AVIFAUNA IMPACT ASSESSMENT FOR THE PROPOSED MAKOPPA SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

Makhado Local Municipality, Vhembe District Municipality, Limpopo Province, South Africa

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Report Name	**AVIFAUNA IMPACT ASSESSMENT FOR THE PROPOSED MAKOPPA SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY**
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, Amended. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake an avifauna assessment for the proposed Tabor Solar Photovoltaic (PV) Facilities. Four facilities are proposed for the Tabor Solar cluster, with associated grid connection lines for each facility. This report assesses the Makoppa Solar PV Facility. The other facilities and associated gridlines are assessed separately. The proposed Project Area of Influence (PAOI) is located approximately 40 km south of Makhado, and 8.5 km southwest of Bandelierkop (Figure 1-1). The Project Area of Interest (PAOI) consists of a 5 km area around the project footprint provided (Figure 1-2).

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making.

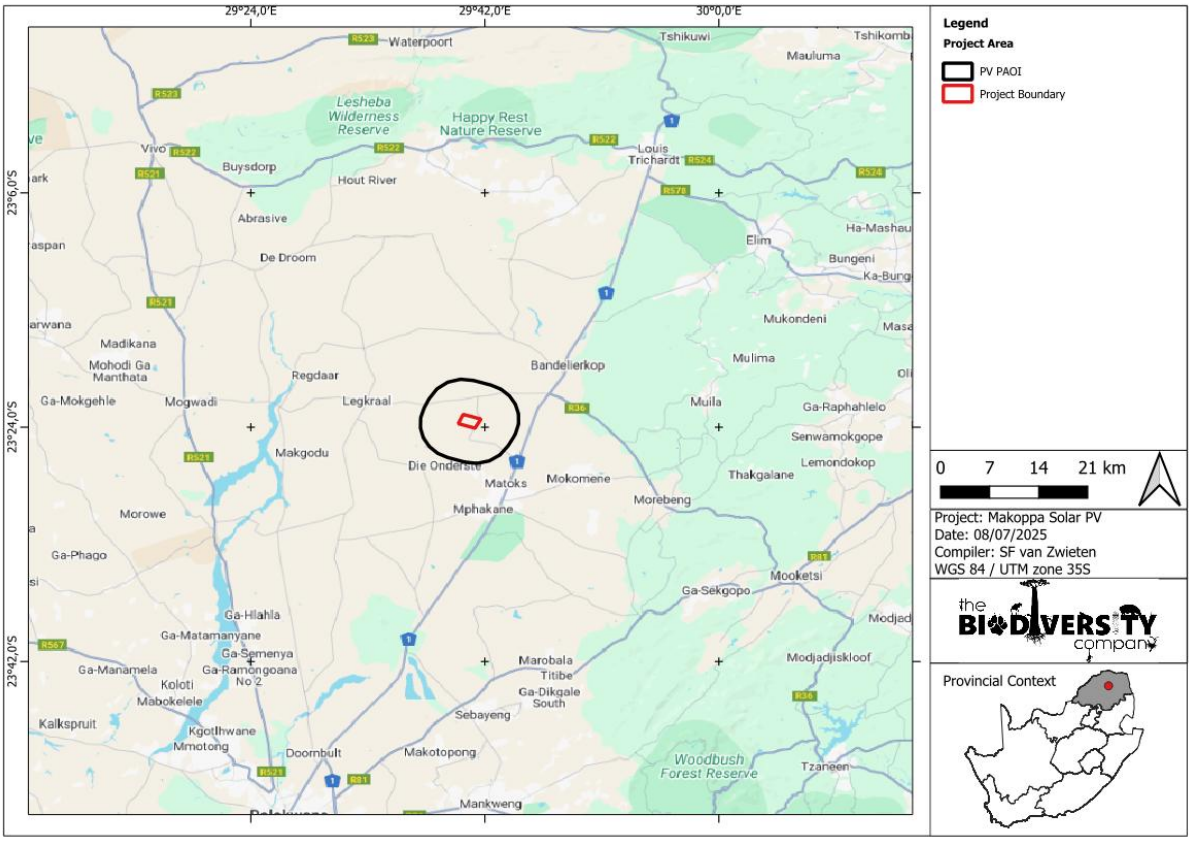


Figure 1-1 Proposed location of the project area in relation to the nearby towns

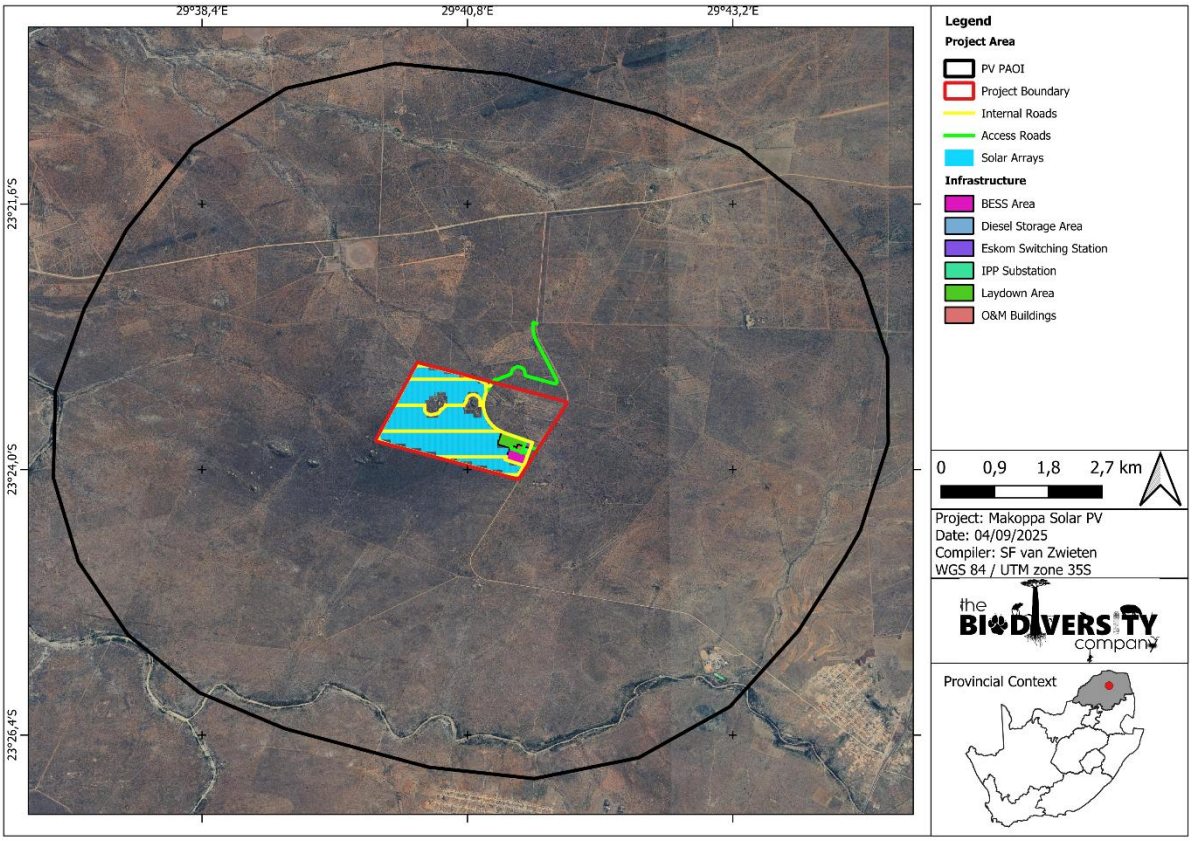


Figure 1-2 Project area of influence

1.2 Project Description

The applicant Makoppa Solar PV (Pty) Ltd are proposing the construction of a Solar Photovoltaic (PV) Energy Facility and associated infrastructure, known as Makoppa Solar PV, on Portion 1 of Farm 465 located South of Louis Trichardt in the Makhado Local Municipality, Vhembe District, Limpopo Province.

A study site of approximately 341ha is being assessed as part of this Environmental Process and the infrastructure associated with an up to 75 Megawatt (MW) PV facility.

The proposed Makoppa Solar PV Project will include the following components:

- Solar Field
    - Solar Arrays: PV modules;
    - Single axis tracking technology maximum height of 5m (aligned northsouth);
    - Solar module mounting structures comprised of galvanised steel and aluminium;
    - Foundations which will likely be drilled and concreted into the ground;
    - Solar measurement and weather stations;
    - Central/string Inverters and MV transformers in in field;
    - DC coupled Battery Energy Storage system (BESS) containers distributed through PV field located adjacent to inverters;

        - Lithium Ion battery Cells, Modules, Racks and containers.
        - Power Conversion Equipment.
        - Battery Management System.
        - Energy Management System.

- Associated Infrastructure
    - Medium Voltage (MV =22/33 kV) overhead powerlines and underground cables;
    - MV Collector stations;
    - Access road;
    - Internal gravel roads;
    - Fencing;
    - General maintenance area;
    - Storm water channels and berms;
    - Water storage tanks and pipelines;
    - Temporary work area during the construction phase (i.e. laydown area) (up to 7ha);
    - O&M buildings (up to 1ha);
    - Storerooms;
    - Diesel storage area (up to 0.25ha).
- Project IPP Substation (up to 1ha);
    - 132kV substation
    - HV transformer;
    - Substation Control Building;
    - HV metering, Scada and protection building;
    - MV collector switchgear buildings;
    - Compensation equipment (Filters capacitors reactors statcoms).
- AC coupled BESS installation at project substation and laydown area (up to 6ha);
    - Solid Sate Battery technology - either Lithium-Ion or Sodium Sulphide (NaS)
        - Battery Cells, Modules, Racks and containers;
        - Power Conversion Equipment;

- Battery Management System;
- Energy Management System;
- MV transformers;
- MV cabling and collector stations;
- Fencing;
- Offices, workshop;
- Fire Protection systems

1.3 Scope of Work

The assessment was conducted according to the above-mentioned (Section 1.1) legislation on assessment and reporting criteria and the best-practice guidelines and principles for Avifaunal Impact Assessments within the context of PVs as outlined by BirdLife South Africa (2017).

The scope of the Avifaunal Impact Assessment included the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the Project Area of Influence (PAOI) and surrounding landscape
- Desktop assessment to compile an expected species list and possible avifauna Species of Conservation Concern (SCC) that potentially occur within the PAOI;
- Field work to determine the density and composition of species in the PAOI;
- Description of the baseline avifauna species and Functional Feeding Guild (FFG) composition assemblage within the PAOI;
- Delineate site sensitivity or sensitivities i.e., the Site Ecological Importance (SEI) within the context of the avifauna species assemblage of the PAOI;
- Identify the manner that the proposed development impacts the avifauna community and evaluate the level of risk of these potential impacts; and
- Provide mitigation measures to prevent or reduce the possible impacts.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The PAOI was based on the project footprint area as provided by the client. Any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;
- The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025. These assessments include a wet and dry season survey and are deemed sufficient for a Regime 2 assessment;

- Whilst every effort was made to cover as much of the PAOI as possible it is possible that some species that are present within the PAOI were not recorded during the field investigations due to their secretive behaviour; and

- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features delineated may be offset by up to 5 m.

1.5 Key Legislative Requirements

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

Table 1-1 A list of key legislative requirements

Region	Legislation / Guideline	Comment
National	NEMA	Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 requirements
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), Threatened or Protected Species Regulations	The protection of species and ecosystems that warrant protection
	Assessment Protocol (March 2020)	The minimum criteria for reporting.
	Assessment Protocol (October 2020)	Protocol for the specialist assessment and minimum report content requirements.
	NEMWA	The regulation of waste management to protect the environment.
	NWA	The regulation of water uses.
	GN 1003 of GG 43726 of 18 Sept 2020	The regulation and management of alien invasive species.
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilisation of the natural agricultural resources, including the vegetation and the combating of weeds and invader plants.
Provincial	Limpopo Environmental Management Act (2003)	To provide for the management and conservation of the Limpopo's Province's biophysical environment and protected areas.
	Limpopo Conservation Plan (2018)	Designation of conservation areas and targets.

2 Fieldwork

2.1 Avifauna Field Assessment

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025. These assessments are deemed sufficient for a Regime 2 assessment.

Point Counts

Standardized point counts (Buckland *et al.,* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as power lines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering. Figure 2-1 shows the locations of the point counts conducted and the GPS tracks of the specialists during the two field surveys.

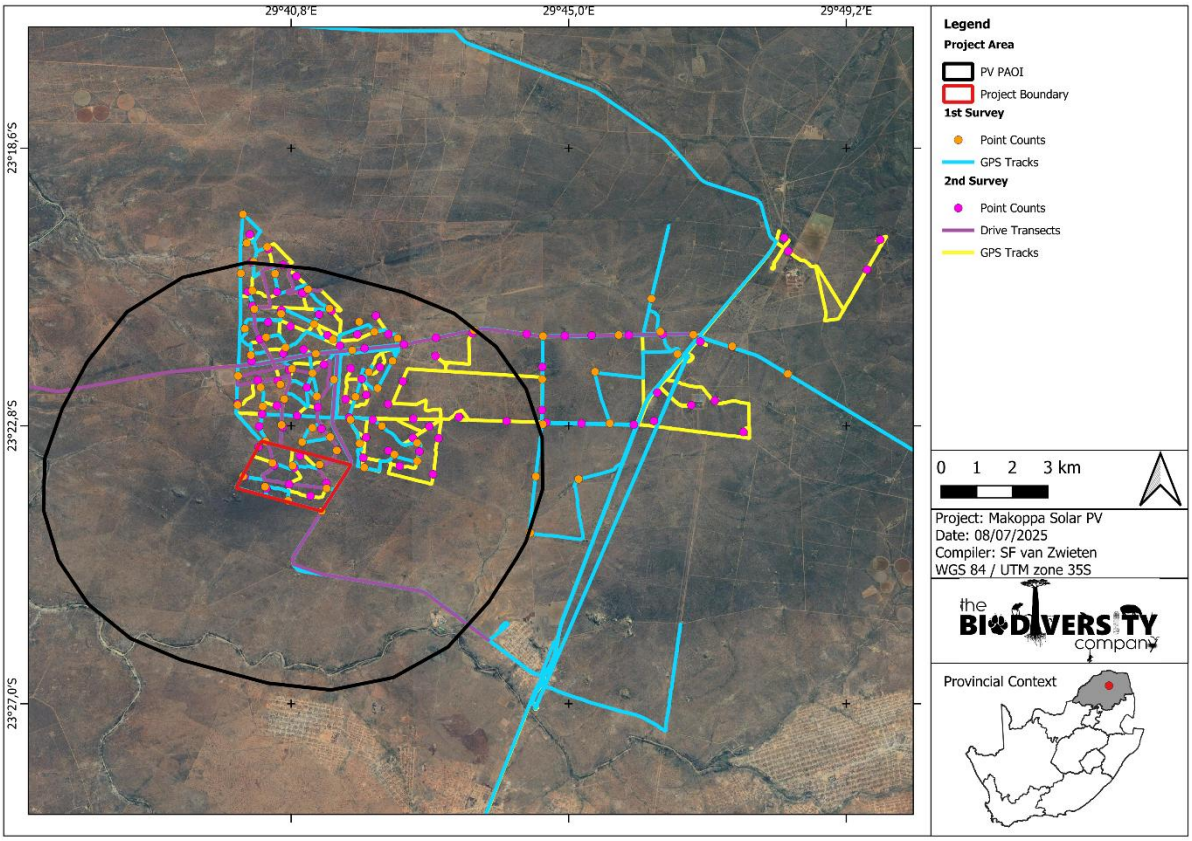


Figure 2-1 Map illustrating the point count locations, drive transects and GPS tracks during the field surveys

3 Results & Discussion

3.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 3-1.

Table 3-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Irrelevant – Overlaps with an "LC" Ecosystems (RLE, 2021).	3.1.1
Ecosystem Protection Level	Relevant – Overlaps with a 'Poorly Protected' Ecosystem.	3.1.2
Provincial Conservation Plan	Relevant – Project footprint overlaps with ONA.	3.1.3
National Protected Areas Expansion Strategy	Irrelevant – Does not overlaps with a NPAES focus areas.	-
SAPAD & SACAD	Relevant – PAOI overlaps with a SACAD area (Vhembe Biosphere Reserve) and is within 10 km of a SAPAD area (Blijdschap Private Nature Reserve).	3.1.4
Key Biodiversity Areas	Irrelevant – The PAOI is over 30 km away from any KBA.	-
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant – PAOI overlaps with CR and EN rivers, but none in the project area.	3.1.5
National Freshwater Priority Area	Relevant – PAOI overlaps with NFEPA Non-priority wetlands and Moderately Modified rivers, but none within the project area.	3.1.6
South Africa's Strategic Water Source Areas	Irrelevant – The PAOI does not overlap with any Strategic Water Source Areas.	-
RAMSAR Wetlands	Irrelevant – The PAOI does not overlap with any RAMSAR Area	-
Renewable Energy Development Zones	Irrelevant – The PAOI does not overlap with any REDZs	-
Renewable Energy Database	Relevant – PAOI overlaps with an REEA project.	3.1.7
Strategic Transmission Corridors (EGI)	Relevant – Overlaps with the International Corridor	3.1.8
Coordinated Water Bird Count	Irrelevant – Nearest CWAC site ~ 35 km from the project area	3.1.9
Coordinated Avifaunal Road Count	Irrelevant – Nearest CAR route ~ 200 km from the project area	3.1.10

3.1.1 Red List of Ecosystems

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed development overlaps with a LC ecosystem (Figure 3-1).

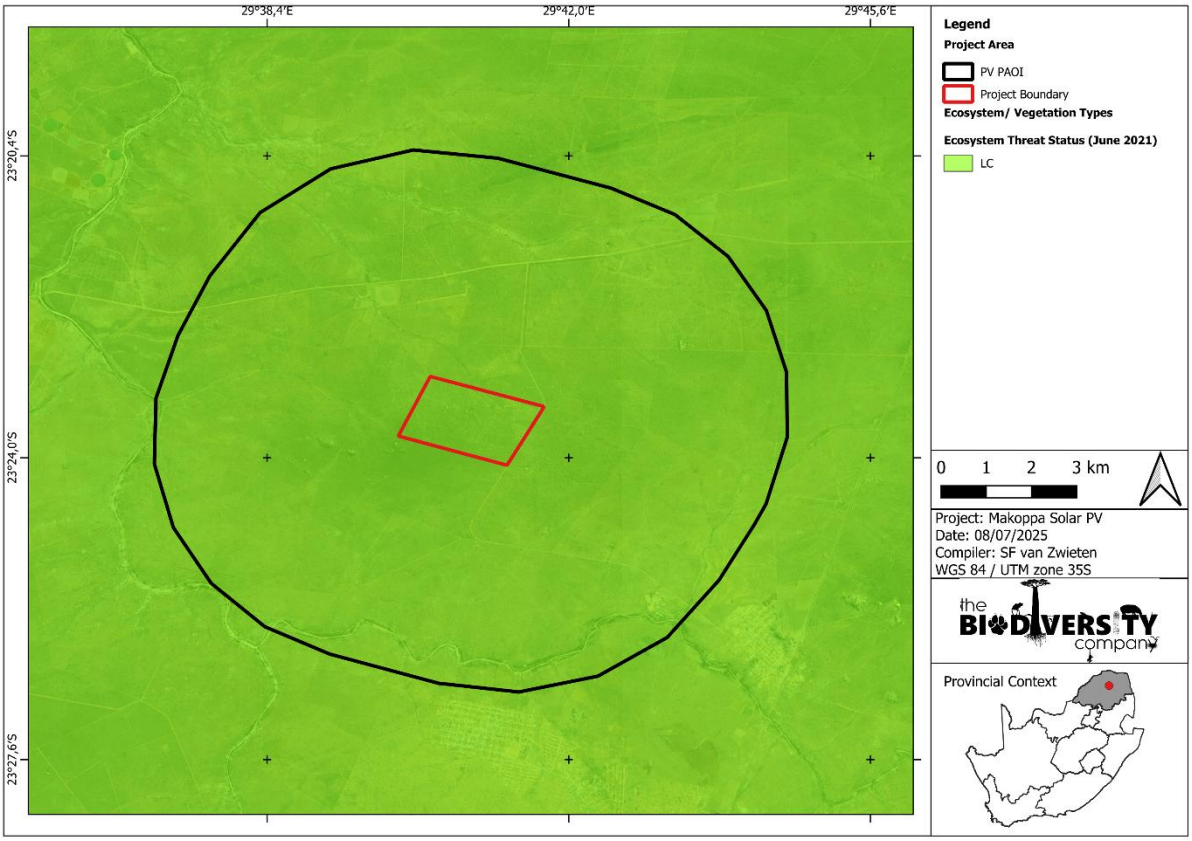


Figure 3-1 Map illustrating the ecosystem threat status associated with the proposed development

3.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a PP ecosystem (Figure 3-2).

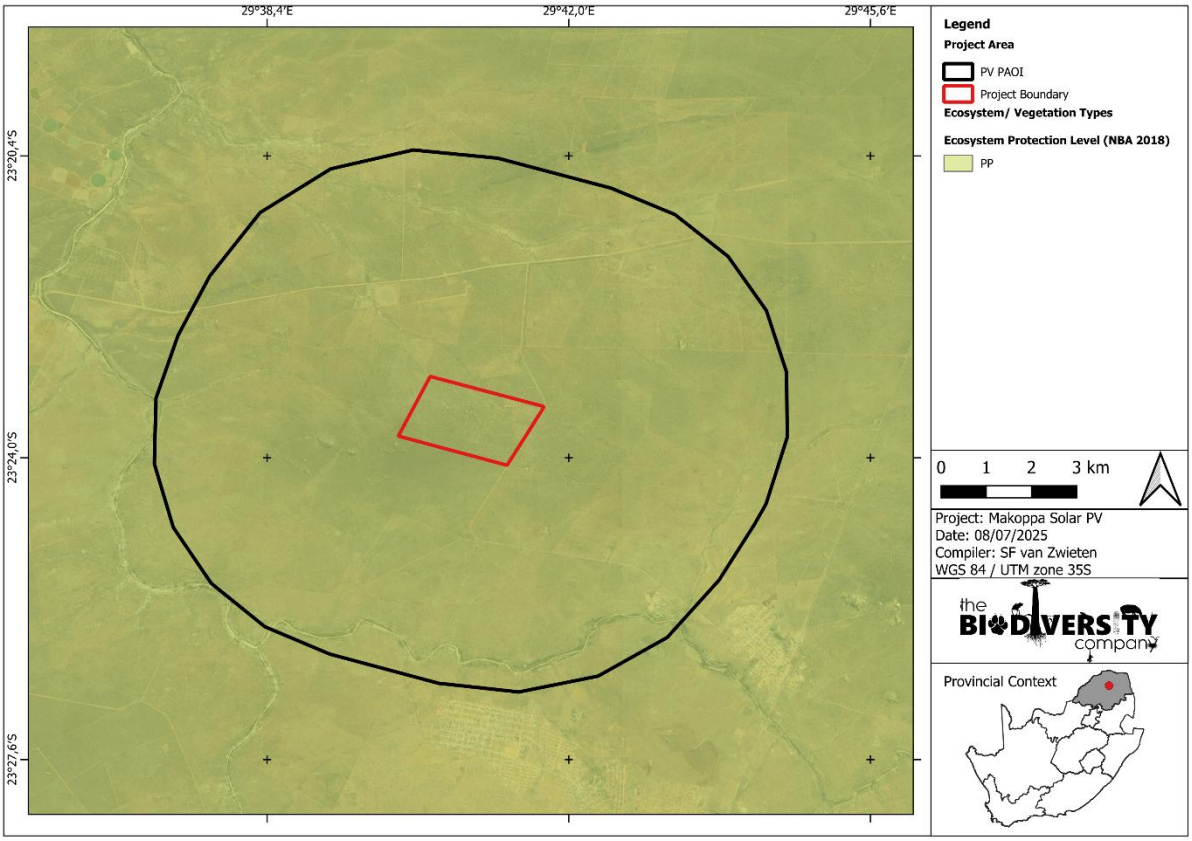


Figure 3-2 Map illustrating the ecosystem protection level associated with the PAOI

3.1.3 Critical Biodiversity Areas and Ecological Support Areas

The key output of this systematic biodiversity plan is a map of biodiversity priority areas (LCPv2, 2018). The LCPv2 CBA map delineates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas, Protected Areas, and areas that have been irreversibly modified from their natural state ((LCPv2, 2018). The LCPv2 uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- Critical Biodiversity Area (CBA);
- Ecological Support Area (ESA);
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Remaining (NNR).

According to the LCPv2 the PAOI falls across areas classified as CBA1, CBA2, ESA1, ESA2, ONA, and NNR (Figure 3-3). The project footprint falls across Other Natural Areas.

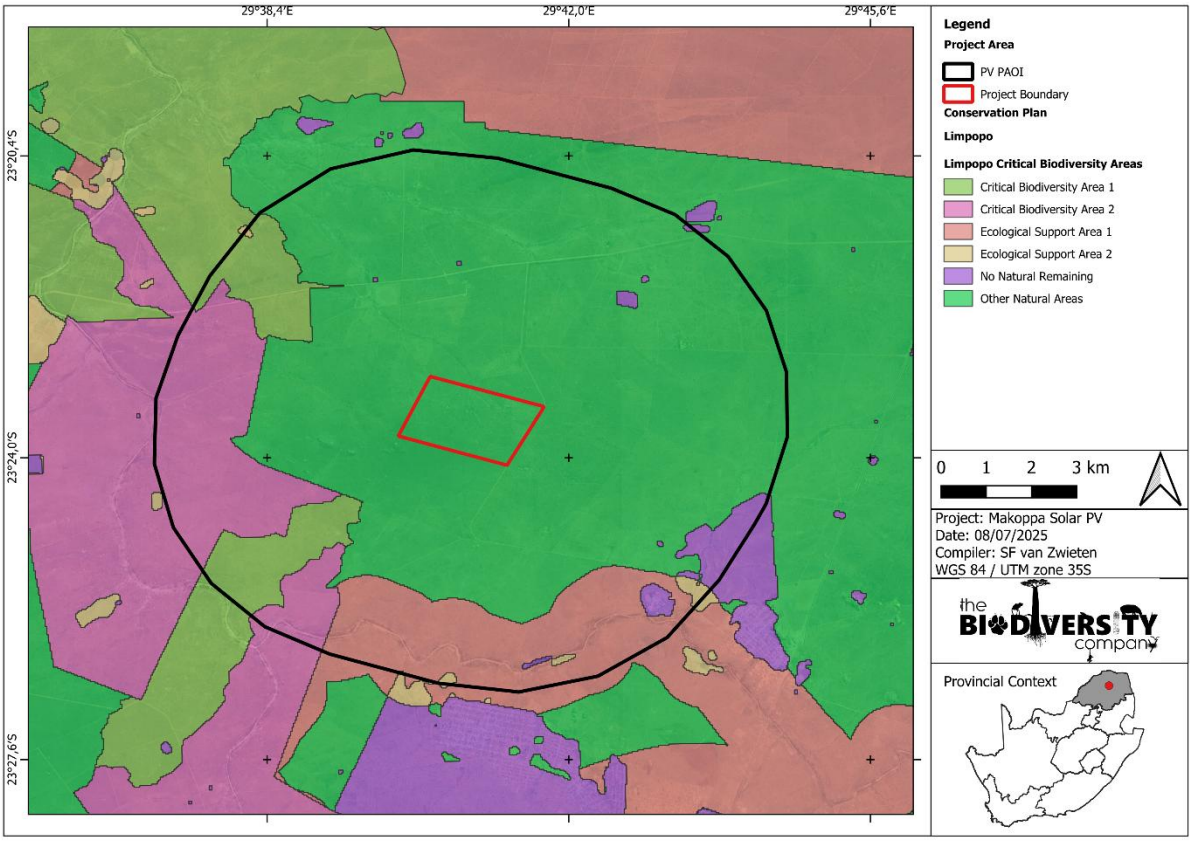


Figure 3-3 Map illustrating the biodiversity spatial plan in relation to the PAOI

3.1.4 Protected Areas

According to the protected and conservation area spatial datasets from SAPAD and SACAD (DFFE, 2021a), the PAOI is within 10 km of a SAPAD Protected area, being the Blijdschap Private Nature Reserve (Figure 3-4). The PAOI overlaps with the Vhembe Biosphere Reserve SACAD area.

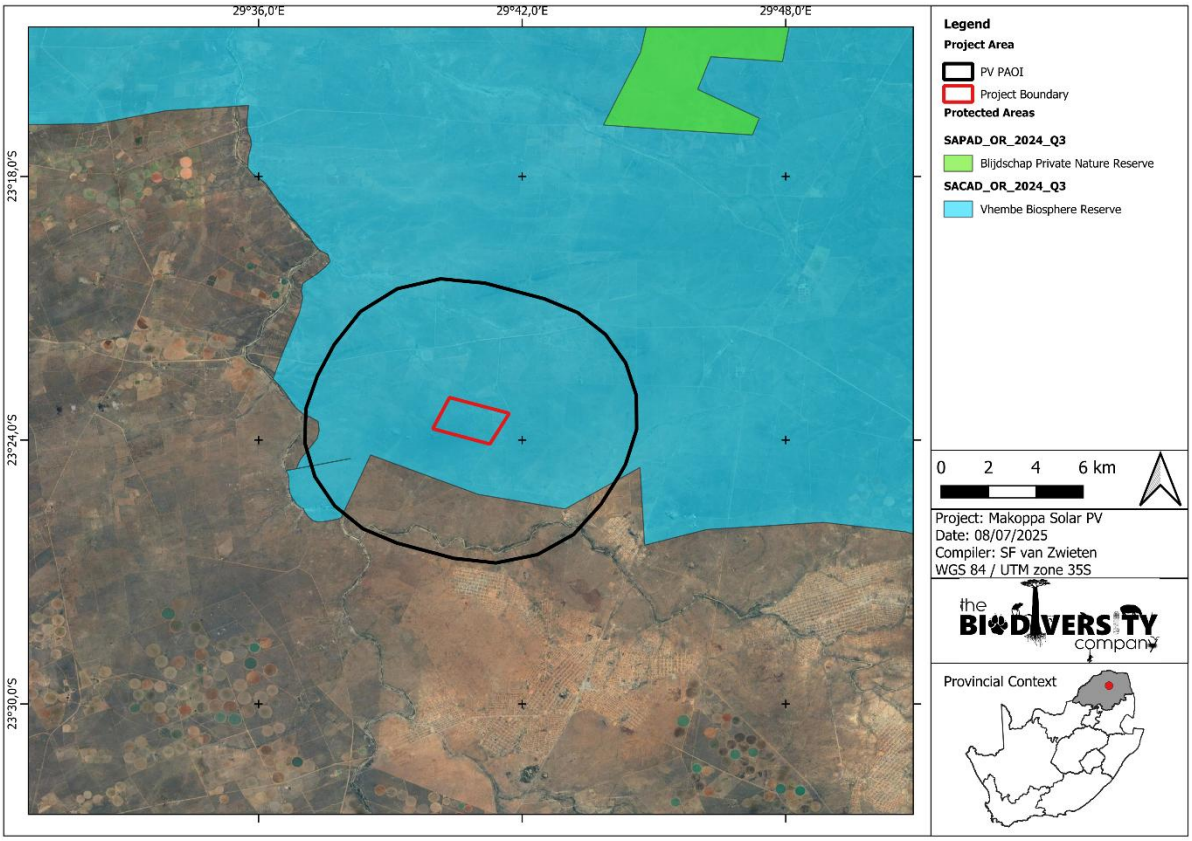


Figure 3-4 Map illustrating the location of conservation and protected areas proximal to the PAOI

3.1.5 South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA in 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al*., 2019; Skowno *et al*., 2019). The PAOI overlaps with CR and EN rivers (Figure 3-5).

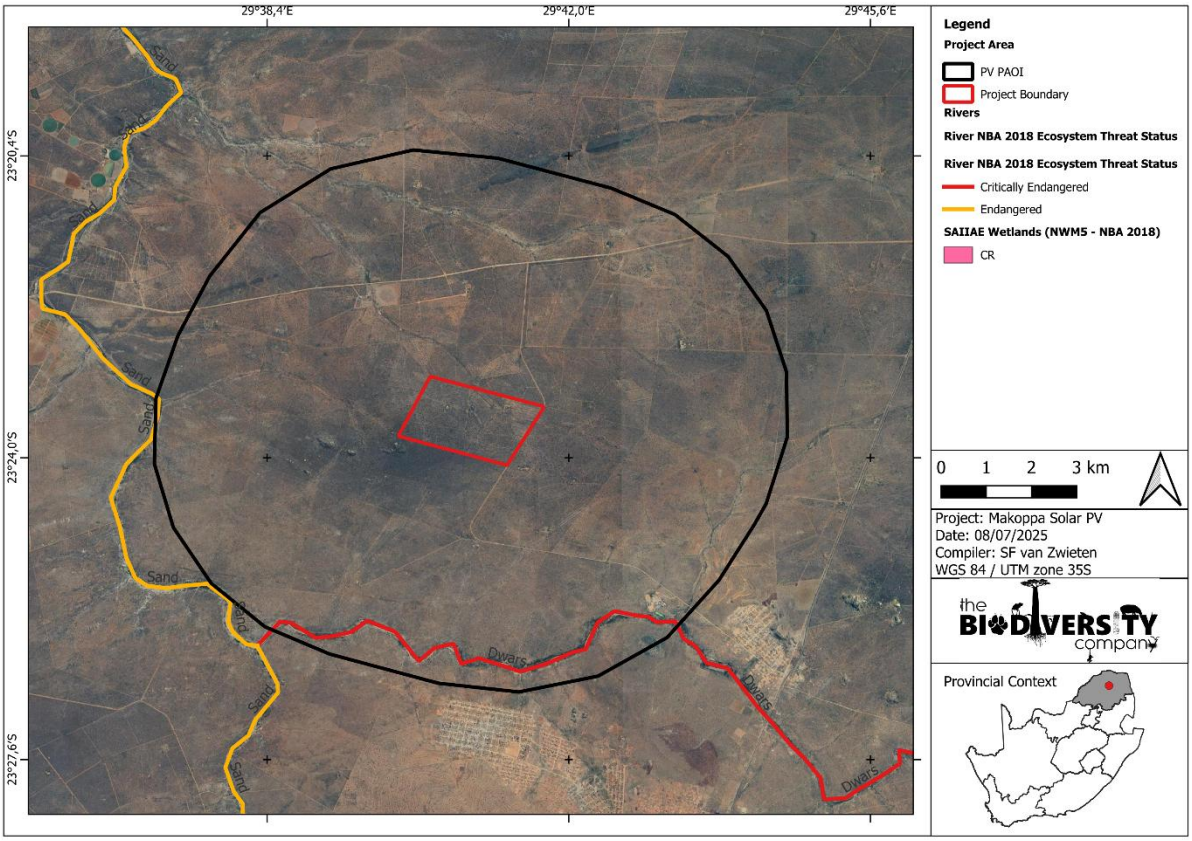


Figure 3-5 Map illustrating ecosystem threat status of rivers and wetland ecosystems in relation to the PAOI

3.1.6 National Freshwater Ecosystem Priority Area Status

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

Figure 3-6 shows that the PAOI overlaps with non-priority wetlands and moderately modified rivers, but none within the project area.

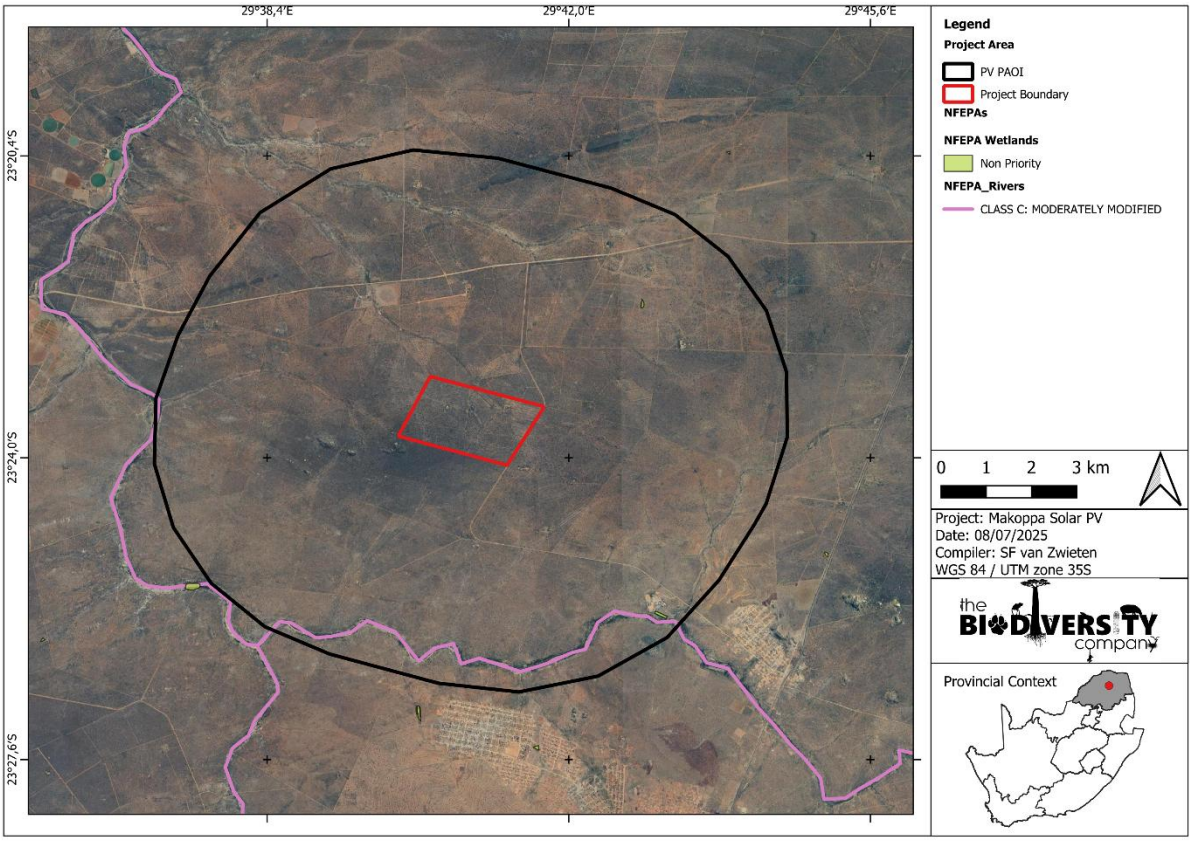


Figure 3-6 The PAOI in relation to the National Freshwater Ecosystem Priority Areas

3.1.7 Renewable Energy EIA Application Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there are approved projects of a similar nature in the near vicinity of the PAOI (Figure 3-7). This will increase the overall impact on the habitats in the area.

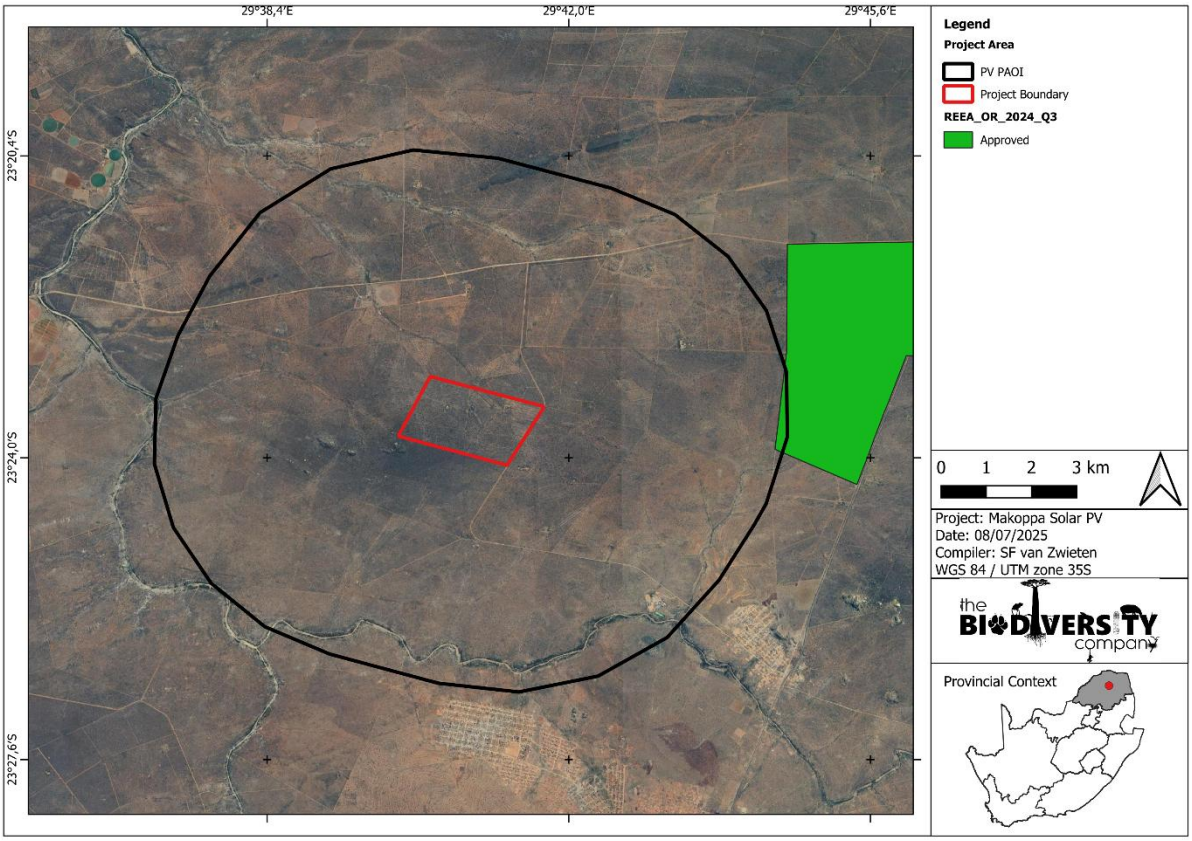


Figure 3-7 The project area in relation to the renewable energy database projects in the area.

3.1.8 Strategic Transmission Corridors

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

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

The project area falls within the International Strategic Transmission Corridor (EGI) (Figure 3-8).

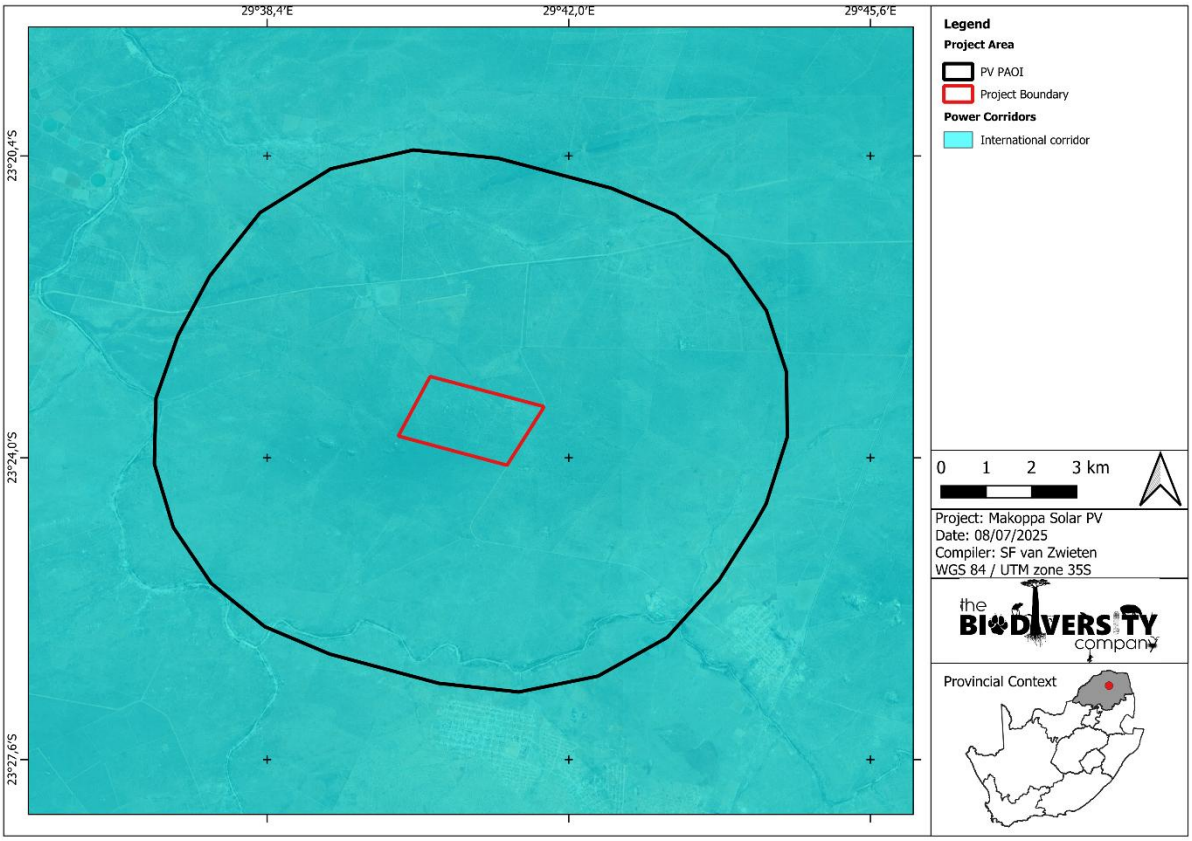


Figure 3-8 The PAOI in relation to the strategic transmission corridors

3.1.9 Coordinated Waterbird Counts (CWAC)

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to International waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC please refer to http://cwac.birdmap.africa/about.php. Figure 3-9 shows the PAOI is over 35 km away from the nearest CWAC site.

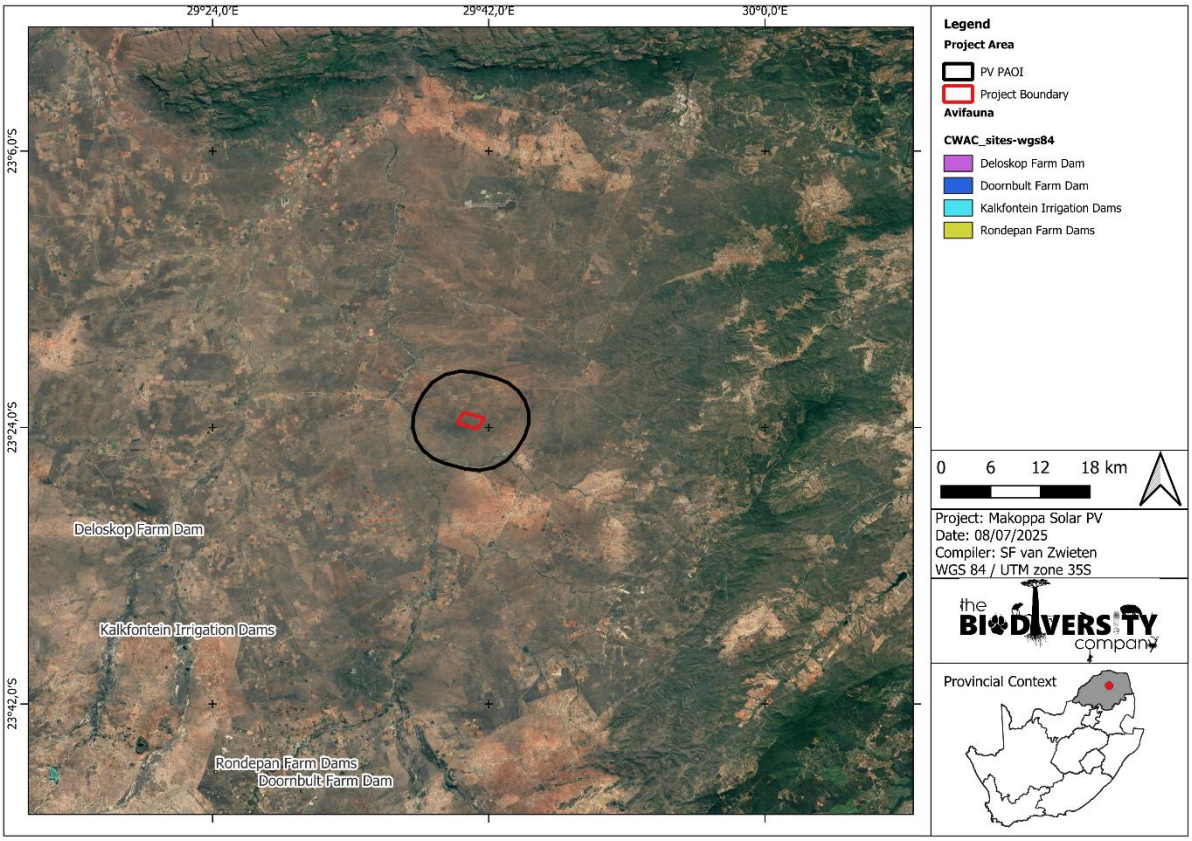


Figure 3-9 The PAOI in relation to the CWAC sites

3.1.10 Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis denhami*). Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), roadcounts are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 3-10 shows that the PAOI is ~200 km away from the nearest CAR route.

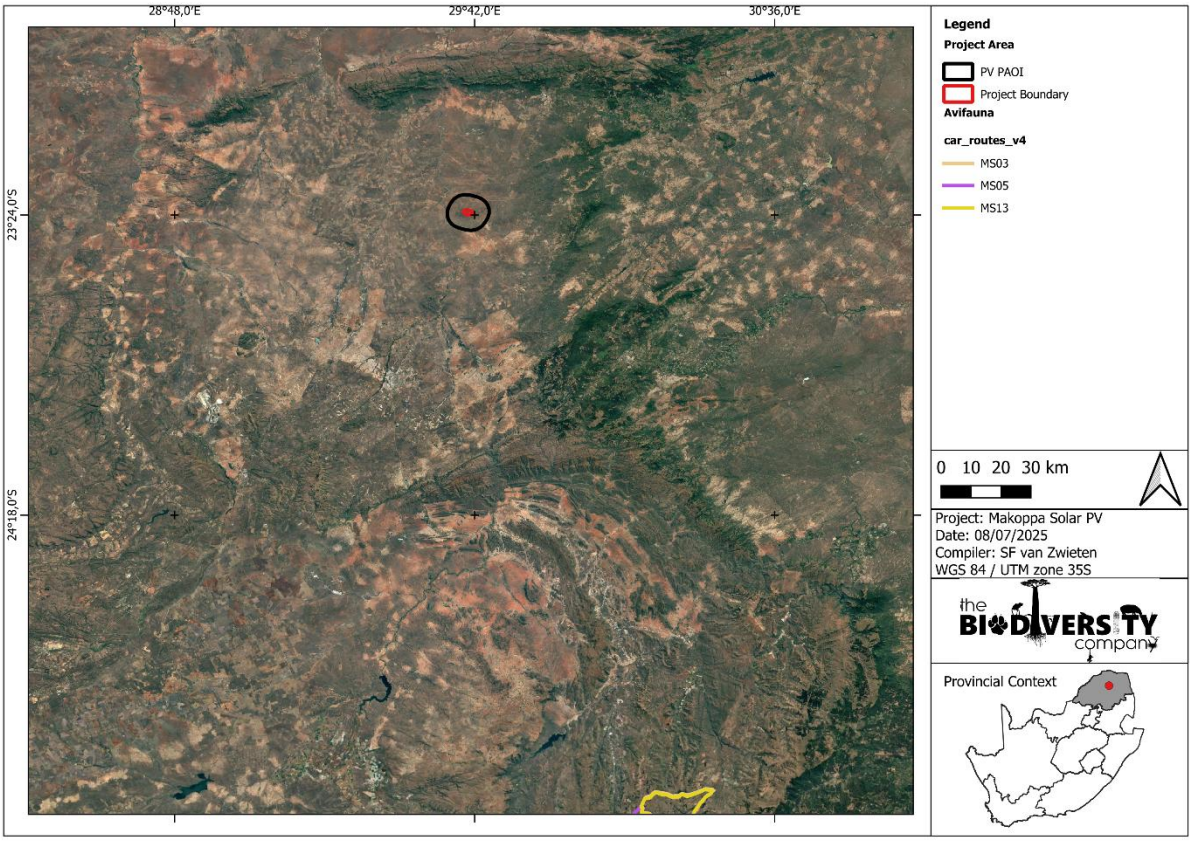


Figure 3-10 The CAR routes in relation to the PAOI

3.2 Avifauna Expected Species

SABAP2 data indicate that 283 avifauna species are expected for the PAOI and surrounds. Of these, 16 are considered SCC. The screening tool identifies two additional avifauna SCC, the Tawny Eagle (*Aquila rapax*) and the African Finfoot (*Podica senegalensis*), and one additional SCC was observed during the field surveys, the Black-crowned Night Heron (*Nycticorax nycticorax*), which results in 19 avifaunal SCC expected for the PAOI. The likelihood of occurrence for these SCCs within the POAI is indicated in Table 3-2. Of these, 11 SCCs have a high likelihood of occurrence, with five of these species being observed during the field surveys, the Black-crowned Night Heron (*Nycticorax nycticorax*), Black-winged Kite (*Elanus caeruleus*), the Cape Vulture (*Gyps coprotheres*), European Roller (*Coracias garrulus*), and Knob-billed Duck (*Sarkidiornis melanotos*).

Table 3-2 Threatened avifauna species that are expected to occur within the PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened, VU = Vulnerable and NA = Not Assessed

Common Name	Scientific Name	Regional*	Global+	Likelihood of occurrence
African Finfoot	*Podica senegalensis*	VU	LC	Low
Black Stork	*Ciconia nigra*	EN	LC	Low
Black-winged Kite	*Elanus caeruleus*	NT	LC	Confirmed
Black-crowned Night Heron	*Nycticorax nycticorax*	NT	LC	Confirmed
Cape Vulture	*Gyps coprotheres*	VU	VU	Confirmed
European Roller	*Coracias garrulus*	NT	LC	Confirmed
Hamerkop	*Scopus umbretta*	NT	LC	High
Kittlitz's Plover	*Charadrius pecuarius*	NT	LC	Moderate

Knob-billed Duck	*Sarkidiornis melanotos*	NT	LC	Confirmed
Lanner Falcon	*Falco biarmicus*	NT	LC	Moderate
Lappet-faced Vulture	*Torgos tracheliotos*	CR	EN	High
Lesser Kestrel	*Falco naumanni*	VU	LC	Moderate
Marsh Owl	*Asio capensis*	NT	LC	Moderate
Red-billed Teal	*Anas erythrorhyncha*	NT	LC	High
Secretarybird	*Sagittarius serpentarius*	VU	EN	Moderate
Short-clawed Lark	*Certhilauda chuana*	NT	LC	High (Confirmed nearby in other study)
Tawny Eagle	*Aquila rapax*	EN	VU	High (Confirmed nearby in other study)
Verreaux's Eagle	*Aquila verreauxii*	VU	LC	Low
White-backed Vulture	*Gyps africanus*	CR	CR	High

*(BLSA 2025), + (IUCN 2021)

Black-crowned Night Heron (*Nycticorax nycticorax*) is listed as regionally NT and globally LC. They inhabit a wide range of wetland habitats, but require dense vegetation nearby to roost. They are threatened by the loss and degradation of their wetland habitats. They are particularly susceptible to the effects of pollutants such as pesticides and petroleum. This species was confirmed at the site during the field survey.

Black-winged Kite (*Elanus caeruleus*) is listed as regionally NT and globally LC. It inhabits open habitats across various biomes and even occurs regularly in urban environments. There is evidence that this species has experienced declines in recent years but the reason behind the declines is unclear. The effects of rodenticides and pesticides may be a contributing factor. This species was confirmed at the site during the field survey.

Cape Vulture (*Gyps coprotheres*) is listed as VU both regionally and globally. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). The main threats faced by this species are poisoning and availability of food as well as collision and electrocution when interacting with powerlines and other infrastructure. This species was confirmed at the site during the field study.

European Roller (*Coracias garrulous*) is listed as regionally and globally NT. They are non-breeding migrants from south-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller prefers bushy plains and dry savannah areas (IUCN, 2017). Most of the threats of this species are on their breeding grounds, particularly loss of breeding habitat. However, in South Africa, they may be affected by habitat loss as well. This species was confirmed at the site during the field study.

Hamerkop (*Scopus umbretta*) is listed as regionally NT and globally LC. It is found in a range of freshwater and marine habitats. It feeds predominantly on frogs and tadpoles. It has experienced significant reductions in its estimated population numbers, but the reasons underlying this reduction remain unclear. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Knob-billed Duck (*Sarkidiornis melanotos*) is listed as regionally NT and globally LC. When breeding, primarily occupies marshes and pans in savannah habitat. When not breeding, wanders widely and may occupy many different natural and artificial wetlands. Its threats are poorly understood but are thought to be related to habitat loss and degradation. This species was confirmed at the site during the field study.

Lappet-faced Vulture (*Torgos tracheliotus*) is listed as CR and EN on a regional and global level respectively. Only a small, very rapidly declining population remains, owing primarily to poisoning and persecution, as well as ecosystem alterations (IUCN, 2017). The species inhabits dry savanna, arid plains, deserts and open mountain. It ranges widely when foraging and is mainly a scavenger, feeding predominantly on any large carcasses or their remains. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Red-billed Teal (*Anas erythrorhyncha*) is listed as regionally NT and globally LC. It occurs in a large variety of shallow wetlands. The threats are not well understood but leech infestations and other changes to their habitats. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Short-clawed Lark (*Certhilauda chuana*) is listed as NT on a regional scale. This species is typically found in semi-arid savannah. In South Africa, this species is divided into two disconnected populations, one along the southeastern border of Botswana and the other within the Limpopo province. This species threatened by habitat loss by urban encroachment. This species was confirmed in close proximity to the site.

Tawny Eagle (*Aquila rapax*) is listed as regionally EN and globally VU. It occupies a range of habitats but is most common in savannah habitats within protected areas. It also occurs in semidesert provided there are nesting sites, which are often on pylons. They are threatened by land transformation and poisoning or trapping by livestock farming, since much of their food is obtained through scavenging. This species was confirmed in close proximity to the site.

White-backed Vulture (*Gyps africanus*) is listed as regionally and globally CR. It has a large range and only occurs throughout sub-Saharan Africa. It is primarily a lowland species of open wooded savanna. It requires tall trees for nesting. According to the IUCN (2017) this species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution and poisoning. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

3.3 Vultures

Due to the fact that eight of South Africa's nine Vulture species are threatened, vulture-specific information is required to ensure this project does not affect their conservation efforts. Figure 3-11 illustrates the PAOI in relation to recorded Vulture electrocutions and collisions (Eskom/EWT Strategic Partnership database unpublished 2020). These maps indicate that there are no recorded fatalities near the PAOI, however, vultures were observed several times during both field surveys, as well as VulPro indicating that vultures have been observed roosting in the nearby facility of the project area on powerline infrastructure. These factors indicate that there is a risk of electrocutions and collisions to the vultures. As such, some appropriate mitigation measures are required. For mitigations refer to section 5.

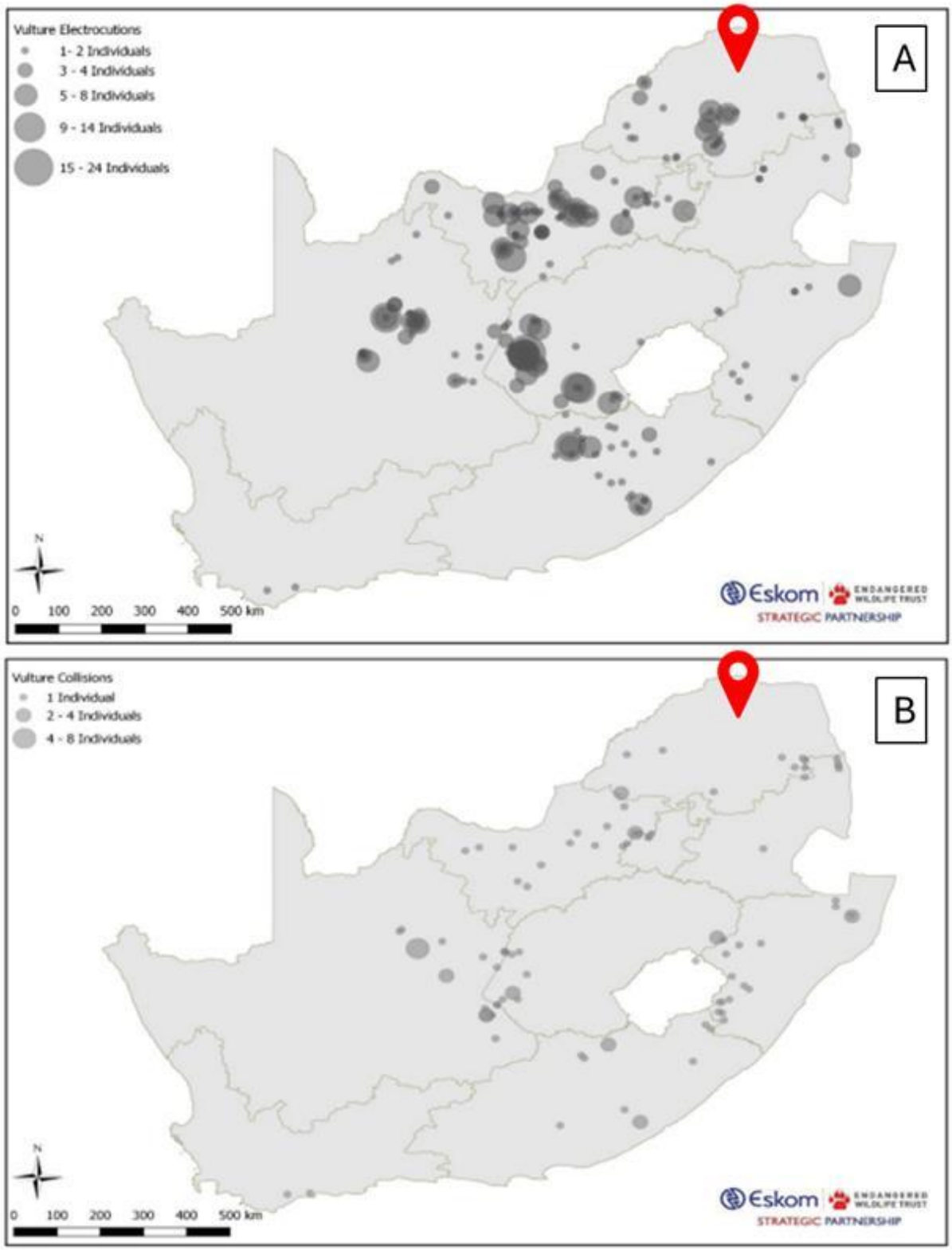


Figure 3-11 ***Maps indicating fatal vulture A) electrocutions and B) collisions on powerlines across South Africa reported to the EWT/Eskom Central Incident Register from 1996-2022 (Eskom/EWT Strategic Partnership database unpublished, 2022). This map and information are as per Government Gazette No 47632. The pin indicates the approximate location of the project area***

3.4 Literature Review

TBC also performed a field assessment on the adjacent property on the 9-11 of December 2024. During this assessment 97 species were recorded, of which two were SCC Short-Clawed Lark (*Certhilauda chuana*) and European Roller (*Coracias garrulus*) were observed on site, and an additional two Tawny Eagle (*Aquila rapax*) and Cape Vulture (*Gyps coprotheres*) were recorded in the general area during incidental assessments.

3.5 Fieldwork Findings

3.5.1 Species List of First Field Survey

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024 over the course of three days. This constitutes a dry season survey. This site visit was conducted to determine the presence of Species of Conservation Concern of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

One SCC was recorded during the first survey period (Table 3-3 and Figure 3-12).

Table 3-3 SCC recorded in the first assessment.

Species	Common Name	Conservation Status	
		Regional	Global
Gyps coprotheres	Cape Vulture	VU	VU

Figure 3-12 Photograph of Cape Vulture (Gyps coprotheres) observed during survey

3.5.1.1 Risk Species

Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at

risk of collision, electrocution or habitat loss as a result of the proposed activity. Twelve (12) of the species observed within the PAOI are regarded as priority species (Table 3-4).

Table 3-4 Summary of Priority Species recorded within and around the proposed development.

Common Name	Scientific Name	Collision	Electrocution	Disturbance/Habitat Loss
African Harrier-Hawk	*Polyboroides typus*		x	
Black-chested Snake Eagle	*Circaetus pectoralis*		x	
Cape Vulture	*Gyps coprotheres*		x	x
Crested Francolin	*Dendroperdix sephaena*		x	
Egyptian Goose	*Alopochen aegyptiaca*	x	x	
Gabar Goshawk	*Micronisus gabar*		x	
Hadada Ibis	*Bostrychia hagedash*		x	
Helmeted Guineafowl	*Numida meleagris*		x	
Pale Chanting Goshawk	*Melierax canorus*		x	
Pied Crow	*Corvus albus*		x	
Red-crested Korhaan	*Lophotis ruficrista*	x	x	
Swainson's Spurfowl	*Pternistis swainsonii*		x	

Figure 3-13 Photograph of Risk Species observed during survey: African Harrier-Hawk (Polyboroides typus)

3.5.1.2 Dominant Species

Table 3-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. The most abundant species was the Red-faced Mousebird (*Urocolius indicus*), with a relative abundance of 0.135 and the most frequently occurring

species was the Ring-necked Dove (*Streptopelia capicola*) with a frequency of occurrence of 56.16% (Table 3-5).

Table 3-5 Relative abundance and frequency of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,135	26,03
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,107	56,16
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,072	8,22
Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae	0,050	12,33
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,044	30,14
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,044	39,73
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,041	31,51
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,033	16,44
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,033	27,40
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,033	26,03
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,030	23,29
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,026	6,85
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,023	15,07
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,023	23,29
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,022	15,07
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,022	1,37
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,020	16,44
Chinspot Batis	*Batis molitor*	Platysteiridae	0,018	13,70
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,016	15,07
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,016	10,96
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,015	8,22

3.5.1.3 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into the major groups based on their diet, habitat, and main area of activity. Although species tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by Invertivore Ground Diurnal (IGD) and Granivore Ground Diurnal (GGD) birds (Figure 3-14).

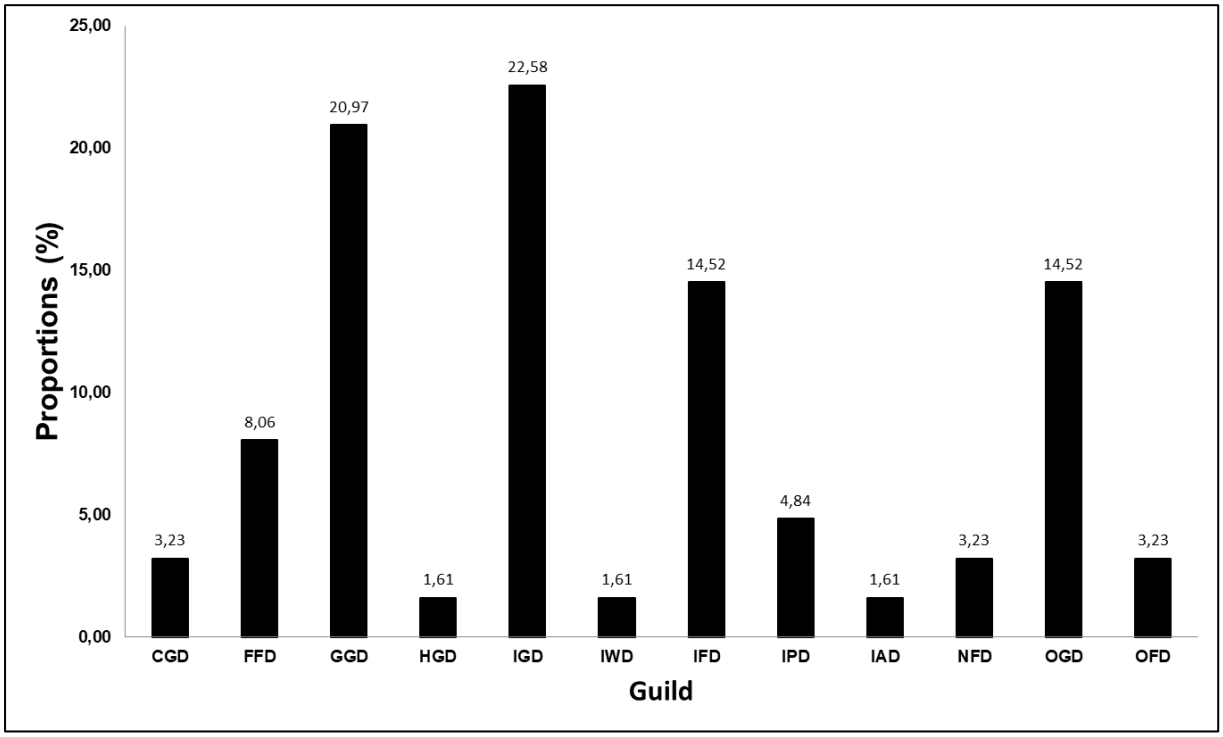


Figure 3-14 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal; CWD, carnivore water diurnal; CWN, carnivore water nocturnal; CFD, carnivore foliage diurnal; CAD, carnivore air nocturnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; GWD, granivore water diurnal; GFD, granivore foliage diurnal; HGD, herbivore ground diurnal; HWD, herbivore water diurnal; IGD, invertivore ground diurnal; IWD, invertivore, water diurnal; IGN, invertivore ground nocturnal; IFD, invertivore foliage diurnal; IPD, invertivore perch diurnal; IPN, invertivore perch nocturnal; IAD, invertivore air diurnal; IAN, invertivore air nocturnal; NFD, nectivore foliage diurnal; OGD, omnivore ground diurnal; OWD, omnivore water diurnal; OFD, omnivore foliage diurnal.***

3.5.2 Species List of Second Field Survey

The second avifaunal field survey was conducted from the 6th to the 9th of January 2025 over the course of four days. This constitutes a wet season survey. This site visit was conducted to determine the presence of Species of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

Five SCC were recorded during the second survey period (Table 3-6).

Table 3-6 ***SCC recorded in the second assessment.***

Species	Common Name	Conservation Status	
		Regional	Global
Nycticorax nycticorax	Black-crowned Night Heron	NT	LC
Elanus caeruleus	Black-winged Kite	NT	LC
Gyps coprotheres	Cape Vulture	VU	VU
Coracias garrulus	European Roller	NT	LC
Sarkidiornis melanotos	Knob-billed Duck	NT	LC

Figure 3-15 Photographs of SCC observed during survey: Black-winged Kite (Elanus caeruleus)

3.5.2.1 Risk Species

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Twenty-five (25) of the species observed within the PAOI are regarded as priority species (Table 3-7).

Table 3-7 Summary of Priority Species recorded within and around the proposed development.

Common Name	Scientific Name	Collision	Electrocution	Disturbance/Habitat Loss
African Harrier-Hawk	*Polyboroides typus*		x	
Black-chested Snake Eagle	*Circaetus pectoralis*		x	
Black-crowned Night Heron	*Nycticorax nycticorax*	x		
Black-winged Kite	*Elanus caeruleus*	x		
Brown Snake Eagle	*Circaetus cinereus*		x	
Cape Vulture	*Gyps coprotheres*		x	x
Common Buzzard	*Buteo buteo*		x	
Crested Francolin	*Dendroperdix sephaena*		x	
Egyptian Goose	*Alopochen aegyptiaca*	x	x	
European Roller	*Coracias garrulus*			x
Fiery-necked Nightjar	*Caprimulgus pectoralis*	x		

Greater Kestrel	*Falco rupicoloides*		x
Hadada Ibis	*Bostrychia hagedash*		x
Helmeted Guineafowl	*Numida meleagris*		x
Knob-billed Duck	*Sarkidiornis melanotos*	x	
Pale Chanting Goshawk	*Melierax canorus*		x
Pied Crow	*Corvus albus*		x
Red-crested Korhaan	*Lophotis ruficrista*	x	x
Spotted Eagle-Owl	*Bubo africanus*		x
Swainson's Spurfowl	*Pternistis swainsonii*		x
Wahlberg's Eagle	*Hieraaetus wahlbergi*		x
Western Barn Owl	*Tyto alba*		x
Western Cattle Egret	*Bubulcus ibis*		x
White Stork	*Ciconia ciconia*		x
White-faced Whistling Duck	*Dendrocygna viduata*	x	

Figure 3-16 Photograph of Risk Species observed during survey: Wahlberg's Eagle (Hieraaetus wahlbergi)

3.5.2.2 Dominant Species

Table 3-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. The most abundant species was Wattled Starling (*Creatophora cinerea*), with a relative abundance of 0.080 and the most frequently occurring species was the Rattling Cisticola (*Cisticola chiniana*) with a frequency of occurrence of 60.82% (Table 3-8).

Table 3-8 Relative abundance and frequency of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,080	8,25
Barn Swallow	*Hirundo rustica*	Hirundinidae	0,076	26,80
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,053	60,82
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,041	50,52
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,038	42,27
African Black Swift	*Apus barbatus*	Apodidae	0,035	16,49
European Bee-eater	*Merops apiaster*	Meropidae	0,035	8,25
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,028	40,21
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,025	34,02
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,025	17,53
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,022	31,96
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,021	28,87
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,019	19,59
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,017	23,71
Sabota Lark	*Calendulauda sabota*	Alaudidae	0,017	22,68
White-rumped Swift	*Apus caffer*	Apodidae	0,017	6,19
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,017	22,68
Red-billed Quelea	*Quelea quelea*	Ploceidae	0,017	1,03
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,016	10,31
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,016	20,62
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,015	18,56
Diederik Cuckoo	*Chrysococcyx caprius*	Cuculidae	0,014	19,59
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,014	18,56
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,013	9,28
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,013	18,56

3.5.2.3 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into the major groups based on their diet, habitat, and main area of activity. Although species tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by Invertivore Foliage Diurnal (IFD), Granivore Ground Diurnal (GGD), and Invertivore Ground Diurnal (IGD) birds (Figure 3-17).

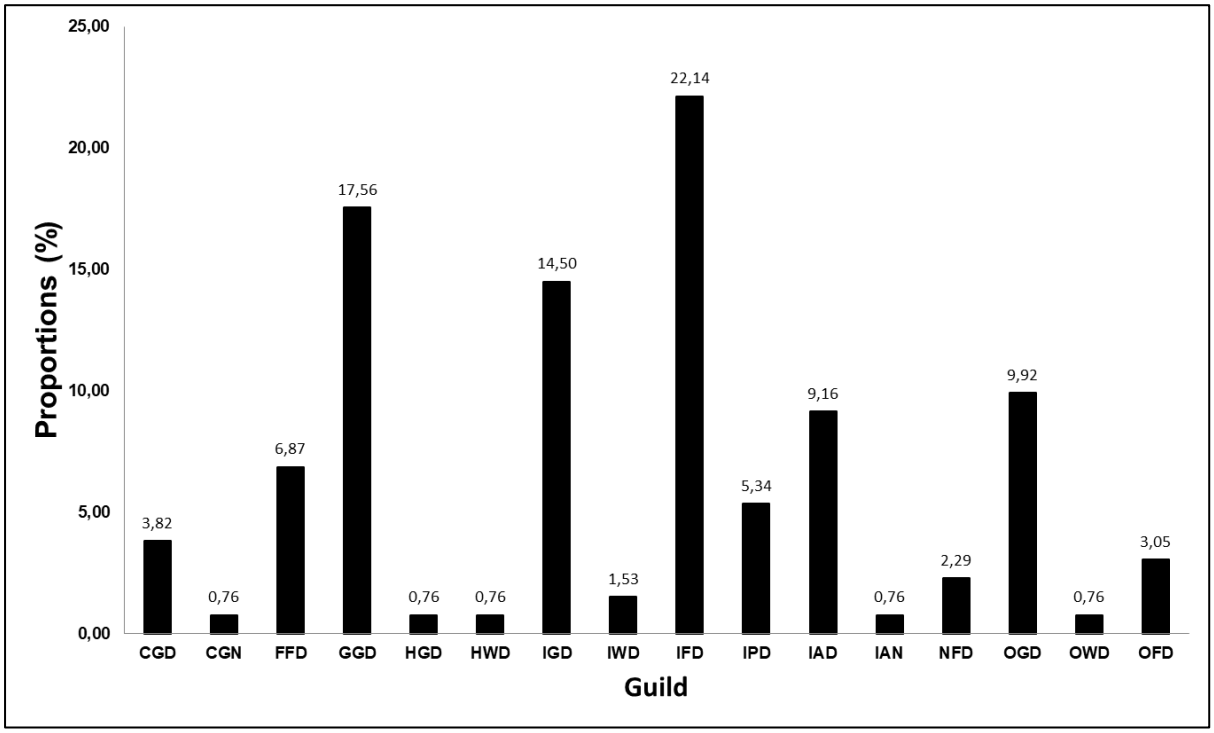


Figure 3-17 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal; CWD, carnivore water diurnal; CWN, carnivore water nocturnal; CFD, carnivore foliage diurnal; CAD, carnivore air nocturnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; GWD, granivore water diurnal; GFD, granivore foliage diurnal; HGD, herbivore ground diurnal; HWD, herbivore water diurnal; IGD, invertivore ground diurnal; IWD, invertivore, water diurnal; IGN, invertivore ground nocturnal; IFD, invertivore foliage diurnal; IPD, invertivore perch diurnal; IPN, invertivore perch nocturnal; IAD, invertivore air diurnal; IAN, invertivore air nocturnal; NFD, nectivore foliage diurnal; OGD, omnivore ground diurnal; OWD, omnivore water diurnal; OFD, omnivore foliage diurnal.***

3.5.3 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. This section needs to be interpreted cautiously based on the limited time spent on this component.

No specific flight paths were noted.

No SCC species nests were found. However, a nest belonging to a risk species, the Wahlberg's Eagle, was found within the project area (Figure 3-18). A 250 m No-Go buffer was placed around the nest, and the buffer was extended to the east boundary of the proposed developments, ensuring that the bird can have a corridor to move in and out of the development area. A 500 m seasonal buffer is applied around the nest with an eastern extension as mentioned above. This 500 m buffer is a No-Go buffer only occurring during the birds breeding season, beginning in August and ending in April. Outside of these months, this buffer falls away. Activity within this seasonal buffer may be permitted, if an avifauna specialist is consulted and confirms that fledgling is no longer making use of the nest. Figure 3-18 indicates that the although the project boundary overlaps with these buffers, all infrastructure avoids both permanent and seasonal Very High buffers

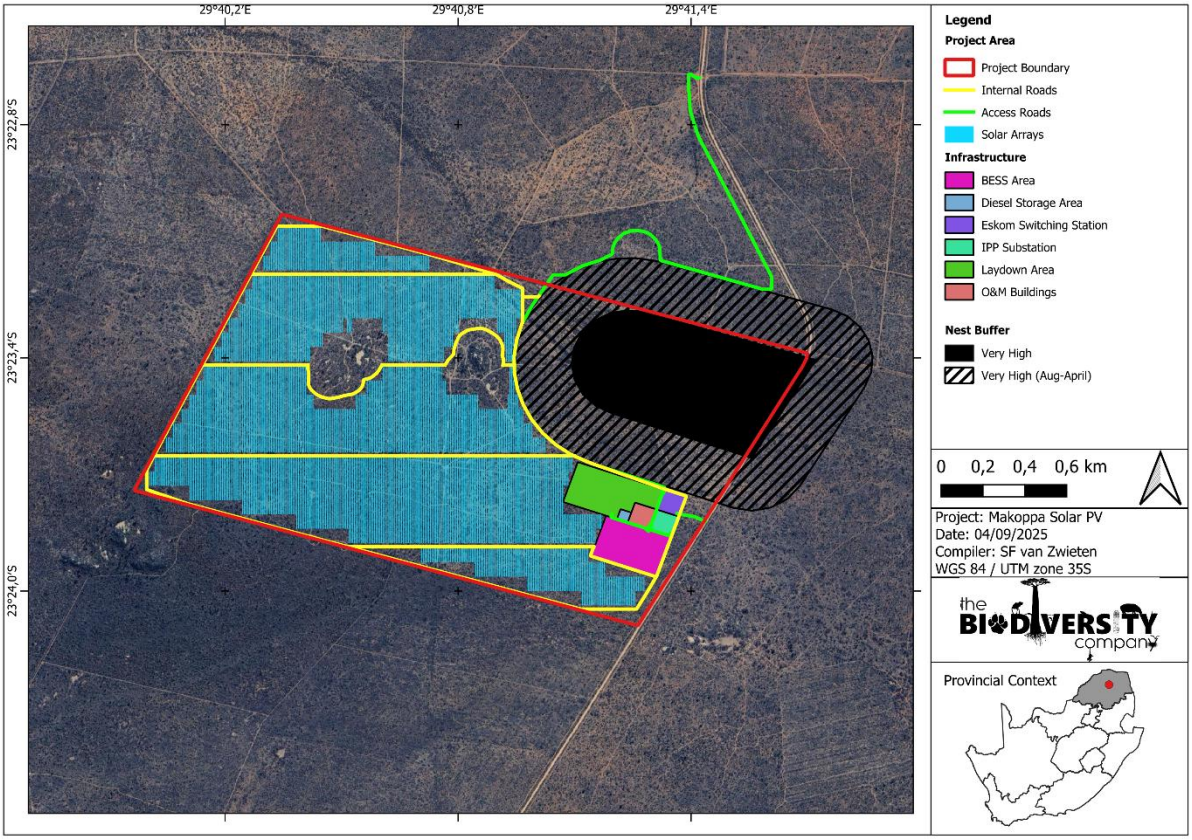


Figure 3-18 Map illustrating the buffers associated with the Wahlberg's Eagle nest

3.6 Habitat Assessment

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities.

The main habitat types identified across the PAOI were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Four (4) habitats were delineated in total (Figure 3-19), a full description of the habitats is provided below.

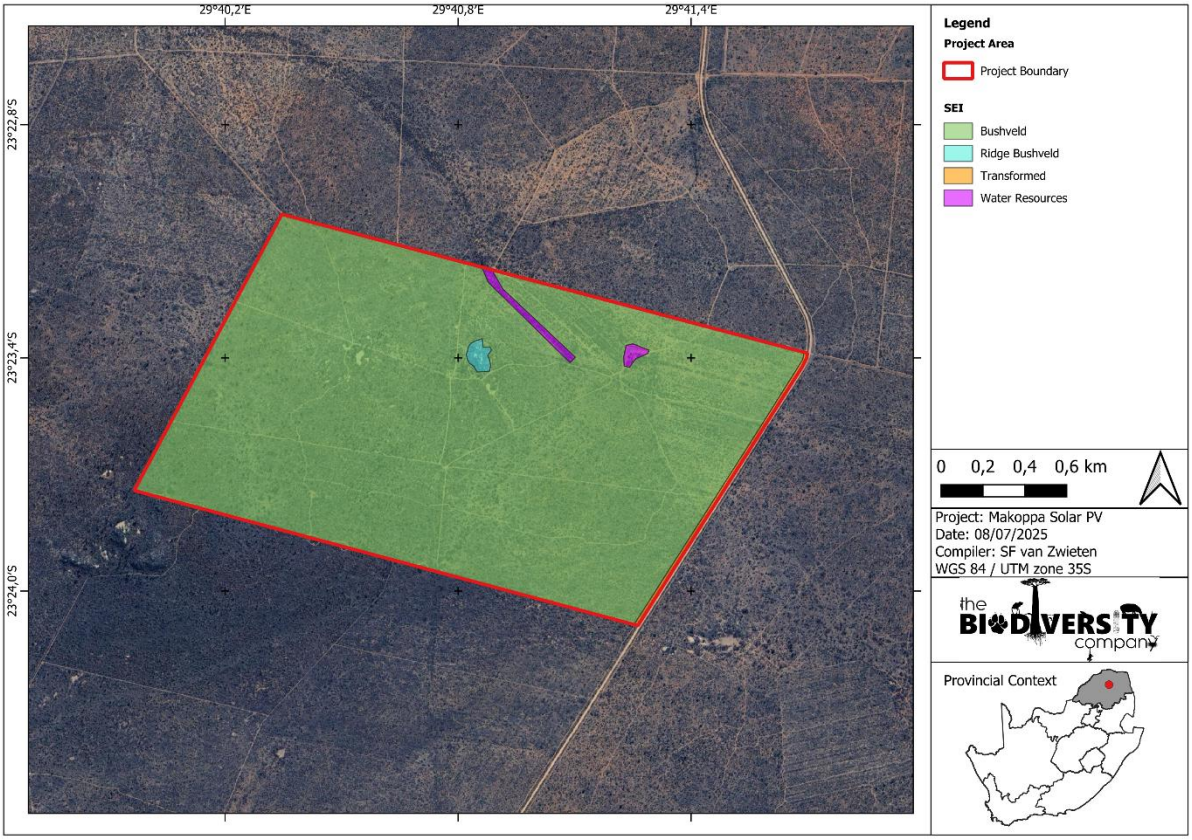


Figure 3-19 Habitats identified within the assessment areas

3.6.1 Bushveld

This habitat consists of savannah with dominance of both trees and grass, with various densities of trees. This habitat is somewhat disturbed by grazing by livestock and game. This habitat provides breeding and foraging habitat for most of the expected SCC (Figure 3-20).

SCC possibly occupying this habitat: Cape Vulture, European Roller, Lanner Falcon, Lappet-faced Vulture, Short-clawed Lark, Secretarybird, Tawny Eagle, White-backed Vulture.

Figure 3-20 Bushveld habitat at -23.397637°; 29.684890°

3.6.2 Ridge Bushveld

This habitat is similar in composition to bushveld but is present on rocky ridges and hills. It differs by having large boulders scattered through the habitat and being on a slope. The bird community present in this habitat differs from that in the other bushveld since it includes species that are specialised inhabitants of ridges. The resource resilience and relative scarcity of this habitat in the region make this habitat sensitive (Figure 3-21).

SCC possibly occupying this habitat: Cape Vulture, European Roller, Lanner Falcon, Lappet-faced Vulture, Tawny Eagle, White-backed Vulture.

Figure 3-21 Ridge Bushveld habitat at -23.390523°; 29.680814°

3.6.3 Transformed

The transformed areas have little to no remaining natural vegetation due to land transformation by historic and current housing, roads and electrical infrastructure. These habitats exist in a constant disturbed state as it cannot recover to a more natural state due to ongoing disturbances and impacts it receives (Figure 3-22).

Figure 3-22 Transformed habitat at -23.359476°; 29.708490°

3.6.4 Water Resources

This habitat provides crucial habitat for waterbirds. In the project area these consist of artificial water holes and drainage lines which are temporarily inundated. This habitat provides suitable foraging habitat for waterfowl, including some SCCs, however due to their artificial nature, they are not likely to be used as suitable breeding habitat (Figure 3-23).

Figure 3-23 Water Resource at -23.389893°; 29.687168°

3.7 Site Ecological Importance

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

Four habitat types were delineated within the Project Area, namely Bushveld, Ridge Bushveld, Transformed, and Water Resources. Their respective SEI and the corresponding mitigation guidelines are summarised in Table 3-9.

Table 3-9 Summary of habitat types delineated within field assessment area

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance Guidelines
Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Ridge Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**High** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Transformed	**Very Low** No natural habitat remaining.	**Very Low** Several major current negative	**Very Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75%	**Very Low** Minimisation mitigation – development activities of medium to high impact

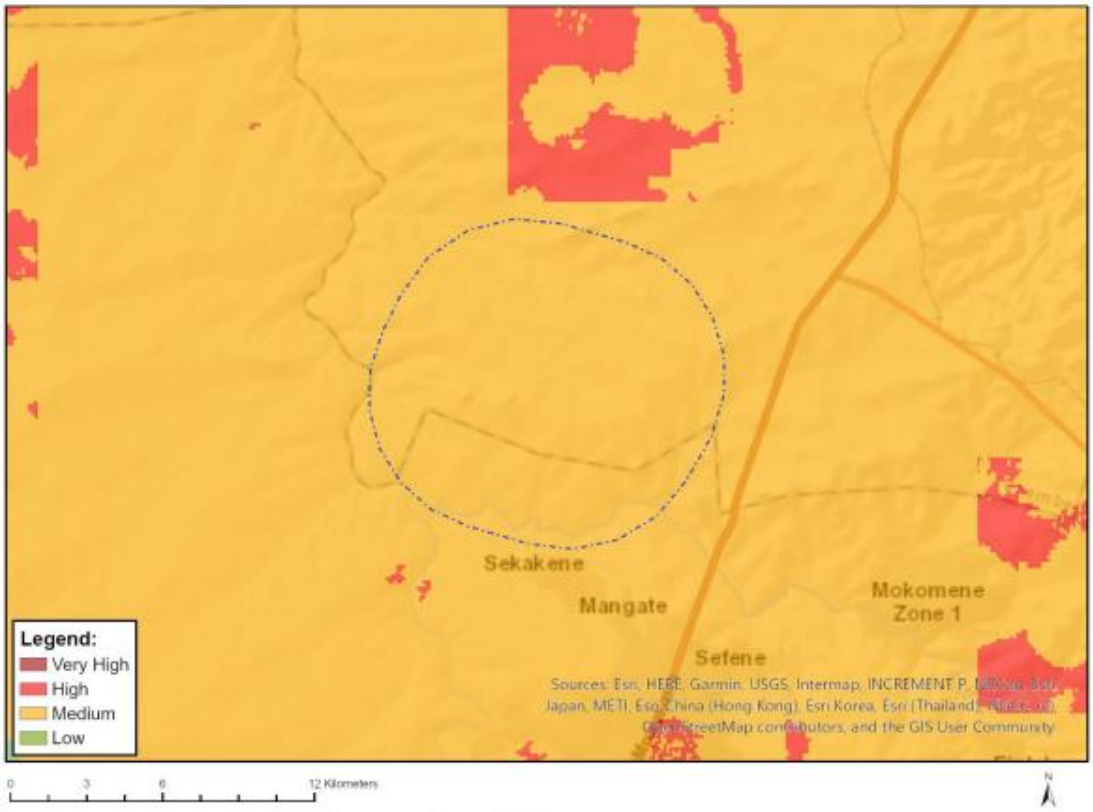
		ecological impacts.	of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	acceptable and restoration activities may not be required.
Water Resources	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Medium** Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Nest Buffer	**250m No-Go Buffer** **500m No-Go Buffer**	**Year Round** **Seasonal (August – April)**		**Very High** Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains

3.7.1 Desktop Ecological Senstivity

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Animal Species Theme sensitivity is 'Medium' for the PAOI, with the possibility of Avifaunal Species of Conservation Concern (SCC) being present (Figure 3-24).

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Podica senegalensis
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Aquila rapax
Medium	Sensitive species 5
Medium	Mammalia-Crocidura maquassiensis
Medium	Invertebrate-Thoracistus viridicrus

Figure 3-24 Animal Species Theme Sensitivity for the PV Facility

3.7.2 Screening Tool Comparison

The allocated sensitivities if the mitigation measures are followed for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-10 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely

presence of SCC or priority species. The sensitivities delineated for the project area is illustrated in Figure 3-25.

Table 3-10 Summary of the screening tool vs specialist assigned sensitivities post mitigation

Screening Tool Theme	Screening Tool	Habitat	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	Medium	Bushveld	Medium	Validated – Habitat shows some negative impacts, but still provide suitable habitat for SCC.
		Ridge Bushveld	High	Disputed – Habitat is generally intact, and high likelihood of SCC.
		Transformed	Very Low	Disputed – Habitat has been severely altered with limited potential to support SCC.
		Water Resources	Medium	Validated – Habitat has limited potential to host SCC but provides important ecological function and has little resource resilience.

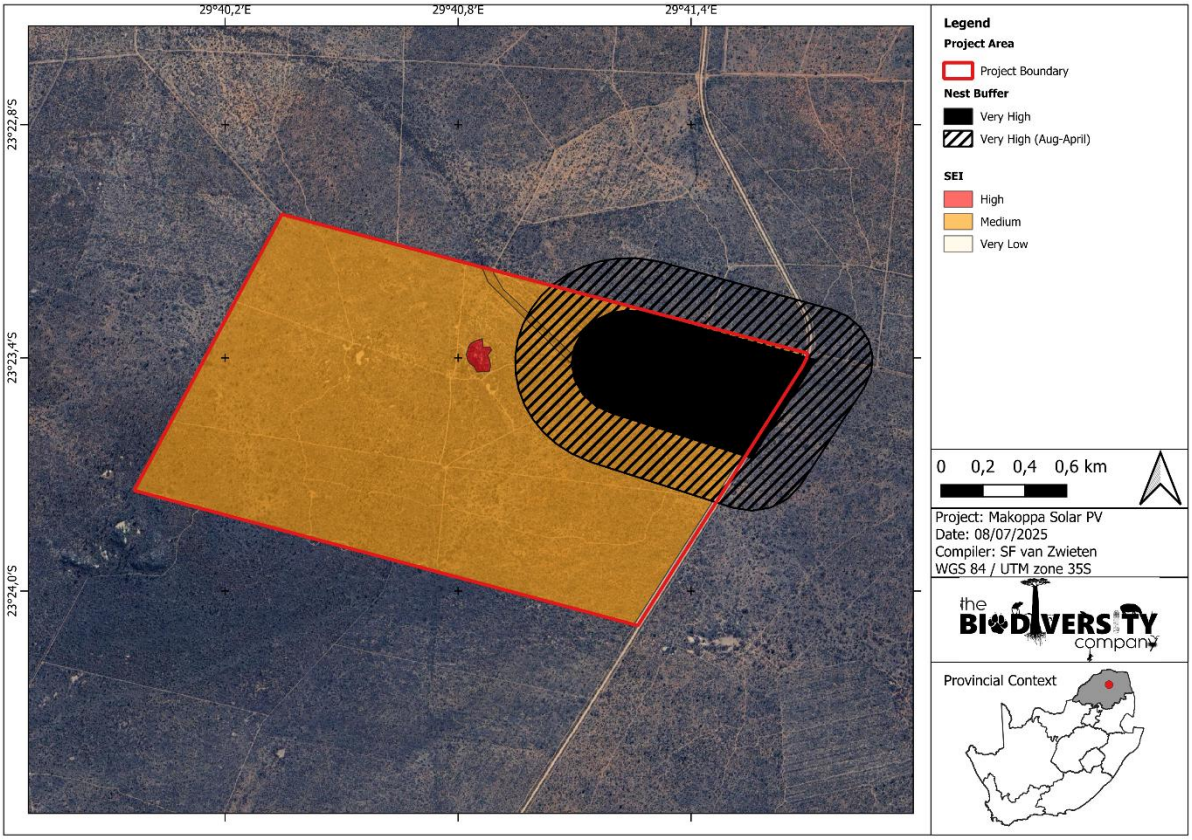


Figure 3-25 Site ecological importance, with mitigation measures applied

4 Impact Assessment

4.1 Current Impacts to Biodiversity

In consideration that there are anthropogenic activities and influences present within the landscape, there are currently several negative impacts to biodiversity, including avifauna. These include:

- Historic land modification to accommodate roads, powerline infrastructure, and housing;
- Livestock and game; and
- Fences and the associated infrastructure (Figure 4-1).

Figure 4-1 Photograph illustrating current negative impacts associated with the PAOI: Existing powerlines, Fences, and Roads

4.2 Alternatives Considered

No alternatives were considered.

4.3 Loss of Irreplaceable Resources

The proposed development will lead to the loss of the following irreplaceable resources:

- Habitat and possible nesting sites for numerous expected avifauna SCC; and
- Loss of avifauna SCC due to displacement or death.

4.4 Quantitative Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project area of interest, specifically the proposed development footprint area. Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat fragmentation as a result of project infrastructure and species disturbance or mortality as a result of project operations;
- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence; and
- Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report. Three phases were considered for the impact assessment:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

4.4.1 Construction Phase

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

- Habitat destruction within the project footprint;
- Destruction, degradation and fragmentation of surrounding habitats due to noise pollution;
- Displacement/emigration of avifauna community (including SCC);
- Direct mortality from persecution or poaching of avifauna species and collection of eggs; and
- Direct mortality from increased vehicle and heavy machinery traffic.

The two proposed access roads were found to have a negligible difference in impact and were therefore not separated for the impact assessment.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-1.

Table 4-1 Construction Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade natural habitat, ultimately displacing avifauna	4	3	4	3	5	
	Life of operation or less than 20 years: Long Term	Local area	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**
Destruction, degradation and fragmentation of surrounding habitats	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Displacement/emigration of avifauna community (including SCC) due to noise pollution	3	4	3	3	4	
	One year to five years: Medium Term	Regional within 5 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from persecution or poaching of avifauna species and collection of eggs	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from increased vehicle and heavy machinery traffic	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Impact	**Post mitigation**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade CBA and ESA habitat, ultimately displacing avifauna	4	2	4	3	4	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Destruction, degradation and fragmentation of surrounding habitats	3	3	3	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Likely	**Moderate**

			moderately altered			
Displacement/emigration of avifauna community (including SCC) due to noise pollution	3	3	2	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Direct mortality from persecution or poaching of avifauna species and collection of eggs	3	2	2	3	2	
	One year to five years: Medium Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**
Direct mortality from increased vehicle and heavy machinery traffic	3	2	2	3	2	
	One year to five years: Medium Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

4.4.2 Operation Phase

The operational phase includes the following impacts:

- Collisions with infrastructure associated with the PV Facility;
- Electrocution due to infrastructure associated with the PV Facility;
- Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs;
- Direct mortalities and hinderance of movement from fencing infrastructure;
- Pollution of water sources and surrounding habitat due to cleaning products of the PV panels; and
- Heat radiation from the PV panels.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-2.

Table 4-2 Operational Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collisions with infrastructure associated with the PV Facility	5	2	4	3	4	
	Permanent	Development specific/ within the site boundary	Great / harmful/ ecosystem structure and	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**

			function largely altered			
Electrocution due to infrastructure associated with the PV Facility	4	2	3	3	4	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	3	3	3	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Direct mortalities and hinderance of movement from fencing infrastructure	4	3	3	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Pollution due to chemicals used to keep the PV panels clean	4	3	3	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Heat radiation from the PV panels.	4	3	3	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Impact	**Post mitigation**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collisions with infrastructure associated with the PV Facility	4	2	3	3	3	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**

Electrocution due to infrastructure associated with the PV Facility	4	2	3	3	2	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Possible	**Low**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	3	2	2	3	1	
	One year to five years: Medium Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	High unlikely	**Low**
Direct mortalities and hinderance of movement from fencing infrastructure	4	2	2	3	2	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**
Pollution due to chemicals used to keep the PV panels clean	4	2	2	3	1	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	High unlikely	**Low**
Heat radiation from the PV panels.	4	2	2	3	2	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

4.4.3 Decommissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the Operational Phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented.

The following potential impacts were considered:

- Direct mortality due to earthworks, vehicle collisions and persecution;
- Direct mortality due to infrastructure including collisions with PV infrastructure, fences, etc; and

- Continued habitat degradation due to Invasive Alien Plant encroachment and erosion.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-3.

Table 4-3 Decommissioning Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Direct mortality due to earthworks, vehicle collisions and persecution	4	3	3	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Direct mortality due to infrastructure including collisions with PV infrastructure, fences etc	4	2	3	3	4	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Continued habitat degradation due to Invasive Alien Plant encroachment and erosion	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Impact	Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Direct mortality due to earthworks, vehicle collisions and persecution	2	2	2	3	1	
	One month to one year: Short Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	High unlikely	**Absent**
Direct mortality due to infrastructure including collisions with PV infrastructure, fences etc	2	2	2	3	1	
		Development specific/ within	Small / ecosystem	Ecology moderately	High unlikely	**Absent**

	One month to one year: Short Term	the site boundary	structure and function largely unchanged	sensitive/ /important		
	2	2	2	3	2	
Continued habitat degradation due to Invasive Alien Plant encroachment and erosion	One month to one year: Short Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

4.4.4 Cumulative Impacts

Cumulative impacts are assessed within the context of the extent of the proposed PAOI, other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, other solar PV facilities, and power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

The total area within the 30 km buffer around the PV development area amounts 301552,10 ha, but when considering the transformation (79826,07 ha) that has taken place within this radius, 221726,04 ha of intact habitat remains according to the 2021 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 26.47% loss in natural habitat. When we look at the project in isolation, the PV development footprint (340 ha) will remove an added 0.11% of natural vegetation. Then there are also numerous other renewable projects within a 30 km radius of the PAOI (as per the latest South African Renewable Energy EIA Application Database). When including these projects (as well as the proposed Tabor Bethel, Draailoop, and Klipput PV projects), the total historical loss within the 30 km area is 28.81%. Table 4-4 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 4-4 The cumulative impacts considered for avifauna

	Total Habitat (ha)	Total Loss (ha)	Tot. Remaining Habitat (ha) (Remnants)	Total Historical Loss	Habitat loss as a direct result of the project (%)	PV Development Similar Projects including this Project	Total Cumulative Habitat Lost
Approximate Solar development cumulative effects (Spatial)	301552,10	79826,07	221726,04	26,47%	0,11%	7076,17	28,81%

The proposed SPP in isolation has a Negative Medium impact significance (Table 4-5). In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative Moderate significance (Figure 4-2).

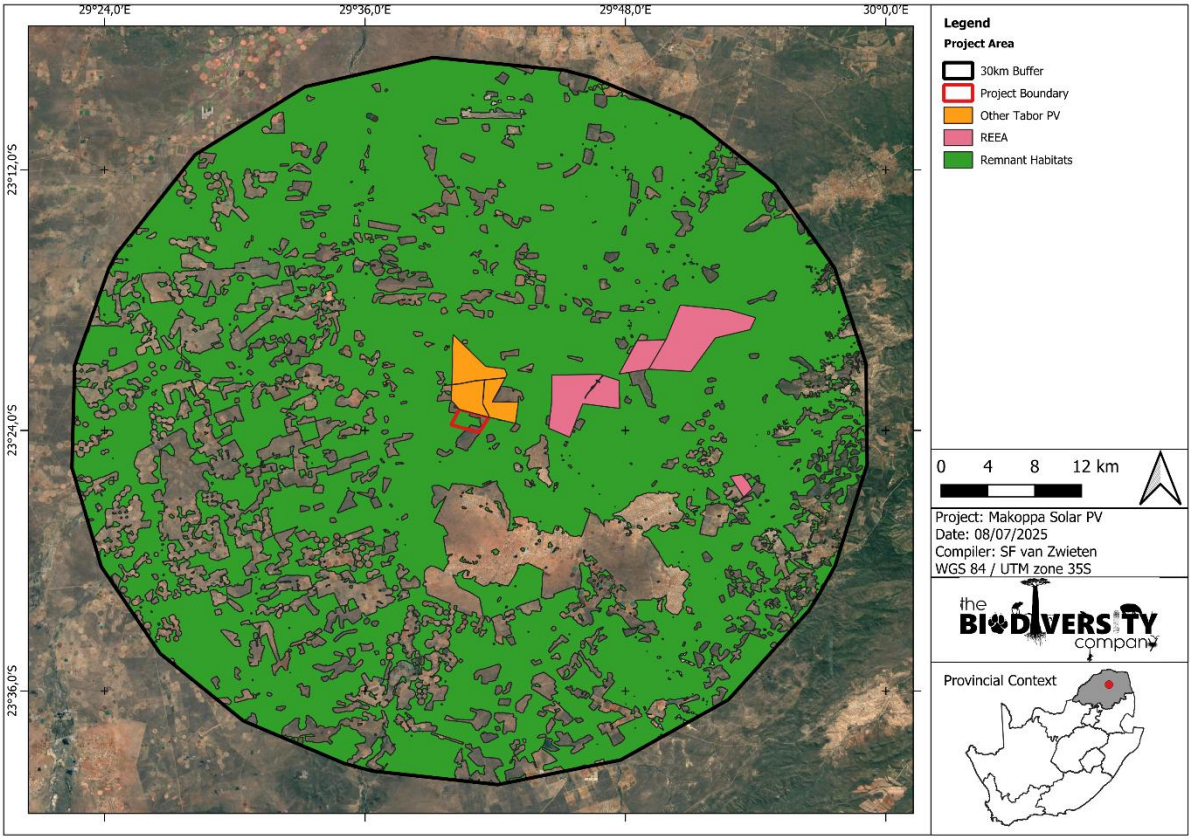


Figure 4-2 Cumulative habitat loss in 30 km surrounding the PAOI

Table 4-5 Cumulative Impacts to avifauna associated with the proposed project

Impact	Project in Isolation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Loss of habitat, and disruption of	4	3	3	3	3	
	Life of operation or	Local area/ within 1 km	Significant / ecosystem	Ecology moderately sensitive/ /important	Likely	**Moderate**

SCC home ranges	less than 20 years: Long Term	of the site boundary	structure and function moderately altered			
Impact	**Cumulative Effect**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	5	4	3	3	3	
Loss of habitat, and disruption of SCC home ranges	Permanent	Regional within 5 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**

5 Avifauna Impact Management Actions

The purpose of the Biodiversity Impact Management Actions is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines.

Table 5-1 details the mitigation measure necessary for implementation, while provides recommended mitigation measures for the Environmental Assessment Practitioner (EAP) to consider, aimed at minimizing the overall impact on avifauna. Both tables include corresponding timeframes, targets, and performance indicators specific to the avifaunal component.

Table 5-1 Specific avifauna management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
Management outcome: Habitats				
The Very High sensitivity areas is a No-Go area and must be avoided for development. Development may occur within seasonal buffer around the eagle nest if an avifauna specialist confirms that breeding is no longer taking place at the nest.	Life of operation	Project Manager Environmental Officer	Very High sensitivity area	Ongoing
All High sensitivity areas must be avoided for development. Only low impact developments can be implemented in the High sensitivity areas, such as upgrading existing roads.	Life of operation	Project Manager Environmental Officer	High sensitivity area	Ongoing
A nest walkdown must be performed prior to clearance of the site. If nests are found, necessary permits and appropriate relocation mitigations should be followed under the consultation with a qualified specialist.	Construction Phase	Environmental Officer	Development footprint	Once during phase
Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity where possible.	Life of operation	Project Manager	Erosion and habitat loss as a result of design	Life of operation
Management outcome: Avifauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
The No-Go Buffer areas must be avoided for development. Only low impact developments can be implemented in the High sensitivity areas, such as upgrading existing roads.	Life of operation	Project Manager Environmental Officer	Very High sensitivity area	Ongoing
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing

not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.				
The duration of the construction must be kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project Manager Environmental Officer	Construction/Closure Phase	Ongoing
Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Bird collisions, and drawing of insects in turn drawing of avifauna	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern be found and not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction	Environmental Officer	Presence of avifauna species and nests	During Phase
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and Construction	Environmental Officer Contractor Engineer	Presence of electrocuted birds	During phase
Outside lighting must be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) lights should be used.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Light pollution and period of light.	Ongoing
Wire mesh fencing should be used, with markers placed on the fence to enhance visibility. Additionally, openings of up to 30cm by 30cm if possible**,** must be incorporated at the bottom of the fence to facilitate the free movement of ground-favouring species.	Life of Operation	Project Manager Environmental Officer Contractor Design Engineer	Presence of birds stuck /dead in fences	During phase
As far as possible and feasible, power cables within the PAOI should be thoroughly insulated and preferably buried.	Construction and Operation	Project Manager Environmental Officer Design Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
All infrastructure, must be removed if the facility is decommissioned.	Closure/Rehabilitation	Project Manager Environmental Officer	Infrastructure removal	During Process

Table 5-2 Generic management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
Management outcome: Habitats				
The areas to be developed must be specifically demarcated to prevent movement into surrounding environments.	Life of operation	Project Manager Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, must under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager Environmental Officer	Areas of indigenous vegetation	Ongoing
Non-woody indigenous vegetation to be maintained under the solar panels if possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty *et al*, 2017; Sinha *et al*, 2018).	Life of operation	Project Manager	Indigenous vegetation under the solar panels.	Life of operation
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation	Project Manager	Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No routine servicing of equipment to be conducted on site, unless in necessary situations. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer Contractor	Spill events, Vehicles dripping.	Ongoing

Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Water pollution and restricted rehabilitation	During phase
Leaking equipment and vehicles must be repaired immediately or be removed from PAOI to facilitate repair.	Life of operation	Environmental Officer Contractor	Leaks and spills	Ongoing
A fire management plan needs to be complied to restrict the impact of fire.	Life of operation	Environmental Officer Contractor	Fire Management	During Phase
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction. This includes wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.	Life of operation	Project Manager Contractor	Dustfall	As per dust monitoring program.
Only environmentally friendly substances may be used for the cleaning/washing of the panels	Operational Phase	Project Manager Environmental Officer	Water pollution	During Phase

Management outcome: Avifauna

Impact Management Actions	Implementation		Monitoring	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40 km/h), to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Life of Operation	Health and Safety Officer	Compliance to the training.	Ongoing
All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region	Construction/Operational Phase	Project Manager Environmental Officer	Noise	Ongoing
Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
Use environmentally friendly cleaning and dust suppressant products	Construction and Operation	Environmental Officer Contractor Engineer	Chemicals used	During phase

6 Conclusion

Based on the SABAP2 data and National Web-based Environmental Screening Tool, 285 avifauna species are expected for the PAOI and surrounds. Of these, 19 are considered SCC. A regime 2 assessment requires two field assessments to be performed. The first avifaunal field survey was on the 6th to the 8th of August 2024 (dry season survey), whilst the second survey was conducted on the 6th to the 9th of January 2025 (wet season survey). This is deemed sufficient for a Regime 2 survey. During this assessment five SCC were recorded during the survey, being Black-crowned Night Heron (*Nycticorax nycticorax*), Black-winged Kite (*Elanus caeruleus*), the Cape Vulture (*Gyps coprotheres*), European Roller (*Coracias garrulus*), and Knob-billed Duck (*Sarkidiornis melanotos*). An additional 6 SCC have a high likelihood of occurrence within the project area. A further twenty-six (26) risk species were also recorded. These risk species are susceptible to collisions, electrocutions and habitat loss.

Four habitat types were delineated within the Project Area, namely Bushveld, Ridge Bushveld, Transformed, and Water Resources. Majority of the project area was found to be a medium sensitivity, validating the screening tool's medium sensitivity. The Transformed habitat was determined to be of very low sensitivity. Only the Ridge Bushveld habitat was determined to be of high sensitivity. This rating is based on the resource resilience and the overall disturbed state of the habitat. The collision risk, electrocution risk and loss of habitat are the main impacts should these be successfully mitigated the overall impact rating can be reduced.

A 250 m No-Go buffer was placed around a Wahlberg's Eagle nest, and the buffer was extended to the eastern boundary of the proposed development, ensuring that the bird can has a corridor to move in and out of the development area. A 500 m buffer is applied around the nest with an eastern extension as mentioned above. This 500 m buffer is a No-Go buffer only occurring during the birds breeding season, beginning in August and ending in April. Outside of these months, this buffer falls away. Activity within this seasonal buffer may be permitted, if an avifauna specialist is consulted and confirms that fledgling is no longer making use of the nest.

6.1 Impact Statement

The main expected impacts of the proposed PV and infrastructure will include habitat loss and fragmentation, as well as electrocutions and collisions resulting in bird mortalities including SCCs.

The overall residual impacts for the project range from moderate to low. The cumulative impact is moderate. Mitigation measures, as described in this report, can be implemented to reduce the significance of the impacts to an acceptable level.

6.2 Specialist Opinion

It is the opinion of the specialist that the development can be favourably considered should the mitigation measures and management actions be implemented.

7 References

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8 Appendix Items

8.1 Appendix A: Methodology

8.1.1 Desktop Dataset Assessment

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

8.1.1.1 Expected Species

The avifaunal desktop assessment comprised of the following, compiling an expected species list:

- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2315_2930; 2315_2935; 2315_2940; 2315_2945; 2315_2950; 2320_2930; 2320_2935; 2320_2940; 2320_2945; 2320_2950; 2325_2930; 2325_2935; 2325_2940; 2325_2945; and 2325_2950.

8.1.1.2 Ecologically Important Landscape Features

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

- Ecosystem Threat Status (ETS) – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. The revised red list of threatened ecosystems was developed between 2016 and 2021 incorporating the best available information on terrestrial ecosystem extent and condition, pressures and drivers of change. The revised list (known as the Red List of Ecosystems (RLE) 2022) is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram *et al.,* 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022;

- Ecosystem Protection level (EPL) informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.,* 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2023) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus

areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- The Limpopo Conservation Plan was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet et al., 2013). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet et al., 2013). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet et al., 2013).

- Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

- Other Natural Areas (ONAs) consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Driver et al., 2017).

- Areas with No Natural Habitat Remaining (NNR) are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Driver et al., 2017).

- A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives.; and

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

8.1.2 Avifauna Survey

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025. These assessments are deemed sufficient for a Regime 2 assessment.

Point Counts

Standardized point counts (Buckland et al., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behavior (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as power lines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering.

8.1.2.1 Data Analysis

The analyses described below only used the data collected from the standardised point counts. See Appendix E and G for the point count raw data.

The analyses described below only used the data collected from the Standardised Point Counts. Raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al*. (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

8.2 Appendix B: Site Ecological Importance

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided Table 8-1 and, respectively Table 8-2.

Table 8-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 8-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.

	Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 8-3.

Table 8-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity (FI)	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 8-4.

Table 8-4 Summary of Resource Resilience (RR) criteria

Resilience	**Fulfilling Criteria**
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 8-5.

Table 8-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed development activities is provided in Table 8-6.

Table 8-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

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

8.3 Appendix C: Impact / Risk Assessment

whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- Construction;
- Operation; and
- Decommissioning.

The significance of the identified impacts was determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and was assessed according to methodology as per the scale utilised for the evaluation of Environmental Impact Ratings in Table 8-7, Table 8-8, and Table 8-9. First, the impact is assigned a score based on Likelihood descriptors Probability and Sensitivity (Likelihood = Probability + Sensitivity) (Table 8-7). and then assigned a Severity rating based on Consequence descriptors Severity, Scope and Duration (Severity

= Severity + Scope + Duration) (Table 8-8). Overall Consequence and Likelihood scores are then used to Determine the Significance Rating (Table 8-9).

Table 8-7 Environmental Impact Assessment: Likelihood Descriptors

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**Rating**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 8-8 Environmental Impact Assessment: Consequence Descriptors

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**Rating**
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	**Rating**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 8-9 Environmental Impact Assessment: Significance Rating Matrix

	CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Probability of impact + Sensitivity of receiving environment)	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Absent
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	High
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	Critical
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

8.4 Appendix D: Avifauna Expected Species

Scientific Name	Common Name	Family Name	Regional	Global (IUCN)	Endemism in South Africa (E)
Accipiter badius	Shikra	Accipitridae			
Accipiter melanoleucus	Black Sparrowhawk	Accipitridae			
Accipiter tachiro	African Goshawk	Accipitridae			
Acrocephalus baeticatus	Common Reed Warbler	Acrocephalidae			
Acrocephalus palustris	Marsh Warbler	Acrocephalidae			
Actitis hypoleucos	Common Sandpiper	Scolopacidae			
Afrotis afraoides	Northern Black Korhaan	Otididae			
Alopochen aegyptiaca	Egyptian Goose	Anatidae			
Amadina erythrocephala	Red-headed Finch	Estriididae			
Amadina fasciata	Cut-throat Finch	Estriididae			
Amblyospiza albifrons	Thick-billed Weaver	Ploceidae			
Anaplectes rubriceps	Red-headed Weaver	Ploceidae			
Anas erythrorhyncha	Red-billed Teal	Anatidae	NT	LC	
Andropadus importunus	Sombre Greenbul	Pycnonotidae			
Anthoscopus caroli	Grey Penduline Tit	Remizidae			
Anthoscopus minutus	Cape Penduline Tit	Remizidae			
Anthus cinnamomeus	African Pipit	Motacillidae			
Anthus leucophrys	Plain-backed Pipit	Motacillidae			
Anthus vaalensis	Buffy Pipit	Motacillidae			
Apalis flavida	Yellow-breasted Apalis	Cisticolidae			

Apalis thoracica	Bar-throated Apalis	Cisticolidae			
Apus affinis	Little Swift	Apodidae			
Apus apus	Common Swift	Apodidae			
Apus barbatus	African Black Swift	Apodidae			
Apus caffer	White-rumped Swift	Apodidae			
Aquila spilogaster	African Hawk-eagle	Accipitridae			
Aquila verreauxii	Verreaux's Eagle	Accipitridae	VU	LC	
Ardea cinerea	Grey Heron	Ardeidae			
Ardea melanocephala	Black-headed Heron	Ardeidae			
Asio capensis	Marsh Owl	Strigidae	NT	LC	
Batis capensis	Cape Batis	Platysteiridae			
Batis molitor	Chinspot Batis	Platysteiridae			
Bostrychia hagedash	Hadada Ibis	Threskiornithidae			
Brunhilda erythronotos	Black-faced Waxbill	Estrildidae			
Bubalornis niger	Red-billed Buffalo Weaver	Ploceidae			
Bubo africanus	Spotted Eagle Owl	Strigidae			
Bubulcus ibis	Western Cattle Egret	Ardeidae			
Buphagus erythrorynchus	Red-billed Oxpecker	Buphagidae			
Burhinus capensis	Spotted Thick-knee	Burhinidae			
Buteo buteo	Common Buzzard	Accipitridae			
Buteo rufofuscus	Jackal Buzzard	Accipitridae			NE
Calamonastes fasciolatus	Barred Wren-warbler	Cisticolidae			
Calandrella cinerea	Red-capped Lark	Alaudidae			
Calendulauda sabota	Sabota Lark	Alaudidae			
Camaroptera brachyura	Green-backed Camaroptera	Cisticolidae			
Camaroptera brevicaudata	Grey-backed Camaroptera	Cisticolidae			
Campephaga flava	Black Cuckooshrike	Campephagidae			
Campethera abingoni	Golden-tailed Woodpecker	Picidae			
Caprimulgus pectoralis	Fiery-necked Nightjar	Caprimulgidae			
Caprimulgus rufigena	Rufous-cheeked Nightjar	Caprimulgidae			
Cecropis abyssinica	Lesser Striped Swallow	Hirundinidae			
Cecropis cucullata	Greater Striped Swallow	Hirundinidae			
Cecropis semirufa	Red-breasted Swallow	Hirundinidae			
Centropus burchellii	Burchell's Coucal	Cuculidae			
Cercotrichas leucophrys	White-browed Scrub Robin	Muscicapidae			
Cercotrichas paena	Kalahari Scrub Robin	Muscicapidae			
Cercotrichas quadrivirgata	Bearded Scrub Robin	Muscicapidae			
Certhilauda chuana	Short-clawed Lark	Alaudidae	NT	LC	
Ceryle rudis	Pied Kingfisher	Alcedinidae			

Chalcomitra amethystina	Amethyst Sunbird	Nectariniidae			
Chalcomitra senegalensis	Scarlet-chested Sunbird	Nectariniidae			
Charadrius pecuarius	Kittlitz's Plover	Charadriidae	NT	LC	
Charadrius tricollaris	Three-banded Plover	Charadriidae			
Chlorocichla flaviventris	Yellow-bellied Greenbul	Pycnonotidae			
Chlorophoneus olivaceus	Olive Bushshrike	Malaconotidae			
Chlorophoneus sulfureopectus	Orange-breasted Bushshrike	Malaconotidae			
Chloropicus namaquus	Bearded Woodpecker	Picidae			
Chrysococcyx caprius	Diederik Cuckoo	Cuculidae			
Chrysococcyx klaas	Klaas's Cuckoo	Cuculidae			
Ciconia abdimii	Abdim's Stork	Ciconiidae			
Ciconia ciconia	White Stork	Ciconiidae			
Ciconia nigra	Black Stork	Ciconiidae	EN	LC	
Cinnyricinclus leucogaster	Violet-backed Starling	Sturnidae			
Cinnyris afer	Greater Double-collared Sunbird	Nectariniidae			SLS
Cinnyris mariquensis	Marico Sunbird	Nectariniidae			
Cinnyris talatala	White-bellied Sunbird	Nectariniidae			
Circaetus cinereus	Brown Snake Eagle	Accipitridae			
Circaetus pectoralis	Black-chested Snake Eagle	Accipitridae			
Cisticola aberrans	Lazy Cisticola	Cisticolidae			
Cisticola aridulus	Desert Cisticola	Cisticolidae			
Cisticola chiniana	Rattling Cisticola	Cisticolidae			
Cisticola fulvicapilla	Neddicky	Cisticolidae			
Cisticola juncidis	Zitting Cisticola	Cisticolidae			
Cisticola tinniens	Levaillant's Cisticola	Cisticolidae			
Clamator glandarius	Great Spotted Cuckoo	Cuculidae			
Clamator jacobinus	Jacobin Cuckoo	Cuculidae			
Clamator levaillantii	Levaillant's Cuckoo	Cuculidae			
Clanga pomarina	Lesser Spotted Eagle	Accipitridae			
Colius striatus	Speckled Mousebird	Coliidae			
Columba guinea	Speckled Pigeon	Columbidae			
Columba livia	Rock Dove	Columbidae			
Coracias caudatus	Lilac-breasted Roller	Coraciidae			
Coracias garrulus	European Roller	Coraciidae	NT	LC	
Coracias naevius	Purple Roller	Coraciidae			
Corvus albus	Pied Crow	Corvidae			
Corythaixoides concolor	Grey Go-away-bird	Musophagidae			
Corythornis cristatus	Malachite Kingfisher	Alcedinidae			
Cossypha humeralis	White-throated Robin-chat	Muscicapidae			

Coturnix delegorguei	Harlequin Quail	Phasianidae		
Creatophora cinerea	Wattled Starling	Sturnidae		
Crithagra atrogularis	Black-throated Canary	Fringillidae		
Crithagra flaviventris	Yellow Canary	Fringillidae		
Crithagra gularis	Streaky-headed Seedeater	Fringillidae		
Crithagra mozambica	Yellow-fronted Canary	Fringillidae		
Crithagra sulphurata	Brimstone Canary	Fringillidae		
Cuculus clamosus	Black Cuckoo	Cuculidae		
Cuculus solitarius	Red-chested Cuckoo	Cuculidae		
Curruca communis	Common Whitethroat	Sylviidae		
Curruca subcoerulea	Chestnut-vented Warbler	Sylviidae		
Cursorius temminckii	Temminck's Courser	Glareolidae		
Cypsiurus parvus	African Palm Swift	Apodidae		
Delichon urbicum	Common House Martin	Hirundinidae		
Dendrocygna viduata	White-faced Whistling Duck	Anatidae		
Dendroperdix sephaena	Crested Francolin	Phasianidae		
Dendropicos fuscescens	Cardinal Woodpecker	Picidae		
Dicrurus adsimilis	Fork-tailed Drongo	Dicruridae		
Dryoscopus cubla	Black-backed Puffback	Malaconotidae		
Elanus caeruleus	Black-winged Kite	Accipitridae	NT	LC
Emberiza capensis	Cape Bunting	Emberizidae		
Emberiza flaviventris	Golden-breasted Bunting	Emberizidae		
Emberiza impetuani	Lark-like Bunting	Emberizidae		
Emberiza tahapisi	Cinnamon-breasted Bunting	Emberizidae		
Eremomela icteropygialis	Yellow-bellied Eremomela	Cisticolidae		
Eremomela usticollis	Burnt-necked Eremomela	Cisticolidae		
Eremopterix leucotis	Chestnut-backed Sparrow-lark	Alaudidae		
Estrilda astrild	Common Waxbill	Estrildidae		
Euplectes afer	Yellow-crowned Bishop	Ploceidae		
Euplectes albonotatus	White-winged Widowbird	Ploceidae		
Euplectes ardens	Red-collared Widowbird	Ploceidae		
Euplectes capensis	Yellow Bishop	Ploceidae		
Euplectes orix	Southern Red Bishop	Ploceidae		
Eurocephalus anguitimens	Southern White-crowned Shrike	Laniidae		
Falco amurensis	Amur Falcon	Falconidae		
Falco biarmicus	Lanner Falcon	Falconidae	NT	LC
Falco naumanni	Lesser Kestrel	Falconidae	VU	LC
Falco rupicoloides	Greater Kestrel	Falconidae		
Falco rupicolus	Rock Kestrel	Falconidae		

Falco subbuteo	Eurasian Hobby	Falconidae			
Fulica cristata	Red-knobbed Coot	Rallidae			
Glaucidium perlatum	Pearl-spotted Owlet	Strigidae			
Granatina granatina	Violet-eared Waxbill	Estrildidae			
Gymnoris superciliaris	Yellow-throated Bush Sparrow	Passeridae			
Gyps africanus	White-backed Vulture	Accipitridae	CR	CR	
Gyps coprotheres	Cape Vulture	Accipitridae	VU	VU	
Halcyon albiventris	Brown-hooded Kingfisher	Alcedinidae			
Halcyon chelicuti	Striped Kingfisher	Alcedinidae			
Haliaeetus vocifer	African Fish Eagle	Accipitridae			
Hieraaetus wahlbergi	Wahlberg's Eagle	Accipitridae			
Hippolais icterina	Icterine Warbler	Acrocephalidae			
Hippolais olivetorum	Olive-tree Warbler	Acrocephalidae			
Hirundo rustica	Barn Swallow	Hirundinidae			
Iduna natalensis	African Yellow Warbler	Acrocephalidae			
Indicator indicator	Greater Honeyguide	Indicatoridae			
Indicator minor	Lesser Honeyguide	Indicatoridae			
Kaupifalco monogrammicus	Lizard Buzzard	Accipitridae			
Lagonosticta rhodopareia	Jameson's Firefinch	Estriididae			
Lagonosticta rubricata	African Firefinch	Estriididae			
Lagonosticta senegala	Red-billed Firefinch	Estriididae			
Lamprotornis chalybaeus	Greater Blue-eared Starling	Sturnidae			
Lamprotornis nitens	Cape Starling	Sturnidae			
Laniarius atrococcineus	Crimson-breasted Shrike	Malaconotidae			
Laniarius ferrugineus	Southern Boubou	Malaconotidae			
Lanius collaris	Southern Fiscal	Laniidae			
Lanius collurio	Red-backed Shrike	Laniidae			
Lanius minor	Lesser Grey Shrike	Laniidae			
Lophoceros nasutus	African Grey Hornbill	Bucerotidae			
Lophotis ruficrista	Red-crested Korhaan	Otididae			
Lybius torquatus	Black-collared Barbet	Lybiidae			
Macronyx croceus	Yellow-throated Longclaw	Motacillidae			
Malaconotus blanchoti	Grey-headed Bushshrike	Malaconotidae			
Melaenornis mariquensis	Marico Flycatcher	Muscicapidae			
Melaenornis pallidus	Pale Flycatcher	Muscicapidae			
Melaenornis pammelaina	Southern Black Flycatcher	Muscicapidae			
Melaenornis silens	Fiscal Flycatcher	Muscicapidae			NE
Melaniparus cinerascens	Ashy Tit	Paridae			
Melaniparus niger	Southern Black Tit	Paridae			

Melierax canorus	Pale Chanting Goshawk	Accipitridae	
Melierax metabates	Dark Chanting Goshawk	Accipitridae	
Merops apiaster	European Bee-eater	Meropidae	
Merops bullockoides	White-fronted Bee-eater	Meropidae	
Merops pusillus	Little Bee-eater	Meropidae	
Microcarbo africanus	Reed Cormorant	Phalacrocoracidae	
Micronisus gabar	Gabar Goshawk	Accipitridae	
Milvus aegyptius	Yellow-billed Kite	Accipitridae	
Milvus migrans	Black Kite	Accipitridae	
Mirafra africana	Rufous-naped Lark	Alaudidae	
Mirafra passerina	Monotonous Lark	Alaudidae	
Mirafra rufocinnamomea	Flappet Lark	Alaudidae	
Motacilla capensis	Cape Wagtail	Motacillidae	
Muscicapa adusta	African Dusky Flycatcher	Muscicapidae	
Muscicapa striata	Spotted Flycatcher	Muscicapidae	
Myioparus plumbeus	Grey Tit-flycatcher	Muscicapidae	
Myrmecocichla formicivora	Ant-eating Chat	Muscicapidae	
Neophedina cincta	Banded Martin	Hirundinidae	
Nilaus afer	Brubru	Malaconotidae	
Numida meleagris	Helmeted Guineafowl	Numididae	
Oena capensis	Namaqua Dove	Columbidae	
Oenanthe familiaris	Familiar Chat	Muscicapidae	
Oenanthe pileata	Capped Wheatear	Muscicapidae	
Onychognathus morio	Red-winged Starling	Sturnidae	
Oriolus larvatus	Black-headed Oriole	Oriolidae	
Ortygospiza atricollis	Quailfinch	Estrildidae	
Paragallinula angulata	Lesser Moorhen	Rallidae	
Passer diffusus	Southern Grey-headed Sparrow	Passeridae	
Passer melanurus	Cape Sparrow	Passeridae	
Passer motitensis	Great Sparrow	Passeridae	
Peliperdix coqui	Coqui Francolin	Phasianidae	
Phoeniculus purpureus	Green Wood Hoopoe	Phoeniculidae	
Phyllastrephus terrestris	Terrestrial Brownbul	Pycnonotidae	
Phylloscopus trochilus	Willow Warbler	Phylloscopidae	
Platalea alba	African Spoonbill	Threskiornithidae	
Plectropterus gambensis	Spur-winged Goose	Anatidae	
Plocepasser mahali	White-browed Sparrow-weaver	Ploceidae	
Ploceus capensis	Cape Weaver	Ploceidae	NE

Ploceus cucullatus	Village Weaver	Ploceidae			
Ploceus intermedius	Lesser Masked Weaver	Ploceidae			
Ploceus ocularis	Spectacled Weaver	Ploceidae			
Ploceus velatus	Southern Masked Weaver	Ploceidae			
Ploceus xanthops	Holub's Golden Weaver	Ploceidae			
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	Lybiidae			
Polyboroides typus	African Harrier-hawk	Accipitridae			
Prinia flavicans	Black-chested Prinia	Cisticolidae			
Prinia subflava	Tawny-flanked Prinia	Cisticolidae			
Prionops plumatus	White-crested Helmetshrike	Vangidae			
Prodotiscus regulus	Brown-backed Honeybird	Indicatoridae			
Pternistis natalensis	Natal Spurfowl	Phasianidae			
Pternistis swainsonii	Swainson's Spurfowl	Phasianidae			
Pterocles bicinctus	Double-banded Sandgrouse	Pteroclidae			
Pterocles burchelli	Burchell's Sandgrouse	Pteroclidae			
Ptilopsis granti	Southern White-faced Owl	Strigidae			
Ptyonoprogne fuligula	Rock Martin	Hirundinidae			
Pycnonotus tricolor	Dark-capped Bulbul	Pycnonotidae			
Pytilia afra	Orange-winged Pytilia	Estrildidae			
Pytilia melba	Green-winged Pytilia	Estrildidae			
Quelea quelea	Red-billed Quelea	Ploceidae			
Rhinopomastus cyanomelas	Common Scimitarbill	Phoeniculidae			
Sagittarius serpentarius	Secretarybird	Sagittariidae	VU	EN	
Sarkidiornis melanotos	Knob-billed Duck	Anatidae	NT	LC	
Saxicola torquatus	African Stonechat	Muscicapidae			
Scleroptila shelleyi	Shelley's Francolin	Phasianidae			
Scopus umbretta	Hamerkop	Scopidae	NT	LC	
Spermestes cucullata	Bronze Mannikin	Estrildidae			
Sphenoeacus afer	Cape Grassbird	Macrosphenidae			NE
Spilopelia senegalensis	Laughing Dove	Columbidae			
Sporopipes squamifrons	Scaly-feathered Weaver	Ploceidae			
Streptopelia capicola	Ring-necked Dove	Columbidae			
Streptopelia semitorquata	Red-eyed Dove	Columbidae			
Strix woodfordii	African Wood Owl	Strigidae			
Struthio camelus	Common Ostrich	Struthionidae			
Sylvietta rufescens	Long-billed Crombec	Macrosphenidae			
Tachybaptus ruficollis	Little Grebe	Podicipedidae			
Tachymarptis melba	Alpine Swift	Apodidae			
Tauraco porphyreolophus	Purple-crested Turaco	Musophagidae			

Tchagra australis	Brown-crowned Tchagra	Malaconotidae			
Tchagra senegalus	Black-crowned Tchagra	Malaconotidae			
Telophorus viridis	Gorgeous Bushshrike	Malaconotidae			
Terpsiphone viridis	African Paradise Flycatcher	Monarchidae			
Thamnolaea cinnamomeiventris	Mocking Cliff Chat	Muscicapidae			
Tockus leucomelas	Southern Yellow-billed Hornbill	Bucerotidae			
Tockus rufirostris	Southern Red-billed Hornbill	Bucerotidae			
Torgos tracheliotos	Lappet-faced Vulture	Accipitridae	CR	EN	
Trachyphonus vaillantii	Crested Barbet	Lybiidae			
Tricholaema leucomelas	Acacia Pied Barbet	Lybiidae			
Tringa glareola	Wood Sandpiper	Scolopacidae			
Tringa stagnatilis	Marsh Sandpiper	Scolopacidae			
Turdoides bicolor	Southern Pied Babbler	Leiothrichidae			
Turdoides jardineii	Arrow-marked Babbler	Leiothrichidae			
Turdus libonyana	Kurrichane Thrush	Turdidae			
Turdus litsitsirupa	Groundscraper Thrush	Turdidae			
Turdus smithi	Karoo Thrush	Turdidae			NE
Turnix sylvaticus	Common Buttonquail	Turnicidae			
Turtur chalcospilos	Emerald-spotted Wood Dove	Columbidae			
Tyto alba	Western Barn Owl	Strigidae			
Upupa africana	African Hoopoe	Upupidae			
Uraeginthus angolensis	Blue Waxbill	Estrildidae			
Urocolius indicus	Red-faced Mousebird	Coliidae			
Urolestes melanoleucus	Magpie Shrike	Laniidae			
Vanellus armatus	Blacksmith Lapwing	Charadriidae			
Vanellus coronatus	Crowned Lapwing	Charadriidae			
Vidua macroura	Pin-tailed Whydah	Viduidae			
Vidua paradisaea	Long-tailed Paradise Whydah	Viduidae			
Vidua regia	Shaft-tailed Whydah	Viduidae			
Zosterops virens	Cape White-eye	Zosteropidae			NE

8.5 Appendix E: Point Count Data from First Survey

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,135	26,03
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,107	56,16
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,072	8,22
Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae	0,050	12,33
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,044	30,14
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,044	39,73

Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,041	31,51
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,033	16,44
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,033	27,40
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,033	26,03
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,030	23,29
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,026	6,85
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,023	15,07
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,023	23,29
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,022	15,07
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,022	1,37
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,020	16,44
Chinspot Batis	*Batis molitor*	Platysteiridae	0,018	13,70
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,016	15,07
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,016	10,96
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,015	8,22
Cape Starling	*Lamprotornis nitens*	Sturnidae	0,011	10,96
Southern Yellow-billed Hornbill	*Tockus leucomelas*	Bucerotidae	0,011	8,22
Burnt-necked Eremomela	*Eremomela usticollis*	Cisticolidae	0,010	6,85
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,010	6,85
White-browed Sparrow-Weaver	*Plocepasser mahali*	Ploceidae	0,010	4,11
African Hoopoe	*Upupa africana*	Upupidae	0,007	6,85
Crowned Lapwing	*Vanellus coronatus*	Charadriidae	0,007	2,74
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae	0,007	4,11
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,007	1,37
Southern Pied Babbler	*Turdoides bicolor*	Leiothrichidae	0,007	1,37
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,005	5,48
Egyptian Goose	*Alopochen aegyptiaca*	Anatidae	0,005	2,74
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae	0,005	4,11
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae	0,005	5,48
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae	0,005	2,74
Three-banded Plover	*Charadrius tricollaris*	Charadriidae	0,005	2,74
Ashy Tit	*Melaniparus cinerascens*	Paridae	0,004	4,11
Namaqua Dove	*Oena capensis*	Columbidae	0,004	2,74
Pale Chanting Goshawk	*Melierax canorus*	Accipitridae	0,004	4,11
Red-billed Firefinch	*Lagonosticta senegala*	Estriididae	0,004	2,74
Rufous-naped Lark	*Mirafra africana*	Alaudidae	0,004	2,74
Southern White-crowned Shrike	*Eurocephalus anguitimens*	Laniidae	0,004	2,74
Spotted Thick-knee	*Burhinus capensis*	Burhinidae	0,004	1,37
Black-throated Canary	*Crithagra atrogularis*	Fringillidae	0,003	1,37

Brubru	*Nilaus afer*	Malaconotidae	0,003	2,74
Gabar Goshawk	*Micronisus gabar*	Accipitridae	0,003	2,74
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae	0,003	1,37
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae	0,003	1,37
Violet-eared Waxbill	*Granatina granatina*	Estrildidae	0,003	1,37
Black-collared Barbet	*Lybius torquatus*	Lybiidae	0,001	1,37
Black-faced Waxbill	*Brunhilda erythronotos*	Estrildidae	0,001	1,37
Black-headed Oriole	*Oriolus larvatus*	Oriolidae	0,001	1,37
Brown-hooded Kingfisher	*Halcyon albiventris*	Alcedinidae	0,001	1,37
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae	0,001	1,37
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae	0,001	1,37
Pied Crow	*Corvus albus*	Corvidae	0,001	1,37
Quailfinch	*Ortygospiza atricollis*	Estrildidae	0,001	1,37
Spectacled Weaver	*Ploceus ocularis*	Ploceidae	0,001	1,37
Swainson's Spurfowl	*Pternistis swainsonii*	Phasianidae	0,001	1,37
Yellow-bellied Greenbul	*Chlorocichla flaviventris*	Pycnonotidae	0,001	1,37
Zitting Cisticola	*Cisticola juncidis*	Cisticolidae	0,001	1,37

8.6 Appendix F: Incidental Records from First Survey

Common Name	Scientific Name
African Harrier-Hawk	*Polyboroides typus*
Black-chested Snake Eagle	*Circaetus pectoralis*
Black-throated Canary	*Crithagra atrogularis*
Bushveld Pipit	*Anthus caffer*
Cape Vulture	*Gyps coprotheres*
Double-banded Sandgrouse	*Pterocles bicinctus*
Great Sparrow	*Passer motitensis*
White-throated Robin-Chat	*Cossypha humeralis*

8.7 Appendix G: Point Count Data from Second Survey

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,080	8,25
Barn Swallow	*Hirundo rustica*	Hirundinidae	0,076	26,80
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,053	60,82
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,041	50,52
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,038	42,27
African Black Swift	*Apus barbatus*	Apodidae	0,035	16,49
European Bee-eater	*Merops apiaster*	Meropidae	0,035	8,25
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,028	40,21

Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,025	34,02
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,025	17,53
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,022	31,96
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,021	28,87
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,019	19,59
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,017	23,71
Sabota Lark	*Calendulauda sabota*	Alaudidae	0,017	22,68
White-rumped Swift	*Apus caffer*	Apodidae	0,017	6,19
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,017	22,68
Red-billed Quelea	*Quelea quelea*	Ploceidae	0,017	1,03
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,016	10,31
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,016	20,62
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,015	18,56
Diederik Cuckoo	*Chrysococcyx caprius*	Cuculidae	0,014	19,59
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,014	18,56
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,013	9,28
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,013	18,56
Cape Starling	*Lamprotornis nitens*	Sturnidae	0,011	10,31
Chinspot Batis	*Batis molitor*	Platysteiridae	0,011	15,46
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,011	9,28
Red-backed Shrike	*Lanius collurio*	Laniidae	0,011	14,43
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae	0,011	11,34
Barred Wren-Warbler	*Calamonastes fasciolatus*	Cisticolidae	0,009	13,40
Shaft-tailed Whydah	*Vidua regia*	Viduidae	0,009	13,40
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,008	9,28
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,008	8,25
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,008	9,28
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae	0,008	4,12
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae	0,007	10,31
White-faced Whistling Duck	*Dendrocygna viduata*	Anatidae	0,007	2,06
Black Cuckoo	*Cuculus clamosus*	Cuculidae	0,006	8,25
Southern Yellow-billed Hornbill	*Tockus leucomelas*	Bucerotidae	0,006	6,19
Violet-backed Starling	*Cinnyricinclus leucogaster*	Sturnidae	0,006	5,15
White-browed Sparrow-Weaver	*Plocepasser mahali*	Ploceidae	0,006	6,19
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae	0,006	4,12
Crested Barbet	*Trachyphonus vaillantii*	Lybiidae	0,006	8,25
Golden-breasted Bunting	*Emberiza flaviventris*	Emberizidae	0,006	8,25
Lesser Grey Shrike	*Lanius minor*	Laniidae	0,006	6,19
Namaqua Dove	*Oena capensis*	Columbidae	0,006	5,15

Violet-eared Waxbill	*Granatina granatina*	Estrildidae	0,006	4,12
Cape Sparrow	*Passer melanurus*	Passeridae	0,005	6,19
Common Scimitarbill	*Rhinopomastus cyanomelas*	Phoeniculidae	0,005	6,19
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae	0,005	7,22
Western Cattle Egret	*Bubulcus ibis*	Ardeidae	0,005	2,06
Yellow Canary	*Crithagra flaviventris*	Fringillidae	0,005	5,15
Swainson's Spurfowl	*Pternistis swainsonii*	Phasianidae	0,004	5,15
Black-throated Canary	*Crithagra atrogularis*	Fringillidae	0,004	2,06
Brubru	*Nilaus afer*	Malaconotidae	0,004	5,15
Rufous-naped Lark	*Mirafra africana*	Alaudidae	0,004	5,15
Three-banded Plover	*Charadrius tricollaris*	Charadriidae	0,004	4,12
Willow Warbler	*Phylloscopus trochilus*	Phylloscopidae	0,004	5,15
African Hoopoe	*Upupa africana*	Upupidae	0,003	4,12
Black-collared Barbet	*Lybius torquatus*	Lybiidae	0,003	2,06
Red-breasted Swallow	*Cecropis semirufa*	Hirundinidae	0,003	3,09
Blacksmith Lapwing	*Vanellus armatus*	Charadriidae	0,002	2,06
Black-winged Kite	*Elanus caeruleus*	Accipitridae	0,002	3,09
Crowned Lapwing	*Vanellus coronatus*	Charadriidae	0,002	1,03
Great Sparrow	*Passer motitensis*	Passeridae	0,002	2,06
Greater Kestrel	*Falco rupicoloides*	Falconidae	0,002	3,09
Jacobin Cuckoo	*Clamator jacobinus*	Cuculidae	0,002	3,09
Klaas's Cuckoo	*Chrysococcyx klaas*	Cuculidae	0,002	3,09
Monotonous Lark	*Mirafra passerina*	Alaudidae	0,002	3,09
Neddicky	*Cisticola fulvicapilla*	Cisticolidae	0,002	3,09
Pale Chanting Goshawk	*Melierax canorus*	Accipitridae	0,002	2,06
African Palm Swift	*Cypsiurus parvus*	Apodidae	0,001	1,03
Bar-throated Apalis	*Apalis thoracica*	Cisticolidae	0,001	1,03
Black-backed Puffback	*Dryoscopus cubla*	Malaconotidae	0,001	2,06
Black-headed Oriole	*Oriolus larvatus*	Oriolidae	0,001	2,06
Cape Vulture	*Gyps coprotheres*	Accipitridae	0,001	1,03
Cape Wagtail	*Motacilla capensis*	Motacillidae	0,001	2,06
Common Buzzard	*Buteo buteo*	Accipitridae	0,001	2,06
Common Waxbill	*Estrilda astrild*	Estrildidae	0,001	1,03
Double-banded Sandgrouse	*Pterocles bicinctus*	Pteroclidae	0,001	1,03
Egyptian Goose	*Alopochen aegyptiaca*	Anatidae	0,001	1,03
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae	0,001	2,06
Greater Striped Swallow	*Cecropis cucullata*	Hirundinidae	0,001	2,06
Green Wood Hoopoe	*Phoeniculus purpureus*	Phoeniculidae	0,001	1,03
Grey-headed Bushshrike	*Malaconotus blanchoti*	Malaconotidae	0,001	2,06

Marsh Warbler	*Acrocephalus palustris*	Acrocephalidae	0,001	2,06
Red-billed Firefinch	*Lagonosticta senegala*	Estriididae	0,001	1,03
Southern Masked Weaver	*Ploceus velatus*	Ploceidae	0,001	1,03
Southern Red-billed Hornbill	*Tockus rufirostris*	Bucerotidae	0,001	2,06
Speckled Mousebird	*Colius striatus*	Coliidae	0,001	1,03
Spotted Flycatcher	*Muscicapa striata*	Muscicapidae	0,001	1,03
White-throated Robin-Chat	*Cossypha humeralis*	Muscicapidae	0,001	2,06
Yellow-bellied Greenbul	*Chlorocichla flaviventris*	Pycnonotidae	0,001	2,06
African Harrier-Hawk	*Polyboroides typus*	Accipitridae	0,001	1,03
African Pipit	*Anthus cinnamomeus*	Motacillidae	0,001	1,03
Amethyst Sunbird	*Chalcomitra amethystina*	Nectariniidae	0,001	1,03
Ashy Tit	*Melaniparus cinerascens*	Paridae	0,001	1,03
Black Cuckooshrike	*Campephaga flava*	Campephagidae	0,001	1,03
Burnt-necked Eremomela	*Eremomela usticollis*	Cisticolidae	0,001	1,03
Cardinal Woodpecker	*Dendropicos fuscescens*	Picidae	0,001	1,03
Common Myna	*Acridotheres tristis*	Sturnidae	0,001	1,03
Common Swift	*Apus apus*	Apodidae	0,001	1,03
Desert Cisticola	*Cisticola aridulus*	Cisticolidae	0,001	1,03
Fiery-necked Nightjar	*Caprimulgus pectoralis*	Caprimulgidae	0,001	1,03
Fiscal Flycatcher	*Melaenornis silens*	Muscicapidae	0,001	1,03
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae	0,001	1,03
Garden Warbler	*Sylvia borin*	Sylviidae	0,001	1,03
Great Spotted Cuckoo	*Clamator glandarius*	Cuculidae	0,001	1,03
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae	0,001	1,03
Icterine Warbler	*Hippolais icterina*	Acrocephalidae	0,001	1,03
Knob-billed Duck	*Sarkidiornis melanotos*	Anatidae	0,001	1,03
Lesser Honeyguide	*Indicator minor*	Indicatoridae	0,001	1,03
Lesser Striped Swallow	*Cecropis abyssinica*	Hirundinidae	0,001	1,03
Levaillant's Cuckoo	*Clamator levaillantii*	Cuculidae	0,001	1,03
Little Bee-eater	*Merops pusillus*	Meropidae	0,001	1,03
Long-tailed Paradise Whydah	*Vidua paradisaea*	Viduidae	0,001	1,03
Orange-breasted Bushshrike	*Chlorophoneus sulfureopectus*	Malaconotidae	0,001	1,03
Pied Crow	*Corvus albus*	Corvidae	0,001	1,03
Pin-tailed Whydah	*Vidua macroura*	Viduidae	0,001	1,03
Sombre Greenbul	*Andropadus importunus*	Pycnonotidae	0,001	1,03
Southern Fiscal	*Lanius collaris*	Laniidae	0,001	1,03
Southern Grey-headed Sparrow	*Passer diffusus*	Passeridae	0,001	1,03
Southern Red Bishop	*Euplectes orix*	Ploceidae	0,001	1,03
Southern White-crowned Shrike	*Eurocephalus anguitimens*	Laniidae	0,001	1,03

Spectacled Weaver	*Ploceus ocularis*	Ploceidae	0,001	1,03
Spotted Eagle-Owl	*Bubo africanus*	Strigidae	0,001	1,03
Tawny-flanked Prinia	*Prinia subflava*	Cisticolidae	0,001	1,03
White-browed Robin-Chat	*Cossypha heuglini*	Muscicapidae	0,001	1,03
White-winged Widowbird	*Euplectes albonotatus*	Ploceidae	0,001	1,03
Common Whitethroat	*Curruca communis*	Sylviidae	0,000	1,03

8.8 Appendix H: Incidental Records from Second Survey

Common Name	Scientific Name
Acacia Pied Barbet	*Tricholaema leucomelas*
African Harrier-Hawk	*Polyboroides typus*
African Hoopoe	*Upupa africana*
African Paradise Flycatcher	*Terpsiphone viridis*
African Pipit	*Anthus cinnamomeus*
Barn Swallow	*Hirundo rustica*
Bearded Woodpecker	*Chloropicus namaquus*
Black-chested Snake Eagle	*Circaetus pectoralis*
Black-crowned Night Heron	*Nycticorax nycticorax*
Black-winged Kite	*Elanus caeruleus*
Blue Waxbill	*Uraeginthus angolensis*
Brown Snake Eagle	*Circaetus cinereus*
Brown-hooded Kingfisher	*Halcyon albiventris*
Cape Vulture	*Gyps coprotheres*
Cinnamon-breasted Bunting	*Emberiza tahapisi*
Common Buzzard	*Buteo buteo*
Common Myna	*Acridotheres tristis*
Common Ostrich	*Struthio camelus*
Crimson-breasted Shrike	*Laniarius atrococcineus*
Double-banded Sandgrouse	*Pterocles bicinctus*
Dusky Indigobird	*Vidua funerea*
Egyptian Goose	*Alopochen aegyptiaca*
Emerald-spotted Wood Dove	*Turtur chalcospilos*
European Bee-eater	*Merops apiaster*
European Roller	*Coracias garrulus*
Golden-tailed Woodpecker	*Campethera abingoni*
Greater Kestrel	*Falco rupicoloides*
Greater Striped Swallow	*Cecropis cucullata*
Green Wood Hoopoe	*Phoeniculus purpureus*
Grey Go-away-bird	*Corythaixoides concolor*

House Sparrow	*Passer domesticus*
Jacobin Cuckoo	*Clamator jacobinus*
Kalahari Scrub Robin	*Cercotrichas paena*
Knob-billed Duck	*Sarkidiornis melanotos*
Laughing Dove	*Spilopelia senegalensis*
Lesser Grey Shrike	*Lanius minor*
Lesser Masked Weaver	*Ploceus intermedius*
Little Bee-eater	*Merops pusillus*
Long-tailed Paradise Whydah	*Vidua paradisaea*
Marico Flycatcher	*Melaenornis mariquensis*
Monotonous Lark	*Mirafra passerina*
Namaqua Dove	*Oena capensis*
Pale Chanting Goshawk	*Melierax canorus*
Pied Crow	*Corvus albus*
Red-backed Shrike	*Lanius collurio*
Red-breasted Swallow	*Cecropis semirufa*
Red-crested Korhaan	*Lophotis ruficrista*
Red-eyed Dove	*Streptopelia semitorquata*
Red-winged Starling	*Onychognathus morio*
Ring-necked Dove	*Streptopelia capicola*
Rock Dove	*Columba livia*
Rufous-naped Lark	*Mirafra africana*
Sabota Lark	*Calendulauda sabota*
Scaly-feathered Weaver	*Sporopipes squamifrons*
Scarlet-chested Sunbird	*Chalcomitra senegalensis*
Shaft-tailed Whydah	*Vidua regia*
Southern Fiscal	*Lanius collaris*
Southern Red-billed Hornbill	*Tockus rufirostris*
Speckled Mousebird	*Colius striatus*
Spotted Flycatcher	*Muscicapa striata*
Spotted Thick-knee	*Burhinus capensis*
Striped Kingfisher	*Halcyon chelicuti*
Village Weaver	*Ploceus cucullatus*
Wahlberg's Eagle	*Hieraaetus wahlbergi*
Western Barn Owl	*Tyto alba*
Western Cattle Egret	*Bubulcus ibis*
White Stork	*Ciconia ciconia*
White-browed Sparrow-Weaver	*Plocepasser mahali*
White-throated Robin-Chat	*Cossypha humeralis*

Yellow Canary	*Crithagra flaviventris*

8.9 Appendix I: Specialist Declaration of Independence

I, Sam van Zwieten, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be 79taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of NEMA.

Sam van Zwieten (Cand. Sci. Nat 167363)

Ecologist/Avifauna Specialist

The Biodiversity Company

July 2025

8.10 Appendix J – Specialist CVs

Sam van Zwieten

M.Sc Genetics

SACNASP Candidate

Cell: +27 72 764 5690
Email: sam@thebiodiversitycompany.com
Identity Number: 9508305041082
Date of birth: 30 August 1995

Profile Summary

Work experience in several Southern African countries.

Biodiversity specialist experience in projects related to infrastructure development, renewable energy, and mining.

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements.

Specialist expertise include Avifauna and Terrestrial Ecology.

Areas of Interest

Ornithology, Conservation, Zoology, Biodiversity, Parasitology, and Genetics.

Key Experience

- Environmental Impact Assessment
- Terrestrial Ecological Assessments
- Avifaunal Conservation Surveys
- Habitat Delineation
- Phylogenies and Taxonomic Classifications
- Field Work and Research

Country Experience

South Africa

Angola

Eswatini

Nationality

South African

Languages

English – Proficient

Afrikaans – Basic

Qualifications

- MSc Genetics, University of KwaZulu Natal
- BSc (Hons) Zoology, University of Johannesburg
- BSc Zoology and Environmental Management, University of Johannesburg
- Cand Sci Nat.

AVIFAUNA IMPACT ASSESSMENT FOR THE PROPOSED GRID CONNECTION ASSOCIATED WITH THE MAKOPPA SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

Makhado Local Municipality, Vhembe District Municipality, Limpopo Province, South Africa

08/07/2025

Prepared by:

The Biodiversity Company

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Report Name	**AVIFAUNA IMPACT ASSESSMENT FOR THE PROPOSED GRID CONNECTION ASSOCIATED WITH THE MAKOPPA SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY**
Specialist Theme	Avifauna Theme
Project Reference	Makoppa Solar Grid
Report Version	Draft 1 / 08/07/2025
Environmental Assessment Practitioner	Cape EAPrac
Report Writer	Sam van Zwieten (Cand. Sci. Nat 167363)
Reviewer	Dr Lindi Steyn (SACNASP 119992)
Reviewer	Ryno Kemp (SACNASP 117462/17)
Reviewer	Andrew Husted (SACNASP 400213/11)
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, Amended. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake an avifauna assessment for the gridlines associated with the proposed Tabor Solar Photovoltaic (PV) Facilities. Four facilities are proposed for the Tabor Solar cluster, with associated grid connection lines for each facility. This report assesses the gridline connecting the Makoppa Solar PV facility to the Tabor Main Transmission Substation (MTS). The proposed Project Area of Influence (PAOI) is located approximately 40 km south of Makhado, and 8.5 km southwest of Bandelierkop (Figure 1-1). The Project Area of Interest (PAOI) consists of a 2 km area around the project area provided (Figure 1-2).

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making.

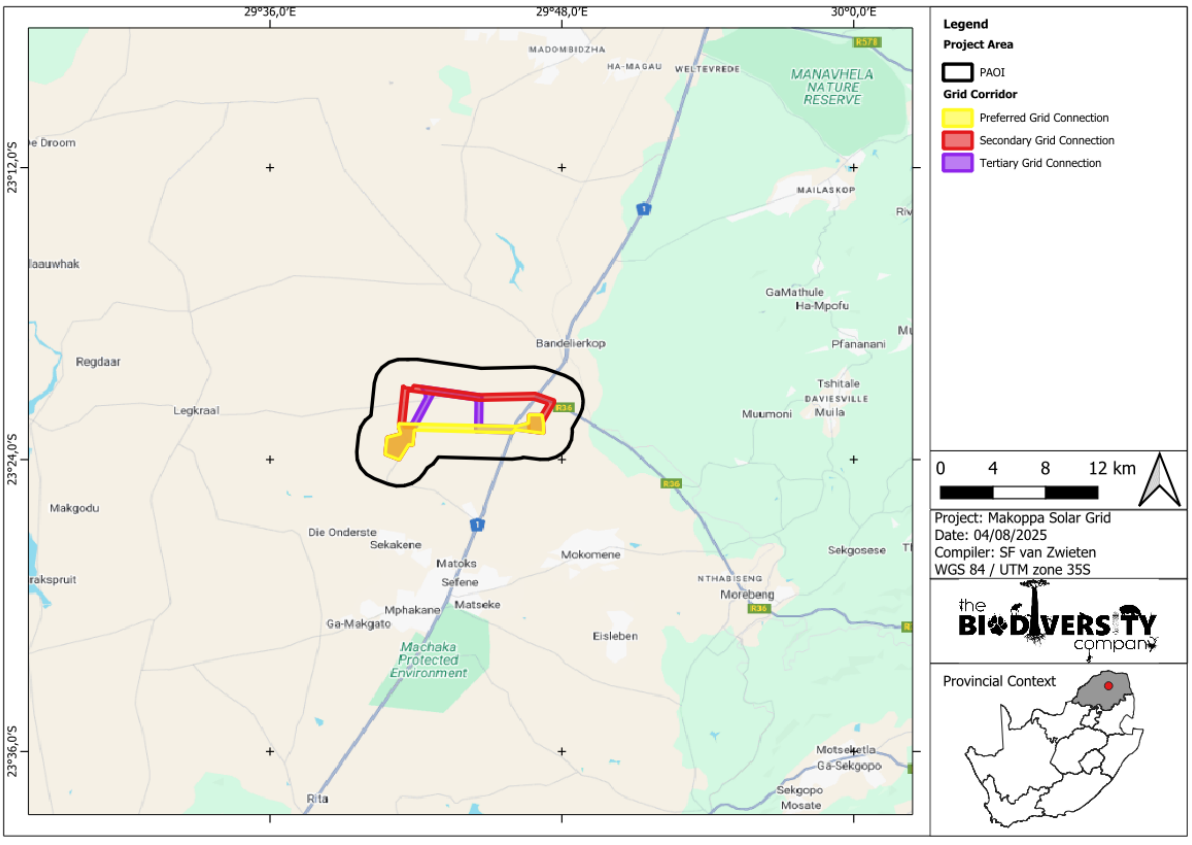


Figure 1-1 Proposed location of the project area in relation to the nearby towns

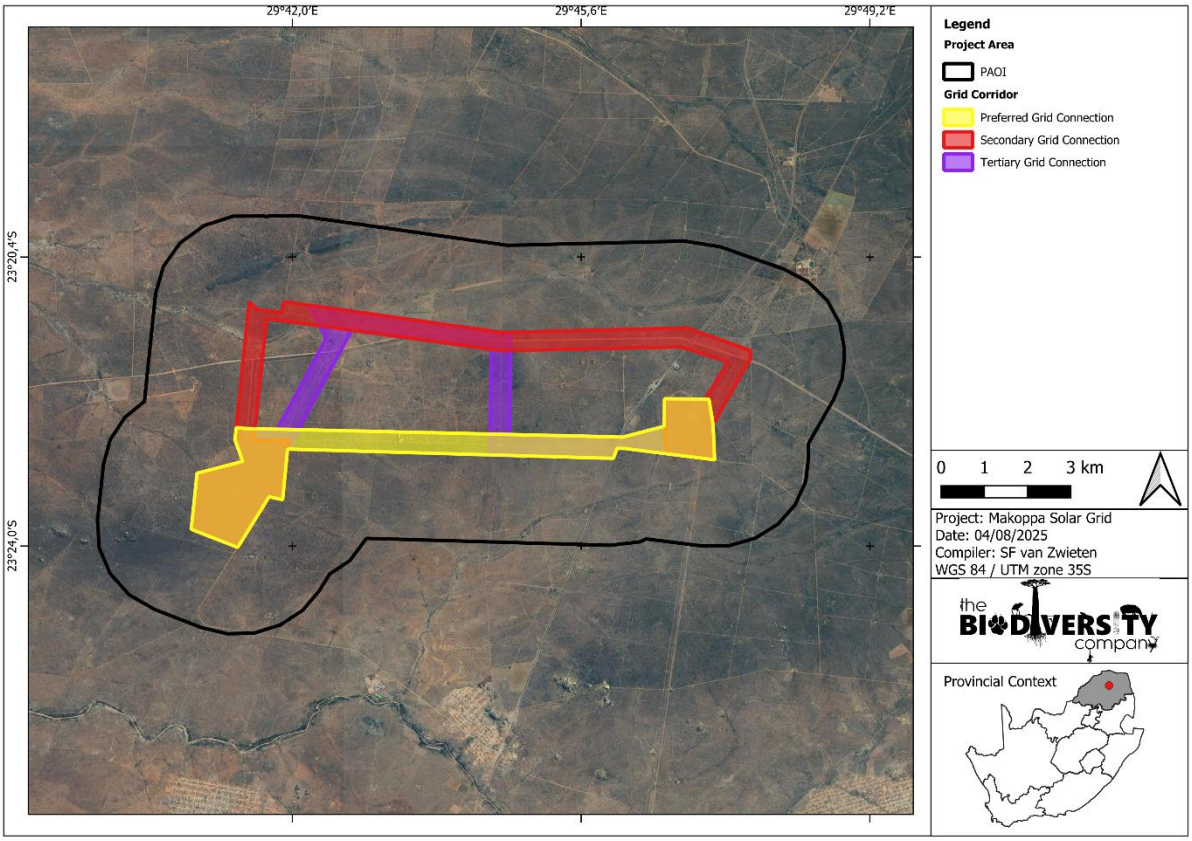


Figure 1-2 Project area of influence

1.2 Project Description

The applicant Makoppa Solar PV (Pty) Ltd are proposing the construction of a Solar Photovoltaic (PV) Energy Facility and associated infrastructure, known as Makoppa Solar PV, on Portion 1 of Farm 465 located South of Louis Trichardt in the Makhado Local Municipality, Vhembe District, Limpopo Province.

This environmental application process includes Electrical Grid Connection Infrastructure required to connect the Makoppa Solar PV to the National Grid via the existing Tabor Main Transmission Substation (MTS).

This Electrical Grid Infrastructure includes:

- Onsite Switching Station (SS) (up to 1ha), adjacent to the IPP Substation.
- 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the existing Eskom Tabor Substation;
- Access Road to Switching Station;
- Maintenance access road below or adjacent to the power line.

Three Grid connection alternatives are under investigation as part of this environmental process. Different land portions are affected by the various grid connection alternatives.

1.3 Scope of Work

The assessment was conducted according to the above-mentioned (Section 1.1) legislation on assessment and reporting criteria and the best-practice guidelines and principles for Avifaunal Impact Assessments within the context of PVs as outlined by BirdLife South Africa (2017).

The scope of the Avifaunal Impact Assessment included the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the Project Area of Influence (PAOI) and surrounding landscape
- Desktop assessment to compile an expected species list and possible avifauna Species of Conservation Concern (SCC) that potentially occur within the PAOI;
- Field work to determine the density and composition of species in the PAOI;
- Description of the baseline avifauna species and Functional Feeding Guild (FFG) composition assemblage within the PAOI;
- Delineate site sensitivity or sensitivities i.e., the Site Ecological Importance (SEI) within the context of the avifauna species assemblage of the PAOI;
- Identify the manner that the proposed development impacts the avifauna community and evaluate the level of risk of these potential impacts; and
- Provide mitigation measures to prevent or reduce the possible impacts.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The PAOI was based on the project footprint area as provided by the client. Any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;
- The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025. These surveys were conducted at the same time as the proposed associated PV, resulting in a wet and dry season survey;
- Whilst every effort was made to cover as much of the PAOI as possible it is possible that some species that are present within the PAOI were not recorded during the field investigations due to their secretive behaviour;
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features delineated may be offset by up to 5 m;
- Access within the greater area were at times limited to only the development sites and not the entirety of the 2 km buffer associated with the PAOI.

1.5 Key Legislative Requirements

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

Table 1-1 A list of key legislative requirements

Region	Legislation / Guideline	Comment
National	NEMA	Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 requirements

	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), Threatened or Protected Species Regulations	The protection of species and ecosystems that warrant protection
	Assessment Protocol (March 2020)	The minimum criteria for reporting.
	Assessment Protocol (October 2020)	Protocol for the specialist assessment and minimum report content requirements.
	NEMWA;	The regulation of waste management to protect the environment.
	NWA	The regulation of water uses.
	GN 1003 of GG 43726 of 18 Sept 2020	The regulation and management of alien invasive species.
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilisation of the natural agricultural resources, including the vegetation and the combating of weeds and invader plants.
Provincial	Limpopo Environmental Management Act (2003)	To provide for the management and conservation of the Limpopo's Province's biophysical environment and protected areas.
	Limpopo Conservation Plan (2018)	Designation of conservation areas and targets.

2 Fieldwork

2.1 Avifauna Field Assessment

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025.

Point Counts

Standardized point counts (Buckland *et al*., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as power lines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering. Figure 2-1 shows the locations of the point counts conducted and the GPS tracks of the specialists during the two field surveys.

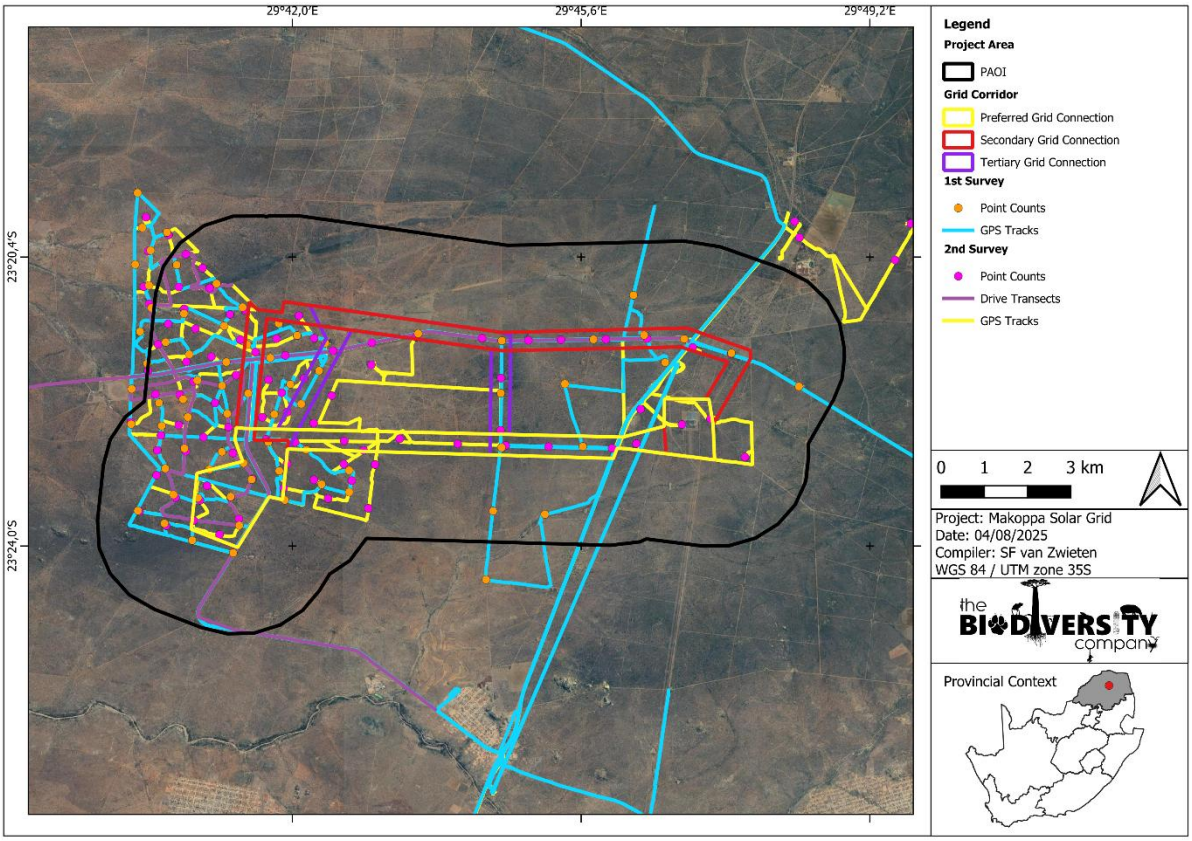


Figure 2-1 Map illustrating the point count locations, drive transects and GPS tracks during the field surveys

3 Results & Discussion

3.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 3-1.

Table 3-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Irrelevant – Overlaps with an "LC" Ecosystems (RLE, 2021).	3.1.1
Ecosystem Protection Level	Relevant – Overlaps with a 'Poorly Protected' Ecosystem.	3.1.2
Provincial Conservation Plan	Relevant – Project footprint overlaps with ONA, and NNR.	3.1.3
National Protected Areas Expansion Strategy	Irrelevant – Does not overlaps with a NPAES focus areas.	-
SAPAD & SACAD	Relevant – Overlaps with a SACAD area (Vhembe Biosphere Reserve) and is within 10 km of a SAPAD area (Blijdschap Private Nature Reserve).	3.1.4
Key Biodiversity Areas	Irrelevant – The PAOI is over 30 km away from any KBA.	-
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Irrelevant – The PAOI does not overlap with any threatened rivers or wetlands.	3.1.5
National Freshwater Priority Area	Relevant – PAOI overlaps with NFEPA Non-priority wetlands.	3.1.6
South Africa's Strategic Water Source Areas	Irrelevant – The PAOI does not overlap with any Strategic Water Source Areas.	-
RAMSAR Wetlands	Irrelevant – The PAOI does not overlap with any RAMSAR Area	-
Renewable Energy Development Zones	Irrelevant – The PAOI does not overlap with any REDZ.s	-
Renewable Energy Database	Relevant – PAOI overlaps with an REEA project.	3.1.7
Strategic Transmission Corridors (EGI)	Relevant – Overlaps with the International Corridor	3.1.8
Coordinated Water Bird Count	Irrelevant – Nearest CWAC site ~ 38 km from the project area	3.1.9
Coordinated Avifaunal Road Count	Irrelevant – Nearest CAR route ~ 200 km from the project area	3.1.10

3.1.1 Red List of Ecosystems

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed development overlaps with a LC ecosystem (Figure 3-1).

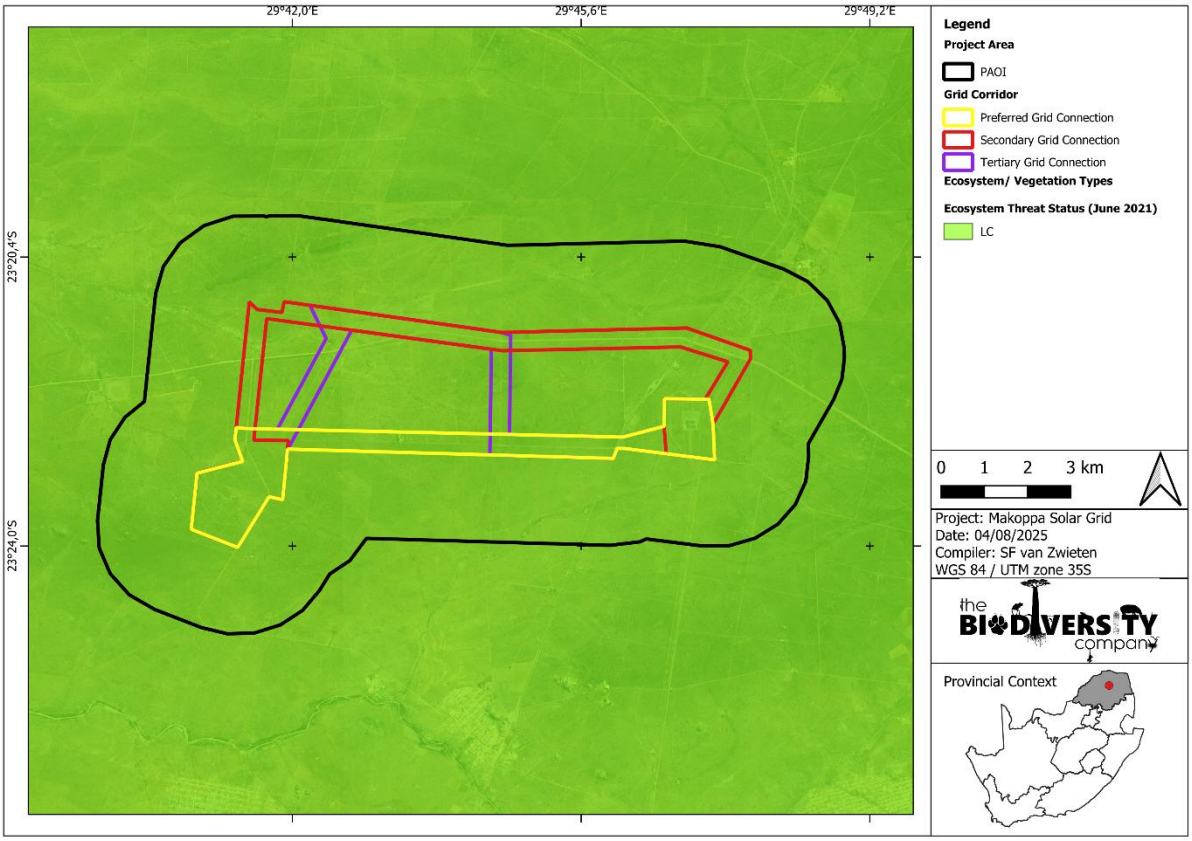


Figure 3-1 Map illustrating the ecosystem threat status associated with the proposed development

3.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a PP ecosystem (Figure 3-2).

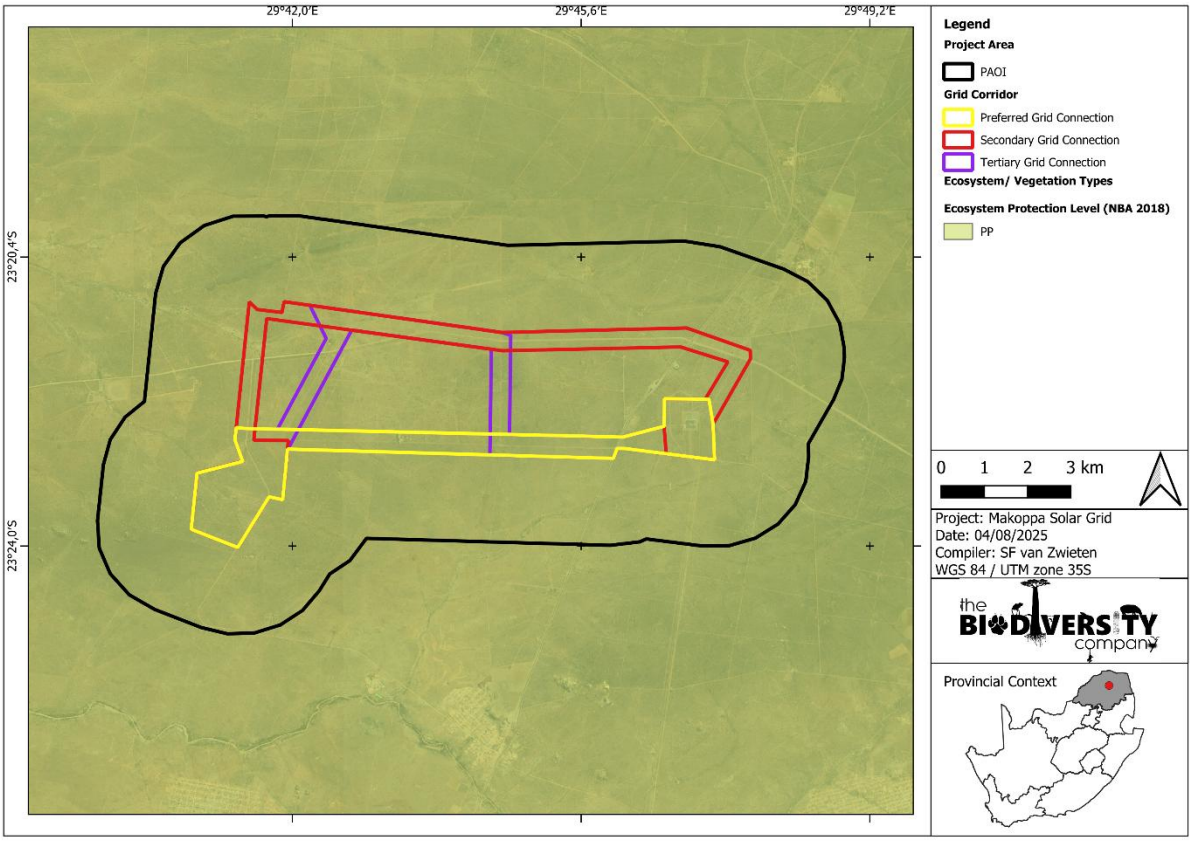


Figure 3-2 Map illustrating the ecosystem protection level associated with the PAOI

3.1.3 Critical Biodiversity Areas and Ecological Support Areas

The key output of this systematic biodiversity plan is a map of biodiversity priority areas (LCPv2, 2018). The LCPv2 CBA map delineates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas, Protected Areas, and areas that have been irreversibly modified from their natural state ((LCPv2, 2018). The LCPv2 uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- Critical Biodiversity Area (CBA);
- Ecological Support Area (ESA);
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Remaining (NNR).

According to the LCPv2 the PAOI falls across areas classified as ESA1, ONA, and NNR (Figure 3-3). The project footprint falls across Other Natural Areas and No Natural Remaining.

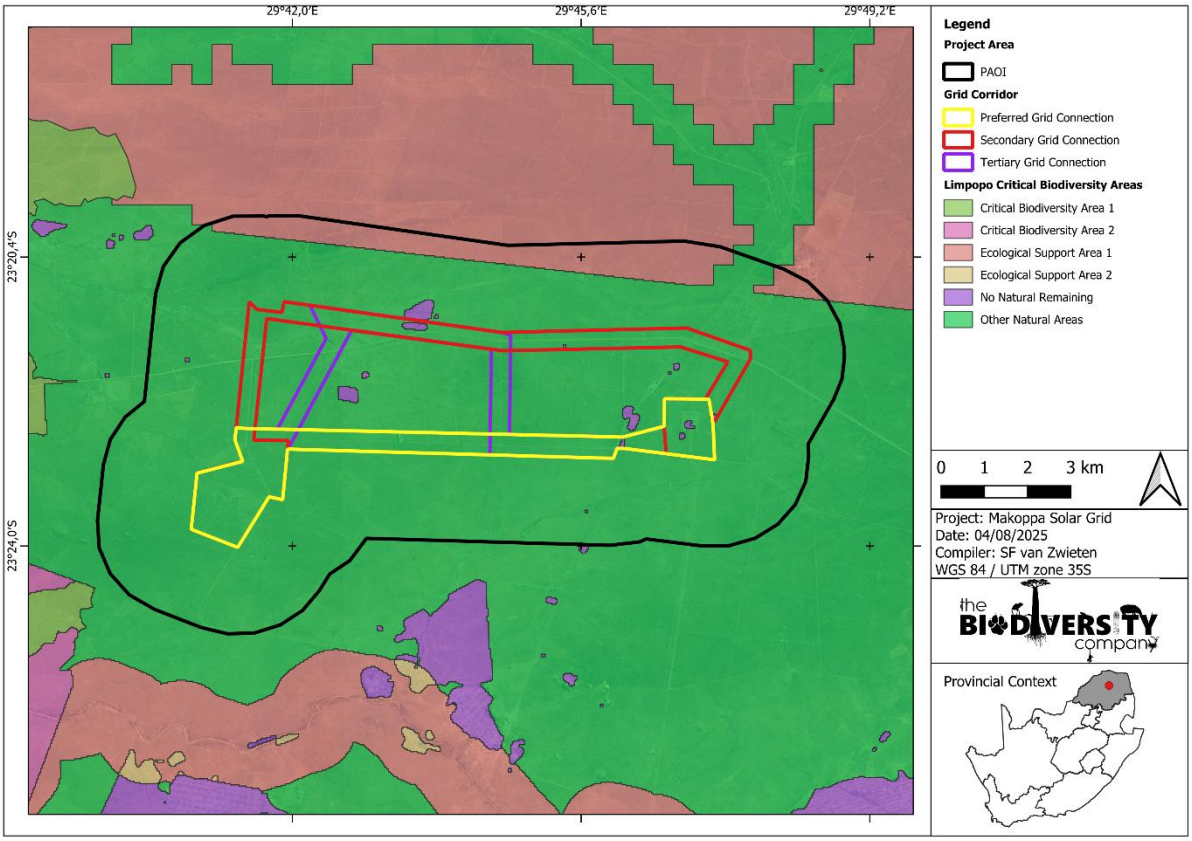


Figure 3-3 Map illustrating the biodiversity spatial plan in relation to the PAOI

3.1.4 Protected Areas

According to the protected and conservation area spatial datasets from SAPAD and SACAD (DFFE, 2021a). The PAOI is within 10 km of a SAPAD Protected area, being the Blijdschap Private Nature Reserve (Figure 3-4). The PAOI overlaps with the Vhembe Biosphere Reserve SACAD area.

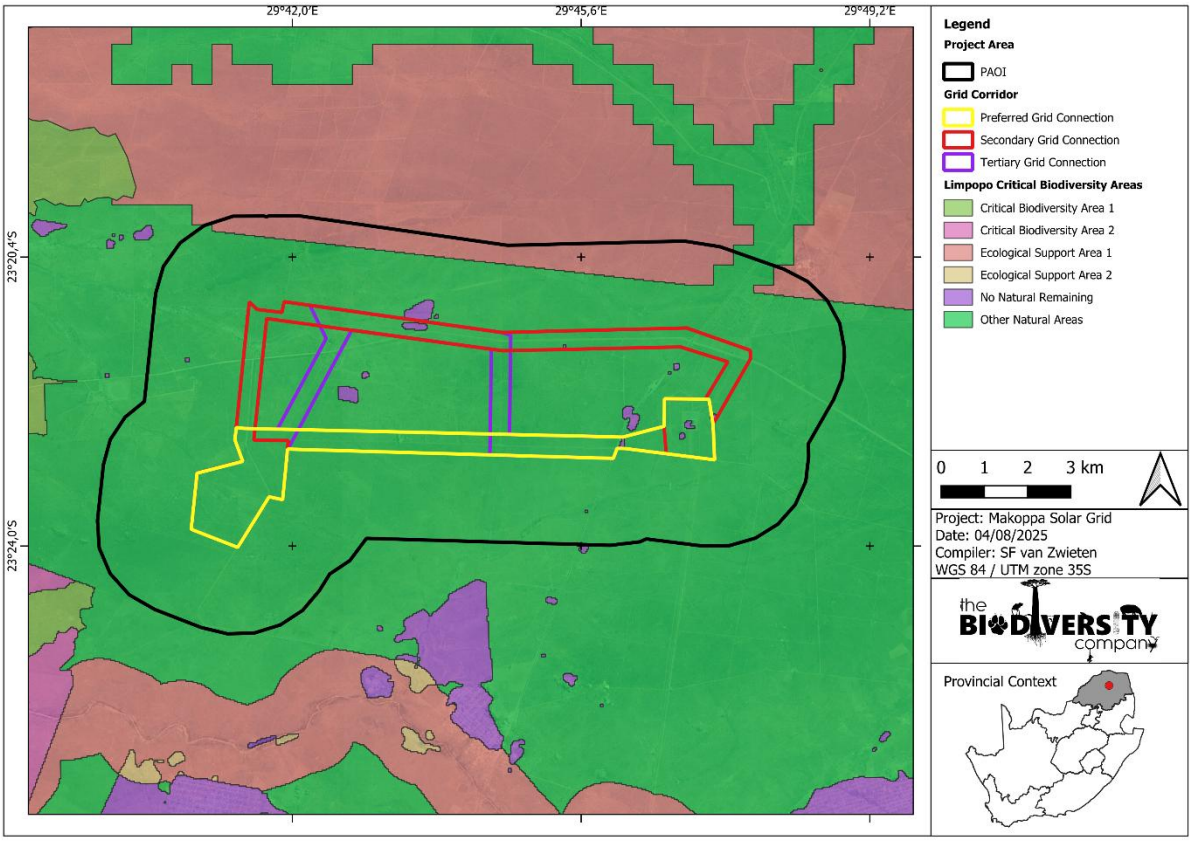


Figure 3-4 Map illustrating the location of conservation and protected areas proximal to the PAOI

3.1.5 South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA in 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al*., 2019; Skowno *et al*., 2019). The PAOI does not overlap with any threatened rivers or wetlands (Figure 3-5).

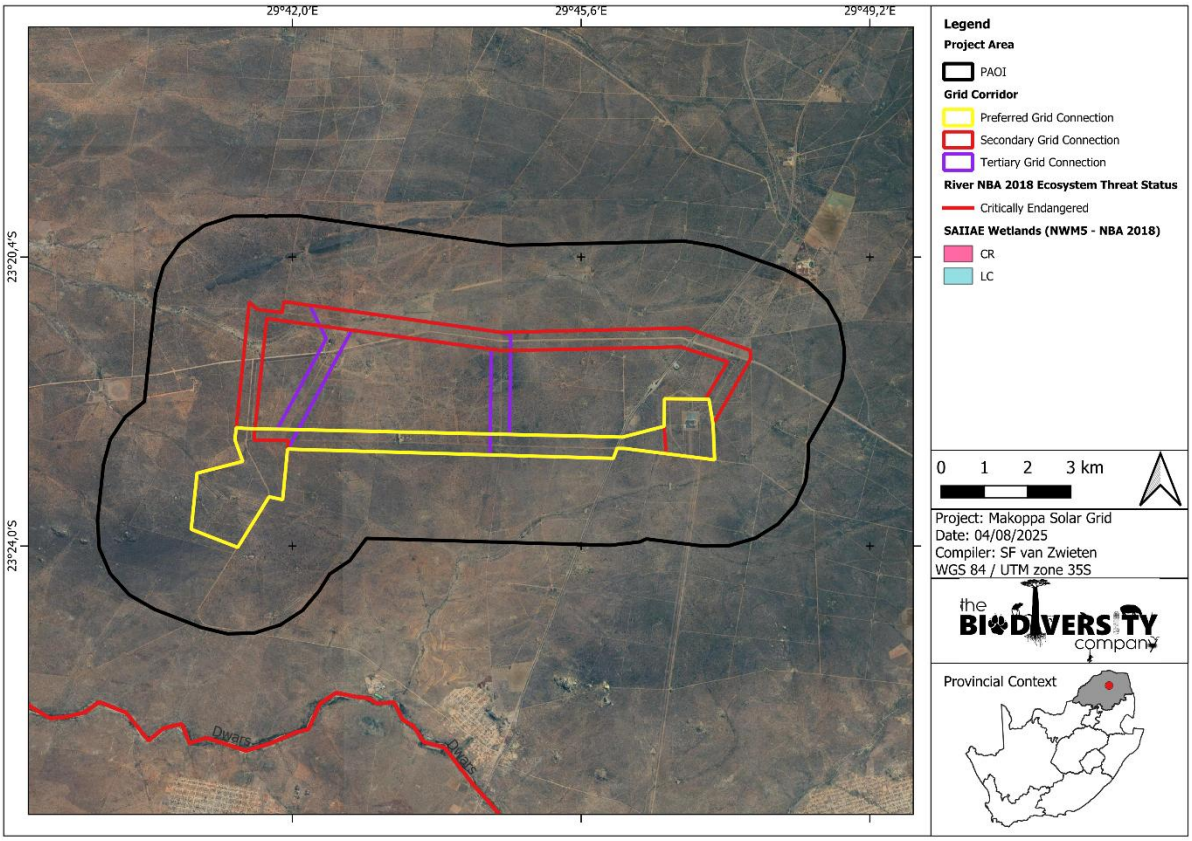


Figure 3-5 Map illustrating ecosystem threat status of rivers and wetland ecosystems in relation to the PAOI

3.1.6 National Freshwater Ecosystem Priority Area Status

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

Figure 3-6 shows that the PAOI overlaps with NFEPA Non-priority wetlands.

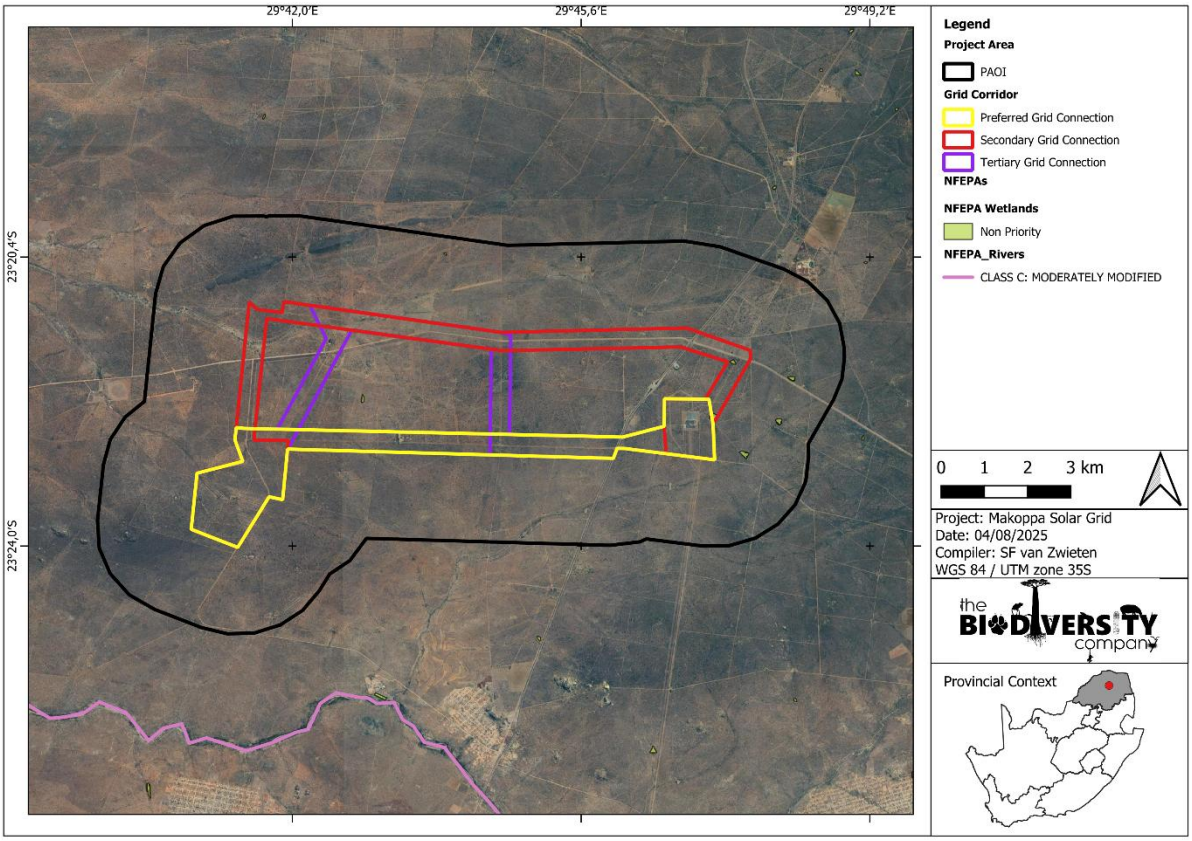


Figure 3-6 The PAOI in relation to the National Freshwater Ecosystem Priority Areas

3.1.7 Renewable Energy EIA Application Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there are approved projects of a similar nature in the near vicinity of the PAOI (Figure 3-7). This will increase the overall impact on the habitats in the area.

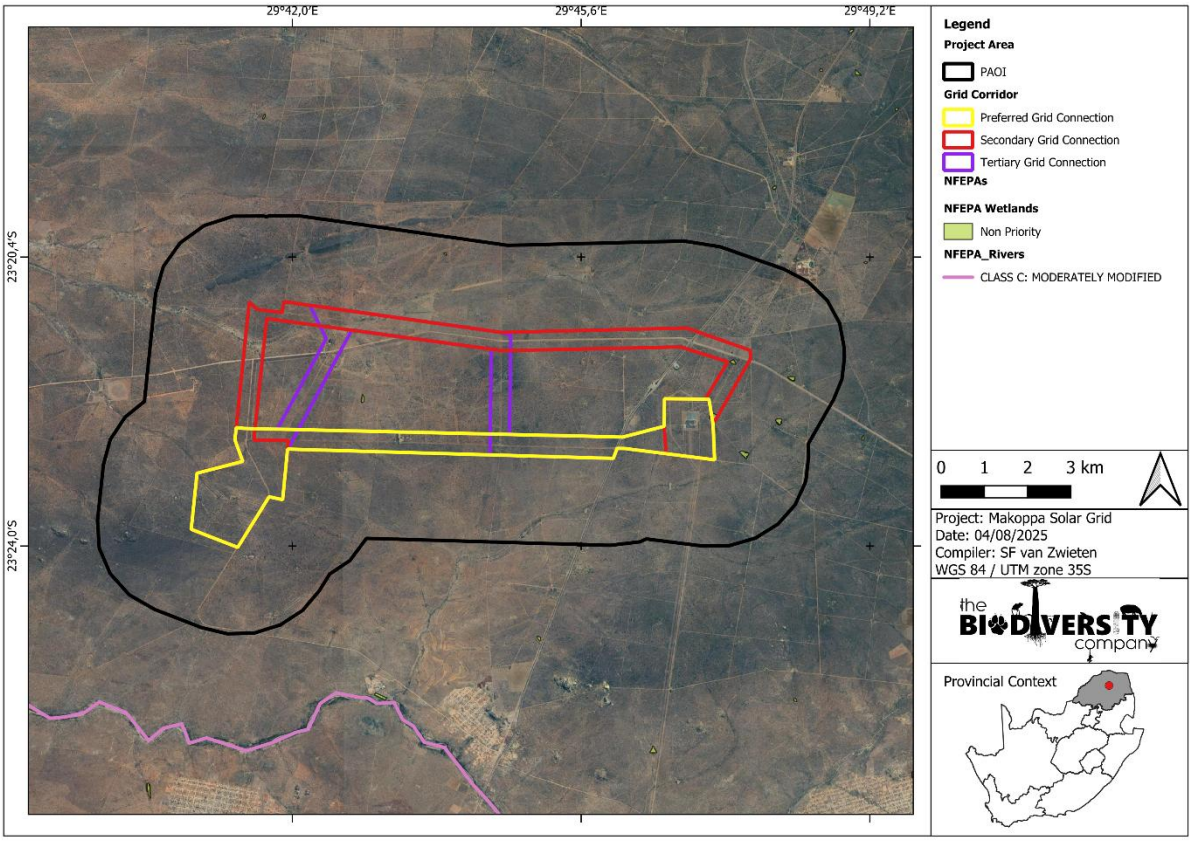


Figure 3-7 The project area in relation to the renewable energy database projects in the area.

3.1.8 Strategic Transmission Corridors

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

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

The project area falls within the International Strategic Transmission Corridor (EGI) (Figure 3-8).

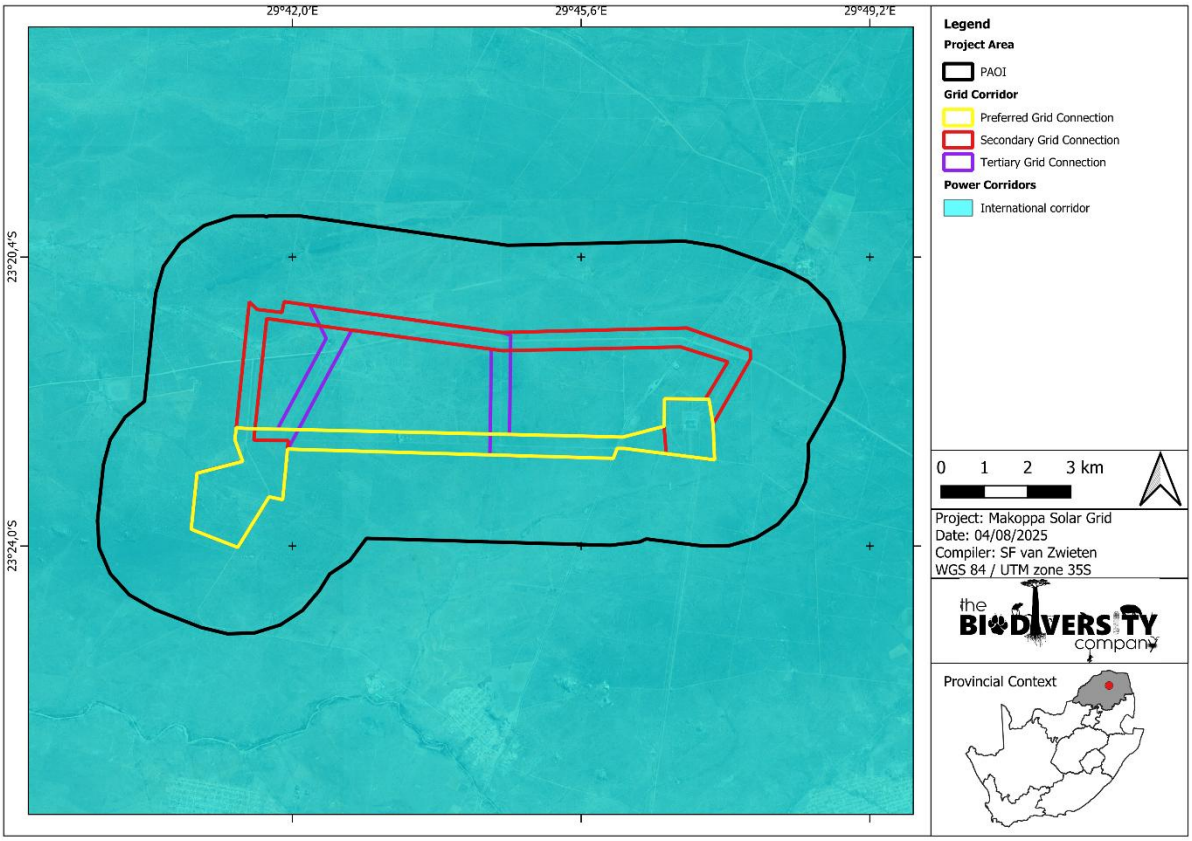


Figure 3-8 The PAOI in relation to the strategic transmission corridors

3.1.9 Coordinated Waterbird Counts (CWAC)

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to International waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC please refer to http://cwac.birdmap.africa/about.php. Figure 3-9 shows the PAOI is over 38 km away from the nearest CWAC site.

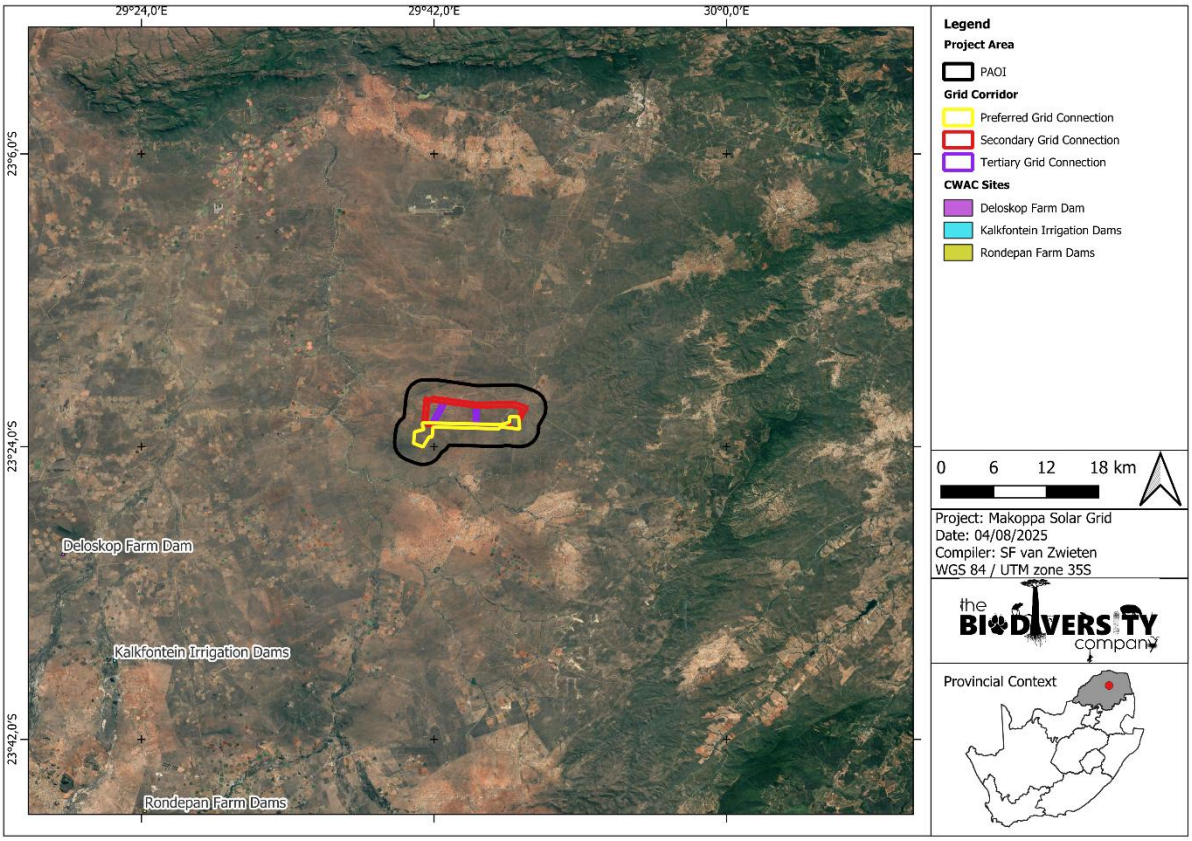


Figure 3-9 The PAOI in relation to the CWAC sites

3.1.10 Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis denhami*). Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), roadcounts are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 3-10 shows that the PAOI is ~200 km away from the nearest CAR route.

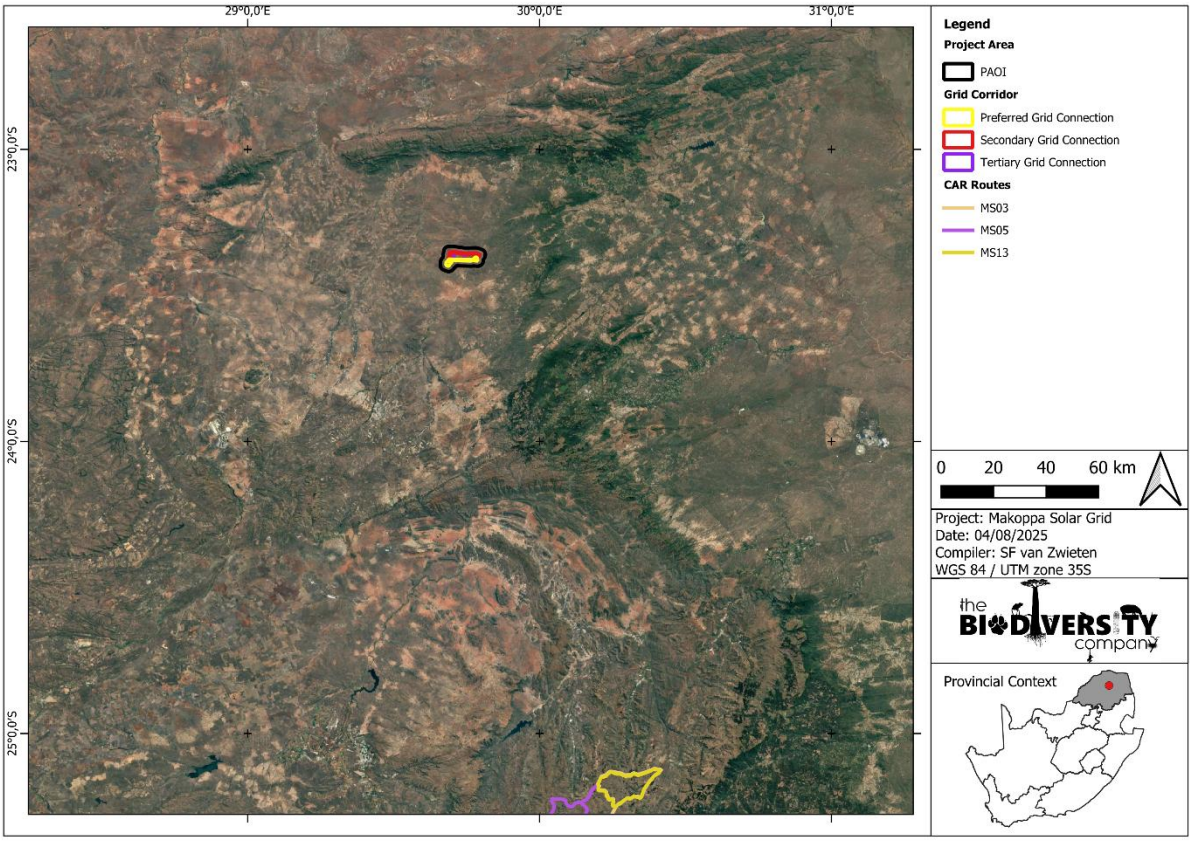


Figure 3-10 The CAR routes in relation to the PAOI

3.2 Avifauna Expected Species

SABAP2 data indicate that 283 avifauna species are expected for the PAOI and surrounds. Of these, 16 are considered SCC. The screening tool identifies one additional avifauna SCC, the Tawny Eagle (*Aquila rapax*) and one additional SCC was observed during the field surveys, the Black-crowned Night Heron (*Nycticorax nycticorax*), which results in 18 avifaunal SCC expected for the PAOI. The likelihood of occurrence for these SCCs within the POAI is indicated in Table 3-2. Of these, 11 SCCs have a high likelihood of occurrence, with five of these species being observed during the field surveys, the Black-crowned Night Heron (*Nycticorax nycticorax*), Black-winged Kite (*Elanus caeruleus*), the Cape Vulture (*Gyps coprotheres*), European Roller (*Coracias garrulus*), and Knob-billed Duck (*Sarkidiornis melanotos*).

Table 3-2 Threatened avifauna species that are expected to occur within the PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened, VU = Vulnerable and NA = Not Assessed

Common Name	Scientific Name	Regional*	Global+	Likelihood of occurrence
Black Stork	*Ciconia nigra*	EN	LC	Low
Black-winged Kite	*Elanus caeruleus*	NT	LC	Confirmed
Black-crowned Night Heron	*Nycticorax nycticorax*	NT	LC	Confirmed
Cape Vulture	*Gyps coprotheres*	VU	VU	Confirmed
European Roller	*Coracias garrulus*	NT	LC	Confirmed
Hamerkop	*Scopus umbretta*	NT	LC	High
Kittlitz's Plover	*Charadrius pecuarius*	NT	LC	Moderate
Knob-billed Duck	*Sarkidiornis melanotos*	NT	LC	Confirmed

Lanner Falcon	*Falco biarmicus*	NT	LC	Moderate
Lappet-faced Vulture	*Torgos tracheliotos*	CR	EN	High
Lesser Kestrel	*Falco naumanni*	VU	LC	Moderate
Marsh Owl	*Asio capensis*	NT	LC	Moderate
Red-billed Teal	*Anas erythrorhyncha*	NT	LC	High
Secretarybird	*Sagittarius serpentarius*	VU	EN	Moderate
Short-clawed Lark	*Certhilauda chuana*	NT	LC	High (Confirmed nearby in other study)
Tawny Eagle	*Aquila rapax*	EN	VU	High (Confirmed nearby in other study)
Verreaux's Eagle	*Aquila verreauxii*	VU	LC	Low
White-backed Vulture	*Gyps africanus*	CR	CR	High

*(BLSA 2025), + (IUCN 2021)

Black-crowned Night Heron (*Nycticorax nycticorax*) is listed as regionally NT and globally LC. They inhabit a wide range of wetland habitats, but require dense vegetation nearby to roost. They are threatened by the loss and degradation of their wetland habitats. They are particularly susceptible to the effects of pollutants such as pesticides and petroleum. This species was confirmed at the site during the field survey.

Black-winged Kite (*Elanus caeruleus*) is listed as regionally NT and globally LC. It inhabits open habitats across various biomes and even occurs regularly in urban environments. There is evidence that this species has experienced declines in recent years but the reason behind the declines is unclear. The effects of rodenticides and pesticides may be a contributing factor. This species was confirmed at the site during the field survey.

Cape Vulture (*Gyps coprotheres*) is listed as VU both regionally and globally. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). The main threats faced by this species are poisoning and availability of food as well as collision and electrocution when interacting with powerlines and other infrastructure. This species was confirmed at the site during the field study.

European Roller (*Coracias garrulous*) is listed as regionally and globally NT. They are non-breeding migrants from south-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller prefers bushy plains and dry savannah areas (IUCN, 2017). Most of the threats of this species are on their breeding grounds, particularly loss of breeding habitat. However, in South Africa, they may be affected by habitat loss as well. This species was confirmed at the site during the field study.

Hamerkop (*Scopus umbretta*) is listed as regionally NT and globally LC. It is found in a range of freshwater and marine habitats. It feeds predominantly on frogs and tadpoles. It has experienced significant reductions in its estimated population numbers, but the reasons underlying this reduction remain unclear. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Knob-billed Duck (*Sarkidiornis melanotos*) is listed as regionally NT and globally LC. When breeding, primarily occupies marshes and pans in savannah habitat. When not breeding, wanders widely and may occupy many different natural and artificial wetlands. Its threats are poorly understood but are thought to be related to habitat loss and degradation. This species was confirmed at the site during the field study.

Lappet-faced Vulture (*Torgos tracheliotus*) is listed as CR and EN on a regional and global level respectively. Only a small, very rapidly declining population remains, owing primarily to poisoning and persecution, as well as ecosystem alterations (IUCN, 2017). The species inhabits dry savanna, arid plains, deserts and open mountain. It ranges widely when foraging and is mainly a scavenger, feeding predominantly on any large carcasses or their remains. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Red-billed Teal (*Anas erythrorhyncha*) is listed as regionally NT and globally LC. It occurs in a large variety of shallow wetlands. The threats are not well understood but leech infestations and other changes to their habitats. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

Short-clawed Lark (*Certhilauda chuana*) is listed as NT on a regional scale. This species is typically found in semi-arid savannah. In South Africa, this species is divided into two disconnected populations, one along the southeastern border of Botswana and the other within the Limpopo province. This species threatened by habitat loss by urban encroachment. This species was confirmed in close proximity to the site.

Tawny Eagle (*Aquila rapax*) is listed as regionally EN and globally VU. It occupies a range of habitats but is most common in savannah habitats within protected areas. It also occurs in semidesert provided there are nesting sites, which are often on pylons. They are threatened by land transformation and poisoning or trapping by livestock farming, since much of their food is obtained through scavenging. This species was confirmed in close proximity to the site.

White-backed Vulture (*Gyps africanus*) is listed as regionally and globally CR. It has a large range and only occurs throughout sub-Saharan Africa. It is primarily a lowland species of open wooded savanna. It requires tall trees for nesting. According to the IUCN (2017) this species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution and poisoning. The presence of suitable habitat within the PAOI suggests that this species is highly likely to occur.

3.3 Vultures

Due to the fact that eight of South Africa's nine Vulture species are threatened, vulture-specific information is required to ensure this project does not affect their conservation efforts. Figure 3-11 illustrates the PAOI in relation to recorded Vulture electrocutions and collisions (Eskom/EWT Strategic Partnership database unpublished 2020). These maps indicate that there are no recorded fatalities near the PAOI, however, vultures were observed several times during both field surveys, as well as VulPro indicating that vultures have been observed roosting in the nearby facility of the project area on powerline infrastructure. These factors indicate that there is a risk of electrocutions and collisions to the vultures. As such, some appropriate mitigation measures are required. For mitigations refer to section 5.

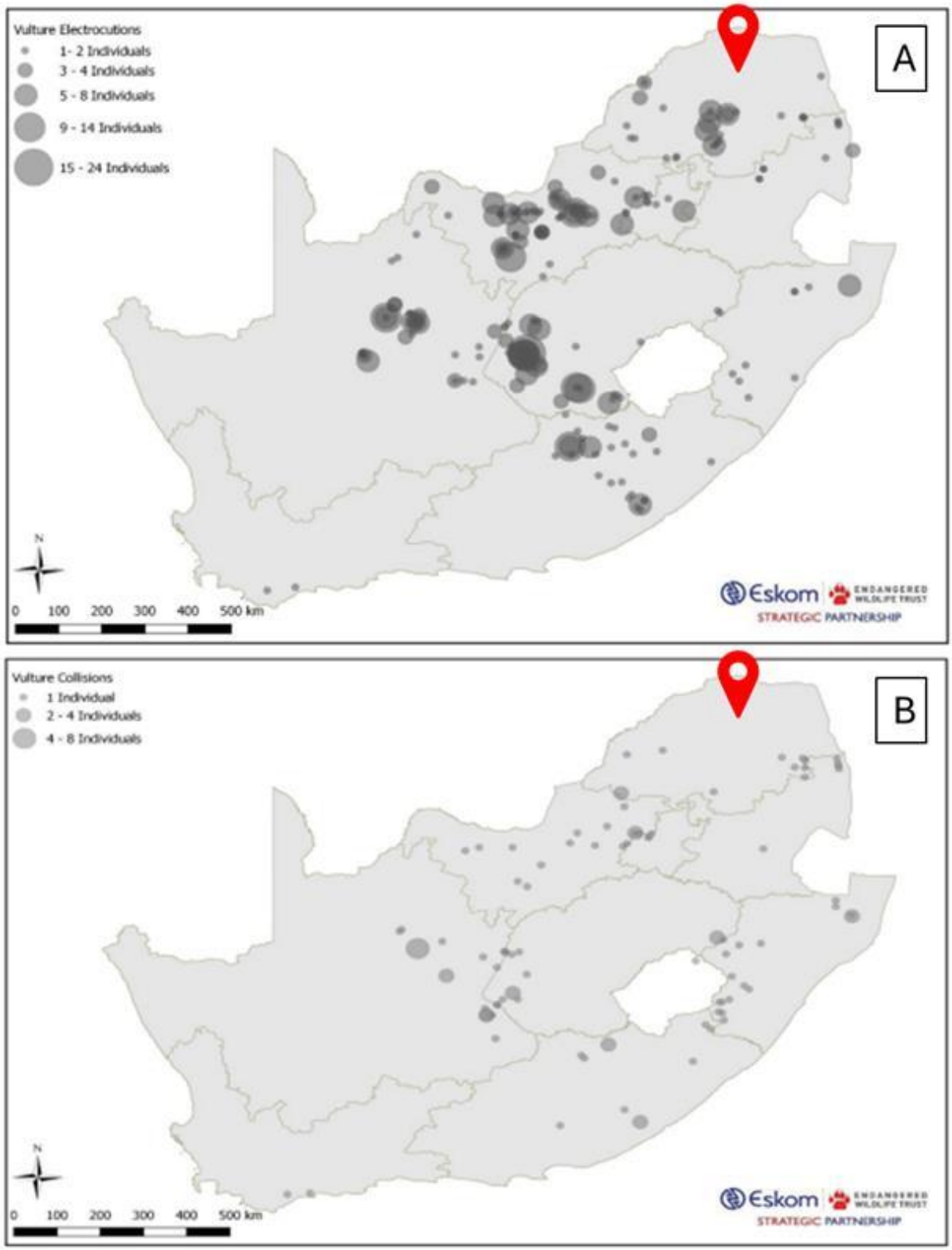


Figure 3-11 ***Maps indicating fatal vulture A) electrocutions and B) collisions on powerlines across South Africa reported to the EWT/Eskom Central Incident Register from 1996-2022 (Eskom/EWT Strategic Partnership database unpublished, 2022). This map and information are as per Government Gazette No 47632. The pin indicates the approximate location of the project area***

3.4 Fieldwork Findings

TBC also performed a field assessment on the adjacent property on the 9-11 of December 2024. During this assessment 97 species were recorded, of which two SCC Short-Clawed Lark (*Certhilauda chuana*) and European Roller (*Coracias garrulus*) were observed on site, and an additional two Tawny Eagle (*Aquila rapax*) and Cape Vulture (*Gyps coprotheres*) were recorded in the general area during incidental assessments.

3.4.1 Species List of First Field Survey

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024 over the course of three days. This constitutes a dry season survey. This site visit was conducted to determine the presence of Species of Conservation Concern of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

One SCC was recorded during the first survey period (Table 3-3 and Figure 3-12).

Table 3-3 SCC recorded in the first assessment.

Species	Common Name	Conservation Status	
		Regional	Global
Gyps coprotheres	Cape Vulture	VU	VU

Figure 3-12 Photograph of Cape Vulture (Gyps coprotheres) observed during survey

3.4.1.1 Risk Species

Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at

risk of collision, electrocution or habitat loss as a result of the proposed activity. Thirteen (13) of the species observed within the PAOI are regarded as priority species (Table 3-4).

Table 3-4 Summary of Priority Species recorded within and around the proposed development.

Common Name	Scientific Name	Collision	Electrocution	Disturbance/Habitat Loss
African Harrier-Hawk	*Polyboroides typus*		x	
Black-chested Snake Eagle	*Circaetus pectoralis*		x	
Cape Vulture	*Gyps coprotheres*		x	x
Crested Francolin	*Dendroperdix sephaena*		x	
Egyptian Goose	*Alopochen aegyptiaca*	x	x	
Gabar Goshawk	*Micronisus gabar*		x	
Hadada Ibis	*Bostrychia hagedash*		x	
Helmeted Guineafowl	*Numida meleagris*		x	
Pale Chanting Goshawk	*Melierax canorus*		x	
Pied Crow	*Corvus albus*		x	
Red-crested Korhaan	*Lophotis ruficrista*	x	x	
Swainson's Spurfowl	*Pternistis swainsonii*		x	

Figure 3-13 Photographs of Risk Species observed during survey: Pale Chanting Goshawk (Melierax canorus)

3.4.1.2 Dominant Species

Table 3-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. The most abundant species was the Red-faced Mousebird (*Urocolius indicus*), with a relative abundance of 0.135 and the most frequently occurring

species was the Ring-necked Dove (*Streptopelia capicola*) with a frequency of occurrence of 56.16% (Table 3-5).

Table 3-5 Relative abundance and frequency of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,135	26,03
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,107	56,16
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,072	8,22
Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae	0,050	12,33
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,044	30,14
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,044	39,73
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,041	31,51
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,033	16,44
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,033	27,40
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,033	26,03
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,030	23,29
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,026	6,85
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,023	15,07
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,023	23,29
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,022	15,07
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,022	1,37
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,020	16,44
Chinspot Batis	*Batis molitor*	Platysteiridae	0,018	13,70
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,016	15,07
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,016	10,96
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,015	8,22

3.4.1.3 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into the major groups based on their diet, habitat, and main area of activity. Although species tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by Invertivore Ground Diurnal (IGD) and Granivore Ground Diurnal (GGD) birds (Figure 3-14).

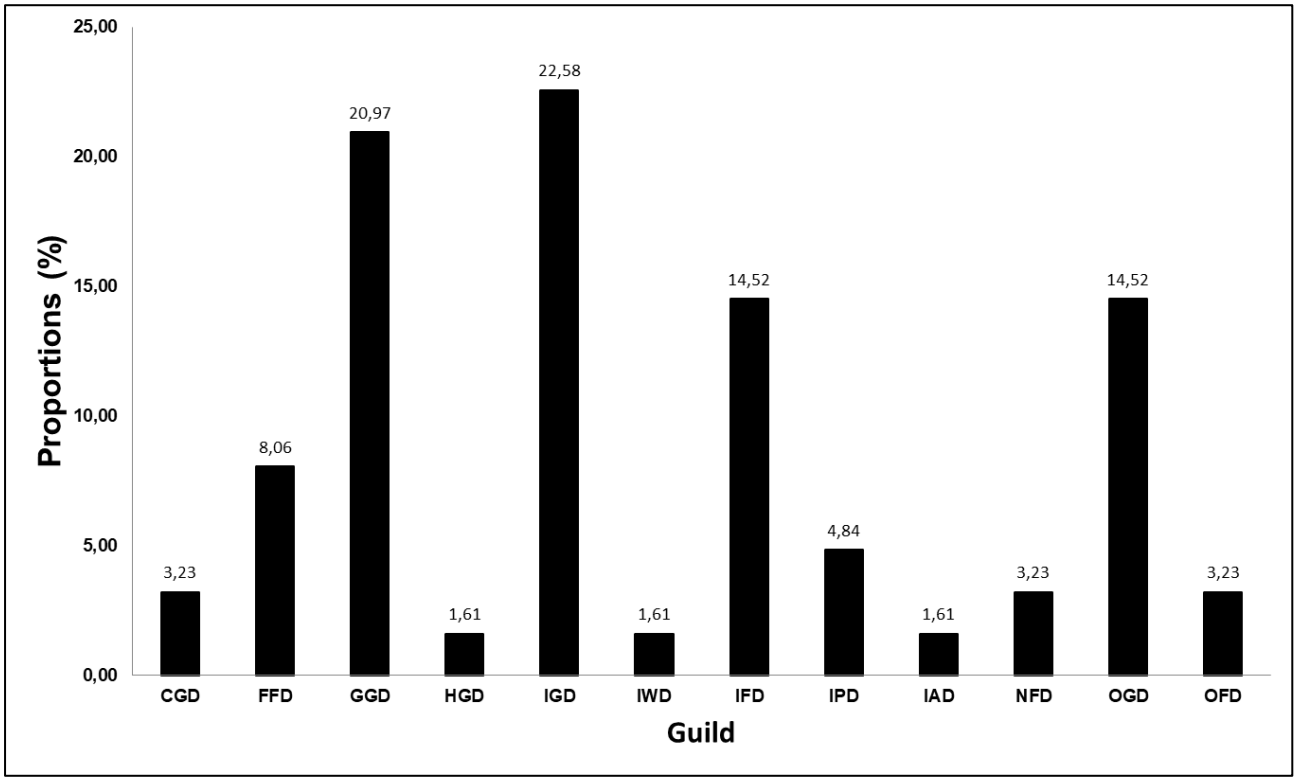


Figure 3-14 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal; CWD, carnivore water diurnal; CWN, carnivore water nocturnal; CFD, carnivore foliage diurnal; CAD, carnivore air nocturnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; GWD, granivore water diurnal; GFD, granivore foliage diurnal; HGD, herbivore ground diurnal; HWD, herbivore water diurnal; IGD, invertivore ground diurnal; IWD, invertivore, water diurnal; IGN, invertivore ground nocturnal; IFD, invertivore foliage diurnal; IPD, invertivore perch diurnal; IPN, invertivore perch nocturnal; IAD, invertivore air diurnal; IAN, invertivore air nocturnal; NFD, nectivore foliage diurnal; OGD, omnivore ground diurnal; OWD, omnivore water diurnal; OFD, omnivore foliage diurnal.***

3.4.2 Species List of Second Field Survey

The second avifaunal field survey was conducted from the 6th to the 9th of January 2025 over the course of four days. This constitutes a wet season survey. This site visit was conducted to determine the presence of Species of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

Five SCC were recorded during the second survey period (Table 3-6).

Table 3-6 ***SCC recorded in the second assessment.***

Species	Common Name	Conservation Status	
		Regional	Global
Nycticorax nycticorax	Black-crowned Night Heron	NT	LC
Elanus caeruleus	Black-winged Kite	NT	LC
Gyps coprotheres	Cape Vulture	VU	VU
Coracias garrulus	European Roller	NT	LC
Sarkidiornis melanotos	Knob-billed Duck	NT	LC

Figure 3-15 Photographs of SCC observed during survey: Knob-billed Duck (Sarkidiornis melanotos)

3.4.2.1 Risk Species

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Twenty-five (25) of the species observed within the PAOI are regarded as priority species (Table 3-7).

Table 3-7 Summary of Priority Species recorded within and around the proposed development.

Common Name	Scientific Name	Collision	Electrocution	Disturbance/Habitat Loss
African Harrier-Hawk	*Polyboroides typus*		x	
Black-chested Snake Eagle	*Circaetus pectoralis*		x	
Black-crowned Night Heron	*Nycticorax nycticorax*	x		
Black-winged Kite	*Elanus caeruleus*	x		
Brown Snake Eagle	*Circaetus cinereus*		x	
Cape Vulture	*Gyps coprotheres*		x	x
Common Buzzard	*Buteo buteo*		x	
Crested Francolin	*Dendroperdix sephaena*		x	
Egyptian Goose	*Alopochen aegyptiaca*	x	x	
European Roller	*Coracias garrulus*			x
Fiery-necked Nightjar	*Caprimulgus pectoralis*	x		

Greater Kestrel	*Falco rupicoloides*		x
Hadada Ibis	*Bostrychia hagedash*		x
Helmeted Guineafowl	*Numida meleagris*		x
Knob-billed Duck	*Sarkidiornis melanotos*	x	
Pale Chanting Goshawk	*Melierax canorus*		x
Pied Crow	*Corvus albus*		x
Red-crested Korhaan	*Lophotis ruficrista*	x	x
Spotted Eagle-Owl	*Bubo africanus*		x
Swainson's Spurfowl	*Pternistis swainsonii*		x
Wahlberg's Eagle	*Hieraaetus wahlbergi*		x
Western Barn Owl	*Tyto alba*		x
Western Cattle Egret	*Bubulcus ibis*		x
White Stork	*Ciconia ciconia*		x
White-faced Whistling Duck	*Dendrocygna viduata*	x	

Figure 3-16 Photograph of Risk Species observed during survey: Wahlberg's Eagle (Hieraaetus wahlbergi)

3.4.2.2 Dominant Species

Table 3-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. The most abundant species was Wattled Starling (*Creatophora cinerea*), with a relative abundance of 0.080 and the most frequently occurring species was the Rattling Cisticola (*Cisticola chiniana*) with a frequency of occurrence of 60.82% (Table 3-8).

Table 3-8 Relative abundance and frequency of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,080	8,25
Barn Swallow	*Hirundo rustica*	Hirundinidae	0,076	26,80
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,053	60,82
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,041	50,52
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,038	42,27
African Black Swift	*Apus barbatus*	Apodidae	0,035	16,49
European Bee-eater	*Merops apiaster*	Meropidae	0,035	8,25
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,028	40,21
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,025	34,02
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,025	17,53
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,022	31,96
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,021	28,87
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,019	19,59
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,017	23,71
Sabota Lark	*Calendulauda sabota*	Alaudidae	0,017	22,68
White-rumped Swift	*Apus caffer*	Apodidae	0,017	6,19
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,017	22,68
Red-billed Quelea	*Quelea quelea*	Ploceidae	0,017	1,03
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,016	10,31
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,016	20,62
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,015	18,56
Diederik Cuckoo	*Chrysococcyx caprius*	Cuculidae	0,014	19,59
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,014	18,56
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,013	9,28
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,013	18,56

3.4.2.3 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into the major groups based on their diet, habitat, and main area of activity. Although species tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by Invertivore Foliage Diurnal (IFD), Granivore Ground Diurnal (GGD), and Invertivore Ground Diurnal (IGD) birds (Figure 3-17).

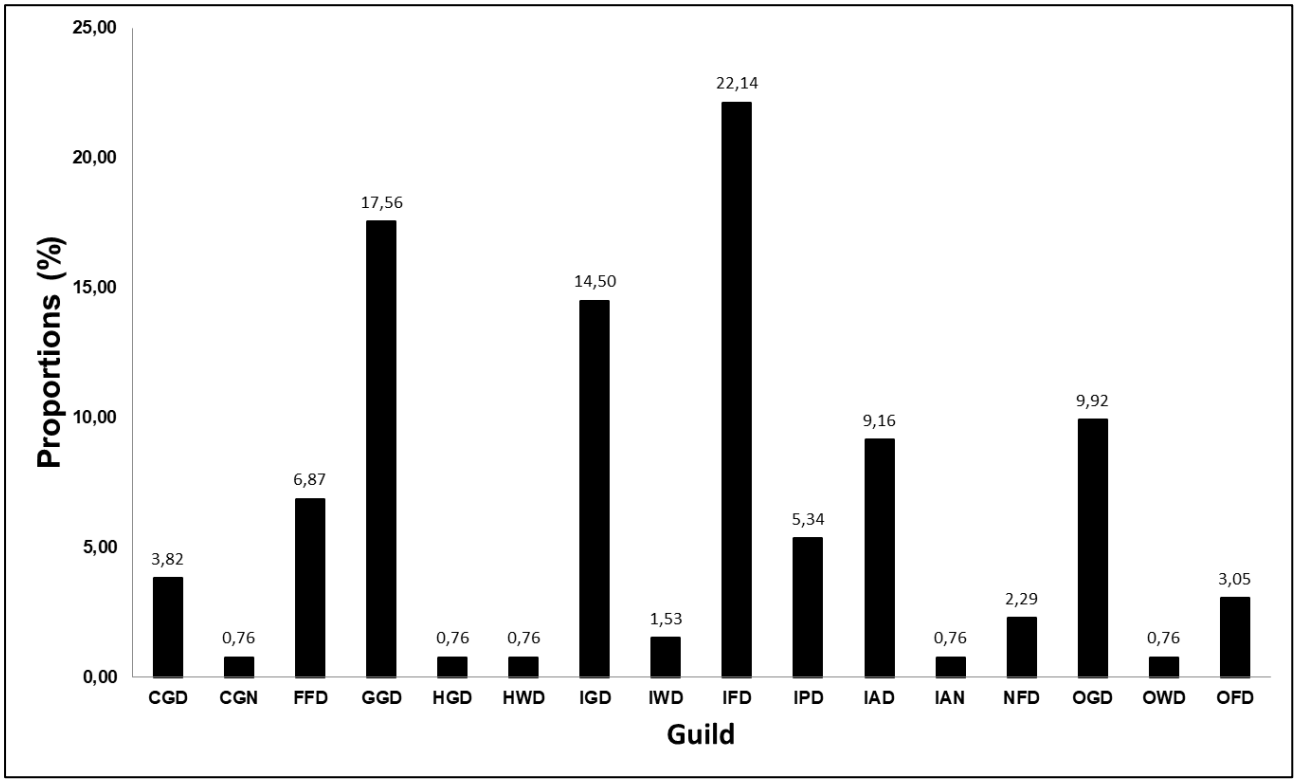


Figure 3-17 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal; CWD, carnivore water diurnal; CWN, carnivore water nocturnal; CFD, carnivore foliage diurnal; CAD, carnivore air nocturnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; GWD, granivore water diurnal; GFD, granivore foliage diurnal; HGD, herbivore ground diurnal; HWD, herbivore water diurnal; IGD, invertivore ground diurnal; IWD, invertivore, water diurnal; IGN, invertivore ground nocturnal; IFD, invertivore foliage diurnal; IPD, invertivore perch diurnal; IPN, invertivore perch nocturnal; IAD, invertivore air diurnal; IAN, invertivore air nocturnal; NFD, nectivore foliage diurnal; OGD, omnivore ground diurnal; OWD, omnivore water diurnal; OFD, omnivore foliage diurnal.***

3.4.3 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. This section needs to be interpreted cautiously based on the limited time spent on this component.

No specific flight paths were noted.

No SCC or risk species nests were found that would impact development.

3.5 Habitat Assessment

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities.

The main habitat types identified across the PAOI were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Five (5) habitats were delineated in total (Figure 3-18), a full description of the habitats is provided below.

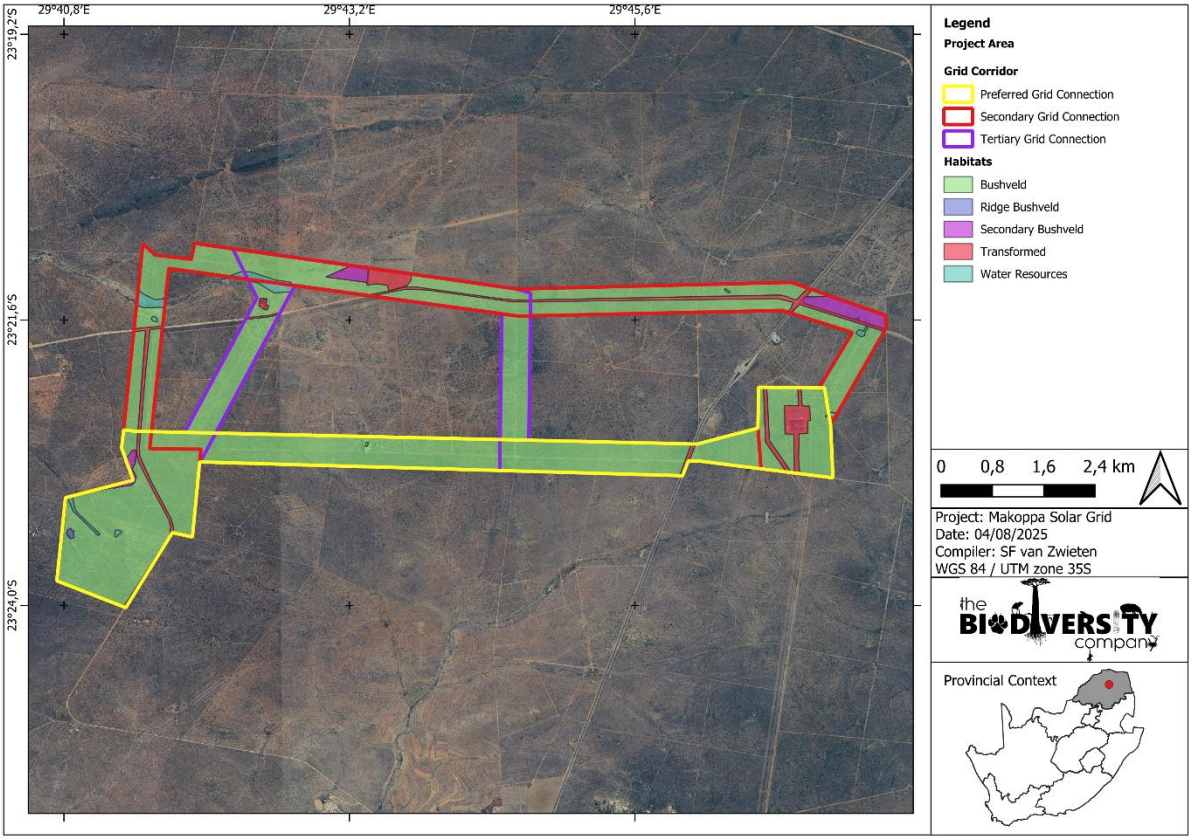


Figure 3-18 Habitats identified within the assessment areas

3.5.1 Bushveld

This habitat consists of savannah with dominance of both trees and grass, with various densities of trees. This habitat is somewhat disturbed by grazing by livestock and game. This habitat provides breeding and foraging habitat for most of the expected SCC (Figure 3-19).

SCC possibly occupying this habitat: Cape Vulture, European Roller, Lanner Falcon, Lappet-faced Vulture, Short-clawed Lark, Secretarybird, Tawny Eagle, White-backed Vulture.

Figure 3-19 Bushveld habitat at -23.346233°; 29.676426°

3.5.2 Ridge Bushveld

This habitat is similar in composition to bushveld but is present on rocky ridges and hills. It differs by having large boulders scattered through the habitat and being on a slope. The bird community present in this habitat differs from that in the other bushveld since it includes species that are specialised inhabitants of ridges. The resource resilience and relative scarcity of this habitat in the region make this habitat sensitive (Figure 3-20).

SCC possibly occupying this habitat: Cape Vulture, European Roller, Lanner Falcon, Lappet-faced Vulture, Tawny Eagle, White-backed Vulture.

Figure 3-20 Ridge Bushveld habitat at -23.390523°; 29.680814°

3.5.3 Secondary Bushveld

This habitat is like bushveld habitat but has been affected by historical and current effects such as clearing for agriculture and is in a secondary successional state. Despite these effects, similar SCC are likely to occur in this habitat, both for breeding and nesting (Figure 3-21).

SCC possibly occupying this habitat: Cape Vulture, European Roller, Lanner Falcon, Lappet-faced Vulture, Short-clawed Lark, Secretarybird, Tawny Eagle, White-backed Vulture.

Figure 3-21 Secondary Bushveld Habitat at -23.368608°; 29.676613°

3.5.4 Transformed

The transformed areas have little to no remaining natural vegetation due to land transformation by historic and current housing, roads and electrical infrastructure. These habitats exist in a constant disturbed state as it cannot recover to a more natural state due to ongoing disturbances and impacts it receives (Figure 3-22).

Figure 3-22 Transformed habitat at -23.359476°; 29.708490°

3.5.5 Water Resources

This habitat provides crucial habitat for waterbirds. In the project area these consist of artificial water holes and drainage lines which are temporarily inundated. This habitat provides suitable foraging habitat for waterfowl, including some SCCs, however due to their artificial nature, they are not likely to be used as suitable breeding habitat (Figure 3-23).

Figure 3-23 Water Resource at -23.359752°; 29.692352°

3.6 Site Ecological Importance

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

Four habitat types were delineated within the Project Area, namely Bushveld, Secondary Bushveld, Transformed, and Water Resources. Their respective SEI and the corresponding mitigation guidelines are summarised in Table 3-9.

Table 3-9 Summary of habitat types delineated within field assessment area

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance Guidelines
Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Ridge Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**High** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Secondary Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened	**Low** Several minor and major current negative ecological impacts.	**Medium**	**High** Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that	**Low** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed

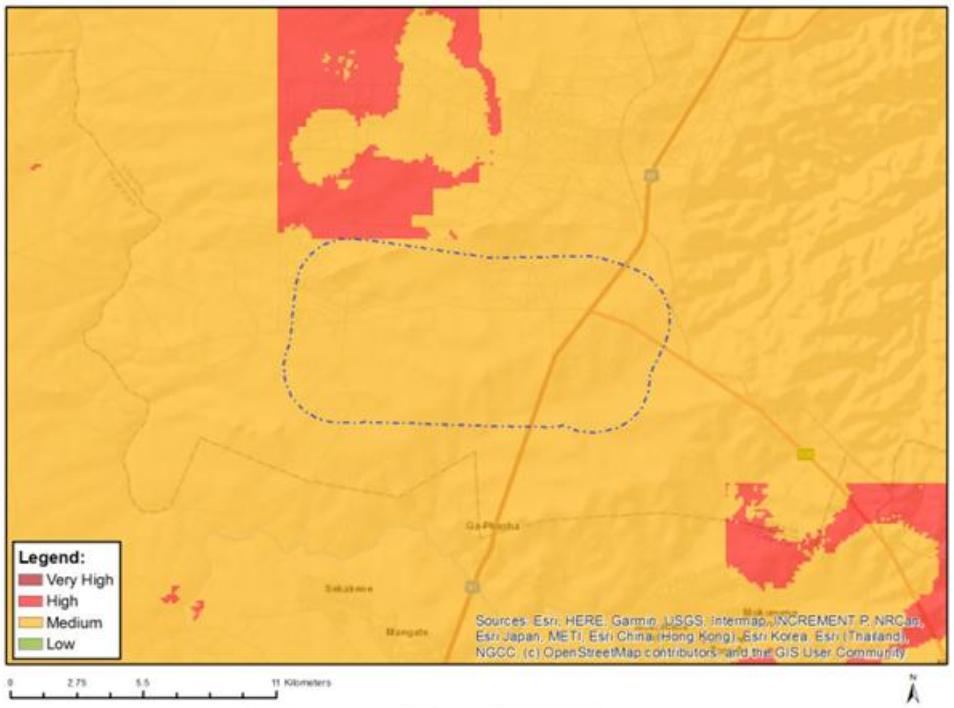
	species (CR, EN, VU) must be listed under any criterion other than A.			have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.	by appropriate restoration activities.
Transformed	**Very Low** No natural habitat remaining.	**Very Low** Several major current negative ecological impacts.	**Very Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low** Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Water Resources	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Medium** Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

3.6.1 Desktop Ecological Senstivity

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Animal Species Theme sensitivity is 'High' for the PAOI, with the possibility of Avifaunal Species of Conservation Concern (SCC) being present (Figure 3-24).

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Torgos tracheliotos
Medium	Aves-Aquila rapax
Medium	Sensitive species 5
Medium	Mammalia-Crocidura maquassiensis
Medium	Invertebrate-Thoracistus viridicrus

Figure 3-24 Animal Species Theme Sensitivity for the powerlines

3.6.2 Screening Tool Comparison

The allocated sensitivities if the mitigation measures are followed for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-10 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC or priority species. The sensitivities delineated for the project area is illustrated in Figure 3-25.

Table 3-10 Summary of the screening tool vs specialist assigned sensitivities post mitigation

Screening Tool Theme	Screening Tool	Habitat	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	High	Bushveld	Medium	Disputed – Habitat shows some negative impacts, but still provide suitable habitat for SCC.
		Ridge Bushveld	High	Validated – Habitat is generally intact, and high likelihood of SCC.
		Secondary Bushveld	Low	Disputed – Habitat has been severely altered, but still has the potential to support SCC.
		Transformed	Very Low	Disputed – Habitat has been severely altered with limited potential to support SCC.
		Water Resources	Medium	Disputed – Habitat has limited potential to host SCC but provides important ecological function and has little resource resilience.

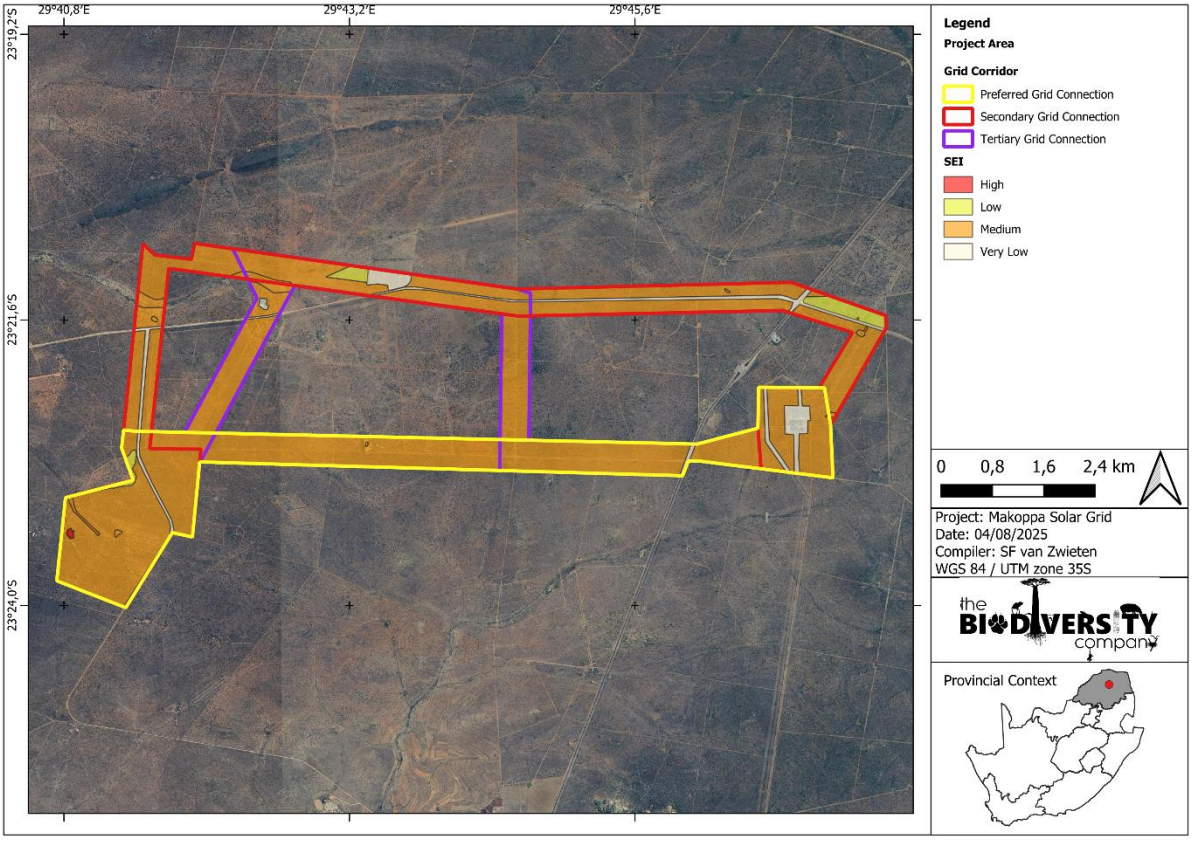


Figure 3-25 Site ecological importance, with mitigation measures applied

4 Impact Assessment

4.1 Current Impacts to Biodiversity

In consideration that there are anthropogenic activities and influences present within the landscape, there are currently several negative impacts to biodiversity, including avifauna. These include:

- Historic land modification to accommodate a substation, roads, powerline infrastructure, and housing;
- Livestock and game; and
- Fences and the associated infrastructure (Figure 4-1).

Figure 4-1 Photograph illustrating current negative impacts associated with the PAOI: Existing powerlines, Fences, and Roads

4.2 Alternatives Considered

Three alternative powerline corridors were proposed by Cape EAPrac (Figure 1-2).

4.3 Loss of Irreplaceable Resources

The proposed development will lead to the loss of the following irreplaceable resources:

- Habitat and possible nesting sites for numerous expected avifauna SCC; and

- Loss of avifauna SCC due to displacement or death.

4.4 Quantitative Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project area of interest, specifically the proposed development footprint area. Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat fragmentation as a result of project infrastructure and species disturbance or mortality as a result of project operations;

- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence; and

- Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report. Three phases were considered for the impact assessment:

- Construction Phase;

- Operational Phase; and

- Decommissioning Phase.

The three alternative powerline options were considered simultaneously as the difference in significance of the impacts are marginal, unless stated otherwise.

4.4.1 Construction Phase

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

- Habitat destruction within the project footprint;

- Destruction, degradation and fragmentation of surrounding habitats due to noise pollution;

- Displacement/emigration of avifauna community (including SCC);

- Direct mortality from persecution or poaching of avifauna species and collection of eggs; and

- Direct mortality from increased vehicle and heavy machinery traffic.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-1.

Table 4-1 Construction Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade CBA and ESA habitat, ultimately displacing avifauna	4	3	4	3	5	
	Life of operation or less than 20 years: Long Term	Local area	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**
Destruction, degradation and fragmentation of surrounding habitats	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Displacement/emigration of avifauna community (including SCC) due to noise pollution	3	4	3	3	4	
	One year to five years: Medium Term	Regional within 5 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from persecution or poaching of avifauna species and collection of eggs	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from increased vehicle and heavy machinery traffic	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Impact	**Post mitigation**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade CBA and ESA habitat, ultimately displacing avifauna	4	2	4	3	3	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Destruction, degradation and fragmentation of surrounding habitats	3	2	3	3	3	
	One year to five years: Medium Term	Development specific/ within the site boundary	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Likely	**Low**

			moderately altered			
Displacement/emigration of avifauna community (including SCC) due to noise pollution	3	3	2	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Direct mortality from persecution or poaching of avifauna species and collection of eggs	3	2	2	3	2	
	One year to five years: Medium Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**
Direct mortality from increased vehicle and heavy machinery traffic	3	2	2	3	2	
	One year to five years: Medium Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

4.4.2 Operation Phase

The operational phase includes the following impacts:

- Collisions with powerlines;
- Electrocution due to powerlines;
- Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs; and
- Displacement or death of SCCs.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-2.

Table 4-2 Operational Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collisions with powerlines, Alternative 1	4	4	4	4	4	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly Likely	**Moderately High**
	4	4	4	4	5	

Collisions with powerlines, Alternative 2	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**
Collisions with powerlines, Alternative 3	4	4	4	4	5	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**
Electrocution by powerlines	4	4	4	4	5	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	3	2	3	3	3	
	One year to five years: Medium Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Low**
Displacement or death of SCC's	4	3	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Impact	**Post mitigation**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collisions with powerlines Alternative 1	4	3	3	4	3	
					Likely	**Moderate**

	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important		
Collisions with powerlines Alternative 2	4	3	3	4	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**
Collisions with powerlines Alternative 3	4	3	3	4	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**
Electrocution by powerlines	4	3	3	4	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Possible	**Moderate**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	1	2	3	3	1	
	One day to one month: Temporary	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	High unlikely	**Absent**
Displacement or death of SCC's	2	3	3	3	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Possible	**Low**

4.4.3 Decommissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the Operational Phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented.

The following potential impacts were considered:

- Habitat Loss (Destroy, fragment, and degrade habitat, ultimately displacing avifauna);
- Sensory disturbances (e.g. noise, dust, vibrations);
- Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs; and
- Collisions with powerlines.

The pre-mitigation and post-mitigation impact ratings for the construction phase are shown in Table 4-3.

Table 4-3 Decommissioning Phase Impacts

Impact	Prior to mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade habitat, ultimately displacing avifauna)	4	2	3	3	3	
	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Sensory disturbances (e.g. noise, dust, vibrations)	3	3	3	3	4	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	3	3	3	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Collisions with powerlines	5	3	3	3	5	
	Permanent	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Definite	**Moderately High**

			moderately altered			
Impact	Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment, and degrade habitat, ultimately displacing avifauna)	2	2	2	3	2	
	One month to one year: Short Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**
Sensory disturbances (e.g. noise, dust, vibrations)	2	2	2	3	3	
	One month to one year: Short Term	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	1	2	2	3	1	
	One day to one month: Temporary	Development specific/ within the site boundary	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Highly unlikely	**Absent**
Collisions with powerlines	2	2	1	3	3	
	One month to one year: Short Term	Development specific/ within the site boundary	Insignificant / ecosystem structure and function unchanged	Ecology moderately sensitive/ /important	Likely	**Low**

4.4.4 Cumulative Impacts

Cumulative impacts are assessed within the context of the extent of the proposed PAOI, other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, and other power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

There are existing powerlines and roads within and around the project area. The proposed powerlines typically follow along either an existing road or an existing powerline for the majority of the lines, lowering the cumulative impact to only Moderate.

Table 4-4 Cumulative Impacts to avifauna associated with the proposed project

Impact	**Project in Isolation**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	4	3	3	3	3	
Loss of habitat, and disruption of SCC home ranges	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Impact	**Cumulative Effect**					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	5	4	3	3	3	

Loss of habitat, and disruption of SCC home ranges	Permanent	Regional within 5 km of the site boundary	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**

5 Avifauna Impact Management Actions

The purpose of the Biodiversity Impact Management Actions is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. This mitigation table must be read in conjunction with the Generic Environmental Management Programme (EMPR) for the development and expansion of substation infrastructure for the transmission and distribution of electricity as per No. 42323 GOVERNMENT GAZETTE, 22 MARCH 2019.

Table 5-1 details the mitigation measure necessary for implementation, while Table 5-2 provides recommended mitigation measures for the Environmental Assessment Practitioner (EAP) to consider, aimed at minimizing the overall impact on avifauna. Both tables include corresponding timeframes, targets, and performance indicators specific to the avifaunal component.

Table 5-1 Specific avifauna management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
Management outcome: Habitats				
A nest walkdown must be performed prior to clearance of the site. If nests are found, necessary permits and appropriate relocation mitigations should be followed under the consultation with a qualified specialist.	Construction Phase	Environmental Officer	Development footprint	Once during phase
Management outcome: Avifauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
The duration of the construction must be kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project Manager Environmental Officer	Construction/Closure Phase	Ongoing
Bird Flappers and diverters must be placed on all new overhead powerlines, this must be conducted in accordance with industry standards.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Bird Collisions	Ongoing
Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw *et al* (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted in accordance with the industry standards. A bird diverter with high visibility under low light conditions is highly recommended when most species move from roosting to feeding sites.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Bird Collisions	Ongoing

Any OHLs must be of a design that minimizes electrocution risk by using adequately insulated 'bird friendly' monopole structures as per the Eskom/EWT guidelines.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Bird Electrocutions	Ongoing
Ensure that the phase cables are spaced far enough apart to reduce the risk of large birds (vultures) touching both simultaneously. If such separation (isolation) cannot be provided, exposed parts must be covered (insulated) to reduce electrocution risk.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Bird Electrocutions	Ongoing
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and Construction	Environmental Officer Contractor Engineer	Presence of electrocuted birds	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
A maintenance schedule must be followed twice yearly to ensure that all components are still intact and does not pose an electrocution risk, this must be done for the extent of the lifetime of the powerline.	Life of Operation	Developer	A maintenance schedule must be followed twice yearly to ensure that all components including bird diverters are still in a working condition, should they be found to be broken they must be replaced within 30 days, this must be done for the extent of the lifetime of the powerline.	Ongoing
All infrastructure, must be removed if the facility is decommissioned.	Closure/Rehabilitation	Project Manager	Infrastructure removal	During Process

		Environmental Officer		
			Presence of dead birds in the project site. Monitoring must be undertaken in accordance with the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017).	
Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing infrastructure. Post construction monitoring must be performed for one year quarterly, following the construction phase by an avifauna specialist. Following this the results of the monitoring must be used to inform whether another year of monitoring is necessary. This should include collision monitoring for vultures due to the high density of vultures found in the area.	Operational	Project Manager Environmental Officer Design Engineer	The precise location of any dead birds found should be recorded and mapped (using GPS). All carcasses should be photographed as found then placed in a plastic bag, labelled as to the location and date, and preserved (refrigerated or frozen) until identified. Feather spots (e.g., a group of feathers attached to skin) and body parts should also be collected.	During phase. The monitoring frequency is based on the collision rate.

Table 5-2 Generic management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
The areas to be developed must be specifically demarcated to prevent movement into surrounding environments.	Life of operation	Project Manager Environmental Officer	Development footprint	Ongoing

Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, must under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager Environmental Officer	Areas of indigenous vegetation	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation	Project Manager	Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No routine servicing of equipment to be conducted on site, unless in necessary situations. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Planning and Construction	Environmental Officer Contractor	Spill events, Vehicles dripping.	Ongoing
Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Water pollution and restricted rehabilitation	During phase
Leaking equipment and vehicles must be repaired immediately or be removed from PAOI to facilitate repair.	Life of operation	Environmental Officer Contractor	Leaks and spills	Ongoing

Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction. This includes wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.	Life of operation	Project Manager Contractor	Dustfall	As per dust monitoring program.

Management outcome: Avifauna

Impact Management Actions	Implementation		Monitoring	
	Phase	**Responsible Party**	**Aspect**	**Frequency**
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40 km/h), to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Life of Operation	Health and Safety Officer	Compliance to the training.	Ongoing
All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region	Construction/Operational Phase	Project Manager Environmental Officer	Noise	Ongoing
Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
Use environmentally friendly cleaning and dust suppressant products	Construction and Operation	Environmental Officer Contractor Engineer	Chemicals used	During phase

6 Monitoring

Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing infrastructure. Post construction monitoring must be performed for one year quarterly, following the construction phase, following this the results of the monitoring must be used to inform whether another year of monitoring is necessary, in consultation with an avifauna specialist. This should include collision monitoring for vultures due to the high density of vultures found in the area.

7 Conclusion

Based on the SABAP2 data and National Web-based Environmental Screening Tool, 285 avifauna species are expected for the PAOI and surrounds. Of these, 18 are considered SCC. The first avifaunal field survey was on the 6th to the 8th of August 2024 (dry season survey), whilst the second survey was conducted on the 6th to the 9th of January 2025 (wet season survey). During this assessment five SCC were recorded during the survey, being Black-crowned Night Heron (*Nycticorax nycticorax*), Black-winged Kite (*Elanus caeruleus*), the Cape Vulture (*Gyps coprotheres*), European Roller (*Coracias garrulus*), and Knob-billed Duck (*Sarkidiornis melanotos*). An additional 6 SCC have a high likelihood of occurrence within the project area. A further twenty-six (26) risk species were also recorded. These risk species are susceptible to collisions, electrocutions and habitat loss.

Five habitat types were delineated within the Project Area, namely Bushveld, Ridge Bushveld, Secondary Bushveld, Transformed, and Water Resources. Majority of the project area has a medium sensitivity, being the bushveld habitat and water resources. The Ridge Bushveld habitat validates the Screening Tool's high sensitivity. The Secondary Bushveld and Transformed habitats have low and very low sensitivities respectively. These sensitivities dispute the Screening Tool's high sensitivity. This rating is based on the resource resilience and the overall disturbed state of the habitat. The collision risk, electrocution risk and loss of habitat are the main impacts should these be successfully mitigated the overall impact rating can be reduced.

7.1 Impact Statement

The main expected impacts of the proposed OHL will include habitat loss and fragmentation, as well as electrocutions and collisions resulting in bird mortalities including SCCs.

The overall residual impacts for the project range from moderate to low. The cumulative impact is moderate. Mitigation measures, as described in this report, can be implemented to reduce the significance of the impacts to an acceptable level.

7.2 Specialist Opinion

It is the opinion of the specialist that the development can be favourably considered should the mitigation measures and management actions be implemented. Of the three alternative grid corridors proposed, the preferred power grid corridor is also the preferred option from an avifaunal perspective, as it follows existing powerlines for almost the entirety of the line and is expected to have marginally lower impacts to the surround avifaunal community.

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9 Appendix Items

9.1 Appendix A: Methodology

9.1.1 Desktop Dataset Assessment

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

9.1.1.1 Expected Species

The avifaunal desktop assessment comprised of the following, compiling an expected species list:

- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2315_2930; 2315_2935; 2315_2940; 2315_2945; 2315_2950; 2320_2930; 2320_2935; 2320_2940; 2320_2945; 2320_2950; 2325_2930; 2325_2935; 2325_2940; 2325_2945; and 2325_2950.

9.1.1.2 Ecologically Important Landscape Features

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

- Ecosystem Threat Status (ETS) – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. The revised red list of threatened ecosystems was developed between 2016 and 2021 incorporating the best available information on terrestrial ecosystem extent and condition, pressures and drivers of change. The revised list (known as the Red List of Ecosystems (RLE) 2022) is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram *et al.,* 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022;

- Ecosystem Protection level (EPL) informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.,* 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2023) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus

areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- The Limpopo Conservation Plan was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet et al., 2013). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet et al., 2013). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

    - Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet et al., 2013).

    - Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

    - Other Natural Areas (ONAs) consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Driver et al., 2017).

    - Areas with No Natural Habitat Remaining (NNR) are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Driver et al., 2017).

- A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives.; and

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

9.1.2 Avifauna Survey

The first avifaunal field survey was conducted from the 6th to the 8th of August 2024, whilst the second survey second survey was conducted from the 6th to the 9th of January 2025. These assessments are deemed sufficient for a Regime 2 assessment.

Point Counts

Standardized point counts (Buckland et al., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behavior (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as power lines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering.

9.1.2.1 Data Analysis

The analyses described below only used the data collected from the standardised point counts. See Appendix E and G for the point count raw data.

The analyses described below only used the data collected from the Standardised Point Counts. Raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al*. (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

9.2 Appendix B: Site Ecological Importance

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided Table 9-1 and, respectively Table 9-2.

Table 9-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 9-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.

	Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 9-3.

Table 9-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity (FI)	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 9-4.

Table 9-4 Summary of Resource Resilience (RR) criteria

Resilience	**Fulfilling Criteria**
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 9-5.

Table 9-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed development activities is provided in Table 9-6.

Table 9-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

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

9.3 Appendix C: Impact / Risk Assessment

whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- Construction;
- Operation; and
- Decommissioning.

The significance of the identified impacts was determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and was assessed according to methodology as per the scale utilised for the evaluation of Environmental Impact Ratings in Table 9-7, Table 9-8, and Table 9-9. First, the impact is assigned a score based on Likelihood descriptors Probability and Sensitivity (Likelihood = Probability + Sensitivity) (Table 9-7). and then assigned a Severity rating based on Consequence descriptors Severity, Scope and Duration (Severity

= Severity + Scope + Duration) (Table 9-8). Overall Consequence and Likelihood scores are then used to Determine the Significance Rating (Table 9-9).

Table 9-7 Environmental Impact Assessment: Likelihood Descriptors

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**Rating**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 9-8 Environmental Impact Assessment: Consequence Descriptors

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**Rating**
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	**Rating**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 9-9 Environmental Impact Assessment: Significance Rating Matrix

	CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Probability of impact + Sensitivity of receiving environment)	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Absent
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	High
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	Critical
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

9.4 Appendix D: Avifauna Expected Species

Scientific Name	Common Name	Family Name	Regional	Global (IUCN)	Endemism in South Africa (E)
Accipiter badius	Shikra	Accipitridae			
Accipiter melanoleucus	Black Sparrowhawk	Accipitridae			
Accipiter tachiro	African Goshawk	Accipitridae			
Acrocephalus baeticatus	Common Reed Warbler	Acrocephalidae			
Acrocephalus palustris	Marsh Warbler	Acrocephalidae			
Actitis hypoleucos	Common Sandpiper	Scolopacidae			
Afrotis afraoides	Northern Black Korhaan	Otididae			
Alopochen aegyptiaca	Egyptian Goose	Anatidae			
Amadina erythrocephala	Red-headed Finch	Estriididae			
Amadina fasciata	Cut-throat Finch	Estriididae			
Amblyospiza albifrons	Thick-billed Weaver	Ploceidae			
Anaplectes rubriceps	Red-headed Weaver	Ploceidae			
Anas erythrorhyncha	Red-billed Teal	Anatidae	NT	LC	
Andropadus importunus	Sombre Greenbul	Pycnonotidae			
Anthoscopus caroli	Grey Penduline Tit	Remizidae			
Anthoscopus minutus	Cape Penduline Tit	Remizidae			
Anthus cinnamomeus	African Pipit	Motacillidae			
Anthus leucophrys	Plain-backed Pipit	Motacillidae			
Anthus vaalensis	Buffy Pipit	Motacillidae			
Apalis flavida	Yellow-breasted Apalis	Cisticolidae			

Apalis thoracica	Bar-throated Apalis	Cisticolidae			
Apus affinis	Little Swift	Apodidae			
Apus apus	Common Swift	Apodidae			
Apus barbatus	African Black Swift	Apodidae			
Apus caffer	White-rumped Swift	Apodidae			
Aquila spilogaster	African Hawk-eagle	Accipitridae			
Aquila verreauxii	Verreaux's Eagle	Accipitridae	VU	LC	
Ardea cinerea	Grey Heron	Ardeidae			
Ardea melanocephala	Black-headed Heron	Ardeidae			
Asio capensis	Marsh Owl	Strigidae	NT	LC	
Batis capensis	Cape Batis	Platysteiridae			
Batis molitor	Chinspot Batis	Platysteiridae			
Bostrychia hagedash	Hadada Ibis	Threskiornithidae			
Brunhilda erythronotos	Black-faced Waxbill	Estrildidae			
Bubalornis niger	Red-billed Buffalo Weaver	Ploceidae			
Bubo africanus	Spotted Eagle Owl	Strigidae			
Bubulcus ibis	Western Cattle Egret	Ardeidae			
Buphagus erythrorynchus	Red-billed Oxpecker	Buphagidae			
Burhinus capensis	Spotted Thick-knee	Burhinidae			
Buteo buteo	Common Buzzard	Accipitridae			
Buteo rufofuscus	Jackal Buzzard	Accipitridae			NE
Calamonastes fasciolatus	Barred Wren-warbler	Cisticolidae			
Calandrella cinerea	Red-capped Lark	Alaudidae			
Calendulauda sabota	Sabota Lark	Alaudidae			
Camaroptera brachyura	Green-backed Camaroptera	Cisticolidae			
Camaroptera brevicaudata	Grey-backed Camaroptera	Cisticolidae			
Campephaga flava	Black Cuckooshrike	Campephagidae			
Campethera abingoni	Golden-tailed Woodpecker	Picidae			
Caprimulgus pectoralis	Fiery-necked Nightjar	Caprimulgidae			
Caprimulgus rufigena	Rufous-cheeked Nightjar	Caprimulgidae			
Cecropis abyssinica	Lesser Striped Swallow	Hirundinidae			
Cecropis cucullata	Greater Striped Swallow	Hirundinidae			
Cecropis semirufa	Red-breasted Swallow	Hirundinidae			
Centropus burchellii	Burchell's Coucal	Cuculidae			
Cercotrichas leucophrys	White-browed Scrub Robin	Muscicapidae			
Cercotrichas paena	Kalahari Scrub Robin	Muscicapidae			
Cercotrichas quadrivirgata	Bearded Scrub Robin	Muscicapidae			
Certhilauda chuana	Short-clawed Lark	Alaudidae	NT	LC	
Ceryle rudis	Pied Kingfisher	Alcedinidae			

Chalcomitra amethystina	Amethyst Sunbird	Nectariniidae			
Chalcomitra senegalensis	Scarlet-chested Sunbird	Nectariniidae			
Charadrius pecuarius	Kittlitz's Plover	Charadriidae	NT	LC	
Charadrius tricollaris	Three-banded Plover	Charadriidae			
Chlorocichla flaviventris	Yellow-bellied Greenbul	Pycnonotidae			
Chlorophoneus olivaceus	Olive Bushshrike	Malaconotidae			
Chlorophoneus sulfureopectus	Orange-breasted Bushshrike	Malaconotidae			
Chloropicus namaquus	Bearded Woodpecker	Picidae			
Chrysococcyx caprius	Diederik Cuckoo	Cuculidae			
Chrysococcyx klaas	Klaas's Cuckoo	Cuculidae			
Ciconia abdimii	Abdim's Stork	Ciconiidae			
Ciconia ciconia	White Stork	Ciconiidae			
Ciconia nigra	Black Stork	Ciconiidae	EN	LC	
Cinnyricinclus leucogaster	Violet-backed Starling	Sturnidae			
Cinnyris afer	Greater Double-collared Sunbird	Nectariniidae			SLS
Cinnyris mariquensis	Marico Sunbird	Nectariniidae			
Cinnyris talatala	White-bellied Sunbird	Nectariniidae			
Circaetus cinereus	Brown Snake Eagle	Accipitridae			
Circaetus pectoralis	Black-chested Snake Eagle	Accipitridae			
Cisticola aberrans	Lazy Cisticola	Cisticolidae			
Cisticola aridulus	Desert Cisticola	Cisticolidae			
Cisticola chiniana	Rattling Cisticola	Cisticolidae			
Cisticola fulvicapilla	Neddicky	Cisticolidae			
Cisticola juncidis	Zitting Cisticola	Cisticolidae			
Cisticola tinniens	Levaillant's Cisticola	Cisticolidae			
Clamator glandarius	Great Spotted Cuckoo	Cuculidae			
Clamator jacobinus	Jacobin Cuckoo	Cuculidae			
Clamator levaillantii	Levaillant's Cuckoo	Cuculidae			
Clanga pomarina	Lesser Spotted Eagle	Accipitridae			
Colius striatus	Speckled Mousebird	Coliidae			
Columba guinea	Speckled Pigeon	Columbidae			
Columba livia	Rock Dove	Columbidae			
Coracias caudatus	Lilac-breasted Roller	Coraciidae			
Coracias garrulus	European Roller	Coraciidae	NT	LC	
Coracias naevius	Purple Roller	Coraciidae			
Corvus albus	Pied Crow	Corvidae			
Corythaixoides concolor	Grey Go-away-bird	Musophagidae			
Corythornis cristatus	Malachite Kingfisher	Alcedinidae			
Cossypha humeralis	White-throated Robin-chat	Muscicapidae			

Coturnix delegorguei	Harlequin Quail	Phasianidae		
Creatophora cinerea	Wattled Starling	Sturnidae		
Crithagra atrogularis	Black-throated Canary	Fringillidae		
Crithagra flaviventris	Yellow Canary	Fringillidae		
Crithagra gularis	Streaky-headed Seedeater	Fringillidae		
Crithagra mozambica	Yellow-fronted Canary	Fringillidae		
Crithagra sulphurata	Brimstone Canary	Fringillidae		
Cuculus clamosus	Black Cuckoo	Cuculidae		
Cuculus solitarius	Red-chested Cuckoo	Cuculidae		
Curruca communis	Common Whitethroat	Sylviidae		
Curruca subcoerulea	Chestnut-vented Warbler	Sylviidae		
Cursorius temminckii	Temminck's Courser	Glareolidae		
Cypsiurus parvus	African Palm Swift	Apodidae		
Delichon urbicum	Common House Martin	Hirundinidae		
Dendrocygna viduata	White-faced Whistling Duck	Anatidae		
Dendroperdix sephaena	Crested Francolin	Phasianidae		
Dendropicos fuscescens	Cardinal Woodpecker	Picidae		
Dicrurus adsimilis	Fork-tailed Drongo	Dicruridae		
Dryoscopus cubla	Black-backed Puffback	Malaconotidae		
Elanus caeruleus	Black-winged Kite	Accipitridae	NT	LC
Emberiza capensis	Cape Bunting	Emberizidae		
Emberiza flaviventris	Golden-breasted Bunting	Emberizidae		
Emberiza impetuani	Lark-like Bunting	Emberizidae		
Emberiza tahapisi	Cinnamon-breasted Bunting	Emberizidae		
Eremomela icteropygialis	Yellow-bellied Eremomela	Cisticolidae		
Eremomela usticollis	Burnt-necked Eremomela	Cisticolidae		
Eremopterix leucotis	Chestnut-backed Sparrow-lark	Alaudidae		
Estrilda astrild	Common Waxbill	Estrildidae		
Euplectes afer	Yellow-crowned Bishop	Ploceidae		
Euplectes albonotatus	White-winged Widowbird	Ploceidae		
Euplectes ardens	Red-collared Widowbird	Ploceidae		
Euplectes capensis	Yellow Bishop	Ploceidae		
Euplectes orix	Southern Red Bishop	Ploceidae		
Eurocephalus anguitimens	Southern White-crowned Shrike	Laniidae		
Falco amurensis	Amur Falcon	Falconidae		
Falco biarmicus	Lanner Falcon	Falconidae	NT	LC
Falco naumanni	Lesser Kestrel	Falconidae	VU	LC
Falco rupicoloides	Greater Kestrel	Falconidae		
Falco rupicolus	Rock Kestrel	Falconidae		

Falco subbuteo	Eurasian Hobby	Falconidae			
Fulica cristata	Red-knobbed Coot	Rallidae			
Glaucidium perlatum	Pearl-spotted Owlet	Strigidae			
Granatina granatina	Violet-eared Waxbill	Estrildidae			
Gymnoris superciliaris	Yellow-throated Bush Sparrow	Passeridae			
Gyps africanus	White-backed Vulture	Accipitridae	CR	CR	
Gyps coprotheres	Cape Vulture	Accipitridae	VU	VU	
Halcyon albiventris	Brown-hooded Kingfisher	Alcedinidae			
Halcyon chelicuti	Striped Kingfisher	Alcedinidae			
Haliaeetus vocifer	African Fish Eagle	Accipitridae			
Hieraaetus wahlbergi	Wahlberg's Eagle	Accipitridae			
Hippolais icterina	Icterine Warbler	Acrocephalidae			
Hippolais olivetorum	Olive-tree Warbler	Acrocephalidae			
Hirundo rustica	Barn Swallow	Hirundinidae			
Iduna natalensis	African Yellow Warbler	Acrocephalidae			
Indicator indicator	Greater Honeyguide	Indicatoridae			
Indicator minor	Lesser Honeyguide	Indicatoridae			
Kaupifalco monogrammicus	Lizard Buzzard	Accipitridae			
Lagonosticta rhodopareia	Jameson's Firefinch	Estriididae			
Lagonosticta rubricata	African Firefinch	Estriididae			
Lagonosticta senegala	Red-billed Firefinch	Estriididae			
Lamprotornis chalybaeus	Greater Blue-eared Starling	Sturnidae			
Lamprotornis nitens	Cape Starling	Sturnidae			
Laniarius atrococcineus	Crimson-breasted Shrike	Malaconotidae			
Laniarius ferrugineus	Southern Boubou	Malaconotidae			
Lanius collaris	Southern Fiscal	Laniidae			
Lanius collurio	Red-backed Shrike	Laniidae			
Lanius minor	Lesser Grey Shrike	Laniidae			
Lophoceros nasutus	African Grey Hornbill	Bucerotidae			
Lophotis ruficrista	Red-crested Korhaan	Otididae			
Lybius torquatus	Black-collared Barbet	Lybiidae			
Macronyx croceus	Yellow-throated Longclaw	Motacillidae			
Malaconotus blanchoti	Grey-headed Bushshrike	Malaconotidae			
Melaenornis mariquensis	Marico Flycatcher	Muscicapidae			
Melaenornis pallidus	Pale Flycatcher	Muscicapidae			
Melaenornis pammelaina	Southern Black Flycatcher	Muscicapidae			
Melaenornis silens	Fiscal Flycatcher	Muscicapidae			NE
Melaniparus cinerascens	Ashy Tit	Paridae			
Melaniparus niger	Southern Black Tit	Paridae			

Melierax canorus	Pale Chanting Goshawk	Accipitridae	
Melierax metabates	Dark Chanting Goshawk	Accipitridae	
Merops apiaster	European Bee-eater	Meropidae	
Merops bullockoides	White-fronted Bee-eater	Meropidae	
Merops pusillus	Little Bee-eater	Meropidae	
Microcarbo africanus	Reed Cormorant	Phalacrocoracidae	
Micronisus gabar	Gabar Goshawk	Accipitridae	
Milvus aegyptius	Yellow-billed Kite	Accipitridae	
Milvus migrans	Black Kite	Accipitridae	
Mirafra africana	Rufous-naped Lark	Alaudidae	
Mirafra passerina	Monotonous Lark	Alaudidae	
Mirafra rufocinnamomea	Flappet Lark	Alaudidae	
Motacilla capensis	Cape Wagtail	Motacillidae	
Muscicapa adusta	African Dusky Flycatcher	Muscicapidae	
Muscicapa striata	Spotted Flycatcher	Muscicapidae	
Myioparus plumbeus	Grey Tit-flycatcher	Muscicapidae	
Myrmecocichla formicivora	Ant-eating Chat	Muscicapidae	
Neophedina cincta	Banded Martin	Hirundinidae	
Nilaus afer	Brubru	Malaconotidae	
Numida meleagris	Helmeted Guineafowl	Numididae	
Oena capensis	Namaqua Dove	Columbidae	
Oenanthe familiaris	Familiar Chat	Muscicapidae	
Oenanthe pileata	Capped Wheatear	Muscicapidae	
Onychognathus morio	Red-winged Starling	Sturnidae	
Oriolus larvatus	Black-headed Oriole	Oriolidae	
Ortygospiza atricollis	Quailfinch	Estrildidae	
Paragallinula angulata	Lesser Moorhen	Rallidae	
Passer diffusus	Southern Grey-headed Sparrow	Passeridae	
Passer melanurus	Cape Sparrow	Passeridae	
Passer motitensis	Great Sparrow	Passeridae	
Peliperdix coqui	Coqui Francolin	Phasianidae	
Phoeniculus purpureus	Green Wood Hoopoe	Phoeniculidae	
Phyllastrephus terrestris	Terrestrial Brownbul	Pycnonotidae	
Phylloscopus trochilus	Willow Warbler	Phylloscopidae	
Platalea alba	African Spoonbill	Threskiornithidae	
Plectropterus gambensis	Spur-winged Goose	Anatidae	
Plocepasser mahali	White-browed Sparrow-weaver	Ploceidae	
Ploceus capensis	Cape Weaver	Ploceidae	NE

Ploceus cucullatus	Village Weaver	Ploceidae			
Ploceus intermedius	Lesser Masked Weaver	Ploceidae			
Ploceus ocularis	Spectacled Weaver	Ploceidae			
Ploceus velatus	Southern Masked Weaver	Ploceidae			
Ploceus xanthops	Holub's Golden Weaver	Ploceidae			
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	Lybiidae			
Polyboroides typus	African Harrier-hawk	Accipitridae			
Prinia flavicans	Black-chested Prinia	Cisticolidae			
Prinia subflava	Tawny-flanked Prinia	Cisticolidae			
Prionops plumatus	White-crested Helmetshrike	Vangidae			
Prodotiscus regulus	Brown-backed Honeybird	Indicatoridae			
Pternistis natalensis	Natal Spurfowl	Phasianidae			
Pternistis swainsonii	Swainson's Spurfowl	Phasianidae			
Pterocles bicinctus	Double-banded Sandgrouse	Pteroclidae			
Pterocles burchelli	Burchell's Sandgrouse	Pteroclidae			
Ptilopsis granti	Southern White-faced Owl	Strigidae			
Ptyonoprogne fuligula	Rock Martin	Hirundinidae			
Pycnonotus tricolor	Dark-capped Bulbul	Pycnonotidae			
Pytilia afra	Orange-winged Pytilia	Estrildidae			
Pytilia melba	Green-winged Pytilia	Estrildidae			
Quelea quelea	Red-billed Quelea	Ploceidae			
Rhinopomastus cyanomelas	Common Scimitarbill	Phoeniculidae			
Sagittarius serpentarius	Secretarybird	Sagittariidae	VU	EN	
Sarkidiornis melanotos	Knob-billed Duck	Anatidae	NT	LC	
Saxicola torquatus	African Stonechat	Muscicapidae			
Scleroptila shelleyi	Shelley's Francolin	Phasianidae			
Scopus umbretta	Hamerkop	Scopidae	NT	LC	
Spermestes cucullata	Bronze Mannikin	Estrildidae			
Sphenoeacus afer	Cape Grassbird	Macrosphenidae			NE
Spilopelia senegalensis	Laughing Dove	Columbidae			
Sporopipes squamifrons	Scaly-feathered Weaver	Ploceidae			
Streptopelia capicola	Ring-necked Dove	Columbidae			
Streptopelia semitorquata	Red-eyed Dove	Columbidae			
Strix woodfordii	African Wood Owl	Strigidae			
Struthio camelus	Common Ostrich	Struthionidae			
Sylvietta rufescens	Long-billed Crombec	Macrosphenidae			
Tachybaptus ruficollis	Little Grebe	Podicipedidae			
Tachymarptis melba	Alpine Swift	Apodidae			
Tauraco porphyreolophus	Purple-crested Turaco	Musophagidae			

Tchagra australis	Brown-crowned Tchagra	Malaconotidae			
Tchagra senegalus	Black-crowned Tchagra	Malaconotidae			
Telophorus viridis	Gorgeous Bushshrike	Malaconotidae			
Terpsiphone viridis	African Paradise Flycatcher	Monarchidae			
Thamnolaea cinnamomeiventris	Mocking Cliff Chat	Muscicapidae			
Tockus leucomelas	Southern Yellow-billed Hornbill	Bucerotidae			
Tockus rufirostris	Southern Red-billed Hornbill	Bucerotidae			
Torgos tracheliotos	Lappet-faced Vulture	Accipitridae	CR	EN	
Trachyphonus vaillantii	Crested Barbet	Lybiidae			
Tricholaema leucomelas	Acacia Pied Barbet	Lybiidae			
Tringa glareola	Wood Sandpiper	Scolopacidae			
Tringa stagnatilis	Marsh Sandpiper	Scolopacidae			
Turdoides bicolor	Southern Pied Babbler	Leiothrichidae			
Turdoides jardineii	Arrow-marked Babbler	Leiothrichidae			
Turdus libonyana	Kurrichane Thrush	Turdidae			
Turdus litsitsirupa	Groundscraper Thrush	Turdidae			
Turdus smithi	Karoo Thrush	Turdidae			NE
Turnix sylvaticus	Common Buttonquail	Turnicidae			
Turtur chalcospilos	Emerald-spotted Wood Dove	Columbidae			
Tyto alba	Western Barn Owl	Strigidae			
Upupa africana	African Hoopoe	Upupidae			
Uraeginthus angolensis	Blue Waxbill	Estrildidae			
Urocolius indicus	Red-faced Mousebird	Coliidae			
Urolestes melanoleucus	Magpie Shrike	Laniidae			
Vanellus armatus	Blacksmith Lapwing	Charadriidae			
Vanellus coronatus	Crowned Lapwing	Charadriidae			
Vidua macroura	Pin-tailed Whydah	Viduidae			
Vidua paradisaea	Long-tailed Paradise Whydah	Viduidae			
Vidua regia	Shaft-tailed Whydah	Viduidae			
Zosterops virens	Cape White-eye	Zosteropidae			NE

9.5 Appendix E: Point Count Data from First Survey

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,135	26,03
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,107	56,16
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,072	8,22
Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae	0,050	12,33
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,044	30,14

Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,044	39,73
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,041	31,51
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,033	16,44
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,033	27,40
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,033	26,03
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,030	23,29
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,026	6,85
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,023	15,07
Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,023	23,29
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,022	15,07
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,022	1,37
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,020	16,44
Chinspot Batis	*Batis molitor*	Platysteiridae	0,018	13,70
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,016	15,07
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,016	10,96
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,015	8,22
Cape Starling	*Lamprotornis nitens*	Sturnidae	0,011	10,96
Southern Yellow-billed Hornbill	*Tockus leucomelas*	Bucerotidae	0,011	8,22
Burnt-necked Eremomela	*Eremomela usticollis*	Cisticolidae	0,010	6,85
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,010	6,85
White-browed Sparrow-Weaver	*Plocepasser mahali*	Ploceidae	0,010	4,11
African Hoopoe	*Upupa africana*	Upupidae	0,007	6,85
Crowned Lapwing	*Vanellus coronatus*	Charadriidae	0,007	2,74
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae	0,007	4,11
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,007	1,37
Southern Pied Babbler	*Turdoides bicolor*	Leiothrichidae	0,007	1,37
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,005	5,48
Egyptian Goose	*Alopochen aegyptiaca*	Anatidae	0,005	2,74
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae	0,005	4,11
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae	0,005	5,48
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae	0,005	2,74
Three-banded Plover	*Charadrius tricollaris*	Charadriidae	0,005	2,74
Ashy Tit	*Melaniparus cinerascens*	Paridae	0,004	4,11
Namaqua Dove	*Oena capensis*	Columbidae	0,004	2,74
Pale Chanting Goshawk	*Melierax canorus*	Accipitridae	0,004	4,11
Red-billed Firefinch	*Lagonosticta senegala*	Estriididae	0,004	2,74
Rufous-naped Lark	*Mirafra africana*	Alaudidae	0,004	2,74
Southern White-crowned Shrike	*Eurocephalus anguitimens*	Laniidae	0,004	2,74
Spotted Thick-knee	*Burhinus capensis*	Burhinidae	0,004	1,37

Black-throated Canary	*Crithagra atrogularis*	Fringillidae	0,003	1,37
Brubru	*Nilaus afer*	Malaconotidae	0,003	2,74
Gabar Goshawk	*Micronisus gabar*	Accipitridae	0,003	2,74
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae	0,003	1,37
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae	0,003	1,37
Violet-eared Waxbill	*Granatina granatina*	Estrildidae	0,003	1,37
Black-collared Barbet	*Lybius torquatus*	Lybiidae	0,001	1,37
Black-faced Waxbill	*Brunhilda erythronotos*	Estrildidae	0,001	1,37
Black-headed Oriole	*Oriolus larvatus*	Oriolidae	0,001	1,37
Brown-hooded Kingfisher	*Halcyon albiventris*	Alcedinidae	0,001	1,37
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae	0,001	1,37
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae	0,001	1,37
Pied Crow	*Corvus albus*	Corvidae	0,001	1,37
Quailfinch	*Ortygospiza atricollis*	Estrildidae	0,001	1,37
Spectacled Weaver	*Ploceus ocularis*	Ploceidae	0,001	1,37
Swainson's Spurfowl	*Pternistis swainsonii*	Phasianidae	0,001	1,37
Yellow-bellied Greenbul	*Chlorocichla flaviventris*	Pycnonotidae	0,001	1,37
Zitting Cisticola	*Cisticola juncidis*	Cisticolidae	0,001	1,37

9.6 Appendix F: Incidental Records from First Survey

Common Name	Scientific Name
African Harrier-Hawk	*Polyboroides typus*
Black-chested Snake Eagle	*Circaetus pectoralis*
Black-throated Canary	*Crithagra atrogularis*
Bushveld Pipit	*Anthus caffer*
Cape Vulture	*Gyps coprotheres*
Double-banded Sandgrouse	*Pterocles bicinctus*
Great Sparrow	*Passer motitensis*
White-throated Robin-Chat	*Cossypha humeralis*

9.7 Appendix G: Point Count Data from Second Survey

Common Name	Scientific Name	Family Name	Relative abundance	Frequency (%)
Wattled Starling	*Creatophora cinerea*	Sturnidae	0,080	8,25
Barn Swallow	*Hirundo rustica*	Hirundinidae	0,076	26,80
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae	0,053	60,82
Red-crested Korhaan	*Lophotis ruficrista*	Otididae	0,041	50,52
Ring-necked Dove	*Streptopelia capicola*	Columbidae	0,038	42,27
African Black Swift	*Apus barbatus*	Apodidae	0,035	16,49
European Bee-eater	*Merops apiaster*	Meropidae	0,035	8,25

Kalahari Scrub Robin	*Cercotrichas paena*	Muscicapidae	0,028	40,21
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae	0,025	34,02
Red-faced Mousebird	*Urocolius indicus*	Coliidae	0,025	17,53
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae	0,022	31,96
Crimson-breasted Shrike	*Laniarius atrococcineus*	Malaconotidae	0,021	28,87
Laughing Dove	*Spilopelia senegalensis*	Columbidae	0,019	19,59
Chestnut-vented Warbler	*Curruca subcoerulea*	Sylviidae	0,017	23,71
Sabota Lark	*Calendulauda sabota*	Alaudidae	0,017	22,68
White-rumped Swift	*Apus caffer*	Apodidae	0,017	6,19
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae	0,017	22,68
Red-billed Quelea	*Quelea quelea*	Ploceidae	0,017	1,03
Scaly-feathered Weaver	*Sporopipes squamifrons*	Ploceidae	0,016	10,31
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae	0,016	20,62
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae	0,015	18,56
Diederik Cuckoo	*Chrysococcyx caprius*	Cuculidae	0,014	19,59
Black-chested Prinia	*Prinia flavicans*	Cisticolidae	0,014	18,56
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae	0,013	9,28
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae	0,013	18,56
Cape Starling	*Lamprotornis nitens*	Sturnidae	0,011	10,31
Chinspot Batis	*Batis molitor*	Platysteiridae	0,011	15,46
Helmeted Guineafowl	*Numida meleagris*	Numididae	0,011	9,28
Red-backed Shrike	*Lanius collurio*	Laniidae	0,011	14,43
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae	0,011	11,34
Barred Wren-Warbler	*Calamonastes fasciolatus*	Cisticolidae	0,009	13,40
Shaft-tailed Whydah	*Vidua regia*	Viduidae	0,009	13,40
Crested Francolin	*Dendroperdix sephaena*	Phasianidae	0,008	9,28
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae	0,008	8,25
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae	0,008	9,28
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae	0,008	4,12
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae	0,007	10,31
White-faced Whistling Duck	*Dendrocygna viduata*	Anatidae	0,007	2,06
Black Cuckoo	*Cuculus clamosus*	Cuculidae	0,006	8,25
Southern Yellow-billed Hornbill	*Tockus leucomelas*	Bucerotidae	0,006	6,19
Violet-backed Starling	*Cinnyricinclus leucogaster*	Sturnidae	0,006	5,15
White-browed Sparrow-Weaver	*Plocepasser mahali*	Ploceidae	0,006	6,19
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae	0,006	4,12
Crested Barbet	*Trachyphonus vaillantii*	Lybiidae	0,006	8,25
Golden-breasted Bunting	*Emberiza flaviventris*	Emberizidae	0,006	8,25
Lesser Grey Shrike	*Lanius minor*	Laniidae	0,006	6,19

Namaqua Dove	*Oena capensis*	Columbidae	0,006	5,15
Violet-eared Waxbill	*Granatina granatina*	Estrildidae	0,006	4,12
Cape Sparrow	*Passer melanurus*	Passeridae	0,005	6,19
Common Scimitarbill	*Rhinopomastus cyanomelas*	Phoeniculidae	0,005	6,19
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae	0,005	7,22
Western Cattle Egret	*Bubulcus ibis*	Ardeidae	0,005	2,06
Yellow Canary	*Crithagra flaviventris*	Fringillidae	0,005	5,15
Swainson's Spurfowl	*Pternistis swainsonii*	Phasianidae	0,004	5,15
Black-throated Canary	*Crithagra atrogularis*	Fringillidae	0,004	2,06
Brubru	*Nilaus afer*	Malaconotidae	0,004	5,15
Rufous-naped Lark	*Mirafra africana*	Alaudidae	0,004	5,15
Three-banded Plover	*Charadrius tricollaris*	Charadriidae	0,004	4,12
Willow Warbler	*Phylloscopus trochilus*	Phylloscopidae	0,004	5,15
African Hoopoe	*Upupa africana*	Upupidae	0,003	4,12
Black-collared Barbet	*Lybius torquatus*	Lybiidae	0,003	2,06
Red-breasted Swallow	*Cecropis semirufa*	Hirundinidae	0,003	3,09
Blacksmith Lapwing	*Vanellus armatus*	Charadriidae	0,002	2,06
Black-winged Kite	*Elanus caeruleus*	Accipitridae	0,002	3,09
Crowned Lapwing	*Vanellus coronatus*	Charadriidae	0,002	1,03
Great Sparrow	*Passer motitensis*	Passeridae	0,002	2,06
Greater Kestrel	*Falco rupicoloides*	Falconidae	0,002	3,09
Jacobin Cuckoo	*Clamator jacobinus*	Cuculidae	0,002	3,09
Klaas's Cuckoo	*Chrysococcyx klaas*	Cuculidae	0,002	3,09
Monotonous Lark	*Mirafra passerina*	Alaudidae	0,002	3,09
Neddicky	*Cisticola fulvicapilla*	Cisticolidae	0,002	3,09
Pale Chanting Goshawk	*Melierax canorus*	Accipitridae	0,002	2,06
African Palm Swift	*Cypsiurus parvus*	Apodidae	0,001	1,03
Bar-throated Apalis	*Apalis thoracica*	Cisticolidae	0,001	1,03
Black-backed Puffback	*Dryoscopus cubla*	Malaconotidae	0,001	2,06
Black-headed Oriole	*Oriolus larvatus*	Oriolidae	0,001	2,06
Cape Vulture	*Gyps coprotheres*	Accipitridae	0,001	1,03
Cape Wagtail	*Motacilla capensis*	Motacillidae	0,001	2,06
Common Buzzard	*Buteo buteo*	Accipitridae	0,001	2,06
Common Waxbill	*Estrilda astrild*	Estrildidae	0,001	1,03
Double-banded Sandgrouse	*Pterocles bicinctus*	Pteroclidae	0,001	1,03
Egyptian Goose	*Alopochen aegyptiaca*	Anatidae	0,001	1,03
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae	0,001	2,06
Greater Striped Swallow	*Cecropis cucullata*	Hirundinidae	0,001	2,06
Green Wood Hoopoe	*Phoeniculus purpureus*	Phoeniculidae	0,001	1,03

Grey-headed Bushshrike	*Malaconotus blanchoti*	Malaconotidae	0,001	2,06
Marsh Warbler	*Acrocephalus palustris*	Acrocephalidae	0,001	2,06
Red-billed Firefinch	*Lagonosticta senegala*	Estriididae	0,001	1,03
Southern Masked Weaver	*Ploceus velatus*	Ploceidae	0,001	1,03
Southern Red-billed Hornbill	*Tockus rufirostris*	Bucerotidae	0,001	2,06
Speckled Mousebird	*Colius striatus*	Coliidae	0,001	1,03
Spotted Flycatcher	*Muscicapa striata*	Muscicapidae	0,001	1,03
White-throated Robin-Chat	*Cossypha humeralis*	Muscicapidae	0,001	2,06
Yellow-bellied Greenbul	*Chlorocichla flaviventris*	Pycnonotidae	0,001	2,06
African Harrier-Hawk	*Polyboroides typus*	Accipitridae	0,001	1,03
African Pipit	*Anthus cinnamomeus*	Motacillidae	0,001	1,03
Amethyst Sunbird	*Chalcomitra amethystina*	Nectariniidae	0,001	1,03
Ashy Tit	*Melaniparus cinerascens*	Paridae	0,001	1,03
Black Cuckooshrike	*Campephaga flava*	Campephagidae	0,001	1,03
Burnt-necked Eremomela	*Eremomela usticollis*	Cisticolidae	0,001	1,03
Cardinal Woodpecker	*Dendropicos fuscescens*	Picidae	0,001	1,03
Common Myna	*Acridotheres tristis*	Sturnidae	0,001	1,03
Common Swift	*Apus apus*	Apodidae	0,001	1,03
Desert Cisticola	*Cisticola aridulus*	Cisticolidae	0,001	1,03
Fiery-necked Nightjar	*Caprimulgus pectoralis*	Caprimulgidae	0,001	1,03
Fiscal Flycatcher	*Melaenornis silens*	Muscicapidae	0,001	1,03
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae	0,001	1,03
Garden Warbler	*Sylvia borin*	Sylviidae	0,001	1,03
Great Spotted Cuckoo	*Clamator glandarius*	Cuculidae	0,001	1,03
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae	0,001	1,03
Icterine Warbler	*Hippolais icterina*	Acrocephalidae	0,001	1,03
Knob-billed Duck	*Sarkidiornis melanotos*	Anatidae	0,001	1,03
Lesser Honeyguide	*Indicator minor*	Indicatoridae	0,001	1,03
Lesser Striped Swallow	*Cecropis abyssinica*	Hirundinidae	0,001	1,03
Levaillant's Cuckoo	*Clamator levaillantii*	Cuculidae	0,001	1,03
Little Bee-eater	*Merops pusillus*	Meropidae	0,001	1,03
Long-tailed Paradise Whydah	*Vidua paradisaea*	Viduidae	0,001	1,03
Orange-breasted Bushshrike	*Chlorophoneus sulfureopectus*	Malaconotidae	0,001	1,03
Pied Crow	*Corvus albus*	Corvidae	0,001	1,03
Pin-tailed Whydah	*Vidua macroura*	Viduidae	0,001	1,03
Sombre Greenbul	*Andropadus importunus*	Pycnonotidae	0,001	1,03
Southern Fiscal	*Lanius collaris*	Laniidae	0,001	1,03
Southern Grey-headed Sparrow	*Passer diffusus*	Passeridae	0,001	1,03
Southern Red Bishop	*Euplectes orix*	Ploceidae	0,001	1,03

Southern White-crowned Shrike	*Eurocephalus anguitimens*	Laniidae	0,001	1,03
Spectacled Weaver	*Ploceus ocularis*	Ploceidae	0,001	1,03
Spotted Eagle-Owl	*Bubo africanus*	Strigidae	0,001	1,03
Tawny-flanked Prinia	*Prinia subflava*	Cisticolidae	0,001	1,03
White-browed Robin-Chat	*Cossypha heuglini*	Muscicapidae	0,001	1,03
White-winged Widowbird	*Euplectes albonotatus*	Ploceidae	0,001	1,03
Common Whitethroat	*Curruca communis*	Sylviidae	0,000	1,03

9.8 Appendix H: Incidental Records from Second Survey

Common Name	Scientific Name
Acacia Pied Barbet	*Tricholaema leucomelas*
African Harrier-Hawk	*Polyboroides typus*
African Hoopoe	*Upupa africana*
African Paradise Flycatcher	*Terpsiphone viridis*
African Pipit	*Anthus cinnamomeus*
Barn Swallow	*Hirundo rustica*
Bearded Woodpecker	*Chloropicus namaquus*
Black-chested Snake Eagle	*Circaetus pectoralis*
Black-crowned Night Heron	*Nycticorax nycticorax*
Black-winged Kite	*Elanus caeruleus*
Blue Waxbill	*Uraeginthus angolensis*
Brown Snake Eagle	*Circaetus cinereus*
Brown-hooded Kingfisher	*Halcyon albiventris*
Cape Vulture	*Gyps coprotheres*
Cinnamon-breasted Bunting	*Emberiza tahapisi*
Common Buzzard	*Buteo buteo*
Common Myna	*Acridotheres tristis*
Common Ostrich	*Struthio camelus*
Crimson-breasted Shrike	*Laniarius atrococcineus*
Double-banded Sandgrouse	*Pterocles bicinctus*
Dusky Indigobird	*Vidua funerea*
Egyptian Goose	*Alopochen aegyptiaca*
Emerald-spotted Wood Dove	*Turtur chalcospilos*
European Bee-eater	*Merops apiaster*
European Roller	*Coracias garrulus*
Golden-tailed Woodpecker	*Campethera abingoni*
Greater Kestrel	*Falco rupicoloides*
Greater Striped Swallow	*Cecropis cucullata*
Green Wood Hoopoe	*Phoeniculus purpureus*

Grey Go-away-bird	*Corythaixoides concolor*
House Sparrow	*Passer domesticus*
Jacobin Cuckoo	*Clamator jacobinus*
Kalahari Scrub Robin	*Cercotrichas paena*
Knob-billed Duck	*Sarkidiornis melanotos*
Laughing Dove	*Spilopelia senegalensis*
Lesser Grey Shrike	*Lanius minor*
Lesser Masked Weaver	*Ploceus intermedius*
Little Bee-eater	*Merops pusillus*
Long-tailed Paradise Whydah	*Vidua paradisaea*
Marico Flycatcher	*Melaenornis mariquensis*
Monotonous Lark	*Mirafra passerina*
Namaqua Dove	*Oena capensis*
Pale Chanting Goshawk	*Melierax canorus*
Pied Crow	*Corvus albus*
Red-backed Shrike	*Lanius collurio*
Red-breasted Swallow	*Cecropis semirufa*
Red-crested Korhaan	*Lophotis ruficrista*
Red-eyed Dove	*Streptopelia semitorquata*
Red-winged Starling	*Onychognathus morio*
Ring-necked Dove	*Streptopelia capicola*
Rock Dove	*Columba livia*
Rufous-naped Lark	*Mirafra africana*
Sabota Lark	*Calendulauda sabota*
Scaly-feathered Weaver	*Sporopipes squamifrons*
Scarlet-chested Sunbird	*Chalcomitra senegalensis*
Shaft-tailed Whydah	*Vidua regia*
Southern Fiscal	*Lanius collaris*
Southern Red-billed Hornbill	*Tockus rufirostris*
Speckled Mousebird	*Colius striatus*
Spotted Flycatcher	*Muscicapa striata*
Spotted Thick-knee	*Burhinus capensis*
Striped Kingfisher	*Halcyon chelicuti*
Village Weaver	*Ploceus cucullatus*
Wahlberg's Eagle	*Hieraaetus wahlbergi*
Western Barn Owl	*Tyto alba*
Western Cattle Egret	*Bubulcus ibis*
White Stork	*Ciconia ciconia*
White-browed Sparrow-Weaver	*Plocepasser mahali*

White-throated Robin-Chat	*Cossypha humeralis*
Yellow Canary	*Crithagra flaviventris*

9.9 Appendix I: Specialist Declaration of Independence

I, Sam van Zwieten, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be 79taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of NEMA.

Sam van Zwieten (Cand. Sci. Nat 167363)

Ecologist/Avifauna Specialist

The Biodiversity Company

July 2025

9.10 Appendix J – Specialist CVs

Sam van Zwieten

M.Sc Genetics

SACNASP Candidate

Cell: +27 72 764 5690
Email: sam@thebiodiversitycompany.com
Identity Number: 9508305041082
Date of birth: 30 August 1995

Profile Summary

Work experience in several Southern African countries.

Biodiversity specialist experience in projects related to infrastructure development, renewable energy, and mining.

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements.

Specialist expertise include Avifauna and Terrestrial Ecology.

Areas of Interest

Ornithology, Conservation, Zoology, Biodiversity, Parasitology, and Genetics.

Key Experience

- Environmental Impact Assessment
- Terrestrial Ecological Assessments
- Avifaunal Conservation Surveys
- Habitat Delineation
- Phylogenies and Taxonomic Classifications
- Field Work and Research

Country Experience

South Africa

Angola

Eswatini

Nationality

South African

Languages

English – Proficient

Afrikaans – Basic

Qualifications

- MSc Genetics, University of KwaZulu Natal
- BSc (Hons) Zoology, University of Johannesburg
- BSc Zoology and Environmental Management, University of Johannesburg
- Cand Sci Nat.

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05 December 2025

Attention : Dale Holder
Cape Environmental Assessment Practitioners
17 Progress Street
George
6530

Via email: dale@cape-eaprac.co.za

RE: MITIGATED LAYOUTS FOR THE PROPOSED BETHEL SOLAR PV, DRAAILOOP SOLAR PV, KLIPPUT SOLAR PV, MAKOPPA SOLAR PV AND ASSOCIATED GRID CONNECTIONS SITUATED SOUTH-WEST OF LOUIS TRICHARDT IN THE MAKHADO MUNICIPALITY OF THE LIMPOPO PROVINCE.

As the Author of the Avifaunal Impact Assessments for the proposed Bethel Solar PV, Draailoop Solar PV, Klipput Solar PV and Makoppa Solar PV facilities and associated grid connection infrastructure, this letter serves to confirm that I have reviewed the mitigated layout plans for these facilities as dated 01 December 2025.

Based on a review of these mitigated layout plans, I confirm the following:

1. The changes to the layouts do not change the nature of significance of impacts already assessed in my studies.
2. The changes to the layouts do not change the EMPr outcomes or mitigation measures outlined in my report.
3. The changes to the layouts do not change the significance of the mitigation measures outlined in my report.

All findings and recommendations in my report remain equally applicable to the revised layout plans dated 01 December 2025.

Sincerely,

Sam van Zwieten (Cand. Sci. Nat 167363)
Ecologist/Avifauna Specialist
The Biodiversity Company

Dr Ryno Kemp (SACNASP 117462/17)
Ecologist/Avifauna Specialist
The Biodiversity Company