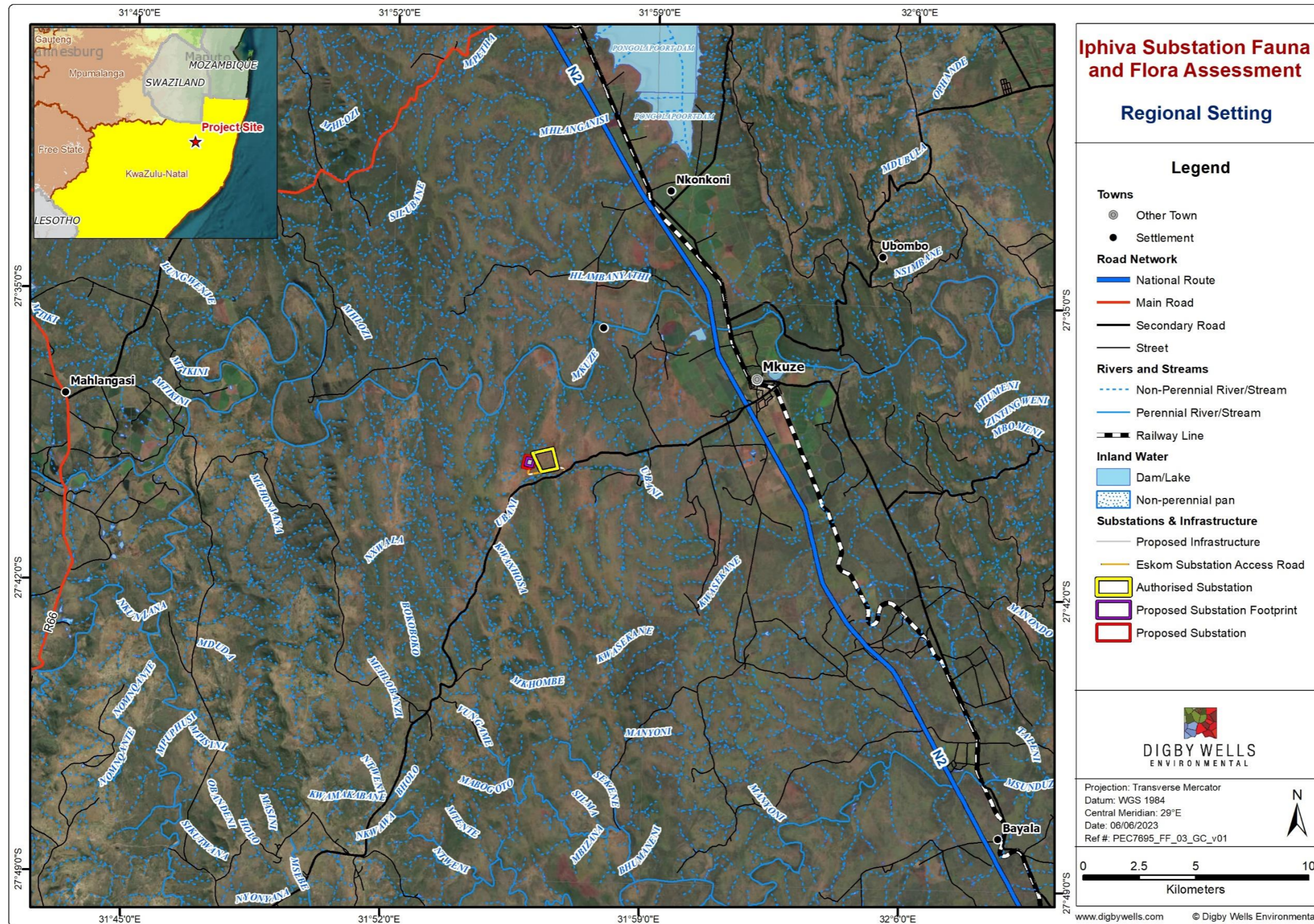


Figure 1-1: Regional Setting

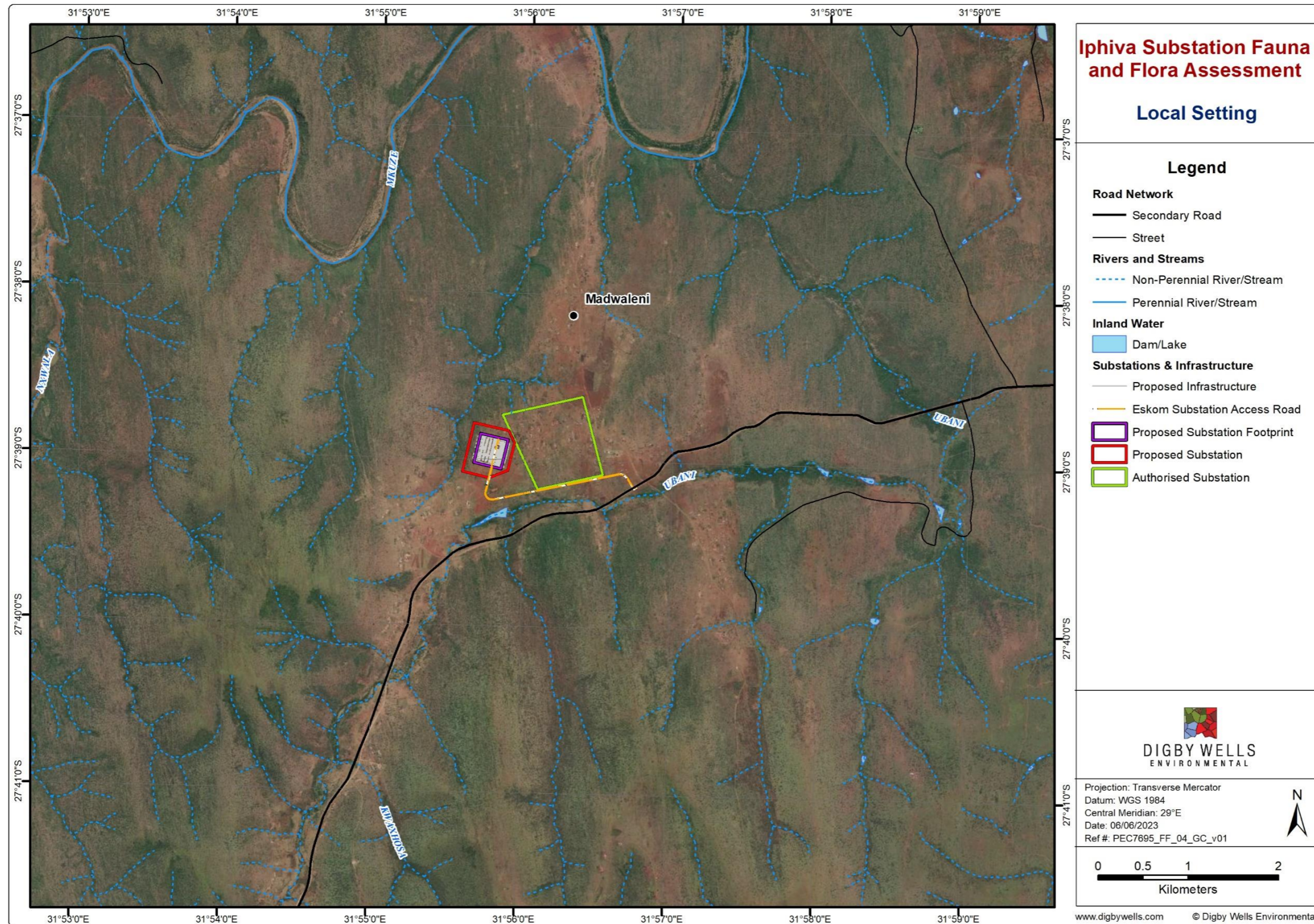


Figure 1-2: Local Setting

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
<p><u>National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)</u></p> <p>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:</p> <ul style="list-style-type: none"> • 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). 	<ul style="list-style-type: none"> • An Avifaunal 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.
<p><u>KwaZulu-Natal Nature Conservation Management Act (Act No. 9 of 1997)</u></p> <p>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.</p> <p>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.</p>	<ul style="list-style-type: none"> • An Avifaunal Impact Assessment has been undertaken; and • The guideline is one of many that provides guidance for assessments of the state and provincial protection of the biodiversity and any sensitive areas that may occur.
<p><u>KwaZulu-Natal Nature Conservation Management Amendment Act, 1999 (No. 5 of 1999)</u></p> <p>This act amends the Nature Conservation Management Act above to insert additional definitions, amend the definition of the protected</p>	<ul style="list-style-type: none"> • The Impact Assessment makes note of the protected species listed in this act.



Legislation, Regulation, Guideline or By-Law	Applicability
<p>areas, to provide for the conservation of plants and animals and more.</p>	
<p><u>SANBI, National Biodiversity Assessment (NBA) 2018</u></p> <p>The NBA is a collaborative effort to synthesize 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:</p> <ul style="list-style-type: none"> • 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. <p>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).</p>	<ul style="list-style-type: none"> • 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 Resultant Consequences of this Report

Assumptions and Limitations	Consequences
<p>This avifaunal 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.</p>	<p>This report does not include any other specialist studies other than the avifaunal assessment. Nor can it be used as a stand-alone report for operational and maintenance requirements.</p>
<p>This Avifaunal Impact Assessment was conducted during April 2022 and May 2023. A previous study and report dated 2018 is available. The study focused on the entire Northern KZN Strengthening Project, this report focusses on the proposed relocation of the initial Iphiva Substation and new access road only.</p>	<p>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.</p>
<p>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.</p>	<p>The avifaunal 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.</p>
<p>Each site assessment was restricted to two days each.</p>	<p>This assessment constitutes a high-level screening to identify to identify the potential impacts to avifauna that may be present within the approved development footprint. This report is not a true reflection of the avifauna currently present in the development footprint</p>

4. Details of the Specialists

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

- **Danie Otto** manages the African Operations at Digby Wells. He holds an M.Sc. in Environmental Management with B.Sc. Hons (Limnology & Geomorphology, and GIS & Environmental Management) and B.Sc. (Botany and Geography & Environmental Management). He is a biogeomorphologist that specialises in the ecology of wetlands and rehabilitation. He has been a registered Professional Natural Scientist since 2002. Danie has 27 years of experience in environmental and specialist assessments, management plans, audits, rehabilitation, and research. He has experience in 8 countries and his experience is in the environmental sector. He has basic firefighting training as well as wetland and geomorphology working experience across Africa, including specialist environmental input into various water resource related studies. These vary from studies of the wetlands of the Kruger National Park to swamp forests in central Africa to alpine systems in Lesotho.
- **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). 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, 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

Prior to the initiation of the field survey, a desktop assessment was conducted to consider the best available information in order to provide a better evaluation of all conditions present within

the Project area. The desktop assessment involved compiling relevant information of the greater study area from reliable resources, including historical studies and national and international databases. The aim of the desktop study is to identify the current biodiversity and ecosystem status of the area using. The following resources were consulted for the desktop assessment:

- Potentially occurring and distribution data was obtained through the South African Bird Atlas Project (SABAP2);
- BirdLife South Africa Area (IBA) Directory (Barnes, 1998), and the 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland status (Taylor, Peacock and Wanless 2015); and
- The previous Avifaunal Impact Assessment which was completed for the greater Northern KZN Strengthening Project in 2018 (Digby Wells Environmental 2018).

5.2. Field Investigations

Avifaunal surveys took place during the 25th to the 26th of April 2022 and the 10 and 11th of May 2023, alongside the fauna and flora assessment. During the field survey, specialists undertook an assessment of avifaunal species in the Project area. The area was thoroughly traversed by vehicle and on foot to obtain a first-hand understanding of the proposed substation and its surrounding areas, habitat and presence of avifauna, and to determine which bird micro-habitats are present and relevant to the study. This involved driving the area around the Project area, taking photographs, and walking certain accessible areas, to see as much as possible of the proposed substation footprint.

5.3. Species of Conservation Concern Assessment

The Red List of threatened species generated by the IUCN (<http://www.iucnredlist.org/>) provided the global conservation status of avifauna. However, Taylor et al. (2015) produced a regional conservation status assessment following the IUCN criteria which was used for this scoping report. The first three categories i.e., Critically Endangered, Endangered and Vulnerable, are collectively called 'threatened' species. The conservation status categories defined by the IUCN, which are considered here to represent species of conservation concern (SCC), are defined as follows:

- Critically Endangered (CR) - Critically Endangered refers to species facing immediate threat of extinction in the wild.
- Endangered (EN) - Endangered species are those facing a very high risk of extinction in the wild within the foreseeable future.
- Vulnerable (VU) - Vulnerable species are those facing a high risk of extinction in the wild in the medium-term.

- Near Threatened (NT) - any indigenous species which does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. NEMBA also deals with endangered, threatened and otherwise controlled species, under the Threatened or Protected Species Regulations (ToPS). A ToPS permit is required for any activities involving the removal or destruction of any ToPS-listed species.

Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor, Peacock and Wanless 2015) is an updated and peer-reviewed conservation status assessment of the 854 bird species occurring in South Africa, including the Prince Edward Islands, Lesotho and Swaziland, undertaken in collaboration between BirdLife South Africa (BLSA), the Animal Demography Unit (ADU) of the University of Cape Town, and the South African National Biodiversity Institute (SANBI). This book provides a quantified measure of the extinction threat faced by birds in the region and it provides an Effective dissemination and integration of this information with a broad cross-section of decision making and decision-influencing bodies.

6. Baseline Assessment

The table below (Table 6-1) 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: Baseline Environment of the Iphiva Substation Project area

Details of the Project area in terms of Mucina & Rutherford (2006)		Description of the vegetation type(s) relevant to the Project area according to Mucina & Rutherford (2006)											
BIOME	The Project area falls within a Savanna Biome.	Altitude (m)	50 - 450 m										
BIOREGION	The Project area falls within the Lowveld Bioregion.	Climate	<p>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.</p> <table border="1"> <thead> <tr> <th>MAP (mm)</th> <th>MAT (°C)</th> <th>MFD (Days)</th> <th>MAPE (mm)</th> <th>MASMS (%)</th> </tr> </thead> <tbody> <tr> <td>680</td> <td>20.8</td> <td>1</td> <td>1898</td> <td>75</td> </tr> </tbody> </table>	MAP (mm)	MAT (°C)	MFD (Days)	MAPE (mm)	MASMS (%)	680	20.8	1	1898	75
MAP (mm)	MAT (°C)	MFD (Days)	MAPE (mm)	MASMS (%)									
680	20.8	1	1898	75									
Vegetation Type (Figure 6-1)	The Iphiva Substation Project area is located in the Zululand Lowveld (Mucina and Rutherford 2006) as illustrated in Figure 6-1.	Distribution	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.										
		Geology & Soils	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.										
Important Bird Areas (IBAs) (Figure 6-2)	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.	Conservation	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 Pongolapoort 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.										
Mining and Biodiversity Guideline Category, DEA (2013) (Figure 6-3)	The proposed location of the substation is almost entirely classified as Highest Biodiversity Importance (Highest Risk for Mining). The authorised location is also mostly classified as the same category, but has a greater area without any classification of importance or risk.	Plant Species Characteristics of the Zululand Lowveld (Mucina and Rutherford 2006)											
Protected Area (SAPAD, 2021) (Figure 6-4)	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 .	Tall Trees	<i>Sclerocarya birrea</i> subsp. <i>caffra</i> (d), <i>Senegalia burkei</i> (d), <i>S. nigrescens</i> (d)										
		Small Trees	<i>Boscia albitrunca</i> , <i>Combretum apiculatum</i> , <i>C. molle</i> , <i>Ozoroa paniculosa</i> , <i>Phoenix reclinata</i> , <i>Schotia brachypetala</i> , <i>Senegalia senegal</i> var. <i>rostrata</i> , <i>S. welwitschii</i> subsp. <i>welwitschii</i> , <i>Spirostachys africana</i> , <i>Teclea gerrardii</i> , <i>Vachellia tortilis</i> subsp. <i>heteracantha</i> (d), <i>V. gerrardii</i> , <i>V. natalitia</i> , <i>V. nilotica</i> , <i>Ziziphus mucronata</i> .										



Details of the Project area in terms of Mucina & Rutherford (2006)		Description of the vegetation type(s) relevant to the Project area according to Mucina & Rutherford (2006)	
Threatened Ecosystems (Figure 6-5)	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	<i>Aloe marlothii</i> subsp. <i>marlothii</i> , <i>Euphorbia grandidens</i> , <i>E. ingens</i> . Tall Shrubs: <i>Dichrostachys cinerea</i> (d), <i>Euclea divinorum</i> (d), <i>Coptosperma supra-axillare</i> , <i>Crotalaria monteiroi</i> , <i>Euclea crispa</i> subsp. <i>crispa</i> , <i>E. schimperi</i> , <i>Galpinia transvaalica</i> , <i>Gardenia volkensii</i> , <i>Gymnosporia maranguensis</i> , <i>G. senegalensis</i> , <i>Jatropha zeyheri</i> , <i>Lycium acutifolium</i> , <i>Olea europaea</i> subsp. <i>africana</i> , <i>Tarchonanthus parvicapitulatus</i> , <i>Tephrosia polystachya</i> , <i>Triumfetta pilosa</i> var. <i>tomentosa</i> .
		Low Shrubs	<i>Barleria obtusa</i> , <i>Crossandra greenstockii</i> , <i>Felicia muricata</i> , <i>Gymnosporia heterophylla</i> , <i>Indigofera trita</i> subsp. <i>sub-ulata</i> , <i>Justicia flava</i> , <i>J. protracta</i> subsp. <i>protracta</i> , <i>Melhania didyma</i> , <i>Orthosiphon serratus</i> , <i>Pearsonia sessilifolia</i> , <i>Ruellia cordata</i> , <i>Sida serratifolia</i> , <i>Tetraselago natalensis</i> .
		Succulent Shrub	<i>Euphorbia grandicornis</i> , <i>E. trichadenia</i> , <i>E. vandermerwei</i> . Soft Shrub: <i>Pavonia columella</i> .
		Herbaceous Climbers	<i>Fockea angustifolia</i> .
KwaZulu-Natal Conservation Plan (Figure 6-6)	According to the KZN Conservation Plan, both the proposed and authorised Project areas overlap a Critical Biodiversity Area 1 Mandatory designation.	Graminoids	<i>Dactyloctenium australe</i> (d), <i>Enteropogon monostachyus</i> (d), <i>Eragrostis capensis</i> (d), <i>E. curvula</i> (d), <i>E. racemosa</i> (d), <i>Heteropogon contortus</i> (d), <i>Panicum maximum</i> (d), <i>Sporobolus pyramidalis</i> (d), <i>Themeda triandra</i> (d), <i>Aristida bipartita</i> , <i>A. congesta</i> , <i>Bothriochloa insculpta</i> , <i>Chloris mossambicensis</i> , <i>Cymbopogon caesius</i> , <i>Digitaria natalensis</i> , <i>Leptochloa eleusine</i> , <i>Panicum deustum</i> , <i>Schizachyrium sanguineum</i> , <i>Setaria incrassata</i> , <i>Sporobolus nitens</i> , <i>Trachypogon spicatus</i> , <i>Tristachya leucothrix</i> .
CBA (Figure 6-6)	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.	Herbs	<i>Acrotome hispida</i> , <i>Argyrolobium rupestre</i> , <i>Aspilia mossambicensis</i> , <i>Chamaecrista biensis</i> , <i>C. mimosoides</i> , <i>Corchorus asplenifolius</i> , <i>Felicia mossamedensis</i> , <i>Gerbera ambigua</i> , <i>Helichrysum rugulosum</i> , <i>Hibiscus pusillus</i> , <i>Kohautia virgata</i> , <i>Lotononis eriantha</i> , <i>Senecio latifolius</i> , <i>Stachys aethiopica</i> , <i>Tragia meyeriana</i> , <i>Vernonia capensis</i> .
ESA (Figure 6-6)	Both locations do not overlap any ESA however, a Corridor ESA has been located within a 2 km proximity of the proposed substation.	Succulent Herb:	<i>Aloe parvibracteata</i>

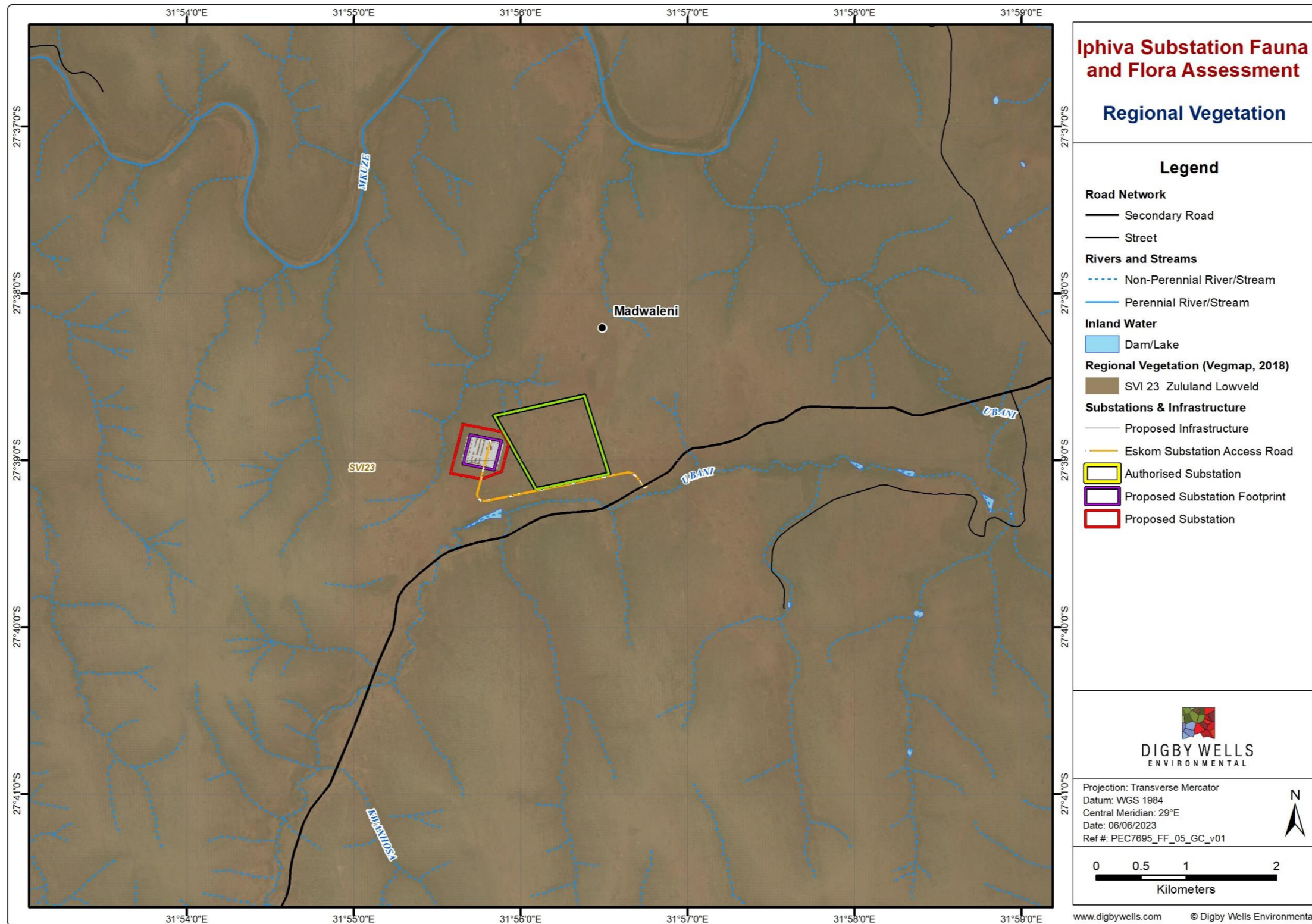


Figure 6-1: Regional Vegetation Map of the Iphiva Substation Project area

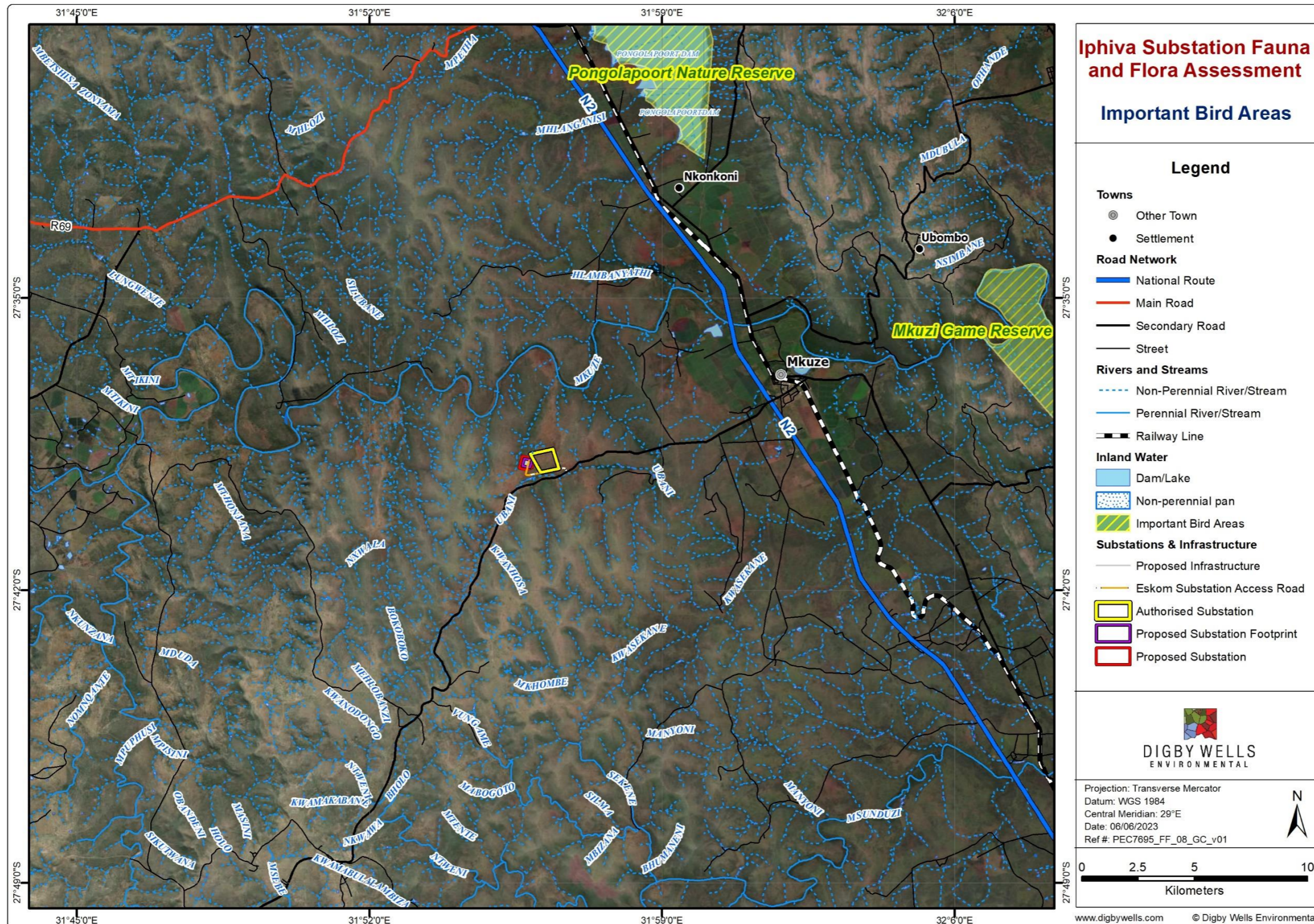


Figure 6-2: IBAs in proximity to the Iphiva Substation Project area

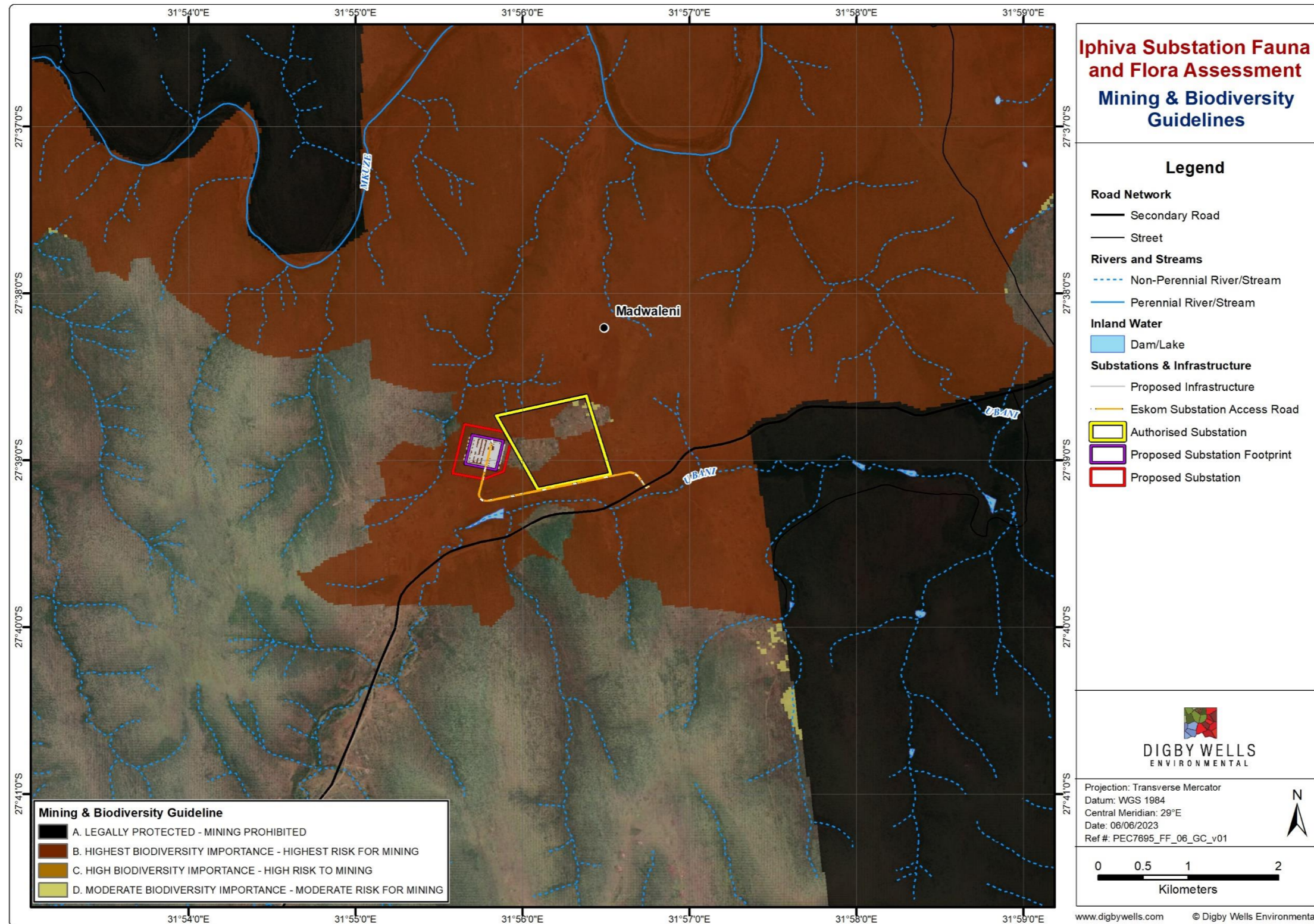


Figure 6-3: Map of the Mining & Biodiversity Guidelines for the Iphiva Substation Project area

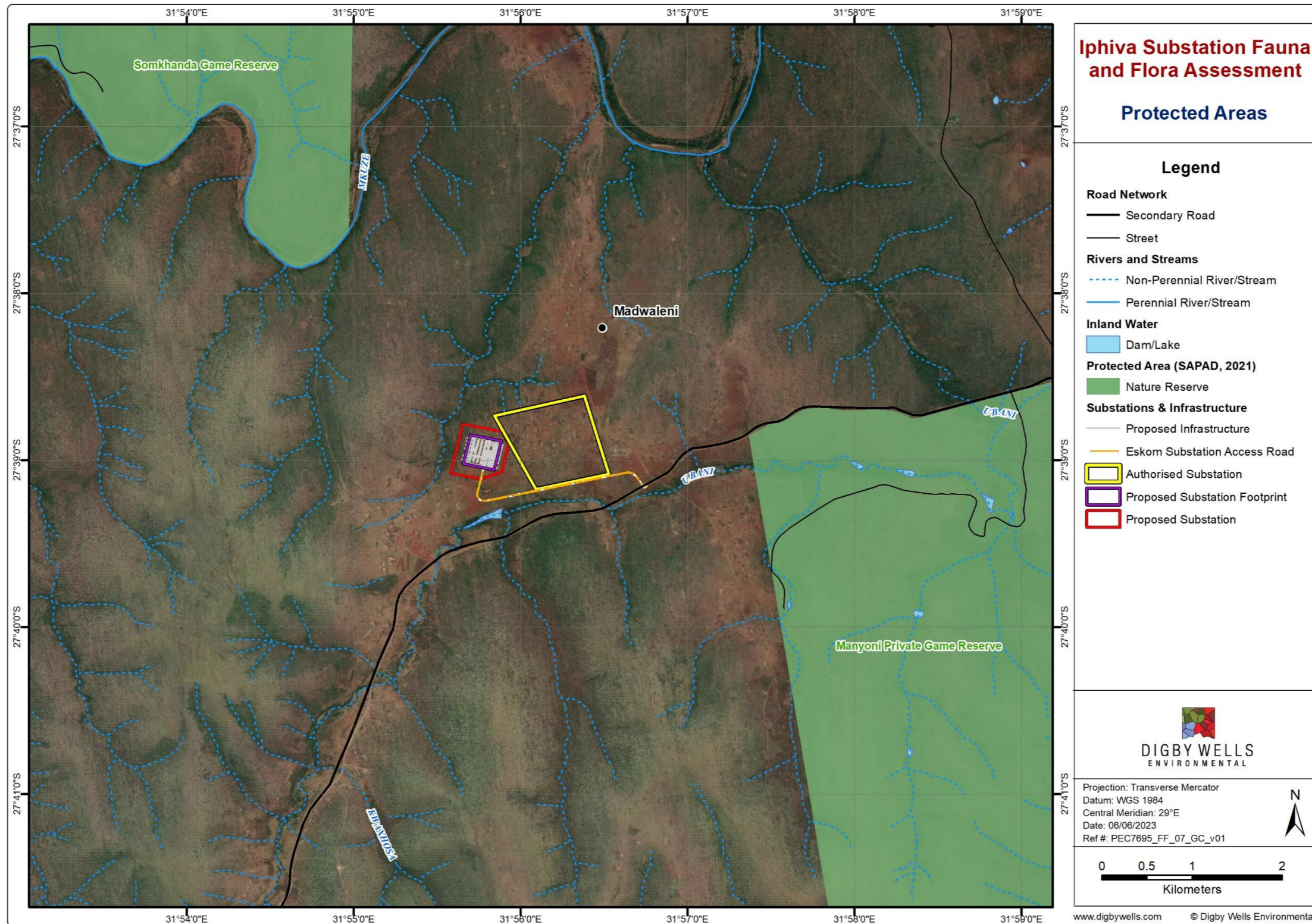


Figure 6-4: Protected Areas in proximity to the Iphiva Substation Project area

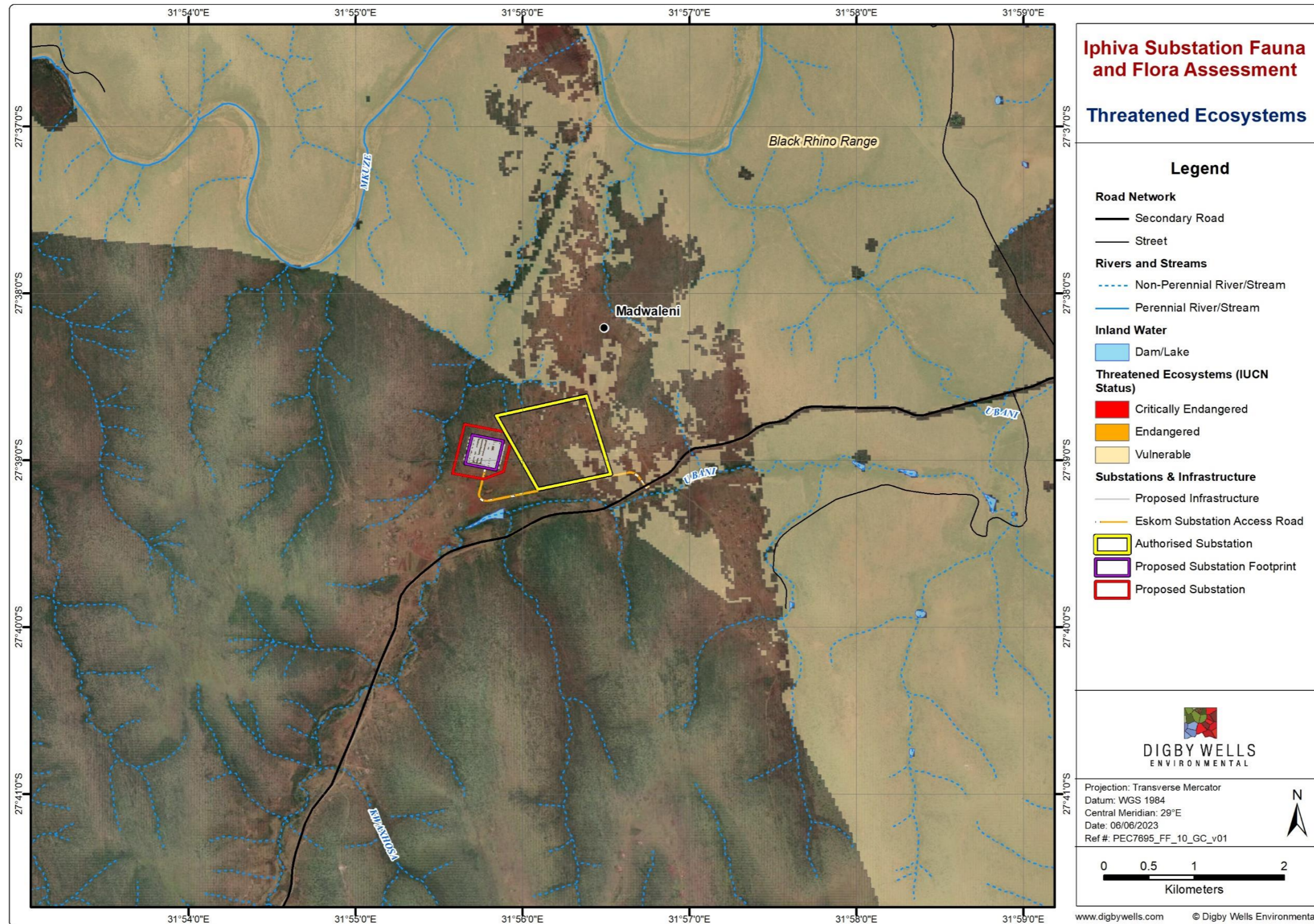


Figure 6-5: Threatened Ecosystems map of the Iphiva Substation Project area

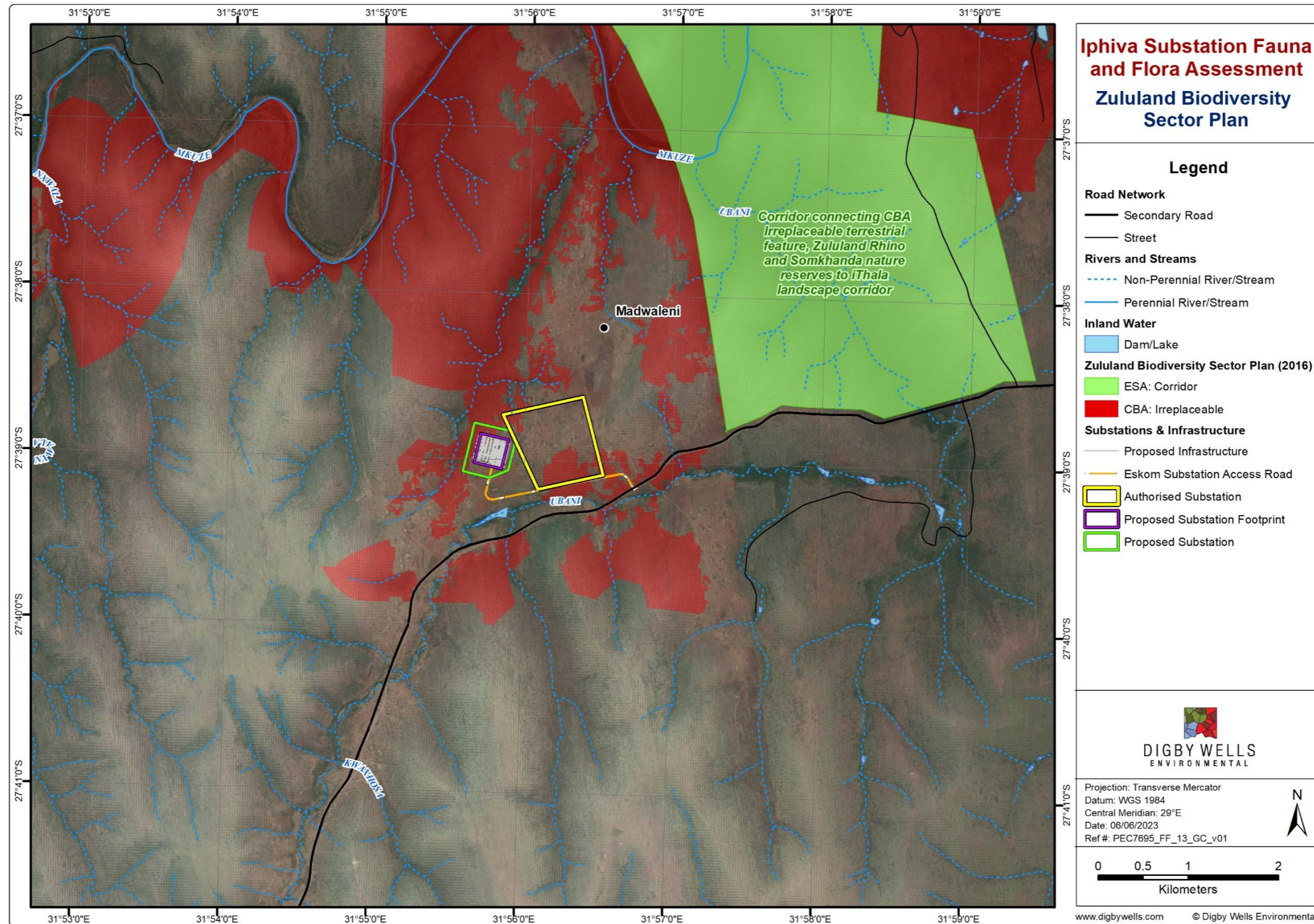


Figure 6-6: KwaZulu-Natal Conservation Plan map of the Iphiva Substation Project area

6.1. Avifaunal Baseline Findings

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 2006).

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*).

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.

Not only do the reserves play host to globally listed Big 5 species, they sustain viable populations of listed birds of prey such as Lappet-faced Vulture (*Torgos tracheliotos*), White-headed Vulture (*Trigonoceps occipitalis*), White-backed Vulture (*Gyps africanus*) Martial Eagle (*Polemaetus bellicosus*), Bateluer (*Terathopius ecaudatus*), Tawny Eagle (*Aquila rapax*), Crowned Eagle (*Lophaelagus occipitalis*), Secretarybird (*Sagittarius serpentarius*) and Marabou Stork (*Leptoptilos crumeniferus*).

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.

6.2. Regional Vegetation

The Iphiva Substation Project area falls within the Zululand Lowveld of the Savanna Biome (Mucina and Rutherford 2006), 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. Fieldwork Results and Discussion

Site visits were undertaken in April 2022 and an additional one in May 2023 to review the updated layout. The results of the sites visits are discussed below.

7.1. Description of Major Bird Habitats

A habitat map was created in order to relate the delineation to avifaunal habitats in the Project area (Figure 7-1), it coincides with the vegetation units identified for the fauna and flora assessment (Digby Wells Environmental 2023). The primary avifaunal habitats are described in tabular formats below with accompanying representative photographs. Sensitivity will largely be based upon "Avifaunal value" which relates to species diversity, endemism and the presence of topographical features or primary habitat units with the intrinsic ability to sustain certain avifaunal assemblages (with specific reference to SCC), their food supply and breeding habits. Most of the immediate area within the proposed substation has already incurred transformation from the local 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 which may cause these areas to be buffered from future development. The proposed substation is in close proximity to protected areas which sustain viable populations of above mentioned Red-Listed species, therefore the propensity and likelihood of the species frequenting the area is high.

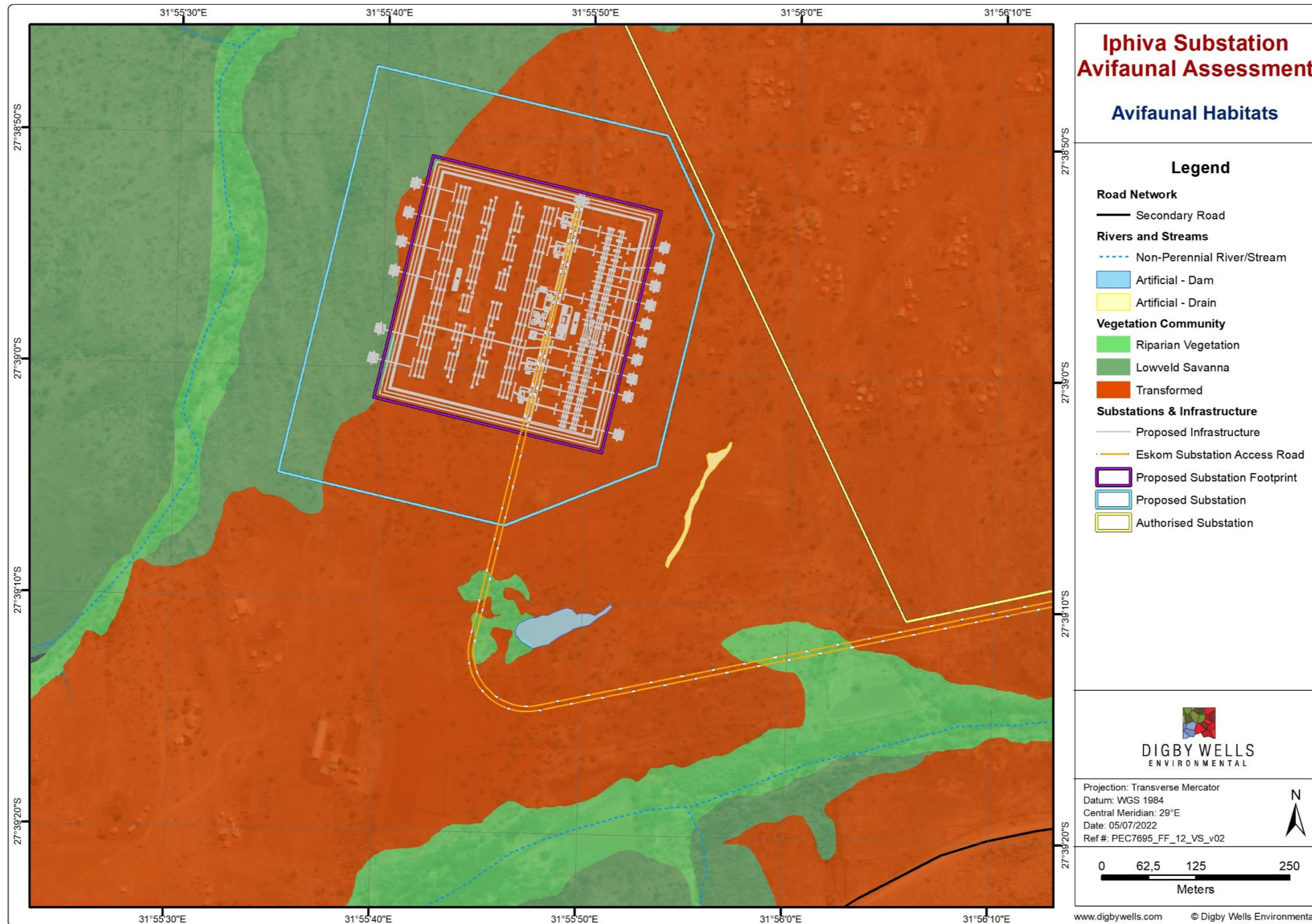


Figure 7-1: Avian Habitats


7.1.1. Riparian Habitat

Photograph	Description
	<p>Classification: Riparian, Unchanneled Valley Bottom and Channeled Valley Bottom (Digby Wells Environmental 2023)</p> <p>Vegetation: 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 lined the smaller channels.</p>
	<p>Avifaunal Characteristics:</p> <p>Avifaunal assemblages differed depending on the classification of the drainage line system. The drainage systems are seasonally influenced with varying water levels. The taller trees consisted of <i>Schotia brachypetala</i>, <i>Spirostachys africana</i>, <i>Pappea capensis</i>, and <i>Ficus sycamorus</i>. Tall shrubs consisted of <i>Gymnosporia buxifolia</i>, <i>Grewia fravescens</i>, <i>G. hexamita</i>, and <i>Euclea daphinoides</i>. The foliage in the drainage line provided dense cover and the tall trees provided perching for insectivorous species and smaller raptors. The following species were recorded: Black-winged Kite, Sabota Lark, Familiar Chat, African Paradise Flycatcher, Southern Fiscal, and Blue Waxbill. No SCC were encountered in the drainage lines of the Project area. Various nationally protected trees reside in this habitat unit and should be avoided (see Digby Wells Fauna and Flora Report 2022).</p> <p>The seasonal drainage lines and accompanying riparian trees are linear dispersal corridors for terrestrial bird species. Much higher species diversity (as well as a unique composition) was observed in this habitat and therefore, these systems are classified to be of high avifaunal importance. The drainage lines act as important flight corridors for passerines and raptors between foraging and roosting sites</p>

7.1.2. Artificial Waterbody with Woody Periphery

Photograph	Description
	<p>Classification: Artificial Waterbody</p> <p>Vegetation: One artificial dam within the Project area is surrounded by medium sized to tall trees and woody shrubs. The herbaceous layer consists of numerous forbs associated with overgrazed and previously trampled areas.</p> <p>Avifaunal Characteristics:</p> <p>This dam comprise of a low to tall moisture loving grassland which may be replaced by forbs when regularly trampled and grazed. Key species include; <i>Panicum coloratum</i>, <i>Cynodon dactylon</i>, <i>Parthenium hysterophorus</i> and <i>Eragrostis cilianensis</i>, Moderate to large sized trees consisting of <i>Ziziphus mucronata</i> and <i>Sclerocarya birrea</i>. This habitat unit is important for numerous species, as it is a reliable source of surface water in the area and because the vegetation potentially supports numerous wetland bird species especially during periods of inundation. Grey Heron and Cattle Egret were encountered in the pan during the site investigation. The open grassy areas represent foraging and/or hunting areas for many insectivorous and granivorous bird species, including species such as African Quailfinch, Crowned Lapwing, Blacksmith Lapwing, Red-billed Firefinch, and Yellow-fronted Canary.</p> <p>Artificial waterbodies benefit numerous avian species such as Egyption Geese, White-breasted Comorant, Grey Heron, Black-headed Heron and Yellow-billed Ducks. These species (as well as many other species) run the risk of collisions with the proposed powerlines for development of the substation.</p>

7.1.3. Tree Savanna (Lowveld Bushveld)

Photograph	Description
	<p>Classification: Dense stands of trees</p> <p>Vegetation: Dense tall shrub tree cover forming almost closed canopies. Directly adjacent to the riparian areas.</p> <p>Avifaunal Characteristics:</p> <p>This Tree Savanna within the Project area is very small and limited in extent and comprises a 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. The tall dense tree cover comprises of broad and compound leaved trees such as <i>Dicrostachys cinrea</i>, <i>Vachellia karroo</i>, <i>V. toritillis</i>, <i>Senegalia burkei</i>, and <i>Commiphora pyracanthoides</i></p> <p>The dense foliage of the trees provides habitat for smaller frugivorous species associated with thickets. This unit is unique in terms of species composition and vegetation structure and subsequently contribute to habitat niche diversity. Species that was recorded within this habitat type included; Cinnamon-breasted Bunting, Red-billed Firefinch, White-bellied Sunbird, Purple-banded Sunbird, Cape Starling, Burchell's Coucol, Fork-tailed Drongo, Red-faced Mousebird, and Acacia Pied Barbet. No avian SCC were encountered in this unit within the Project area.</p>



7.1.4. Transformed Areas

Photograph	Description
	<p>Classification: Roads, homesteads, kraals and plantations.</p> <p>Vegetation: mostly cleared, with lone-standing large trees such as <i>Sclerocarya birrea</i>, <i>Peltophorum africanum</i>, <i>Ozoroa engleri</i>, and succulent tree <i>Aloe marlothii</i>.</p> <p>Avifaunal Characteristics:</p> <p>Low density permanent structures, including gravel roads, homesteads consisting of houses, and kraals are present. These locations may be important for several bird species which use them for roosting and/or nesting, such as owls and swallows as well as valuable roosting and nesting habits for a wide spectrum synanthropic species (Pied Crows).</p> <p>Observations confirmed that a high density of birds, mainly raptors, can frequently be found associated with road infrastructure, possibly due to the prevalence of perching locations, such as electric or telephone lines running alongside available roads, or due to road kills (attracting scavenging species), African Harrier Hawk was seen frequenting the area. Finally, homestead and livestock related transformed areas act as attractants for both synanthropic and some Red-Listed species that seek water or food. Density of synanthropic species with great within this habitat but avian diversity was very low.</p>

7.2. Observed and Expected Avifauna

7.2.1. Total Species and Composition

The Project area supports a relatively low diversity and abundance of avifauna, which is to be expected in an area that is predominantly transformed. A total of 81 species were recorded in 2022 and 2023 survey. The 2018 survey, which covered a much larger range recorded 170 avifaunal species. The low species count may be attributed to the extensive land transformation seen within the proposed substation area and the smaller area of interest in comparison to the 2018 survey. Highest avian diversity was recorded within the Riparian Habitat, followed by the Tree Savanna. The unique vegetative structural composition of the Riparian Habitat provides habitat for an array of avifaunal species.

It must be noted that stochastic high rainfall events and other atypical prevailing influences (persistent cold) may have influenced the local avifaunal assemblages.

7.2.2. Priority Species List

According to the South African Bird Atlas Project 2 (SABAP2), 218 species have been identified in the area (see Appendix A). Of these, twelve (12) species have been assigned an IUCN Red List Category and SANBI Red List Category (Taylor, Peacock and Wanless 2015) and are listed below in Table 7-1. As disclosed above, the proposed substation is situated in close proximity to protected areas (namely the Manyoni Private Game Reserve and Somkhanda Game Reserve). Subsequently, 12km south of the Project area, several White-backed Vultures and a Tawny Eagle were seen perched among dead *Vachellia xanthophloea* and numerous sightings of Bateleur scanning the area. This showcases the sensitivity of the entire area in relation to the Projects locality. Although recorded outside of the Project area, their transient nature may bring them into contact with the future development.

Table 7-1: Protected Avifaunal Species that may occur

Family	Scientific Name	Common Name	IUCN	Regional Red List
Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	VU	EN
Accipitridae	<i>Gyps africanus</i>	White-backed Vulture	CR	CR
Accipitridae	<i>Polemaetus bellicosus</i>	Martial Eagle	EN	EN
Accipitridae	<i>Terathopius ecaudatus</i>	Bateleur	EN	EN
Accipitridae	<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	EN
Accipitridae	<i>Trigonoceps occipitalis</i>	White-headed Vulture	CR	CR
Ciconiidae	<i>Ciconia episcopus</i>	Woolly-necked Stork	NT	LC
Ciconiidae	<i>Leptoptilos crumenifer</i>	Marabou Stork	LC	NT
Ciconiidae	<i>Mycteria ibis</i>	Yellow-billed Stork	LC	EN
Coraciidae	<i>Coracias garrulus</i>	European Roller	LC	NT
Falconidae	<i>Falco biarmicus</i>	Lanner Falcon	LC	VU
Sagittariidae	<i>Sagittarius serpentarius</i>	Secretarybird	EN	VU

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern

The most commonly recorded species within the Project area during the 2022/23 assessment included passerine species such as Southern Grey-headed Sparrow, Fork-tailed Drongo, Blue Waxbill, Croaking Cisticola and Yellow-fronted Canary. Common non-passerine species included Common Myna, Sabota Lark, Cape Turtle Dove, Crowned Lapwing and Cape Glossy Starling. Raptors were not common within the Project area, although few Dark Chanting Goshawk, Black-winged Kites were sighted perching on the telephone poles along the main road and an African Harrier Hawk was encountered with the Project area.

Three avian SCC were recorded in close proximity to the Project area. The 2018 assessment recorded eleven (11) avian SCC for the entire development footprint, and the 2022/23 assessment recorded three (3) of the previously identified SCC for the substation alone (see Table 7-2).

On the basis of the observations recorded during the 2022 and 2023 site visit, and with due consideration of previously recorded avifauna information of the Project area, twelve (12) priority species should be considered in this avifaunal impact study. These threatened species are known to occur, or could occur in the Project area and the broader impact zone of the development and which may be negatively impacted by the Project.

Table 7-2: A comparative list of the avifaunal species recorded in 2018 and 2022/2023

Family	Species Name	Common Name	IUCN	Regional Red List	2018	2022 and 2023
Accipitridae	<i>Aquila spilogaster</i>	African Hawk Eagle	LC	LC	X	
Accipitridae	<i>Polyboroides typus</i>	African Harrier Hawk	LC	LC		X
Accipitridae	<i>Circus maurus</i>	Black Harrier	EN	VU	X	
Accipitridae	<i>Milvus migrans</i>	Black Kite	LC	LC	X	
Accipitridae	<i>Circaetus pectoralis</i>	Black-chested Snake Eagle	LC	LC	X	X
Accipitridae	<i>Terathopius ecaudatus</i>	Bateleur	EN	EN	X	X
Accipitridae	<i>Circaetus cinereus</i>	Brown Snake Eagle	LC	LC	X	
Accipitridae	<i>Elanus caeruleus</i>	Black-winged Kite	LC	LC	X	X
Accipitridae	<i>Gyps coprotheres</i>	Cape Vulture	VU	VU	X	
Accipitridae	<i>Melierax canorus</i>	Pale Chanting Goshawk	LC	LC		X
Accipitridae	<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	EN	X	
Accipitridae	<i>Lophaetus occipitalis</i>	Long-crested Eagle	LC	LC	X	
Accipitridae	<i>Polemaetus bellicosus</i>	Martial Eagle	EN	VU	X	
Accipitridae	<i>Buteo buteo</i>	Steppe Buzzard	LC	LC	X	
Accipitridae	<i>Buteo rufufuscus</i>	Jackal Buzzard	LC	LC	X	X
Accipitridae	<i>Hieraaetus wahlbergi</i>	Wahlberg's Eagle	LC	LC	X	
Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	VU	EN		X
Accipitridae	<i>Gyps africanus</i>	White-backed Vulture	LC	EN	X	X
Alaudidae	<i>Mirafra rufocinnamomea</i>	Flappet Lark	LC	LC	X	
Alaudidae	<i>Calendulauda sabota</i>	Sabota Lark	LC	LC	X	X
Alcedinidae	<i>Corythornis cristatus</i>	African Malachite Kingfisher	LC	LC	X	
Alcedinidae	<i>Ispidina picta</i>	African Pygmy Kingfisher	LC	LC	X	
Alcedinidae	<i>Megaceryle maxima</i>	Giant Kingfisher	LC	LC	X	
Alcedinidae	<i>Halcyon albiventris</i>	Brown-hooded Kingfisher	LC	LC	X	X
Alcedinidae	<i>Ceryle rudis</i>	Pied Kingfisher	LC	LC	X	X
Anatidae	<i>Anas sparsa</i>	African Black Duck	LC	LC	X	
Anatidae	<i>Anas capensis</i>	Cape Teal	LC	LC	X	
Anatidae	<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC	LC	X	X
Anatidae	<i>Plectropterus gambensis</i>	Spur-winged Goose	LC	LC	X	
Anatidae	<i>Dendrocygna viduata</i>	White-faced Whistling Duck	LC	LC	X	X
Anatidae	<i>Anas undulata</i>	Yellow-billed Duck	LC	LC	X	
Anhingidae	<i>Anhinga rufa</i>	African Darter	LC	LC	X	X
Apodidae	<i>Apus barbatus</i>	African Swift	LC	LC	X	X
Apodidae	<i>Apus affinis</i>	Little Swift	LC	LC	X	X
Apodidae	<i>Apus caffer</i>	White-rumped Swift	LC	LC	X	
Ardeidae	<i>Ardea melanocephala</i>	Black-headed Heron	LC	LC	X	
Ardeidae	<i>Bubulcus ibis</i>	Cattle Egret	LC	LC	X	X
Ardeidae	<i>Ardea goliath</i>	Goliath Heron	LC	LC	X	
Ardeidae	<i>Ardea alba</i>	Great Egret	LC	LC	X	
Ardeidae	<i>Ardea purpurea</i>	Purple Heron	LC	LC	X	
Ardeidae	<i>Ardea cinerea</i>	Grey Heron	LC	LC	X	X



Family	Species Name	Common Name	IUCN	Regional Red List	2018	2022 and 2023
Bucerotidae	<i>Lophoceros nasutus</i>	African Grey Hornbill	LC	LC		X
Bucerotidae	<i>Tockus erythrorhynchus</i>	Red-billed Hornbill	LC	LC	X	X
Bucerotidae	<i>Bycanistes bucinator</i>	Trumpeter Hornbill	LC	LC	X	
Bucerotidae	<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill	LC	LC	X	X
Buphagidae	<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	LC (decreasing)	LC	X	X
Burhinidae	<i>Burhinus capensis</i>	Spotted Thick-knee	LC	LC	X	
Burhinidae	<i>Burhinus vermiculatus</i>	Water Thick-knee	LC	LC	X	X
Campephagidae	<i>Campephaga flava</i>	Black Cuckooshrike	LC	LC	X	
Caprimulgidae	<i>Caprimulgus fossii</i>	Mozambique Nightjar	LC	LC	X	
Charadriidae	<i>Vanellus senegallus</i>	African Wattled Lapwing	LC	LC	X	
Charadriidae	<i>Vanellus armatus</i>	Blacksmith Lapwing	LC	LC	X	X
Charadriidae	<i>Charadrius tricollaris</i>	Three-banded Plover	LC	LC	X	
Charadriidae	<i>Vanellus coronatus</i>	Crowned Lapwing	LC	LC	X	X
Ciconiidae	<i>Anastomus lamelligerus</i>	African Openbill	LC	LC	X	
Ciconiidae	<i>Ciconia ciconia</i>	European White Stork	LC	LC	X	
Ciconiidae	<i>Ephipiorhynchus senegalensis</i>	Saddle-bill Stork	LC	LC	X	
Ciconiidae	<i>Ciconia episcopus</i>	Woolly-necked Stork	NT	LC	X	
Cisticolalidae	<i>Eremomela usticollis</i>	Burnt-necked Eremomela	LC	LC	X	
Cisticolalidae	<i>Cisticola tinniens</i>	Levaillant's Cisticola	LC	LC	X	X
Cisticolalidae	<i>Cisticola erythrops</i>	Red-faced Cisticola	LC	LC	X	
Cisticolalidae	<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	LC	X	
Cisticolalidae	<i>Cisticola natalensis</i>	Croaking Cisticola	LC	LC		X
Coliidae	<i>Urocolius indicus</i>	Red-faced Mousebird	LC	LC	X	X
Coliidae	<i>Colius colius</i>	White-backed Mousebird	LC	LC	X	X
Columnidae	<i>Treron calvus</i>	African Green Pigeon	LC	LC	X	
Columnidae	<i>Columba arquatrix</i>	African Olive Pigeon	LC	LC	X	
Columnidae	<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	LC	LC	X	X
Columnidae	<i>Streptopelia capicola</i>	Cape Turtle Dove	LC	LC	X	X
Columnidae	<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC	LC	X	X
Columnidae	<i>Columba livia</i>	Rock Dove	LC	LC	X	
Columnidae	<i>Columba guinea</i>	Speckled Pigeon	LC	LC	X	
Columnidae	<i>Turtur tympanistria</i>	Tambourine Dove	LC	LC	X	
Columnidae	<i>Streptopelia senegalensis</i>	Laughing Dove	LC	LC	X	X
Coraciidae	<i>Coracias garrulus</i>	European Roller	LC	NT	X	
Coraciidae	<i>Coracias naevius</i>	Purple Roller	LC	LC	X	
Coraciidae	<i>Coracias caudatus</i>	Lilac-breasted Roller	LC	LC	X	X
Corvidae	<i>Corvus capensis</i>	Cape Crow	LC	LC	X	X
Corvidae	<i>Corvus albicollis</i>	White-necked Raven	LC	LC	X	
Corvidae	<i>Corvus albus</i>	Pied Crow	LC	LC	X	X
Cuculidae	<i>Chrysococcyx caprius</i>	Diederick Cuckoo	LC	LC	X	
Cuculidae	<i>Centropus burchellii</i>	Burchell's Coucal	LC	LC		X
Dicruridae	<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC	LC	X	X
Emberizidae	<i>Fringillaria capensis</i>	Cape Bunting	LC	LC	X	X

Family	Species Name	Common Name	IUCN	Regional Red List	2018	2022 and 2023
Emberizidae	<i>Fringillaria flaviventris</i>	Golden-breasted Bunting	LC	LC	X	X
Estrilidae	<i>Ortygospiza fuscocrissa</i>	African Quailfinch	LC	LC	X	X
Estrilidae	<i>Spermestes cucullata</i>	Bronze Mannikin	LC	LC	X	
Estrilidae	<i>Uraeginthus angolensis</i>	Blue Waxbill	LC	LC	X	X
Estrilidae	<i>Pytilia melba</i>	Green-winged Pytilia	LC	LC		X
Estrilidae	<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	LC	X	X
Falconidae	<i>Falco amurensis</i>	Amur Falcon	LC	LC	X	
Falconidae	<i>Falco tinnunculus</i>	Common Kestrel	LC	LC	X	
Falconidae	<i>Falco biarmicus</i>	Lanner Falcon	LC	NT	X	
Fringillidae	<i>Crithagra atrogularis</i>	Black-throated Canary	LC	LC	X	
Fringillidae	<i>Crithagra mozambica</i>	Yellow-fronted Canary	LC	LC	X	X
Gruidae	<i>Grus paradisea</i>	Blue Crane	VU	NT	X	
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	LC	LC	X	X
Hirundinidae	<i>Psalidoprocne pristoptera</i>	Black Saw-wing	LC	LC	X	
Hirundinidae	<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC	LC	X	
Hirundinidae	<i>Cecropis semirufa</i>	Red-chested Swallow	LC	LC	X	
Hirundinidae	<i>Delichon urbicum</i>	House Martin	LC	LC	X	X
Jacanidae	<i>Actophilornis africanus</i>	African Jacana	LC	LC	X	
Laniidae	<i>Lanius collaris</i>	Common Fiscal	LC	LC		X
Lanniidae	<i>Lanius minor</i>	Lesser Grey Shrike	LC	LC	X	
Lanniidae	<i>Lanius collurio</i>	Red-backed Shrike	LC	LC	X	
Locustellidae	<i>Schoenicola brevirostris</i>	Fan-tailed Grassbird	LC	LC	X	
Lybiidae	<i>Tricholaema leucomelas</i>	Acacia Pied Barbet	LC	LC		X
Malaconitidae	<i>Dryoscopus cubla</i>	Black-backed Puffback	LC	LC	X	
Malaconitidae	<i>Tchagra senegalus</i>	Black-crowned Tchagra	LC	LC	X	X
Malaconitidae	<i>Telophorus zeylonus</i>	Bokmakierie	LC	LC		X
Malaconitidae	<i>Tchagra australis</i>	Brown-crowned Tchagra	LC	LC	X	X
Malaconitidae	<i>Nilaus afer</i>	Brubru	LC	LC	X	
Malaconitidae	<i>Telophorus viridis</i>	Gorgeous Bush-shrike	LC	LC	X	
Malaconitidae	<i>Malaconotus blanchoti</i>	Grey-headed Bush-shrike	LC	LC	X	
Malaconitidae	<i>Chlorophoneus sulfureopectus</i>	Orange-breasted Bush-shrike	LC	LC	X	X
Malaconitidae	<i>Laniarius ferrugineus</i>	Southern Boubou	LC	LC		X
Meropidae	<i>Merops persicus</i>	Blue-cheeked Bee-eater	LC	LC	X	
Meropidae	<i>Merops apiaster</i>	European Bee-eater	LC	LC	X	
Meropidae	<i>Merops nubicoides</i>	Southern Carmine Bee-eater	LC	LC	X	
Meropidae	<i>Merops bullockoides</i>	White-fronted Bee-eater	LC	LC	X	
Meropidae	<i>Merops pusillus</i>	Little Bee-eater	LC	LC	X	X
Monarchidae	<i>Terpsiphone viridis</i>	African Paradise-flycatcher	LC	LC	X	X
Motacillidae	<i>Anthus cinnamomeus</i>	African Pipit	LC	LC	X	
Motacillidae	<i>Motacilla aguimp</i>	African Wagtail	LC	LC	X	
Motacillidae	<i>Anthus vaalensis</i>	Buffy Pipit	LC	LC	X	
Motacillidae	<i>Macronyx capensis</i>	Cape Longclaw	LC	LC	X	
Muscicapidae	<i>Cossypha caffra</i>	Cape Robin Chat	LC	LC	X	



Family	Species Name	Common Name	IUCN	Regional Red List	2018	2022 and 2023
Muscicapidae	<i>Monticola rupestris</i>	Cape Rock Thrush	LC	LC	X	
Muscicapidae	<i>Muscicapa striata</i>	Spotted Flycatcher	LC	LC	X	X
Muscicapidae	<i>Cossypha heuglini</i>	White-browed Robin Chat	LC	LC	X	
Muscicapidae	<i>Cercotrichas leucophrys</i>	White-browed Scrub Robin	LC	LC	X	
Muscicapidae	<i>Cossypha humeralis</i>	White-throated Robin Chat	LC	LC	X	
Musophagidae	<i>Gallirex porphyreolophus</i>	Purple-crested Turaco	LC	LC	X	
Musophagidae	<i>Corythaixoides concolor</i>	Grey Go-away Bird	LC	LC	X	X
Nectariniidae	<i>Chalcomitra amethystina</i>	Amethyst Sunbird	LC	LC	X	
Nectariniidae	<i>Cinnyris bifasciatus</i>	Purple-banded Sunbird	LC	LC		X
Nectariniidae	<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	LC	LC	X	X
Nectariniidae	<i>Cinnyris talatala</i>	White-bellied Sunbird	LC	LC	X	X
Nicatoridae	<i>Nicator gularis</i>	Eastern Nicator	LC	LC	X	
Numididae	<i>Numida meleagris</i>	Helmeted Guineafowl	LC	LC	X	X
Otididae	<i>Lophotis ruficrista</i>	Red-crested Bustard	LC	LC	X	
Paridae	<i>Melaniparus niger</i>	Southern Black Tit	LC	LC	X	X
Passeridae	<i>Passer melanurus</i>	Cape Sparrow	LC	LC	X	X
Passeridae	<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC	LC	X	X
Passeridae	<i>Passer domesticus</i>	House Sparrow	LC	LC	X	X
Phalacrocoridae	<i>Microcarbo africanus</i>	Reed Cormorant	LC	LC	X	
Phalacrocoridae	<i>Phalacrocorax carbo</i>	White Breasted Cormorant	LC	LC	X	
Phasianidae	<i>Pternistis natalensis</i>	Natal Francolin	LC	LC	X	
Phasianidae	<i>Ortygornis sephaena</i>	Crested Francolin	LC	LC		X
Phoeniculidae	<i>Upupa epops</i>	Common Hoopoe	LC	LC	X	
Phoeniculidae	<i>Rhinopomastus cyanomelas</i>	Common Scimitarbill	LC	LC	X	X
Phoeniculidae	<i>Phoeniculus purpureus</i>	Green Wood-hoopoe	LC	LC	X	X
Picidae	<i>Dendropicos fuscescens</i>	Cardinal Woodpecker	LC	LC	X	X
Picidae	<i>Campethera abingoni</i>	Golden-tailed Woodpecker	LC	LC	X	
Platysteiridae	<i>Batis molitor</i>	Chinspot Batis	LC	LC	X	X
Ploceidae	<i>Ploceus intermedius</i>	Lesser Masked Weaver	LC	LC	X	
Ploceidae	<i>Euplectes ardens</i>	Red-collared Widowbird	LC	LC	X	
Ploceidae	<i>Ploceus velatus</i>	Southern Masked Weaver	LC	LC	X	
Ploceidae	<i>Euplectes orix</i>	Southern Red Bishop	LC	LC	X	
Ploceidae	<i>Ploceus cucullatus</i>	Village Weaver	LC	LC	X	X
Ploceidae	<i>Quelea quelea</i>	Red-billed Quelea	LC	LC	X	X
Podicipedidae	<i>Tachybaptus ruficollis</i>	Little Grebe	LC	LC	X	X
Pycnonotidae	<i>Andropadus importunus</i>	Sombre Greenbul	LC	LC	X	X
Pycnonotidae	<i>Phyllastrephus terrestris</i>	Terrestrial Brownbul	LC	LC	X	
Pycnonotidae	<i>Chlorocichla flaviventris</i>	Yellow-bellied Greenbul	LC	LC	X	
Pycnonotidae	<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC	LC		X
Ramphastidae	<i>Trachyphonus vaillantii</i>	Crested Barbet	LC	LC	X	X
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	LC	LC	X	
Scolopacidae	<i>Tringa ochropus</i>	Green Sandpiper	LC	LC	X	
Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	LC	LC	X	

Family	Species Name	Common Name	IUCN	Regional Red List	2018	2022 and 2023
Scopidae	<i>Scopus umbretta</i>	Hamerkop	LC	LC	X	
Strigidae	<i>Glaucidium perlatum</i>	Pearl-spotted Owlet	LC	LC	X	
Strigidae	<i>Colius striatus</i>	Speckled Mousebird	LC	LC	X	X
Sturnidae	<i>Lamprotornis nitens</i>	Cape Glossy Starling	LC	LC	X	X
Sturnidae	<i>Onychognathus morio</i>	Red-winged Starling	LC	LC	X	
Sturnidae	<i>Acridotheres tristis</i>	Common Myna	LC	LC	X	X
Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	LC	LC	X	
Threskiornithidae	<i>Bostrychia hagedash</i>	Hadada Ibis	LC	LC	X	
Turdidae	<i>Myrmecocichla monticola</i>	Mountain Wheatear	LC	LC	X	
Turdidae	<i>Turdus libonyana</i>	Kurrichane Thrush	LC	LC	X	X
Vangidae	<i>Prionops plumatus</i>	White-crested Helmet-shrike	LC	LC	X	
Viduidae	<i>Vidua paradisaea</i>	Eastern Paradise Whydah	LC	LC	X	
Viduidae	<i>Vidua macroura</i>	Pin-tailed Whydah	LC	LC	X	
Zosterops	<i>Zosterops virens</i>	Cape White-eye	LC	LC	X	
Total					170	81

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, *Previously noted as NT, however

7.3. Potential Impacts

Below is described in detail the potential impacts that may affect the potential avian SCC and other species. Table 7-3 lists the avian SCC and their likelihood of susceptibility to impacts and occurrence.

7.3.1. Electrocutions

The electrocution of birds on overhead lines is a significant cause of unnatural mortality of a number of different bird species including birds of prey and large terrestrial birds in a Southern African context. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2000). Electrocution is possible on a 132 kV power line, especially where large raptors and vultures feature prevalently. Unfortunately, it is likely that vultures will occur in high numbers in the greater area of the Project area as well as numerous large Eagles, Ibises, Storks and other birds of prey, so the impact of electrocution is likely to be of High Significance within the proposed development.

The impacts that are expected along the 132kV powerline network depend on the diversity and density of bird species present. Species based on their behaviour, physical structure, size and habitat preferences will be vulnerable to different impacts. For example, birds that perch on the pylons and wires of large powerlines would be more susceptible to electrocution while those species that fly in large flocks such as some waterfowl are vulnerable to collisions along areas within their preferred flight paths such as within river or valley systems.

7.3.2. Collisions

Collisions are the biggest single threat posed by over-head power lines to birds in southern Africa (Van Rooyen 2000). In general, large lines with earth wires that are not always visible to birds can have the largest impact in terms of collisions. Most heavily impacted upon are Korhaans, Bustards, Storks, Cranes and various species of water birds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (Anderson 2001). Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. The Red Data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. There are a few exceptions to this with the likes of some of the Lark and Pipit species. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the results that consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term.

Many of the anthropogenic threats to these species are non-discriminatory as far as age is concerned (e.g. habitat destruction, disturbance and power lines) and therefore contribute to adult mortality, and it is not known what the cumulative effect of these impacts could be over

the long term. Collision of certain large flying bird species such as Woolly-necked Stork, Yellow-billed Stork, Marabou Stork and Secretarybird with the proposed powerlines is a possibility.

7.3.3. Habitat Loss

During the construction phase of the substation some habitat clearing and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of servitudes, as well as clearing vegetation at the substation site. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat.

7.3.3.1. Bird Nesting

When natural bird nesting sites such as trees and cliffs are in short supply, birds will sometimes breed on electricity structures as they offer a safe and sturdy platform for birds to build their nests. Large birds such as Eagles and Vultures will make use of the structures for roosting and nesting. They use large sticks, exceeding 1m in length, to build their nests. When the sticks are long enough, they can constitute an air gap intrusion between the conductor and the earthed structure, which causes a flashover during the wet conditions. Crows often incorporate wire and other conductive materials in their nest. This could constitute a flashover risk if it protrudes into the air gap, or when a bird arrives with a piece of wire in its bill and flies through the gap. When nests cause flash overs, the nesting material can catch fire and in turn lead to equipment damage or fire.

7.3.4. Disturbance

Similarly, the above-mentioned construction and maintenance activities impact on birds through disturbance, particularly during bird breeding activities. Uncontrolled vehicle access can result in unnecessary loss of indigenous and riparian vegetation and preferred habitat for breeding bird species such as Larks, Pipit, Lapwing, Courser and Bustard species.

Table 7-3: Priority species and their susceptibilities in relation to the Project

Scientific Name	Common Name	IUCN	Regional Red List	Habitat	Likelihood of Occurrence	Susceptible to
<i>Aquila rapax</i>	Tawny Eagle	VU	EN	Open Savanna Woodland	High (Confirmed)	Habitat Loss/ Disturbance/ Electrocution
<i>Gyps africanus</i>	White-backed Vulture	CR	CR	Savanna Woodland and Bushveld	High (Confirmed)	Habitat Loss/ Disturbance/ Electrocution/ Collisions
<i>Polemaetus bellicosus</i>	Martial Eagle	EN	EN	Open Woodland in fairly flat country, also open Shrubland with drainage line woodland or high-tension pylons, and open farmland with clumps of trees.	High (previously recorded)	Electrocution/ Collision
<i>Terathopius ecaudatus</i>	Bateleur	EN	EN	Open Savanna Woodland	High (Confirmed)	Habitat Loss/ Disturbance
<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	EN	Open drier Woodlands	High (previously recorded)	Electrocution/ Collision
<i>Trigonoceps occipitalis</i>	White-headed Vulture	CR	CR	Woodland Savanna	Moderate	Habitat Loss/ Disturbance/ Electrocution/ Collisions
<i>Ciconia episcopus</i>	Woolly-necked Stork	NT	LC	Forest, Grassland and Wetlands	High (previously recorded)	Collision/ Habitat Loss
<i>Leptoptilos crumenifer</i>	Marabou Stork	LC	NT	Open dry Savannas, grasslands, swamps, riverbanks, lake shores, and receding pools where fish are concentrated	Moderate	Collisions

Scientific Name	Common Name	IUCN	Regional Red List	Habitat	Likelihood of Occurrence	Susceptible to
<i>Mycteria ibis</i>	Yellow-billed Stork	LC	EN	Often in pairs or groups. Wide variety of wetland and aquatic habitats. Forages in shallow water free of emergent vegetation. Roosts communally on sandbanks, lake margins and large trees	High (previously recorded)	Habitat Loss/ Disturbance/ Collisions
<i>Coracias garrulus</i>	European Roller	LC	NT	Open Woodlands	High	Habitat Loss/ Disturbance
<i>Falco biarmicus</i>	Lanner Falcon	LC	VU	Singly or in pairs. Open grassland, open or cleared woodland, and agricultural areas. Nesting sites includes; cliffs (normally), large trees, electricity pylons and buildings). May utilize existing nests of other species, e.g. crows and other raptor species.	High (previously recorded)	Habitat Loss/ Disturbance/ Electrocution/ Collisions
<i>Sagittarius serpentarius</i>	Secretarybird	EN	VU	Pairs or sometimes solitary. Open grassland with scattered trees and shrubs. Roosts in crown of trees (mostly <i>Vachellia</i> spp.).	Low	Habitat Loss/ Disturbance/ Collisions

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 and 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 and areas that are protected by legislation.

Table 8-1: Sensitivity Criterion

Ecological Function	
Class	Description
High	Sensitive 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

It is important to delineate sensitive avian habitats within the project site in order to ensure the development does not have a long-term negative impact on these habitats. Important avian habitats play an integral role in their persistence within a landscape providing nesting, foraging and reproductive benefits.

The majority of the Project area which consists of the Transformed Habitat, has been assessed as being of Low sensitivity from an avifaunal perspective. This is due to the transformation of the landscape and lack of habitable trees and shrubs for avifaunal species. The transformed areas are characterised with habitat transformation and low avifaunal diversity and abundance.

Moderate sensitivity can be observed in the Lowveld Bushveld Tree Savanna and Artificial Waterbody. 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 niched habitat for numerous cryptic avifaunal species. The relative abundance and diversity of species was higher than that of the transformed areas. 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. Regarding avian species, 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. Additionally, the tall trees generally associated with Riparian areas are fruit bearing (i.e. *Ficus sycamorous*, *Diospyrous lycioides*, *Pappea capensis*) and provide foraging for frugivorous avian species. Furthermore, high avian 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 avifaunal area with some encroachment into Medium sensitive areas. However, the development within these Medium areas are regarded as acceptable as this will not have a significant impact on

local habitat diversity and avifaunal populations with most of these species, encountered within these Medium sensitivity areas, moving into adjacent similar habitats. According to the proposed layout of the substation, no High Sensitive areas will be impacted by the proposed development.

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

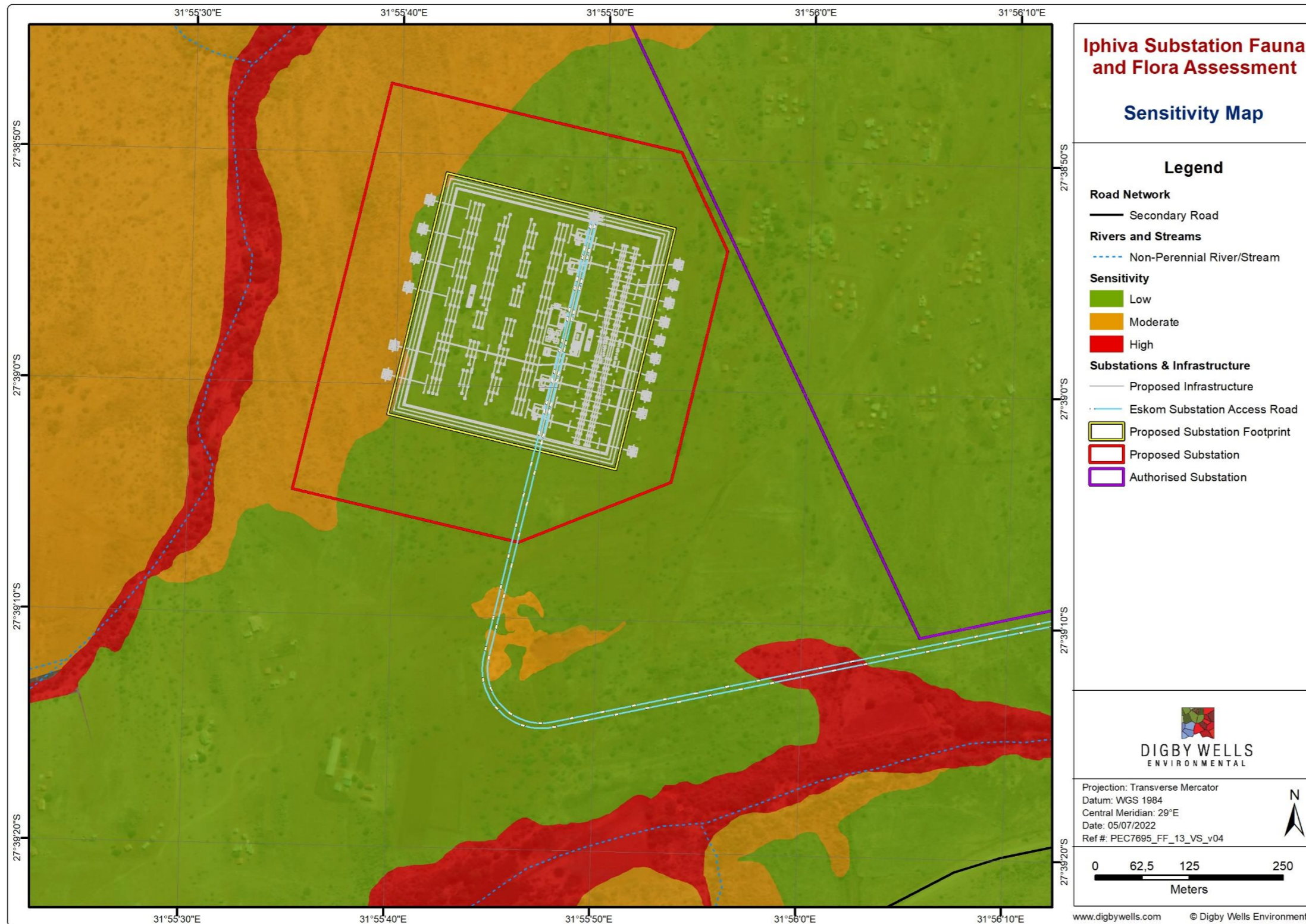


Figure 8-1: Sensitivity Map

9. Impact Statement

Details on some expected impacts on the fauna and flora during the Development and Operational Phases are presented in the table below (Table 9-1).

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

Interaction	Impact
<ul style="list-style-type: none"> Vegetation clearing and infrastructure construction; Upgrade to access road; and Construction of ancillary infrastructure. 	<ul style="list-style-type: none"> Direct loss of habitat types and biodiversity; and Loss of avifaunal SCC (protected species), due to collision or electrocution;

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. A 600 m x 600 m footprint, with a 1km x 1km study area (33 ha) will be required for the development footprint. The 33 ha development footprint area includes provisions for an 70 m high microwave radio communication mast, oil and fuel storage facilities, and an oil bund to contain any accidental transformer oil spills

With the clearing of vegetation, habitat will be removed; here indigenous vegetation will be replaced by fast growing alien and weed vegetation, degrading the general habitat quality. The construction of infrastructure especially at height, which includes distribution lines emanating from the substation will pose a risk to avifaunal species in the form of collision and electrocution risk.

9.1.1.1. Management Objectives

Management objectives will be to prevent the loss of important/protected avifaunal 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.

High structures, such as the radio tower pose a risk of collision, and suitable measures must be applied to make the mast visible to birds, the same principle applies to electrical infrastructure but these have the added risk of electrocution.

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 absolutely essential for the infrastructure placements, particularly in areas with high sensitivity (see Figure 8-1).

9.1.1.2. Management Measures

The following management measures are recommended:

- Conduct a pre-construction inspection to identify Red List species that may be breeding within the project footprint to ensure that the impacts to breeding species (if any) are adequately managed.
- 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 priority species.
- 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.
- Vegetation clearing to be kept at bare minimum as required.

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

Activity, and Interaction: Vegetation clearing and infrastructure construction;			
<ul style="list-style-type: none"> • Direct loss of biodiversity and avian habitats; • Loss of potential avian SCC 			
Prior Mitigation			
Dimension	Rating	Motivation	Significance
Duration	Permanent (7)	A permanent and total loss of 33 ha of habitat will occur.	Moderate (negative) - 77
Extent	Limited (2)	Vegetation clearance is limited to the proposed substation area only	
Severity	Minor Loss (2)	Majority of the area proposed for clearing is within already transformed habitat	
Probability	Definite (7)	The clearing of the vegetation is definite	
Nature	Negative		
Mitigation measures			



- A suitable qualified avifauna specialist must undertake a walkthrough of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers.
- The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr.
- Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands;
- Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action;
- Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted.
- Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and
- Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and nesting grounds and vulture restaurants).

Post-Mitigation

Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The potential for collisions and electrocution will be for the life of the project.	Minor (negative) - 72
Extent	Limited (2)	Bird interactions with substations can be limited with mitigation measures	
Intensity	High (4)	The home ranges of protected bird species coincide with this substation.	
Probability	High (6)	It is likely that loss of species due to collisions will occur.	
Nature	Negative		

9.2. Operational Phase

Activities during the Construction Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 9-3.

Table 9-3: Operation Phase Interactions and Impacts of Activity

Interaction	Impact
<ul style="list-style-type: none"> Operation of the substation 	<ul style="list-style-type: none"> Displacement due to habitat transformation in the substations; Mortality of avifauna due to collision with the overhead power line or road upgrade; and Mortality of avifauna due to electrocution in the onsite substations.

9.2.1. Impact Description

The operation of the substation and the associated electrical equipment including the 70 m radio communication mast and connecting powerlines may permit the total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance in the onsite substations. The operation of the substation may also increase the mortality of avifauna due to collisions with the overhead power line and electrocutions. Additionally, disturbances may also influence the community structure of avifauna within close proximity to the development although this may only occur to a very limited extent. Furthermore, increased traffic in the area may increase the risk of road collisions with avifauna species.

9.2.1.1. Management Objective

Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented where possible by an appropriately qualified rehabilitation specialist, according to the recommendations of the fauna and flora specialist study. The overall objective is to reduce the likelihood of mortalities caused by collisions with the overhead powerlines and prevent electrocution.

9.2.1.2. Management Measures

The following mitigation measures are recommended during the operational phase of the project:

- The mitigation measures proposed by the vegetation specialist must be strictly enforced;
- Collision risks can be mitigated by creating foraging patches to encourage birds to land before encountering powerline obstacles. Health and safety protocols must be

implemented by all employees involved in the Project to ensure speed limits are obeyed;

- Bird flight diverters (BDF) should be installed on the entire power line for the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively. These devices must be installed as soon as the conductors are strung; and
- The hardware within the proposed substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site-specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the substation.

9.2.1.3. Impact Rating

Impacts associated with the construction phase are presented below in Table 9-4 and Table 9-5.

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

Activity, and Interaction: Disturbance During Operation			
<ul style="list-style-type: none"> • Displacement and disturbance of avian species due to habitat transformation of the substation. • Maintenance and activity within the substation area. 			
Prior Mitigation			
Dimension	Rating	Motivation	Significance
Duration	Medium term (3)	A permanent and total loss of 33 ha of habitat will occur.	Negligible (negative) - 28
Extent	Limited (2)	Disturbances are only limited to the proposed substation area only	
Severity	Minor Loss (2)	Majority of the area proposed for clearing is within already transformed habitat	
Probability	Probable (4)	The transformation of the habitat is definite	
Nature	Negative		
Mitigation measures			



<ul style="list-style-type: none"> • If birds are nesting on the infrastructure of the facility and cannot be tolerated due to operational risks of fire, electrical short, soiling of panels or other problems, birds must be prevented from accessing nesting sites by using mesh or other manner of excluding them. Birds must not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks must be allowed to fledge their chicks before nests are removed; • The clearing of vegetation should be limited to areas only essential for the development; • If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation. • Working staff must stay within the development area and movement outside these areas especially into avian habitats must be restricted. • Driving must take place on existing and new access roads and a speed limit of 30km/h must be implemented on all roads running through the project site during the operation phase. 			
Post-Mitigation			
Dimension	Rating	Motivation	Significance
Duration	Short Term (2)	The potential for collisions and electrocution will be for the life of the project.	Negligible (negative) - 24
Extent	Limited (2)	Bird/ power station interactions can be limited with mitigation measures	
Intensity	Moderate (3)	The home ranges of protected bird species coincide with this substation.	
Probability	Unlikely (3)	It is likely that loss of species due to collisions will occur.	
Nature	Negative		

Table 9-5: Operational Phase Interactions and Impacts of Activity Rating

Activity, and Interaction: Loss of avian SCC			
<ul style="list-style-type: none"> • Loss of potential avian SCC due to collisions with overhead powerlines and electrocutions. 			
Prior Mitigation			
Dimension	Rating	Motivation	Significance
Duration	Project life (5)	Can occur long term (>15 yrs) may be reversed through mitigation.	Moderate (negative) - 70
Extent	Local (3)	Impact from the substation and powerlines is localised in the area.	
Severity	Significant (6)	There is a risk for SCC collisions	
Probability	Likely (5)	The is a high probability that mortalities may occur (<65%)	

Nature	Negative		
Mitigation measures			
<ul style="list-style-type: none"> • A “Bird Friendly” structure, with a bird perch (as per standard Eskom guidelines) must be used for the mast infrastructure. • All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents. • Installation of artificial bird space perches and nesting platforms, at a safe distance from energised components. • Monitoring of the powerlines to detect any faults in the deterrent mechanisms as well as monitoring potential mortality rates of birds. 			
Post-Mitigation			
Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The potential for collisions and electrocution will be for the life of the project.	Negligible (negative) - 30
Extent	Limited (2)	Bird/ power station interactions can be limited with mitigation measures	
Intensity	Moderate (3)	The home ranges of protected bird species coincide with this substation.	
Probability	Unlikely (3)	It is unlikely that loss of species due to collisions will occur.	
Nature	Negative		

10. Environmental Management Plan

The EMP 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.	<ul style="list-style-type: none"> Loss of vegetation and habitat for avifaunal species; and The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area; 	<ul style="list-style-type: none"> Conduct a pre-construction inspection to identify Red List species that may be breeding within the project footprint to ensure that the impacts to breeding species (if any) are adequately managed; 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: <ul style="list-style-type: none"> 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; 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. Any bird nests that are found during the construction phase must be reported to the Environmental Officer (EO). 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. Mark power line with Eskom approved Bird Flight Diverters (BFDs), and fit them on the entire earthwire. Monitoring of the powerlines to detect any faults in the deterrent mechanisms as well as monitoring potential mortality rates of birds. 	Concurrent rehabilitation through the Project Life	Life of Construction Phase
	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.				



Phase	Project Activity	Potential Impacts	Mitigation Measures	Mitigation Type	Period for Implementation
Operational Phase	Maintenance and operation of substation.	<ul style="list-style-type: none"> • Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance in the onsite substations; • Mortality of avifauna due to collisions with the overhead power line; and • Mortality of avifauna due to electrocutions in the substations. 	<ul style="list-style-type: none"> • Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. • Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. • Monitor the collision mortality on the overhead power line. Enlist an avifaunal specialist to conduct quarterly inspections of the overhead power line for a period of two years. • Monitor the electrocution mortality in the substations and apply mitigation if electrocution happens regularly. • Contractors and working staff should stay within the development area and movement outside these areas especially into sensitive avian microhabitats must be restricted. • All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents. • Install artificial bird space perches and nesting platforms at a safe distance away from the energized structures. 	Concurrent rehabilitation through the Project Life	Life of Operational Phase

11. Recommendations

In summary, the following recommendations are important and should be included in the project life cycle to prevent further impact to the avian community of the area and prevent loss of the avian SCC:

Prevent sensitive habitat degradation

The proposed substation is in close proximity to sensitive Riparian vegetation. These habitats sustain a unique vegetation composition (with confirmed nationally protected trees) that supports a variety of avian species. Therefore, during the construction of the substation and the associate powerlines, should be designated as “no-go” areas for any construction activities.

Prevent Bird Collisions

Bird collisions are a difficult impact to mitigate and prevent therefore, planning design and execution would benefit and possible prevent unacceptable levels of bird collisions. An important aspect of design to consider is the placement of the running powerlines from the substation. If practicable, it is recommended that the powerlines run parallel with any existing, adjoining lines. This method of powerline placement is known to significantly reduce bird collisions to acceptable levels. Furthermore, ‘high collision zone’ areas can only be demarcated once the final alignment has been confirmed. Once this placement is confirmed, through the combination of physical inspections and detailed high resolution satellite imagery, then the demarcation of sections that need to be mitigated can be identified. This procedure should be done with a qualified avifaunal specialist in collaboration with the Eskom Transmission Group. At this stage, specific ‘high collision zones’ are demarcated and anti-collision devices may be installed. Sensitive areas will include dams, wetlands, drainage crossings and bushveld.

Bird flappers have been used extensively in South Africa since 1996 to mitigate for bird collisions (Anderson 2001). The idea behind the bird flapper is that a dynamic device will be more effective than a static device to prevent bird collisions, because the movement will draw the bird’s attention to the wire and therefore give it time to take evasive action. Although some evidence exists to support this theory (Anderson 2001), it has not been conclusively proven. Regardless of the evidence, anecdotal evidence suggest that the bird flappers help reduce bird collisions however, the long-term durability of the mechanism is not proven and would require monitoring and maintenance. The literature suggests that static devices used as deterrents are correlated with success. Alonso and Alonso (1999) reiterate that marking a powerline with PVC spiral type Bird Flight Detectors (BFDs) can recude mortality rates by at least 60%. Therefore these anti-collision methods are highly recommend to prevent avian casualties, Figure 11-1 exemplifies the current mechanisms used for this mitigation.

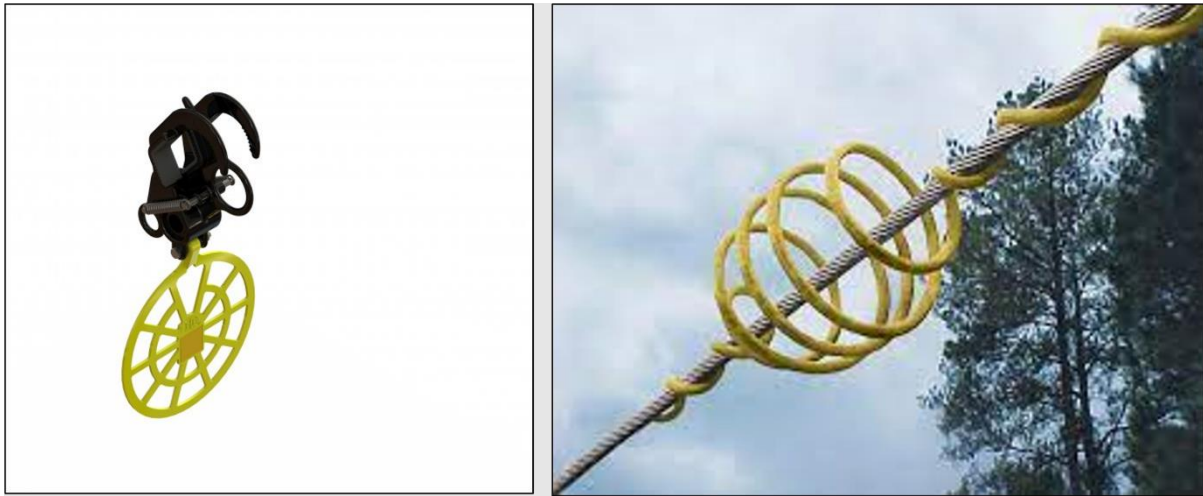


Figure 11-1: Examples of bird deterrents (left) Bird Flapper, (right) BFD

The powerline should be inspected once a year for a minimum of two years by an avifaunal specialist to establish if there is any significant collision mortality, which may require additional mitigation. Thereafter the frequency of inspections will be informed by the results of the first two years.

Preventing Electrocutions

According to the Eskom Proactive Bird Mitigation Report (Eskom 2017), in order to understand bird electrocution problem, the relationship of the size of large birds and the design of installations must be considered. The space between the elements is the cause of the electrocutions. Two design factors make a line hazardous to birds; (1) phase conductors separated by less than the wingspan of the bird that is landing, perching or taking off; and (2) a distance between grounded hardware and an energised conductor that is less than the wingspan or height of the bird. Therefore, bird friendly structures as per Eskom guidelines must be used for the electrical components of the Project.

12. Conclusion

The proposed substation is located in a region dominated by Lowveld vegetation types and is considered predominantly transformed from the surrounding community. The project boundary is encompassed by Lowveld Bushveld (Tree Savanna) and Riparian habitats, and an artificial dam is located within the boundary.

No avian SCC were recorded within the Project boundary during the 2022/23 assessment however, three (3) species were recorded in close proximity to the proposed substation, namely Bateleur, White-back Vulture and Tawny Eagle recorded approximately 12 km south of the site.

The proximity of the proposed substation in relation to the surrounding protected areas gives rise to one major concern regarding the bird community, the potential of bird collisions with sensitive raptors and other avian SCC (see Table 7-3).

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 Appendix 6 of GN 326 of 7 April 2014, and all Provincial and National environmental legislation with regards to avifauna and general biodiversity when describing the activity and the impact that will have on the natural environment.

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.

13. References

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Appendix A: Expected Avifaunal Species

Family	Scientific Name	Common Name	IUCN Red List Category	SANBI Red List Category
Accipitridae	<i>Accipiter badius</i>	Shikra	LC	LC
Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	VU	EN
Accipitridae	<i>Buteo buteo</i>	Common Buzzard	LC	LC
Accipitridae	<i>Buteo rufofuscus</i>	Jackal Buzzard	LC	LC
Accipitridae	<i>Circaetus cinereus</i>	Brown Snake Eagle	LC	LC
Accipitridae	<i>Circaetus pectoralis</i>	Black-chested Snake Eagle	LC	LC
Accipitridae	<i>Clanga pomarina</i>	Lesser Spotted Eagle	LC	LC
Accipitridae	<i>Elanus caeruleus</i>	Black-winged Kite	LC	LC
Accipitridae	<i>Gyps africanus</i>	White-backed Vulture	CR	CR
Accipitridae	<i>Haliaeetus vocifer</i>	African Fish Eagle	LC	LC
Accipitridae	<i>Hieraaetus wahlbergi</i>	Wahlberg's Eagle	LC	LC
Accipitridae	<i>Melierax metabates</i>	Dark Chanting Goshawk	LC	LC
Accipitridae	<i>Micronisus gabar</i>	Gabar Goshawk	LC	LC
Accipitridae	<i>Milvus aegyptius</i>	Yellow-billed Kite	LC	LC
Accipitridae	<i>Polemaetus bellicosus</i>	Martial Eagle	EN	EN
Accipitridae	<i>Polyboroides typus</i>	African Harrier-Hawk	LC	LC
Accipitridae	<i>Terathopius ecaudatus</i>	Bateleur	EN	EN
Accipitridae	<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	EN
Accipitridae	<i>Trionoceph occipitalis</i>	White-headed Vulture	CR	CR
Alaudidae	<i>Calendulauda sabota</i>	Sabota Lark	LC	LC
Alaudidae	<i>Eremopterix leucotis</i>	Chestnut-backed Sparrow-Lark	LC	LC
Alaudidae	<i>Mirafra africana</i>	Rufous-naped Lark	LC	LC
Alaudidae	<i>Mirafra rufocinnamomea</i>	Flappet Lark	LC	LC
Alcedinidae	<i>Ceryle rudis</i>	Pied Kingfisher	LC	LC
Alcedinidae	<i>Corythornis cristatus</i>	Malachite Kingfisher	LC	LC
Alcedinidae	<i>Halcyon albiventris</i>	Brown-hooded Kingfisher	LC	LC
Alcedinidae	<i>Halcyon chelicuti</i>	Striped Kingfisher	LC	LC
Alcedinidae	<i>Halcyon senegalensis</i>	Woodland Kingfisher	LC	LC
Anatidae	<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC	LC
Anatidae	<i>Anas sparsa</i>	African Black Duck	LC	LC
Anatidae	<i>Dendrocygna viduata</i>	White-faced Whistling Duck	LC	LC
Apodidae	<i>Cypsiurus parvus</i>	African Palm Swift	LC	LC
Ardeidae	<i>Ardea alba</i>	Great Egret	LC	LC
Ardeidae	<i>Ardea cinerea</i>	Grey Heron	LC	LC
Ardeidae	<i>Ardea melanocephala</i>	Black-headed Heron	LC	LC
Ardeidae	<i>Bubulcus ibis</i>	Western Cattle Egret	LC	LC

Family	Scientific Name	Common Name	IUCN Red List Category	SANBI Red List Category
Ardeidae	<i>Egretta garzetta</i>	Little Egret	LC	LC
Bucerotidae	<i>Bycanistes bucinator</i>	Trumpeter Hornbill	LC	LC
Bucerotidae	<i>Lophoceros nasutus</i>	African Grey Hornbill	LC	LC
Bucerotidae	<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill	LC	LC
Bucerotidae	<i>Tockus rufirostris</i>	Southern Red-billed Hornbill	Not listed	LC
Buphagidae	<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	LC	NT
Burhinidae	<i>Burhinus capensis</i>	Spotted Thick-knee	LC	LC
Burhinidae	<i>Burhinus vermiculatus</i>	Water Thick-knee	LC	LC
Campephagidae	<i>Campephaga flava</i>	Black Cuckooshrike	LC	LC
Caprimulgidae	<i>Caprimulgus europaeus</i>	European Nightjar	LC	LC
Caprimulgidae	<i>Caprimulgus fossii</i>	Square-tailed Nightjar	LC	LC
Charadriidae	<i>Charadrius tricollaris</i>	Three-banded Plover	LC	LC
Charadriidae	<i>Vanellus armatus</i>	Blacksmith Lapwing	LC	LC
Charadriidae	<i>Vanellus coronatus</i>	Crowned Lapwing	LC	LC
Ciconiidae	<i>Ciconia episcopus</i>	Woolly-necked Stork	NT	LC
Ciconiidae	<i>Leptoptilos crumenifer</i>	Marabou Stork	LC	NT
Ciconiidae	<i>Mycteria ibis</i>	Yellow-billed Stork	LC	EN
Cisticolidae	<i>Apalis flavida</i>	Yellow-breasted Apalis	LC	LC
Cisticolidae	<i>Apalis ruddi</i>	Rudd's Apalis	LC	LC
Cisticolidae	<i>Camaroptera brachyura</i>	Green-backed Camaroptera	LC	LC
Cisticolidae	<i>Cisticola aberrans</i>	Lazy Cisticola	LC	LC
Cisticolidae	<i>Cisticola chiniana</i>	Rattling Cisticola	LC	LC
Cisticolidae	<i>Cisticola erythrops</i>	Red-faced Cisticola	LC	LC
Cisticolidae	<i>Cisticola fulvicapilla</i>	Neddicky	LC	LC
Cisticolidae	<i>Cisticola juncidis</i>	Zitting Cisticola	LC	LC
Cisticolidae	<i>Cisticola natalensis</i>	Croaking Cisticola	LC	LC
Cisticolidae	<i>Cisticola textrix</i>	Cloud Cisticola	LC	LC
Cisticolidae	<i>Eremomela icteropygialis</i>	Yellow-bellied Eremomela	LC	LC
Cisticolidae	<i>Eremomela usticollis</i>	Burnt-necked Eremomela	LC	LC
Cisticolidae	<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	LC
Coliidae	<i>Colius striatus</i>	Speckled Mousebird	LC	LC
Coliidae	<i>Urocolius indicus</i>	Red-faced Mousebird	LC	LC
Columbidae	<i>Oena capensis</i>	Namaqua Dove	LC	LC
Columbidae	<i>Spilopelia senegalensis</i>	Laughing Dove	LC	LC

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Columbidae	<i>Streptopelia capicola</i>	Cape Turtle Dove	LC	LC
Columbidae	<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC	LC
Columbidae	<i>Treron calvus</i>	African Green Pigeon	LC	LC
Columbidae	<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	LC	LC
Columbidae	<i>Turtur tympanistria</i>	Tambourine Dove	LC	LC
Coraciidae	<i>Coracias caudatus</i>	Lilac-breasted Roller	LC	NT
Coraciidae	<i>Coracias garrulus</i>	European Roller	LC	LC
Corvidae	<i>Corvus albus</i>	Pied Crow	LC	LC
Cuculidae	<i>Centropus burchellii</i>	Burchell's Coucal	Not listed	LC
Cuculidae	<i>Chrysococcyx caprius</i>	Diederik Cuckoo	LC	LC
Cuculidae	<i>Chrysococcyx klaas</i>	Klaas's Cuckoo	LC	LC
Cuculidae	<i>Clamator jacobinus</i>	Jacobin Cuckoo	LC	LC
Cuculidae	<i>Cuculus clamosus</i>	Black Cuckoo	LC	LC
Cuculidae	<i>Cuculus gularis</i>	African Cuckoo	LC	LC
Cuculidae	<i>Cuculus solitarius</i>	Red-chested Cuckoo	LC	LC
Dicruridae	<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC	LC
Emberizidae	<i>Emberiza flaviventris</i>	Golden-breasted Bunting	LC	LC
Emberizidae	<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	LC	LC
Estrildidae	<i>Amandava subflava</i>	Orange-breasted Waxbill	LC	LC
Estrildidae	<i>Estrilda astrild</i>	Common Waxbill	LC	LC
Estrildidae	<i>Lagonosticta rhodopareia</i>	Jameson's Firefinch	LC	LC
Estrildidae	<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	LC
Estrildidae	<i>Ortygospiza atricollis</i>	Quailfinch	LC	Not listed
Estrildidae	<i>Pytilia melba</i>	Green-winged Pytilia	LC	LC
Estrildidae	<i>Spermestes cucullata</i>	Bronze Mannikin	LC	LC
Estrildidae	<i>Uraeginthus angolensis</i>	Blue Waxbill	LC	LC
Falconidae	<i>Falco amurensis</i>	Amur Falcon	LC	LC
Falconidae	<i>Falco biarmicus</i>	Lanner Falcon	LC	VU
Fringillidae	<i>Crithagra gularis</i>	Streaky-headed Seedeater	LC	LC
Fringillidae	<i>Crithagra mozambica</i>	Yellow-fronted Canary	LC	LC
Hirundinidae	<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC	LC
Hirundinidae	<i>Cecropis semirufa</i>	Red-breasted Swallow	LC	LC
Hirundinidae	<i>Hirundo albigularis</i>	White-throated Swallow	LC	LC
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	LC	LC
Hirundinidae	<i>Hirundo smithii</i>	Wire-tailed Swallow	LC	LC

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<i>Hirundinidae</i>	<i>Psalidoprocne pristoptera holomelas</i>	Black (Southern Africa) Saw-wing	Not listed	Not listed
<i>Hirundinidae</i>	<i>Riparia paludicola</i>	Brown-throated Martin	LC	LC
<i>Indicatoridae</i>	<i>Indicator indicator</i>	Greater Honeyguide	LC	LC
<i>Indicatoridae</i>	<i>Indicator minor</i>	Lesser Honeyguide	LC	LC
<i>Laniidae</i>	<i>Lanius collaris</i>	Southern Fiscal	LC	LC
<i>Laniidae</i>	<i>Lanius collurio</i>	Red-backed Shrike	LC	LC
<i>Laniidae</i>	<i>Lanius minor</i>	Lesser Grey Shrike	LC	LC
<i>Laniidae</i>	<i>Urolestes melanoleucus</i>	Magpie Shrike	LC	LC
<i>Leiothrichidae</i>	<i>Turdoides jardineii</i>	Arrow-marked Babbler	LC	LC
<i>Lybiidae</i>	<i>Lybius torquatus</i>	Black-collared Barbet	LC	LC
<i>Lybiidae</i>	<i>Pogoniulus pusillus</i>	Red-fronted Tinkerbird	LC	LC
<i>Lybiidae</i>	<i>Trachyphonus vaillantii</i>	Crested Barbet	LC	LC
<i>Lybiidae</i>	<i>Tricholaema leucomelas</i>	Acacia Pied Barbet	LC	LC
<i>Macrosphenidae</i>	<i>Sylvietta rufescens</i>	Long-billed Crombec	LC	LC
<i>Malaconotidae</i>	<i>Chlorophoneus sulfureopectus</i>	Orange-breasted Bushshrike	LC	LC
<i>Malaconotidae</i>	<i>Dryoscopus cubla</i>	Black-backed Puffback	LC	LC
<i>Malaconotidae</i>	<i>Laniarius ferrugineus</i>	Southern Boubou	LC	LC
<i>Malaconotidae</i>	<i>Malaconotus blanchoti</i>	Grey-headed Bushshrike	LC	LC
<i>Malaconotidae</i>	<i>Nilaus afer</i>	Brubru	LC	LC
<i>Malaconotidae</i>	<i>Tchagra australis</i>	Brown-crowned Tchagra	LC	LC
<i>Malaconotidae</i>	<i>Tchagra senegalus</i>	Black-crowned Tchagra	LC	LC
<i>Malaconotidae</i>	<i>Telophorus viridis</i>	Gorgeous Bushshrike	LC	LC
<i>Meropidae</i>	<i>Merops apiaster</i>	European Bee-eater	LC	LC
<i>Meropidae</i>	<i>Merops bullockoides</i>	White-fronted Bee-eater	LC	LC
<i>Meropidae</i>	<i>Merops pusillus</i>	Little Bee-eater	LC	LC
<i>Monarchidae</i>	<i>Terpsiphone viridis</i>	African Paradise Flycatcher	LC	LC
<i>Motacillidae</i>	<i>Anthus caffer</i>	Bushveld Pipit	LC	LC
<i>Motacillidae</i>	<i>Anthus cinnamomeus</i>	African Pipit	LC	LC
<i>Motacillidae</i>	<i>Anthus leucophrys</i>	Plain-backed Pipit	LC	LC
<i>Motacillidae</i>	<i>Macronyx croceus</i>	Yellow-throated Longclaw	LC	LC
<i>Motacillidae</i>	<i>Motacilla aguimp</i>	African Pied Wagtail	LC	LC
<i>Motacillidae</i>	<i>Motacilla capensis</i>	Cape Wagtail	LC	LC

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Muscicapidae	<i>Cercotrichas leucophrys</i>	White-browed Scrub Robin	LC	LC
Muscicapidae	<i>Cossypha heuglini</i>	White-browed Robin-Chat	LC	LC
Muscicapidae	<i>Cossypha humeralis</i>	White-throated Robin-Chat	LC	LC
Muscicapidae	<i>Cossypha natalensis</i>	Red-capped Robin-Chat	LC	LC
Muscicapidae	<i>Melaenornis pallidus</i>	Pale Flycatcher	LC	LC
Muscicapidae	<i>Melaenornis pammelaina</i>	Southern Black Flycatcher	LC	LC
Muscicapidae	<i>Melaenornis silens</i>	Fiscal Flycatcher	LC	LC
Muscicapidae	<i>Muscicapa caeruleascens</i>	Ashy Flycatcher	LC	LC
Muscicapidae	<i>Muscicapa striata</i>	Spotted Flycatcher	LC	LC
Muscicapidae	<i>Myioparus plumbeus</i>	Grey Tit-Flycatcher	LC	LC
Muscicapidae	<i>Oenanthe familiaris</i>	Familiar Chat	LC	LC
Muscicapidae	<i>Saxicola torquatus</i>	African Stonechat	LC	LC
Musophagidae	<i>Crinifer concolor</i>	Grey Go-away-bird	LC	LC
Musophagidae	<i>Gallirex porphyreolophus</i>	Purple-crested Turaco	LC	LC
Nectariniidae	<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	LC	LC
Nectariniidae	<i>Cinnyris bifasciatus</i>	Purple-banded Sunbird	LC	LC
Nectariniidae	<i>Cinnyris mariquensis</i>	Marico Sunbird	LC	LC
Nectariniidae	<i>Cinnyris talatala</i>	White-bellied Sunbird	LC	LC
Nicatoridae	<i>Nicator gularis</i>	Eastern Nicator	LC	LC
Numididae	<i>Numida meleagris</i>	Helmeted Guineafowl	LC	LC
Oriolidae	<i>Oriolus larvatus</i>	Black-headed Oriole	LC	LC
Otididae	<i>Lissotis melanogaster</i>	Black-bellied Bustard	LC	LC
Otididae	<i>Lophotis ruficrista</i>	Red-crested Korhaan	LC	LC
Paridae	<i>Melaniparus niger</i>	Southern Black Tit	LC	LC
Passeridae	<i>Gymnoris superciliaris</i>	Yellow-throated Bush Sparrow	LC	Not listed
Passeridae	<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC	LC
Phasianidae	<i>Dendroperdix sephaena</i>	Crested Francolin	LC	LC
Phasianidae	<i>Pternistis natalensis</i>	Natal Spurfowl	LC	LC
Phasianidae	<i>Pternistis swainsonii</i>	Swainson's Spurfowl	LC	LC
Phoeniculidae	<i>Phoeniculus purpureus</i>	Green Wood Hoopoe	LC	LC
Phoeniculidae	<i>Rhinopomastus cyanomelas</i>	Common Scimitarbill	LC	LC
Phylloscopidae	<i>Phylloscopus trochilus</i>	Willow Warbler	LC	LC
Picidae	<i>Campethera abingoni</i>	Golden-tailed Woodpecker	LC	LC

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<i>Picidae</i>	<i>Chloropicus namaquus</i>	Bearded Woodpecker	LC	LC
<i>Picidae</i>	<i>Dendropicos fuscescens</i>	Cardinal Woodpecker	LC	LC
<i>Picidae</i>	<i>Jynx ruficollis</i>	Red-throated Wryneck	LC	LC
<i>Platysteiridae</i>	<i>Batis molitor</i>	Chinspot Batis	LC	LC
<i>Ploceidae</i>	<i>Amblyospiza albifrons</i>	Thick-billed Weaver	LC	LC
<i>Ploceidae</i>	<i>Euplectes albonotatus</i>	White-winged Widowbird	LC	LC
<i>Ploceidae</i>	<i>Euplectes ardens</i>	Red-collared Widowbird	LC	LC
<i>Ploceidae</i>	<i>Euplectes axillaris</i>	Fan-tailed Widowbird	LC	LC
<i>Ploceidae</i>	<i>Euplectes orix</i>	Southern Red Bishop	LC	LC
<i>Ploceidae</i>	<i>Ploceus cucullatus</i>	Village Weaver	LC	LC
<i>Ploceidae</i>	<i>Ploceus intermedius</i>	Lesser Masked-weaver	LC	LC
<i>Ploceidae</i>	<i>Ploceus ocularis</i>	Spectacled Weaver	LC	LC
<i>Ploceidae</i>	<i>Ploceus velatus</i>	Southern Masked Weaver	LC	LC
<i>Ploceidae</i>	<i>Quelea quelea</i>	Red-billed Quelea	LC	LC
<i>Podicipedidae</i>	<i>Tachybaptus ruficollis</i>	Little Grebe	LC	LC
<i>Pycnonotidae</i>	<i>Andropadus importunus</i>	Sombre Greenbul	LC	LC
<i>Pycnonotidae</i>	<i>Phyllastrephus terrestris</i>	Terrestrial Brownbul	LC	LC
<i>Pycnonotidae</i>	<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC	LC
<i>Rallidae</i>	<i>Zapornia flavirostra</i>	Black Crake	LC	LC
<i>Remizidae</i>	<i>Anthoscopus caroli</i>	Grey Penduline Tit	LC	LC
<i>Sagittariidae</i>	<i>Sagittarius serpentarius</i>	Secretarybird	EN	VU
<i>Sarothruridae</i>	<i>Sarothrura rufa</i>	Red-chested Flufftail	LC	LC
<i>Scolopacidae</i>	<i>Actitis hypoleucos</i>	Common Sandpiper	LC	LC
<i>Scolopacidae</i>	<i>Calidris minuta</i>	Little Stint	LC	LC
<i>Scolopacidae</i>	<i>Tringa glareola</i>	Wood Sandpiper	LC	LC
<i>Scolopacidae</i>	<i>Tringa nebularia</i>	Common Greenshank	LC	LC
<i>Scopidae</i>	<i>Scopus umbretta</i>	Hamerkop	LC	LC
<i>Strigidae</i>	<i>Asio capensis</i>	Marsh Owl	LC	LC
<i>Strigidae</i>	<i>Bubo africanus</i>	Spotted Eagle-Owl	LC	LC
<i>Strigidae</i>	<i>Bubo lacteus</i>	Verreaux's Eagle-Owl	LC	LC
<i>Strigidae</i>	<i>Glaucidium perlatum</i>	Pearl-spotted Owlet	LC	LC
<i>Struthionidae</i>	<i>Struthio camelus</i>	Common Ostrich	LC	LC
<i>Sturnidae</i>	<i>Acridotheres tristis</i>	Common Myna	LC	LC

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<i>Sturnidae</i>	<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	LC	LC
<i>Sturnidae</i>	<i>Creatophora cinerea</i>	Wattled Starling	LC	LC
<i>Sturnidae</i>	<i>Lamprotornis nitens</i>	Cape Starling	LC	LC
<i>Sturnidae</i>	<i>Notopholia corusca</i>	Black-bellied Starling	LC	LC
<i>Threskiornithidae</i>	<i>Bostrychia hagedash</i>	Hadada Ibis	LC	LC
<i>Threskiornithidae</i>	<i>Platalea alba</i>	African Spoonbill	LC	LC
<i>Turdidae</i>	<i>Turdus libonyana</i>	Kurrichane Thrush	LC	LC
<i>Turdidae</i>	<i>Turdus litsitsirupa</i>	Groundscraper Thrush	LC	LC
<i>Turnicidae</i>	<i>Turnix sylvaticus</i>	Common Buttonquail	LC	LC
<i>Upupidae</i>	<i>Upupa africana</i>	African Hoopoe	LC	Not listed
<i>Vangidae</i>	<i>Prionops plumatus</i>	White-crested Helmetshrike	LC	LC
<i>Viduidae</i>	<i>Vidua chalybeata</i>	Village Indigobird	LC	LC
<i>Viduidae</i>	<i>Vidua funerea</i>	Dusky Indigobird	LC	LC
<i>Viduidae</i>	<i>Vidua macroura</i>	Pin-tailed Whydah	LC	LC
<i>Viduidae</i>	<i>Vidua paradisaea</i>	Long-tailed Paradise Whydah	LC	LC