Proposed Kopanya Solar Photovoltaic (PV) 2 Project – Avifauna Assessment

Thaba Chweu Local Municipality, Ehlanzeni District Municipality in the Mpumalanga Province, South Africa

03 November 2026

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**Proposed Kopanya Solar Photovoltaic (PV) 2 Project – Avifauna Assessment**
Specialist Theme	Avifauna Theme
Project Reference	Kopanya Solar PV 2 Project
Report Version	Draft 1 / 03 November 2026
Environmental Assessment Practitioner	
Responsible Specialist	Dr Ryno Kemp (SACNASP 117462/17)
Technical Support	Wicus Cronje
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

Executive Summary

Objectives

Evaluate the potential impacts of the proposed Kopanya Solar PV 2 Project (the proposed Project) on avifauna and terrestrial biodiversity in support of the Environmental Impact Assessment (EIA) process, ensuring legal compliance and providing mitigation recommendations.

Key Findings

The Project Area of Influence (PAOI) overlaps with high-value ecological areas (Sekhukhune Montane Grassland, Steelpoort Key Biodiversity Areas (KBA) but is significantly disturbed by mining and invasive alien plants. Four habitat types identified: Disturbed Grassland, Alien Stand, Modified, and Water Resources. Field surveys recorded 119 bird species, with 5 confirmed Species of Conservation Concern (SCC): African Finfoot, Cape Vulture, Gurney's Sugarbird, Half-collared Kingfisher, and Tawny Eagle. No protected or threatened fauna was observed; SCC likelihood is low due to habitat disturbance. Specialist assessment downgraded the national screening tool sensitivity from "High" to "Very Low" (Modified), "Low" (Alien Stand), and "Medium" (Disturbed Grassland).

Potential Impacts

Construction phase: vegetation clearance, habitat loss, fauna mortality, displacement, poaching, blasting (noise, vibration, dust and flyrock), road construction and fence installation. Operational phase: collisions, electrocution, fencing hazards, road use and maintenance, conservancy tank leaks or spills, water pollution, and heat radiation. The layout and the activities (blasting, roads, fence and conservancy tank) are preliminary and are still being confirmed by the Applicant. Cumulative habitat loss within a 50 km radius is 32.47%, with the proposed Project and similar projects contributing 1.04%.

Recommendations

Prioritise development in Low and Very Low Site Ecological Importance areas; avoid and buffer Water Resources (the preliminary access road and overhead power line corridor overlap approximately 0.29 ha of High SEI Water Resource habitat, which must be avoided); implement Alien Invasive Plant Management Plan; restrict activities to authorised areas; walk down and monitor nests before and during blasting; rehabilitate disturbed areas with indigenous vegetation; conduct environmental awareness training; review this assessment if the layout or activities change; and adhere to related specialist recommendations.

Developability

Alien Stand (Low Site Ecological Importance (SEI)): medium to high impact development permitted with rehabilitation. Disturbed Grassland (Medium SEI): medium impact development permitted with rehabilitation. Modified (Very Low SEI): medium to high impact development permitted. Water Resources (High SEI): development only as outlined in Wetland Assessment.

Conclusion

With strict implementation of mitigation measures, the proposed Project's impact on avifauna can be reduced to neutral or very Low Negative significance, making the Project ecologically viable. Approval is recommended subject to strict compliance with the mitigation framework.

Table of Contents

1 Introduction 10
1.1 Background 10
1.2 Project Description 11
1.2.1 Introduction 11
1.2.2 Description of the Proposed Development 12
1.3 Scope of Work 16
1.4 Assumptions and Limitations 16
1.5 Key Legislative Requirements 17
2 Fieldwork 19
2.1 Field Assessment 19
3 Results and Discussion 21
3.1 Ecologically Important Landscape Features 21
3.1.1 Ecosystem Threat Status 22
3.1.2 Mpumalanga Biodiversity Spatial Plan Intact Grassland 23
3.1.3 Ecosystem Protection Level 24
3.1.4 Mpumalanga Biodiversity Spatial Plan 25
3.1.5 Protected Areas 26
3.1.6 National Protected Area Expansion Strategy 27
3.1.7 Key Biodiversity Areas 28
3.1.8 South African Inventory of Inland Aquatic Ecosystems 29
3.1.9 National Freshwater Ecosystem Priority Area Status 31
3.1.10 Strategic Transmission Corridors 32
3.1.11 Renewable Energy Environmental Authorisations Database 33
3.2 Avifauna Expected Species 33
3.2.1 Coordinated Avifaunal Roadcount (CAR) 34
3.3 Fieldwork Findings 35
3.3.1 Species List of the Field Survey 35
3.3.2 Flight and Nest Analysis 38
3.4 Habitat Assessment 38
3.4.1 Alien Stand 39
3.4.2 Disturbed Grassland 40
3.4.3 Modified 41

3.4.4 Water Resources (HGM 1 and HGM 2) 42
3.5 Site Ecological Importance 43
3.5.1 Desktop Ecological Sensitivity 45
3.5.2 Screening Tool Comparison 46
4 Impact Risk Assessment 47
4.1 Avifauna Risk Assessment Method 47
4.2 Current Impacts to Biodiversity 47
4.3 Identification of Additional Potential Impacts 48
4.4 Alternatives Considered 49
4.5 Quantitative Impact Assessment 51
4.5.1 Construction Phase 52
4.5.2 Operation Phase 55
4.5.3 Additional Activities in the Preliminary Layout 58
4.5.4 Decommissioning Phase 62
Table 4-4 Impacts to avifauna and mitigation measures associated with the decommissioning phase .....
4.5.5 Cumulative Impacts 64
4.5.6 General Mitigation Measures 66
5 Conclusion 66
5.1 Impact Statement 66
5.2 Specialist Opinion 67
6 References 67
7 Appendix Items 70
7.1 Appendix A: Methodology 70
7.1.1 Desktop Dataset Assessment 70
7.1.2 Avifauna Survey 77
7.1 Appendix D: Avifauna Expected Species 79
7.1 Appendix E: Bird Species Recorded in the Field Assessment 87
7.2 Appendix F: Site Ecological Importance 89
7.3 Appendix G: Impact Rating 93
7.3.1 Methodology for Assessing Impacts 93
7.3.2 Cumulative Assessment Methodology 95
7.4 Appendix I: Specialist Declaration of Independence 97

7.5 Appendix II: Specialist CV 98

List of Tables

Table 1-1 A list of key legislative requirements relevant to biodiversity and conservation in the Mpumalanga Province 17

Table 3-1 Summary of the ecologically important landscape features 21

Table 3-2 Species triggering the Steelpoort and Steenkampberg Grassland KBAs 28

Table 3-3 Threatened avifauna species that are expected to occur within the PAOI. EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable 33

Table 3-4 SCC recorded in the assessment 35

Table 3-5 Summary of Priority Species recorded within and around the proposed development. 36

Table 3-6 Relative abundance of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey. 36

Table 3-7 Summary of habitat types delineated within the field assessment area 43

Table 3-8 Summary of the screening tool vs specialist assigned sensitivities 47

Table 4-1 Impacts to avifauna and mitigation measures associated with the construction phase 53

Table 4-2 Impacts to avifauna and mitigation measures associated with the operation phase 56

Table 4-3 Impacts to avifauna and mitigation measures associated with blasting, roads, the perimeter fence and the conservancy tank (preliminary layout) 59

Table 4-4 Impacts to avifauna and mitigation measures associated with the decommissioning phase 63

Table 4-5 Cumulative impact assessment of the proposed Project 64

Table 4-6 Cumulative impacts to biodiversity associated with the proposed Project 65

Table 4-7 General mitigation measures for the proposed Project 66

Table 7-1 Land use guidelines for terrestrial Critical Biodiversity Areas (Mpumalanga Biodiversity Sector Plan Handbook, 2014) 73

Table 7-2 Summary of Conservation Importance (CI) criteria 90

Table 7-3 Summary of Functional Integrity (FI) criteria 90

Table 7-4 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI) 91

Table 7-5 Summary of Resource Resilience (RR) criteria 91

Table 7-6 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI) 91

Table 7-7 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities 92

Table 7-8 Criteria and Rating Scales to be used in the Assessment of the Potential Impacts 93

Table 7-9 Explanation of Assessment Criteria 94

List of Figures

Figure 1-1 The proposed Project area of Influence in proximity to the nearby towns 10

Figure 1-2 Map illustrating the proposed Project Area of Influence (PAOI) and the development footprint (shown in yellow) 11

Figure 2-1 Map illustrating the point count locations and tracks 20

Figure 3-1 Map illustrating the Ecosystem Threat Status associated with the PAOI 22

Figure 3-2 Map illustrating the PAOI in relation to the Mpumalanga Biodiversity Spatial Plan Intact Grassland dataset 23

Figure 3-3 Map illustrating the ecosystem Protection Level associated with the PAOI 24

Figure 3-4 Map illustrating the PAOI in relation to the Mpumalanga Biodiversity Sector Plan 25

Figure 3-5 The PAOI in relation to the South Africa Protected Areas Database and South Africa Conservation Areas Database datasets 26

Figure 3-6 Map illustrating the PAOI in relation to the National Protected Area Expansion Strategy dataset 27

Figure 3-7 The PAOI in relation to the Key Biodiversity Areas dataset 29

Figure 3-8 Map illustrating the South African Inventory of Inland Aquatic Ecosystems threat status of rivers and wetland systems of the PAOI 30

Figure 3-9 Map illustrating the PAOI in relation to the National Freshwater Ecosystem Priority Areas (wetland FEPA class: 0 = non-priority, 1 = priority) 31

Figure 3-10 The PAOI in relation to the Strategic Transmission Corridors dataset 32

Figure 3-11 Map illustrating the PAOI in relation to the Renewable Energy Environmental Authorisations Database approved projects within a 50 km buffer 33

Figure 3-12 The Coordinated Avifaunal Roadcount routes in relation to the PAOI 35

Figure 3-13 Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance 37

Figure 3-14 Map illustrating the habitats identified within the development area 39

Figure 3-15 Example of the Alien Stand at 25°09'54.09"S 30°09'11.76"E 40

Figure 3-16 Example of the Disturbed Grassland habitat at 25°09'38.53"S 30°09'09.21"E 41

Figure 3-17 Example of the Modified habitat at 25°09'34.78"S 30°09'53.23"E 42

Figure 3-18 Example of the Wetland habitat at 25°09'42.84"S 30°09'17.65"E 43

Figure 3-19 Map illustrating the Site Ecological Importance of the development area 45

Figure 3-20 Relative animal species theme sensitivity for the PAOI (avifauna features mapped by the DFFE Screening Tool within the map extent) 46

Figure 3-21 Avian species theme sensitivity for the PAOI (Low sensitivity throughout the PAOI) ... 46

Figure 4-1 Photographs illustrating some of the impacts to biodiversity. A – Powerlines and roads, B – Fences, roads, and mining infrastructure, and C – Alien and Invasive Plants. 48

Figure 4-2 Preliminary layout of the proposed Project in relation to the development footprint (the conservancy tank and the individual hub buildings are shown in Figure 4-3) 50

Figure 4-3 Detail of the infrastructure hub, construction laydown area, equipment delivery zone and stockpiles in the preliminary layout (the development footprint, OHL buffer and PV boundary are as in Figure 4-2) 51

Figure 4-4 Cumulative habitat loss in 50 km surrounding the development footprint (shown enlarged), according to the National Biodiversity Assessment 2025 remnant layer (Skowno et al., 2026) and the Renewable Energy Environmental Authorisations Database dataset (Q2, 2026) 65

Table of Abbreviations and Units of Measurement

Abbreviation	Full Term	Unit/Description
%	Percent	Proportion
°C	Degrees Celsius	Temperature
AIP	Alien Invasive Plant	Non-native plant species
AVMP	Alien Vegetation Management Plan	Management plan
BI	Biodiversity Importance	Sensitivity rating
CARA	Conservation of Agricultural Resources Act	South African legislation
CBA	Critical Biodiversity Area	Biodiversity spatial plan category
cf.	Confer (compare)	Taxonomic qualifier
CI	Conservation Importance	Sensitivity rating
CR	Critically Endangered	IUCN Red List category
DD	Data Deficient	IUCN Red List category
EAP	Environmental Assessment Practitioner	Project role
EGI	Strategic Transmission Corridors	Electricity grid infrastructure
EIA	Environmental Impact Assessment	Regulatory process
EN	Endangered	IUCN Red List category
EO	Environmental Officer	Project role
ESA	Ecological Support Area	Biodiversity spatial plan category
FI	Functional Integrity	Sensitivity rating
GIS	Geographic Information System	Mapping/analysis tool
GPS	Global Positioning System	Location technology
ha	Hectare	Area (10,000 m²)
HMA	Heavily Modified Area	Biodiversity spatial plan category
IUCN	International Union for Conservation of Nature	
KBA	Key Biodiversity Area	International conservation designation
kV	Kilovolt	Electrical potential (1,000 volts)
LC	Least Concern	IUCN Red List category
m	Metre	Length
m.a.s.l.	Metres above sea level	Elevation
m²	Square metre	Area
m³	Cubic metre	Volume
MBSP	Mpumalanga Biodiversity Sector Plan	Provincial biodiversity plan
mm	Millimetre	Length
MMA	Moderately Modified Area	Biodiversity spatial plan category
MPAES	Mpumalanga Protected Areas Expansion Strategy	Provincial conservation strategy
MWAC	Megawatt Alternating Current	Power (MW)
NEMA	National Environmental Management Act	South African legislation
NEMBA	National Environmental Management: Biodiversity Act	South African legislation

NEMWA	National Environmental Management: Waste Act	South African legislation
NFEPA	National Freshwater Ecosystem Priority Area	National aquatic priority area
NPAES	National Protected Area Expansion Strategy	Conservation planning strategy
NT	Near Threatened	IUCN Red List category
NWA	National Water Act	South African legislation
ONA	Other Natural Area	Biodiversity spatial plan category
PAOI	Project Area of Influence	Defined project boundary
Pr. Sci. Nat.	Professional Natural Scientist	Professional registration
PV	Photovoltaic	Solar energy technology
Q3	Quarter 3	Time period (July–September)
REDZ	Renewable Energy Development Zone	Renewable energy planning area
REEA	Renewable Energy Environmental Application Database	National database
RR	Receptor Resilience	Sensitivity rating
s.l.	*Sensu lato* (in the broad sense)	Taxonomic qualifier
s.s.	*Sensu stricto* (in the strict sense)	Taxonomic qualifier
SACAD	South Africa Conservation Areas Database	Spatial dataset
SAIIAE	South African Inventory of Inland Aquatic Ecosystems	National aquatic dataset
SANBI	South African National Biodiversity Institute	National authority
SAPAD	South Africa Protected Areas Database	Spatial dataset
SCC	Species of Conservation Concern	Conservation status
SEI	Site Ecological Importance	Sensitivity rating
sp.	Species (singular, unspecified)	Taxonomic term
Spp.	Species (plural)	Taxonomic term
subsp.	Subspecies	Taxonomic rank
SWSA	Strategic Water Source Area	Water resource area
var.	Variety	Taxonomic rank
VU	Vulnerable	IUCN Red List category

1 Introduction

1.1 Background

The Biodiversity Company was appointed by GCS Environment South Africa (Pty) Ltd (GCS) to undertake an avifaunal assessment for the proposed Kopanya Photovoltaic (PV) 2 Project (the proposed Project). The preliminary development layout provided (October 2026) was used to determine the Project Area of Influence (PAOI (Figure 1-1). The property boundary as well as 5 km area is regarded as the PAOI (Figure 1-2).

This assessment was conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the Environmental Impact Assessment Regulations, 2014, published under GN R982 in Government Gazette 38282 of 4 December 2014, as amended, including GN R326 in Government Gazette 40772 of 7 April 2017 and GN R517 in Government Gazette 44701 of 11 June 2021. The approach further took cognisance of GN 320 in Government Gazette 43110 of 20 March 2020, being the 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 NEMA, when applying for Environmental Authorisation, as well as GN 1150 in Government Gazette 43855 of 30 October 2020, as amended by GN 3717 in Government Gazette 49028 of 28 July 2023, relating to the applicable specialist assessment protocols and minimum report content requirements.

The purpose of the specialist studies is to provide relevant input into the environmental assessment process and provide a report for the proposed activities associated with the Project. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed Project.

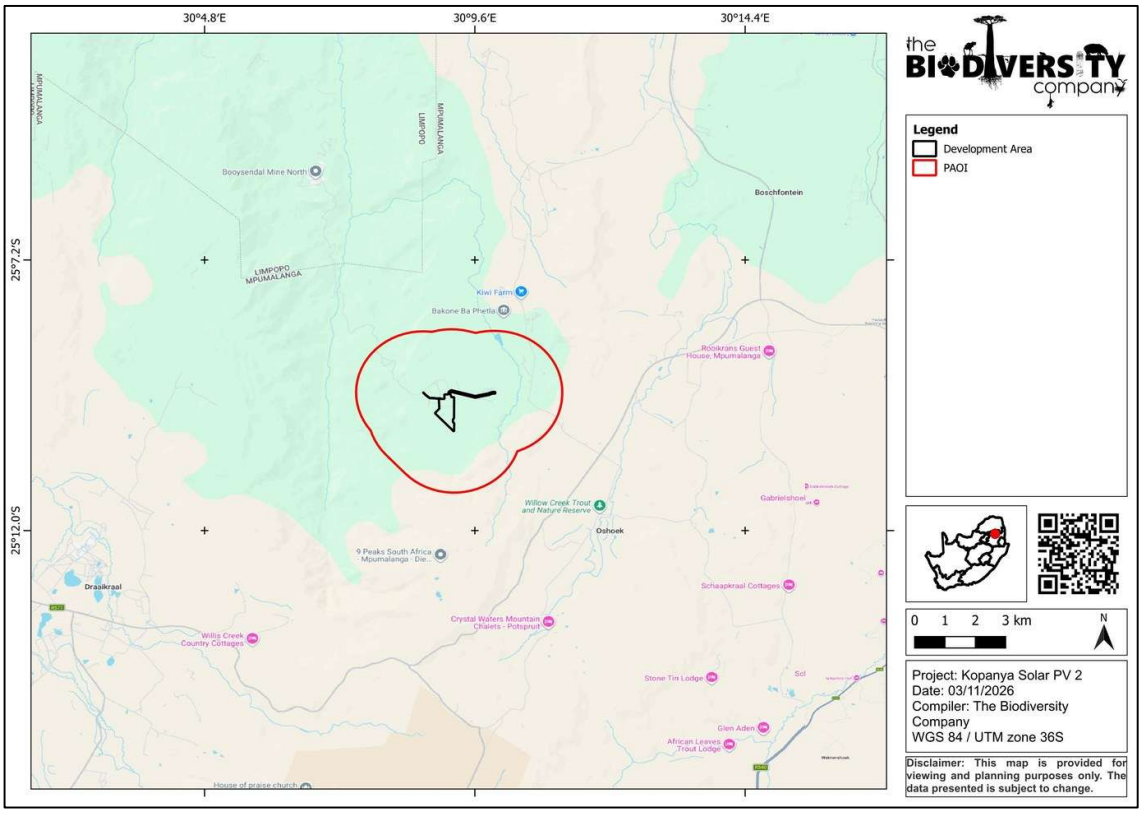


Figure 1-1 The proposed Project area of Influence in proximity to the nearby towns

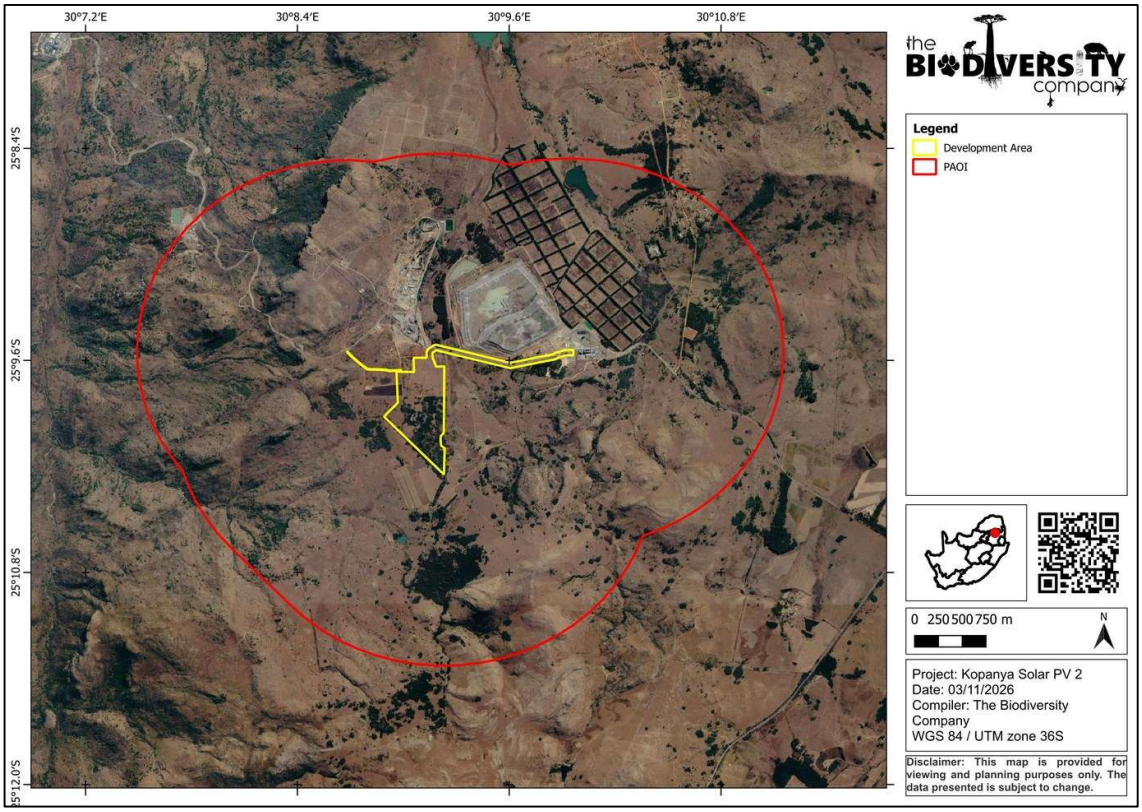


Figure 1-2 Map illustrating the proposed Project Area of Influence (PAOI) and the development footprint (shown in yellow)

1.2 Project Description

The following has been provided by GCS.

1.2.1 Introduction

Booysendal Platinum (Pty) Ltd (the Applicant / Booysendal) proposes to develop the Kopanya Solar Photovoltaic 2 Project (the proposed Project), comprising a 20-megawatt alternating current (MWAC) utility-scale solar photovoltaic facility and associated infrastructure at the Booysendal South Mine in Mpumalanga Province. The proposed Project will be located within the existing Booysendal Mining Right held by Booysendal, a subsidiary of Northam Platinum Holdings Limited.

The proposed Project requires Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), read with the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) Government Notice Regulation (GN R) 982 (EIA Regulations, 2014). A Basic Assessment (BA) process is being undertaken to assess potential environmental impacts and risks, consider reasonable and feasible alternatives, facilitate participation by interested and affected parties (I&APs) and relevant organs of state, and provide the competent authority with sufficient information to decide the application.

GCS Environment South Africa (Pty) Ltd (GCS) has been appointed as the independent Environmental Assessment Practitioner (EAP) responsible for managing the environmental assessment process, facilitating public participation and preparing the application documentation for submission to the Department of Mineral and Petroleum Resources (DMPR).

1.2.1.1 Project Background

The proposed Project will be located on Portion 8, the Remaining Extent of Portion 15 and Portion 17 of the Farm No. 53 JT, approximately 30 kilometres (km) west of Mashishing, within the Thaba Chweu Local Municipality and Ehlanzeni District Municipality. The proposed development footprint is approximately 41 hectares (ha).

The proposed Project will comprise up to approximately 35,000 bifacial photovoltaic panels mounted on single-axis tracking systems, together with an on-site substation, inverters, transformer stations, electrical houses, access and internal roads, operations and maintenance facilities, security and telecommunications infrastructure, and an overhead power line of up to 132 kilovolts (kV). A detailed Project description is provided in Section 1.2.2.

Electricity generated by the proposed Project will primarily supplement the electricity requirements of the Booysendal South Mine. The proposed Project forms part of Northam Platinum Holdings Limited's energy resilience and sustainability strategy.

1.2.2 Description of the Proposed Development

This section describes the principal components, supporting infrastructure and lifecycle activities associated with the proposed Project.

1.2.2.1 Project Overview

The Project comprises a 20 MWAC solar PV facility and associated grid connection and support infrastructure within the existing Booysendal South Mine. Electricity generated will primarily supply the Mine, with any surplus export subject to the applicable grid connection arrangements.

1.2.2.2 Project Components

1.2.2.2.1 Overview of the Proposed Facility

The facility will have an installed generation capacity of 20 MWAC and will integrate with existing mining and electrical infrastructure.

The proposed Project will utilise single-axis tracking bifacial solar photovoltaic panels to optimise solar exposure throughout the day. Locating the facility within an established mining area and using modular infrastructure may reduce the need for additional land disturbance.

1.2.2.2.2 Solar PV Arrays and Tracking System

The facility will comprise up to approximately 35,000 bifacial PV panels, each with a typical capacity greater than 600 watts (W), mounted on single-axis tracking systems to optimise energy yield.

The racking and tracking systems will be constructed from steel sections supported by driven piles, reducing the need for extensive concrete foundations and limiting ground disturbance. Panel structures will be designed to accommodate site-specific geotechnical conditions, wind loading, and long-term operational requirements.

1.2.2.2.3 Electrical Infrastructure and Grid Connection

The Project will include the following electrical and grid connection infrastructure:

- An overhead power line of up to 132 kV connecting the solar PV facility to the grid connection infrastructure;
- An on-site PV substation to collect and regulate electricity generated by the PV arrays;

- A substation adjacent to the existing Eskom substation; and
- Power transformer stations, inverters and associated electrical infrastructure housed in prefabricated units or electrical houses.

Electricity generated will primarily supply the Booysendal South Mine. Any surplus export will be subject to the final grid connection arrangements.

1.2.2.2.4 Temporary Construction Infrastructure

Temporary infrastructure required during the construction phase will include:

- A construction yard and laydown areas of approximately 1 ha;
- Site offices, storage areas, and temporary ablution facilities;
- Internal access roads and construction traffic routes; and
- Temporary services required to support construction activities.

Construction of the proposed Project is anticipated to occur over a period of approximately 15 months. At peak construction, an estimated 300 personnel will be employed, comprising skilled and semi-skilled labour associated with civil works, electrical installation, and commissioning activities.

1.2.2.2.5 Permanent Operational Infrastructure

Permanent operational infrastructure associated with the proposed Project will include:

- Buildings for operations, maintenance, control, and storage purposes;
- An operations and maintenance warehouse;
- Parking areas for operational staff and service vehicles; and
- Security facilities, including access control points.

The operational lifespan of the proposed Project is anticipated to be approximately 25 years, during which an estimated 20 personnel will be employed for routine operation, maintenance, and security functions.

1.2.2.2.6 Supporting Infrastructure and Services

Additional supporting infrastructure will include:

- Water-supply infrastructure and conservancy tanks for the collection of domestic wastewater;
- Internal and access roads, linking the facility to existing Mine infrastructure;
- Security and access control infrastructure, including perimeter fencing of up to approximately 3 100 metres (m); and
- Telecommunications systems to support monitoring, control, and security operations.

Stormwater infrastructure will be designed to maintain natural drainage patterns, promote dispersed flow and infiltration, and prevent erosion, sedimentation and concentrated discharge into wetlands and

drainage features. The final design may include vegetated swales, berms, energy dissipation measures, cross-drainage structures and sediment-control measures.

1.2.2.2.7 Water Requirements and Management

Water will be required during construction for dust suppression, concrete works and general construction activities. Total construction phase demand is estimated at approximately 1 790 m³.

Operational water demand, associated mainly with domestic use and routine maintenance, is estimated at approximately 518 m³/a.

Water will be sourced from existing authorised Mine supplies and/or boreholes. No new abstraction infrastructure is proposed, and water use will be managed in accordance with the Mine's water management procedures.

No process wastewater will be generated during normal operation. Domestic wastewater will be collected in conservancy tanks and removed by an appropriately authorised service provider for disposal at an approved facility.

1.2.2.2.8 Waste Management

Waste generated during construction, operation and decommissioning will be managed in accordance with the Mine's approved waste management procedures, the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), and applicable good practice.

1.2.2.2.8.1 Construction Phase Waste

During the construction phase, both non-hazardous and hazardous waste streams will be generated. Waste volumes are anticipated to be temporary and largely associated with civil works, installation activities, and workforce-related activities.

Non-hazardous waste will include:

- General domestic waste generated by construction personnel;
- Packaging materials associated with solar PV components, including wooden pallets, cardboard, plastics, polystyrene, and strapping materials;
- Scrap metal arising from mounting structures, tracker systems, cable trays, and minor steel off-cuts;
- Construction off-cuts, including electrical cabling, conduits and plastic materials;
- Minor quantities of inert waste, such as concrete residues generated during foundation works; and
- Damaged, defective, or broken solar PV panels arising from transport, handling, or installation activities.

Solar PV panels damaged during delivery or installation will be handled with care to prevent further breakage. Intact but defective panels will, where possible, be returned to the supplier under warranty agreements. Broken panels will be stored in a designated, secure area to prevent glass dispersion and environmental contamination. Panels suitable for recycling will be sent to appropriately authorised recycling facilities.

Hazardous waste generated during construction will be limited in volume and will include:

- Small quantities of waste fuels, oils and hydraulic fluids generated during the use and maintenance of construction vehicles and equipment;
- Oily rags, absorbent materials, used filters, and contaminated materials; and
- Empty containers that previously contained hazardous substances, such as oils, greases, and cleaning agents.

Hazardous waste will be stored in clearly demarcated, bunded areas with impermeable surfaces. Waste will be removed by appropriately registered or authorised service providers and taken to authorised facilities.

1.2.2.2.8.2 Operational Phase Waste

Waste generation during the operational phase is expected to be minimal and largely associated with routine maintenance and administrative activities.

- Non-hazardous waste during operation will primarily include:
- Limited domestic waste generated by operational and maintenance personnel;
- Minor packaging waste associated with spare parts and replacement components; and
- Scrap metal and redundant components arising from maintenance activities.

Hazardous or potentially hazardous waste may include:

Used oils, lubricants, and cleaning materials associated with maintenance activities;

- Oily rags, absorbent materials and used filters;
- Damaged or replaced solar PV panels arising from storm events, mechanical failure, vandalism, or routine replacement; and
- Electrical components such as inverters or transformers containing oils or electronic parts.

Damaged, defective and end-of-life PV panels will be assessed and managed according to their condition and applicable waste classification requirements. Supplier take-back, reuse and recycling will be prioritised where reasonably available, and panels awaiting removal will be stored in a secure, weather-protected area.

All operational waste will be collected, transported and disposed of in accordance with approved waste management procedures.

1.2.2.2.8.3 Decommissioning Phase Waste

At the end of the proposed Project's operational lifespan, the facility may be decommissioned, repowered, or refurbished. The decommissioning phase will generate both non-hazardous and hazardous waste streams associated with dismantling and removal of infrastructure.

Waste generated during decommissioning will include:

- Non-hazardous waste, such as dismantled equipment, scrap metal, concrete material, fencing, and general waste associated with infrastructure removal;

- Solar PV panels, including damaged, obsolete, or end-of-life panels and associated mounting structures and electrical components; and
- Hazardous waste, including electronic components, oils and other hazardous materials.

Solar PV panels removed during decommissioning will represent a primary waste stream. Functional panels may be reused, resold or incorporated into a repowering programme, while end-of-life panels will be prioritised for recycling to recover glass, aluminium frames and other reusable materials.

Electrical components, including inverters and transformers, will be assessed for potential refurbishment or recycling. Hazardous materials will be separated and managed in accordance with applicable waste legislation.

Decommissioning waste will be transported by appropriately registered or authorised service providers to authorised waste management or recycling facilities. Material recovery, reuse and recycling will be prioritised to minimise disposal to landfill.

1.3 Scope of Work

The Avifaunal Impact Assessments were undertaken according to the legislation referenced in Section 1.5 including the Birds and Solar Energy Best Practice Guidelines by BirdLife South Africa's (2017).

The scope of the Avifaunal Impact Assessment included the following:

- Desktop assessment to:
    - Identify the relevant ecologically important geographical features within the PAOI and surrounding landscape;
    - Compile an expected species list and possible avifauna Species of Conservation Concern (SCC) that potentially occur within the PAOI;
- Fieldwork 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 in which the proposed Project 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 proposed Project footprint area as provided by the Applicant. Any alterations to the area and/or missing Geographic Information System (GIS) information pertaining to the assessment area would have affected the area surveyed and, hence the results of this assessment;

- The layout (Figure 4-2) and the Project activities assessed in this report, including blasting, the perimeter fence, the access, perimeter and service roads and the conservancy tank, are preliminary and are still being confirmed by the Applicant. The locations, frequency and extent of blasting have not been provided. The assessment was undertaken on a precautionary basis, and the impacts and mitigation measures must be reviewed should the layout or the activities change;

- The first avifaunal field survey was completed between 26th to the 30th of January 2026, while the second survey was conducted between the 20th and 23rd of April 2026. The Regime 2 requirement (Section 1.5) is therefore fulfilled;

- 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 Global Positioning System 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 proposed 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 relevant to biodiversity and conservation in the Mpumalanga Province

Region	Legislation / Guideline	Comment
National	BirdLife South Africa. 2017. Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in Southern Africa (compiled by Jenkins AR, Ralston-Paton S and Smit-Robinson HA).	Solar Guidelines
	National Environmental Management Act, 1998 (Act No. 107 of 1998) (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.
	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA);	The regulation of waste management to protect the environment.
	National Water Act, 1998 (Act No. 36 of 1998) (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 No. 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.
	Species Environmental Assessment Guideline (SANBI, 2020)	Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa.
	Environmental Assessment Guideline for Ecosystems (SANBI, 2022)	Guideline to support the implementation of the Terrestrial and Aquatic Biodiversity Protocols for environmental impact assessment in South Africa.
Provincial	Mpumalanga Parks Board, 1995 (Act No. 6 of 1995)	To provide for the management and conservation of the province's biophysical environment and protected areas.
	Mpumalanga Conservation Act, 1998 (Act No. 10 of 1998)	

	Mpumalanga Tourism and Parks Agency, 2005 (Act No. 5 of 2005)	To inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management.
	Mpumalanga Biodiversity Sector Plan (2024)	

2 Fieldwork

2.1 Field Assessment

The first avifaunal field survey was completed between 26th to the 30th of January 2026 (Summer), while the second survey was conducted between the 20th and 23rd of April 2026 (Autumn).

Point Counts

Standardised 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 standardised point count technique was utilised 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 m. 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.

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 tracks and locations of the point counts conducted within the PAOI (it is worth noting that several points were done in and around the PAOI as well, and the survey as a whole consisted of 56 survey locations with incidentals and SCC recordings). The PAOI had a total of 16 point counts.

`

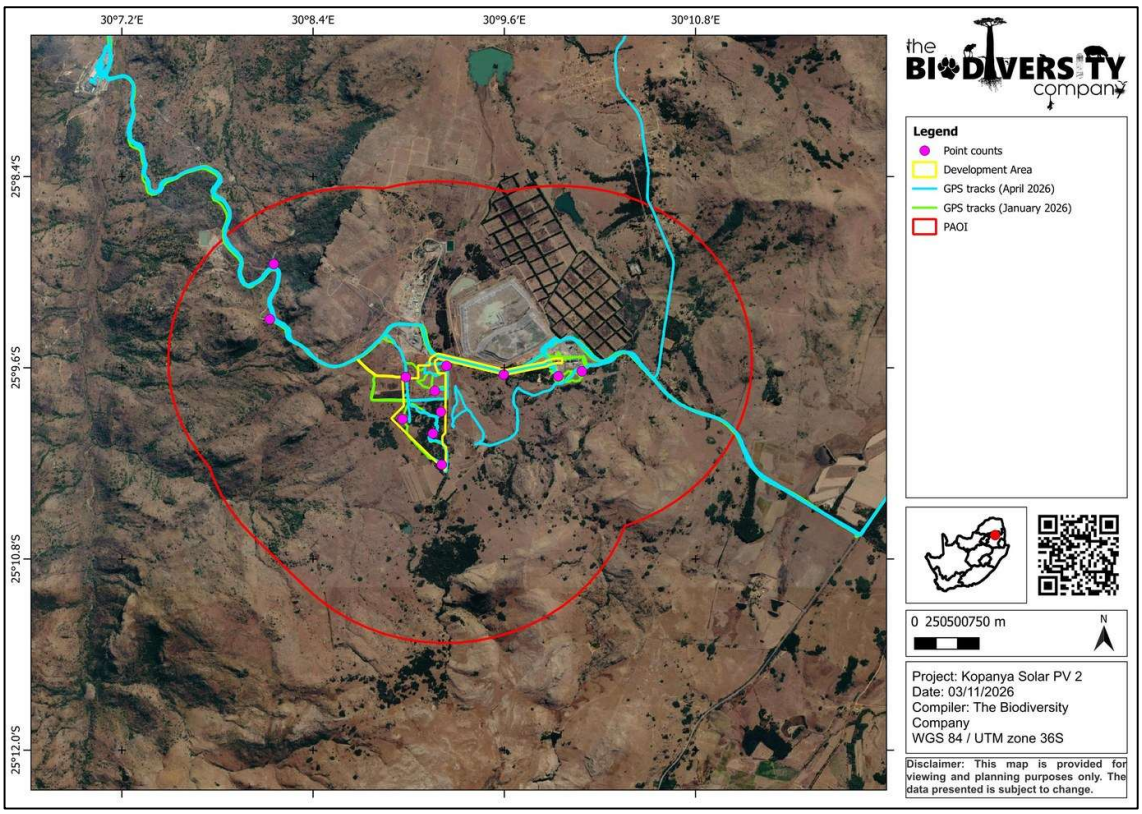


Figure 2-1 Map illustrating the point count locations and tracks

3 Results and 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 the ecologically important landscape features

Desktop Information Considered	Relevance	Reasoning	Report section
Ecosystem Threat Status (RLE 2022)	Relevant	The Project Area of Influence (PAOI) overlaps with a Least Concern (LC) ecosystem.	**3.1.1**
Mpumalanga Intact Grasslands	Relevant	The PAOI overlaps with Mpumalanga Intact Grasslands	3.1.2
Mpumalanga Ecological Corridors	Irrelevant	The PAOI does not overlap with any ecological corridors.	-
Ecosystem Protection Level	Relevant	The PAOI overlaps with a Not Protected (NP) ecosystem.	**3.1.3**
Provincial Conservation Plan	Relevant	The PAOI overlaps with Other Natural Areas, Moderately Modified – Old lands and Heavily Modified.	**3.1.4**
South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD)	Relevant	The development area is situated approximately 2.5 to 3 km from the Davel Private Nature Reserve (SAPAD and SACAD, 2025 Q3), which lies less than 1 km from the edge of the PAOI, and approximately 9 km from the Tim Tilden-Davis Nature Reserve (SAPAD, 2025 Q3) and the Verloren Vallei Nature Reserve (SACAD, 2025 Q3).	**3.1.5**
National Protected Areas Expansion Strategy (NPAES)	Relevant	The PAOI overlaps with NPAES Priority Focus Areas.	**3.1.6**
Mpumalanga Protected Areas Expansion Strategy (MPAES)	Relevant	The PAOI overlaps with National protected area expansion according to the MPAES.	**3.1.6**
Key Biodiversity Areas (KBA)	Relevant	The PAOI overlaps with the Steelpoort KBA.	**3.1.7**
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant	The PAOI overlaps with a Critically Endangered (CR) wetland (Channelled valley- bottom).	**3.1.8**
National Freshwater Priority Area (NFEPA)	Relevant	The PAOI overlaps with non – priority FEPA wetlands.	**3.1.9**
Mpumalanga Highveld Grassland Wetlands (MPHG)	Irrelevant	The PAOI does not overlap with any MPHG wetlands.	-
Strategic Water Source Areas (SWSA)	Irrelevant	The PAOI does not overlap with any SWSA.	-
Strategic Transmission Corridors (EGI)	Relevant	The PAOI overlaps with the International Corridor.	**3.1.10**
Renewable Energy Development Zones (REDZ)	Irrelevant	The PAOI does not overlap with any REDZ.	-
Renewable Energy Database	Relevant	Other approved renewable energy projects occur within a 50 km buffer of the PAOI.	**3.1.11**
Coordinated Water Bird Count (CWAC)	Irrelevant	The PAOI is not within close proximity to any CWAC.	-
Coordinated Avifaunal Road Count	Relevant	The PAOI is 3.3 km from the closest route.	3.2.1

3.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. The revised list (known as the Red List of Ecosystems (RLE) 2022) is based on assessments that followed the IUCN Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina & 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 (GG) (47526, Notice Number 2747) and came into effect on 18 November 2022.

The proposed PAOI overlaps with a LC ecosystem (Figure 3-1).

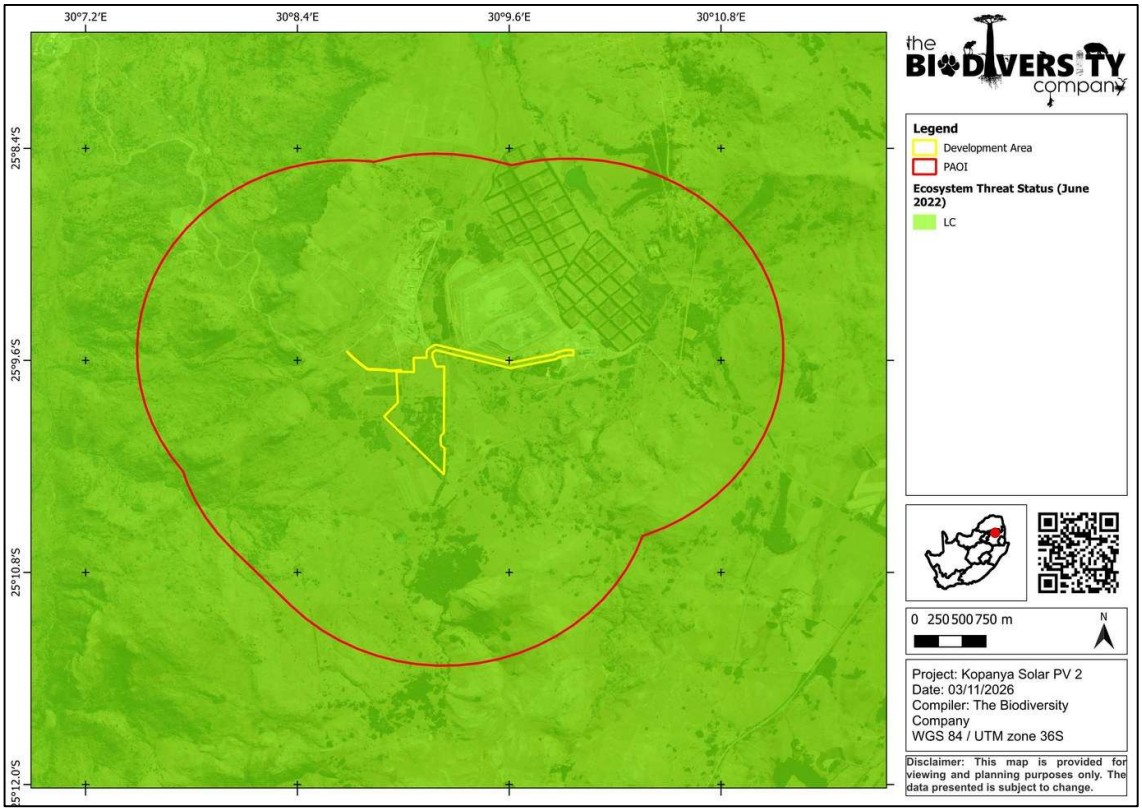


Figure 3-1 Map illustrating the Ecosystem Threat Status associated with the PAOI

According to the 2021 National Biodiversity Assessment, sections of the LC Sekhukhune Montane Grassland vegetation type has been modified, with some areas still considered as remnants of this vegetation type within the PAOI.

3.1.2 Mpumalanga Biodiversity Spatial Plan Intact Grassland

Given that grasslands within Mpumalanga are very fragmented (with only 50.7% of grassland areas still in a natural state), quantifying and prioritising the connectivity importance of remaining intact grassland patches was thought to be important in supporting species and ecosystems to adapt to climate change. These intact grassland patches are envisaged to provide habitat for species to thrive (access to resources, ability to reproduce, and protection from edge effects), and allow for the dispersal of smaller mobile mammal, avifaunal and plant species. Maintain functional intact grassland patches which support species (in response to climate change) and allow for natural ecological processes such as fire regimes, pollination, etc. to persist (MTPA, 2025).

The PAOI overlaps with intact grasslands identified by the Mpumalanga Biodiversity Spatial Plan (MBSP) (Figure 3-2).

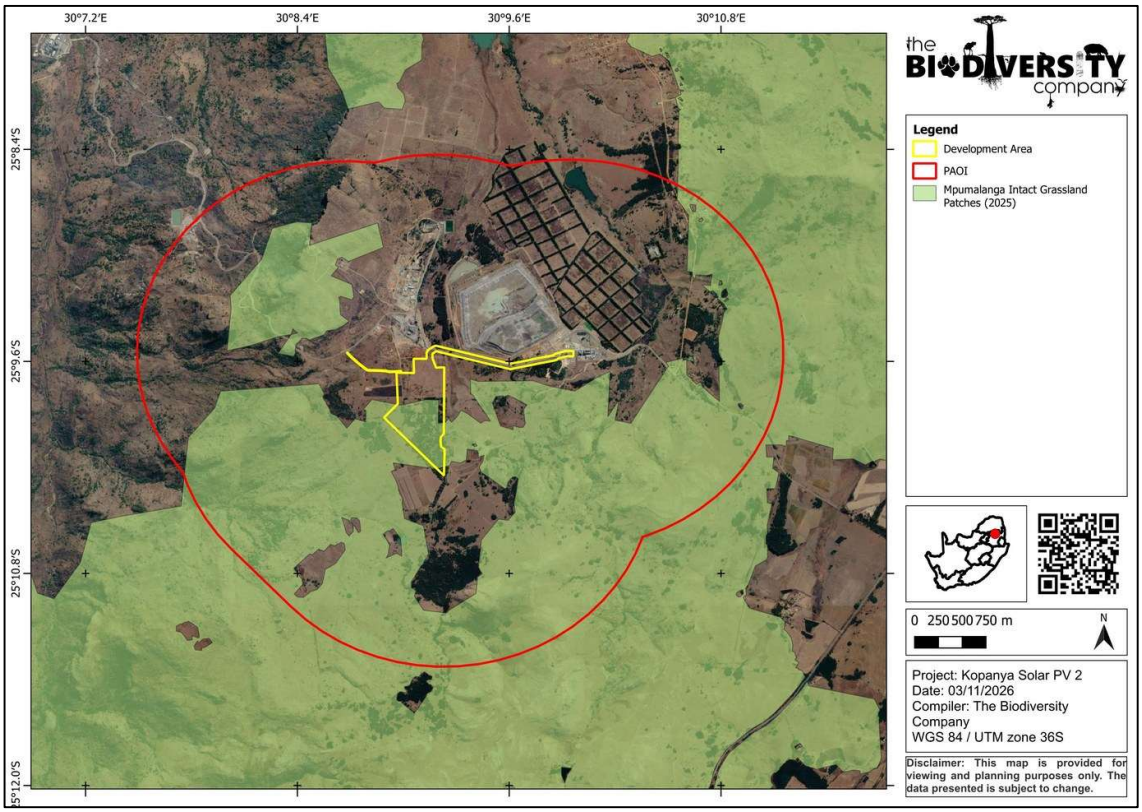


Figure 3-2 Map illustrating the PAOI in relation to the Mpumalanga Biodiversity Spatial Plan Intact Grassland dataset

3.1.3 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 PAOI overlaps with a NP ecosystem (Figure 3-3).

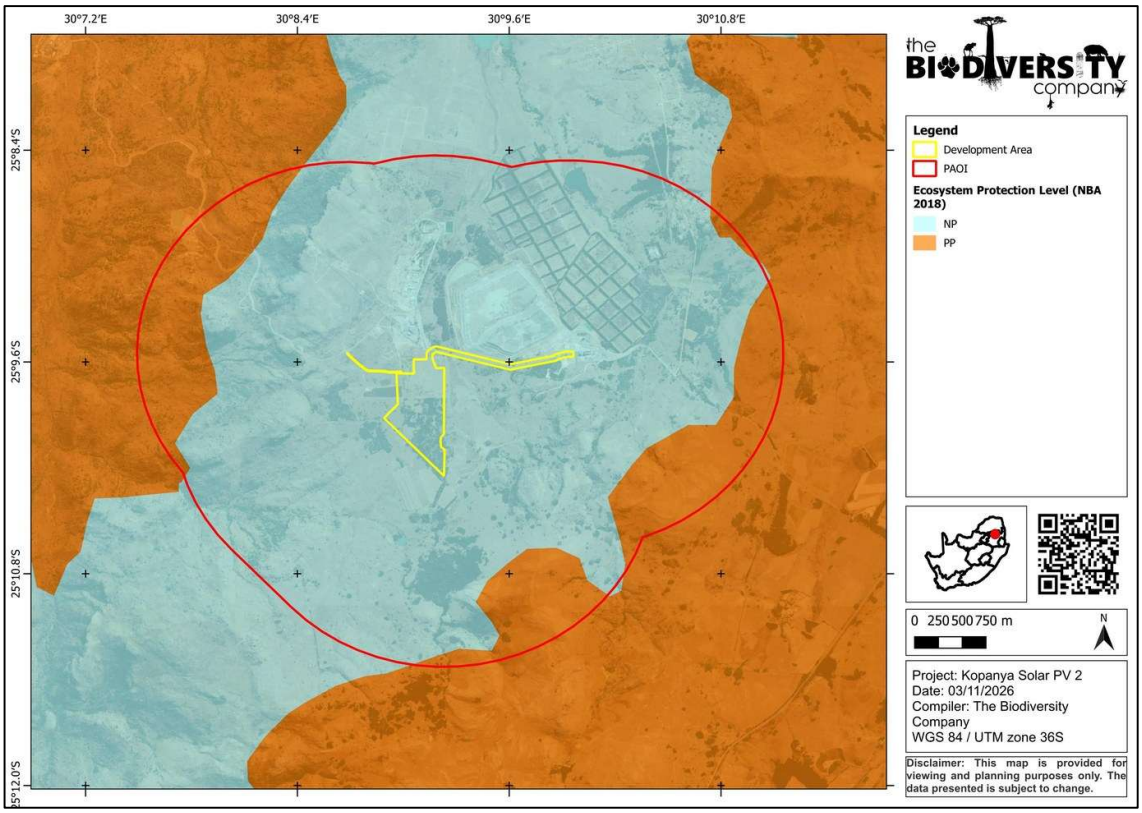


Figure 3-3 Map illustrating the ecosystem Protection Level associated with the PAOI

3.1.4 Mpumalanga Biodiversity Spatial Plan

The key output of this systematic biodiversity plan is a map of biodiversity priority areas (MTPA, 2025). The MBSP map delineates Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA), Protected Areas (PA), Protected Area buffers and areas that have been irreversibly modified from their natural state (MTPA, 2025). The MBSP uses the following terms to categorise the various land use types according to their biodiversity and environmental importance:

- CBA;
- ESA;
- ESA Protected Area Buffer;
- ONA;
- PA; and
- Moderately Modified Areas (MMA's) or Heavily Modified Areas (HMA's).

According to the MBSP dataset, the PAOI overlaps with ONA, MMA – old lands, and HMA (Figure 3-4).

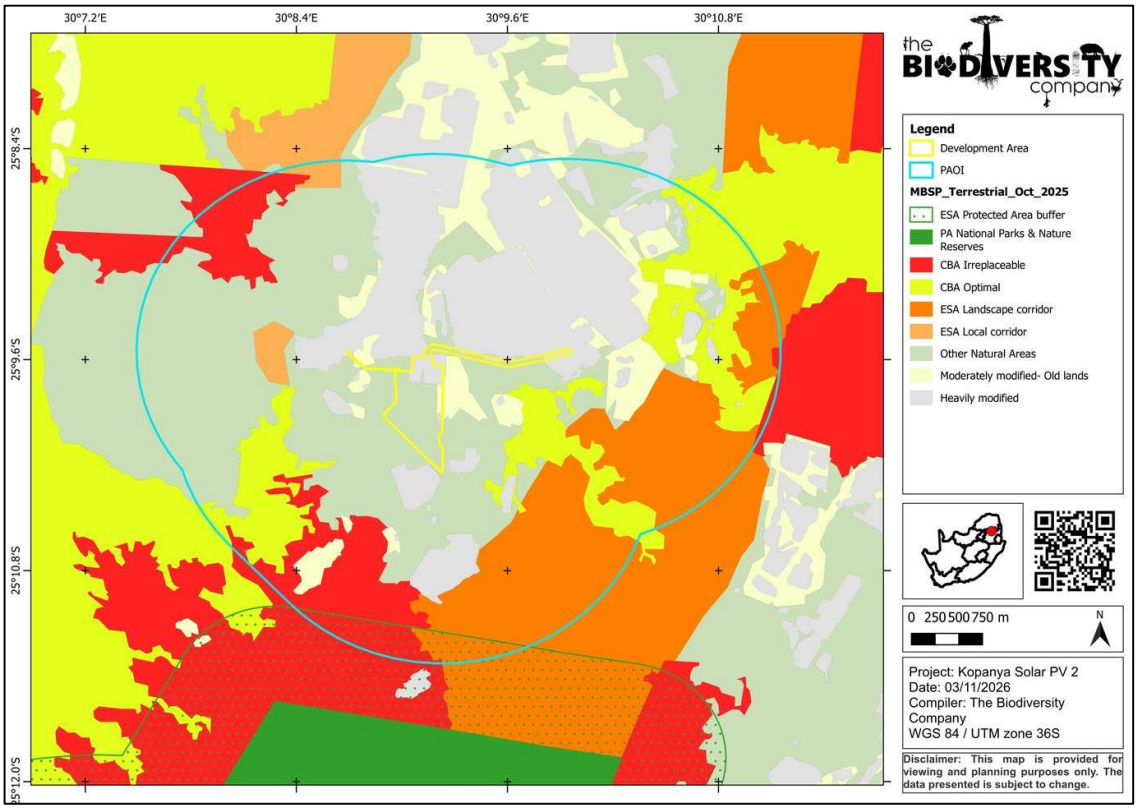


Figure 3-4 Map illustrating the PAOI in relation to the Mpumalanga Biodiversity Sector Plan

3.1.5 Protected Areas

According to the datasets (Figure 3-5) from South Africa Protected Areas Database (SAPAD) (2025, Q3) and South Africa Conservation Areas Database (SACAD) (2025, Q3), at the nearest point, the development area is situated approximately 2.5 to 3 km from the Davel Private Nature Reserve (SAPAD and SACAD, 2025 Q3), which lies less than 1 km from the edge of the PAOI, and approximately 9 km from the Tim Tilden-Davis Nature Reserve (SAPAD, 2025 Q3) and the Verloren Vallei Nature Reserve (SACAD, 2025 Q3).

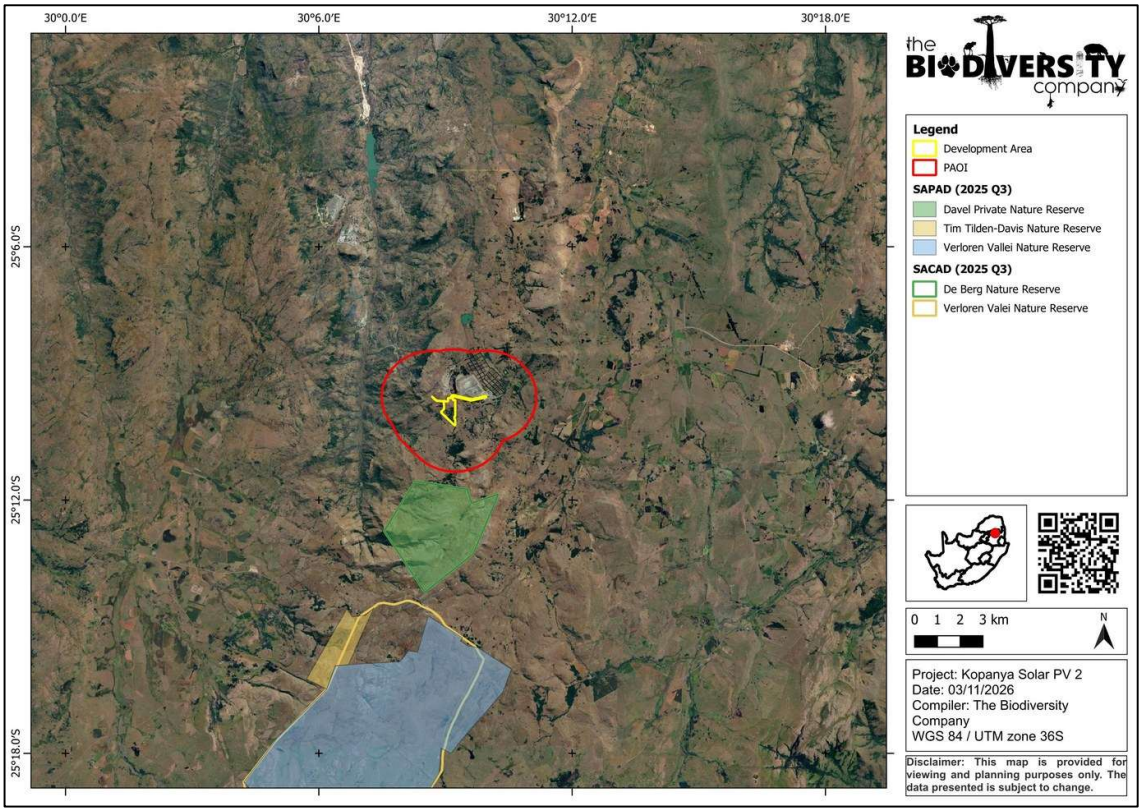


Figure 3-5 The PAOI in relation to the South Africa Protected Areas Database and South Africa Conservation Areas Database datasets

3.1.6 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2018 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of PAs, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2018).

The Mpumalanga Protected Area Expansion Strategy (MPAES, 2013), commissioned by the MTPA, serves to function as a provincial framework for an integrated, coordinated and uniform approach in the expansion and consolidation of the Provincial PAs, in line with the requirements of the NPAES.

The priority areas for PA Expansion within Mpumalanga were spatially established based on the premise that the primary goal of these areas is to protect biodiversity targets. Several biodiversity data sources were used for the assessment, namely the: Threatened Ecosystems, MBCP Terrestrial Assessment, MBCP Aquatic Assessment, MBCP Irreplaceability, C-plan Irreplaceability, and the National Spatial Biodiversity Assessment Priority areas. A combination of all these were used, together with the spatial priorities established within the NPAES, to establish the spatial priority areas that will guide the MPAES (2018) over the next 20 years.

The PAOI overlaps with NPAES priority focus areas and National Protected Area Expansion Priority according to the MPAES (Figure 3-6).

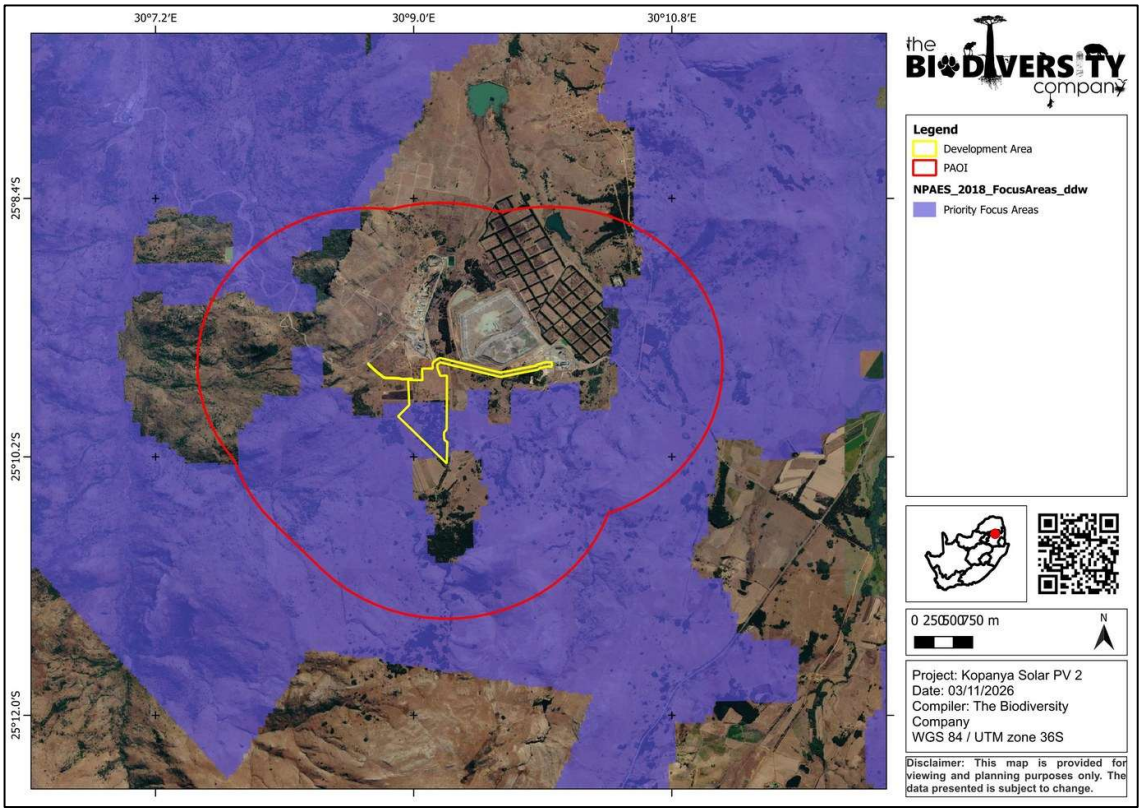


Figure 3-6 Map illustrating the PAOI in relation to the National Protected Area Expansion Strategy dataset

3.1.7 Key Biodiversity Areas

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.

Unlike the Important Bird Areas (IBAs), which primarily focus on birds, the KBA framework encompasses a broader spectrum of biodiversity, including mammals, amphibians, plants, and other taxa. BirdLife South Africa, in consultation with the KBA National Coordination Group, has opted to retire IBAs and integrate KBAs into its conservation strategy. This strategic shift acknowledges the necessity of investing resources effectively to protect avian and other macroecological elements at the site level within a comprehensive framework of biodiversity conservation (KBA NCG, 2024).

The PAOI overlaps with the Steelpoort KBA and Steenkampberg Grasslands (Figure 3-7). Table 3-2 lists the SCC species that has been recorded in these KBAs.

Table 3-2 Species triggering the Steelpoort and Steenkampberg Grassland KBAs

Taxonomic group	Scientific name	Common name	IUCN Red List category
Aves	*Hemimacronyx chloris*	Yellow-breasted Pipit	VU
Aves	*Heteromirafra ruddi*	Rudd's Lark	EN
Aves	*Sarothrura ayresi*	White-winged Flufftail	CR
Aves	*Sylvia nigricapillus*	Bush Blackcap	VU
Aves	*Geronticus calvus*	Southern Bald Ibis	VU

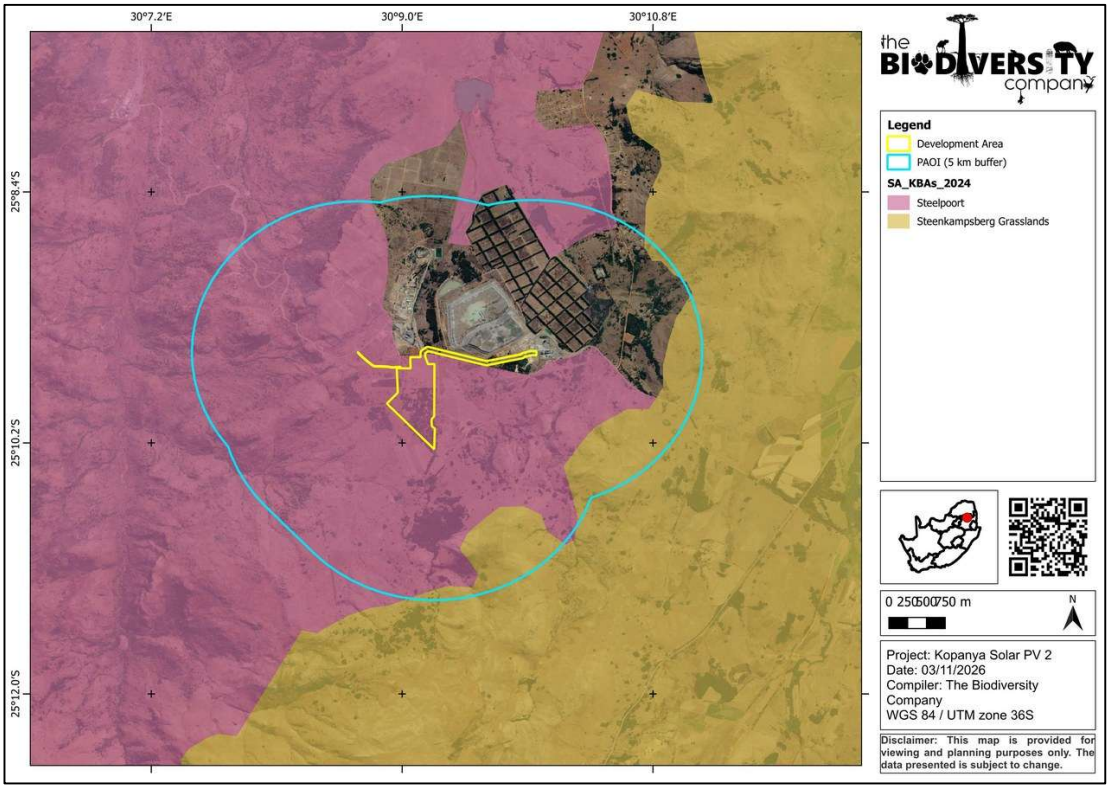


Figure 3-7 The PAOI in relation to the Key Biodiversity Areas dataset

3.1.8 South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status 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 Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (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 a CR wetland (Channelled valley- bottom) (Figure 3-8).

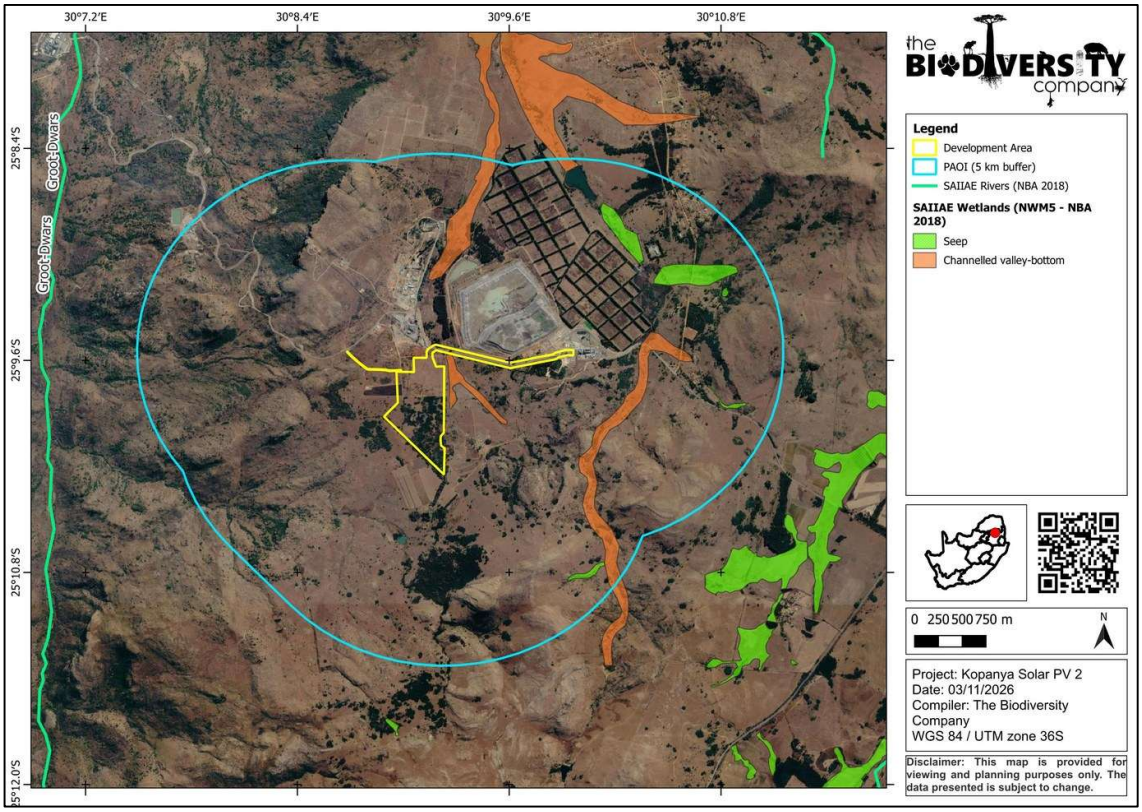


Figure 3-8 Map illustrating the South African Inventory of Inland Aquatic Ecosystems threat status of rivers and wetland systems of the PAOI

3.1.9 National Freshwater Ecosystem Priority Area Status

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 NEMBA biodiversity goals (Nel *et al.*, 2011).

The PAOI overlaps with a non – priority FEPA wetland (Figure 3-9).

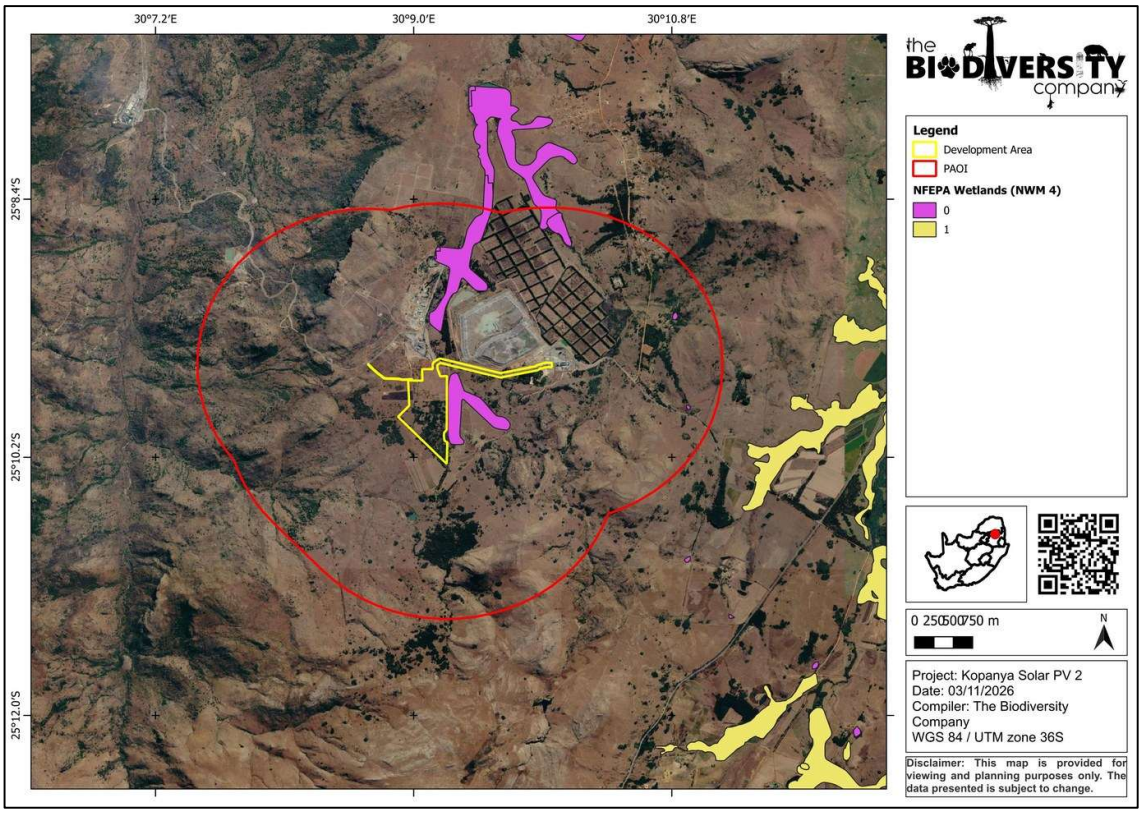


Figure 3-9 Map illustrating the PAOI in relation to the National Freshwater Ecosystem Priority Areas (wetland FEPA class: 0 = non-priority, 1 = priority)

3.1.10 Strategic Transmission Corridors

On the 16 February 2018 Minister Edna Molewa published GN No. 113 in GG 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 GN No. 383 in GG No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in GN No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

The PAOI overlaps with the International Corridor (Figure 3-10).

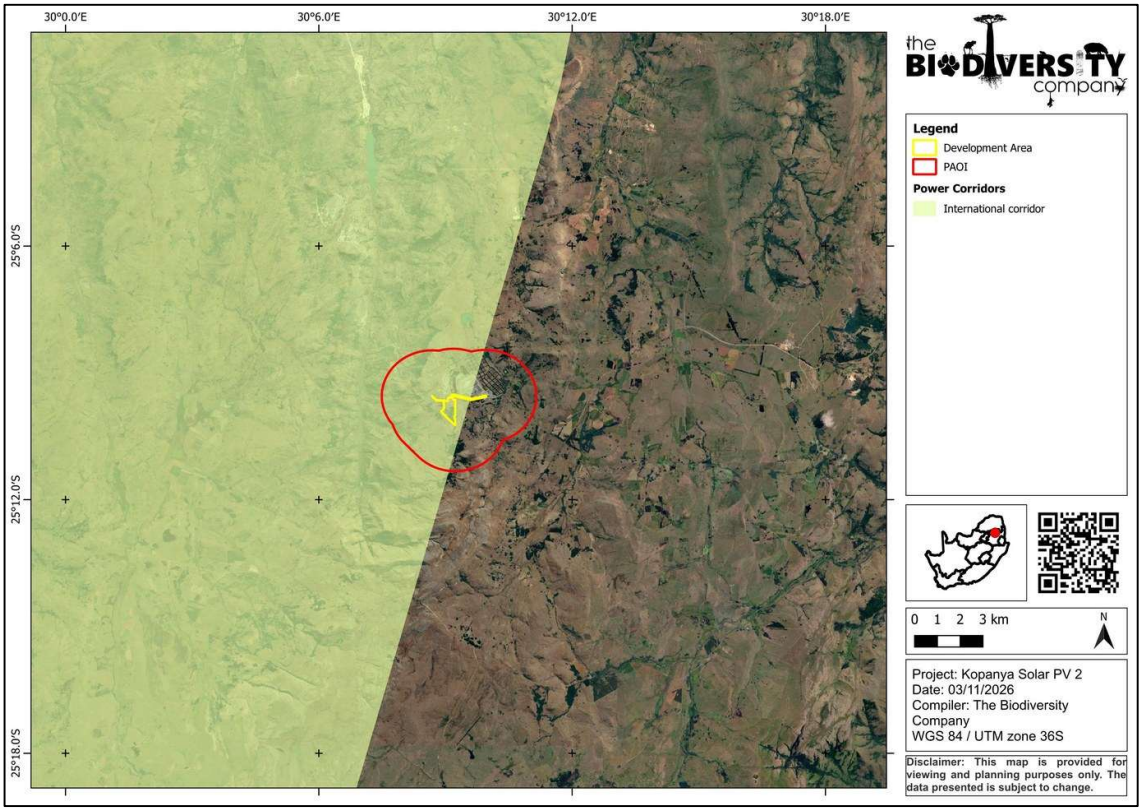


Figure 3-10 The PAOI in relation to the Strategic Transmission Corridors dataset

3.1.11 Renewable Energy Environmental Authorisations Database

The Renewable Energy Environmental Authorisations Database (REEA) (http://egis.environment.gov.za/), shows that there are other "approved" projects in the near vicinity (Figure 3-11). This increases the overall impact on the habitats in the area.

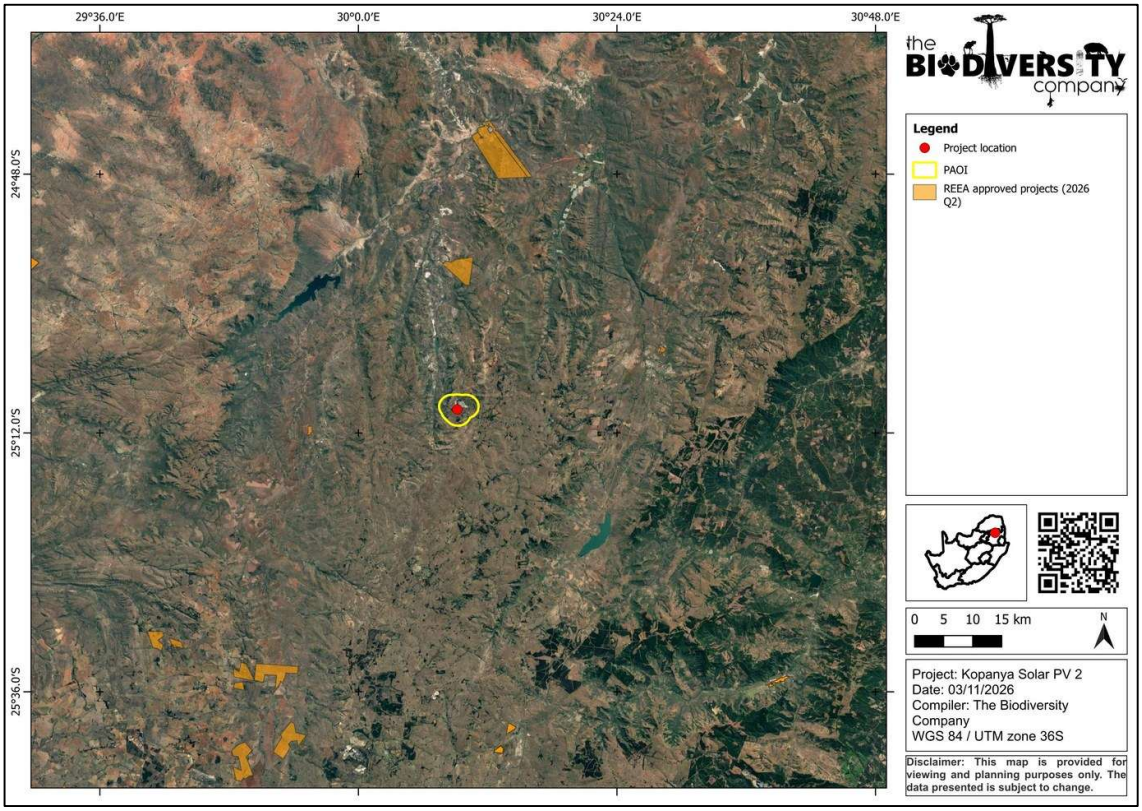


Figure 3-11 Map illustrating the PAOI in relation to the Renewable Energy Environmental Authorisations Database approved projects within a 50 km buffer

3.2 Avifauna Expected Species

The Bird Atlas Project (SABAP2) data indicate that 354 avifauna species are expected for the PAOI and surrounds. Of these, 40 are considered SCC (Table 3-3). The likelihood of occurrence within the PAOI is included here.

Table 3-3 Threatened avifauna species that are expected to occur within the PAOI. EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Scientific Name	Common Name	Regional *	Global (IUCN)+	Likelihood of occurrence
Alcedo semitorquata	Half-collared Kingfisher	VU	LC	Confirmed
Anas erythrorhyncha	Red-billed Teal	NT	LC	High
Anas undulata	Yellow-billed Duck	NT	LC	High
Anhinga rufa	African Darter	NT	LC	High
Anthropoides paradiseus	Blue Crane	VU	VU	Moderate
Anthus brachyurus	Short-tailed Pipit	VU	LC	Low
Anthus chloris	Yellow-breasted Pipit	VU	VU	High

Scientific Name	Common Name	Regional *	Global (IUCN)+	Likelihood of occurrence
Aquila rapax	Tawny Eagle	EN	VU	Confirmed
Aquila verreauxii	Verreaux's Eagle	VU	LC	Moderate
Ardea alba	Great Egret	NT	LC	Moderate
Ardea brachyrhyncha	Yellow-billed Egret	NT	LC	High
Asio capensis	Marsh Owl	NT	LC	Moderate
Balearica regulorum	Grey Crowned Crane	VU	EN	High
Ciconia nigra	Black Stork	EN	LC	Low
Circus ranivorus	African Marsh Harrier	VU	LC	High
Elanus caeruleus	Black-winged Kite	NT	LC	High
Eupodotis senegalensis	White-bellied Bustard	VU	LC	High
Falco biarmicus	Lanner Falcon	NT	LC	Moderate
Falco naumanni	Lesser Kestrel	VU	LC	Moderate
Geocolaptes olivaceus	Ground Woodpecker	NT	NT	Low
Geronticus calvus	Southern Bald Ibis	NT	NT	High
Gorsachius leuconotus	White-backed Night Heron	VU	LC	Low
Grus carunculata	Wattled Crane	EN	VU	Low
Gyps africanus	White-backed Vulture	CR	CR	Low
Gyps coprotheres	Cape Vulture	VU	VU	Confirmed
Monticola explorator	Sentinel Rock Thrush	LC	NT	Moderate
Neotis denhami	Denham's Bustard	VU	NT	High
Netta erythrophthalma	Southern Pochard	NT	LC	Moderate
Nycticorax nycticorax	Black-crowned Night Heron	NT	LC	Low
Polemaetus bellicosus	Martial Eagle	EN	EN	Moderate
Promerops gurneyi	Gurney's Sugarbird	LC	NT	Confirmed
Sagittarius serpentarius	Secretarybird	VU	EN	High
Sarkidiornis melanotos	Knob-billed Duck	NT	LC	Low
Scopus umbretta	Hamerkop	NT	LC	High
Stephanoaetus coronatus	Crowned Eagle	VU	NT	Low
Sylvia nigricapillus	Bush Blackcap	VU	VU	Low
Thalassornis leuconotus	White-backed Duck	NT	LC	Moderate
Turnix nanus	Black-rumped Buttonquail	EN	LC	Moderate
Tyto capensis	African Grass Owl	VU	LC	Moderate
Zapornia pusilla	Baillon's Crake	NT	LC	Low
African Finfoot	Podica senegalensis	VU	LC	Confirmed

3.2.1 Coordinated Avifaunal Roadcount (CAR)

The Avian Demography Unit (ADU)/Cape Bird Club pioneered the avifaunal road count of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus)* and Denham'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), road counts 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 very important (CAR, 2020). Figure 3-12 shows the PAOI is 3.3 km from a CAR route.

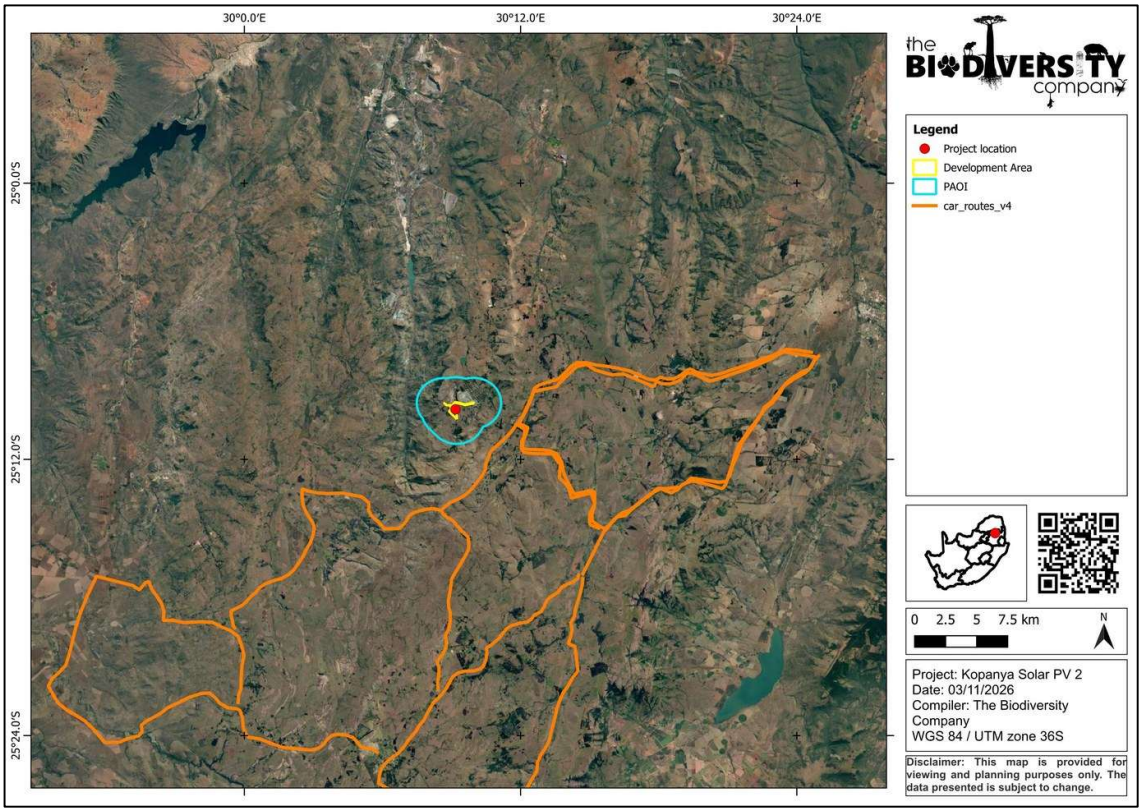


Figure 3-12 The Coordinated Avifaunal Roadcount routes in relation to the PAOI

3.3 Fieldwork Findings

3.3.1 Species List of the Field Survey

The avifaunal field surveys were completed on 26th - 30th January 2026 (Summer) and 20th – 22nd April 2026 (Autumn) by one surveyor. An effort was made to cover all the different habitat types within the limits of time and access. 119 species were recorded, of which five were SCC (Table 3-4).

Table 3-4 SCC recorded in the assessment

Scientific Name	Common Name	Family Name	Endemism	Regional	Global
Podica senegalensis	African Finfoot	Heliornithidae		VU	LC
Gyps coprotheres	Cape Vulture	Accipitridae		VU	VU
Promerops gurneyi	Gurney's Sugarbird	Promeropidae	NE	LC	NT
Alcedo semitorquata	Half-collared Kingfisher	Alcedinidae		VU	LC
Aquila rapax	Tawny Eagle	Accipitridae		EN	VU

3.3.1.1 Risk Species

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). The Biodiversity Company 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. Sixteen (16) of the species observed within the PAOI are regarded as Priority Species (

Table 3-5).

Table 3-5 Summary of Priority Species recorded within and around the proposed development.

Scientific Name	Common Name	Collision - OHL	Electrocution	Habitat Loss
Podica senegalensis	African Finfoot	X		X
Haliaeetus vocifer	African Fish Eagle	X	X	
Polyboroides typus	African Harrier -hawk	X	X	
Anthus caffer	Bushveld Pipit			X
Gyps coprotheres	Cape Vulture	X	X	X
Buteo buteo	Common Buzzard	X	X	
Alopochen aegyptiaca	Egyptian Goose	X	X	
Promerops gurneyi	Gurney's Sugarbird			X
Corvus albus	Pied Crow		X	
Tauraco porphyreolophus	Purple-crested Turaco			X
Falco rupicolus	Rock Kestrel	X	X	
Anthus lineiventris	Striped Pipit			X
Aquila rapax	Tawny Eagle	X	X	X
Hieraaetus wahlbergi	Wahlberg's Eagle	X	X	X
Phalacrocorax lucidus	White-breasted Cormorant	X	X	
Milvus aegyptius	Yellow-billed Kite	X	X	

Table 3-6 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 Dark-capped Bulbul (*Pycnonotus tricolor*) with a relative abundance of 0,096 and a frequency of 53.8%.

Table 3-6 Relative abundance of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Scientific Name	Common Name	Family Name	Relative abundance	Frequency of occurrence
Pycnonotus tricolor	Dark-capped Bulbul	Pycnonotidae	0.096	0.538
Estrilda astrild	Common Waxbill	Estrildidae	0.069	0.051
Laniarius ferrugineus	Southern Boubou	Malaconotidae	0.063	0.385
Zosterops virens	Cape White-eye	Zosteropidae	0.062	0.333
Prinia subflava	Tawny-flanked Prinia	Cisticolidae	0.038	0.308
Cisticola fulvicapilla	Neddicky	Cisticolidae	0.031	0.282
Euplectes ardens	Red-collared Widowbird	Ploceidae	0.031	0.051
Streptopelia capicola	Ring-necked Dove	Columbidae	0.023	0.205
Cypsiurus parvus	African Palm Swift	Apodidae	0.023	0.026

Lybius torquatus	Black-collared Barbet	Lybiidae	0.019	0.179
Hirundo rustica	Barn Swallow	Hirundinidae	0.019	0.026
Oriolus larvatus	Black-headed Oriole	Oriolidae	0.017	0.128
Turdoides jardineii	Arrow-marked Babbler	Leiothrichidae	0.015	0.051
Emberiza tahapisi	Cinnamon-breasted Bunting	Emberizidae	0.015	0.128
Columba arquatrix	African Olive Pigeon	Columbidae	0.015	0.026
Pternistis natalensis	Natal Spurfowl	Phasianidae	0.015	0.103
Onychognathus morio	Red-winged Starling	Sturnidae	0.015	0.051
Batis molitor	Chinspot Batis	Platysteiridae	0.012	0.103
Cisticola tinniens	Levaillant's Cisticola	Cisticolidae	0.012	0.077
Campephaga flava	Black Cuckooshrike	Campephagidae	0.012	0.154

3.3.1.2 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 23 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 invertivore flying diurnal (IFD) birds, followed by Granicvores Ground Diurnal (GGD) species (Figure 3-13).

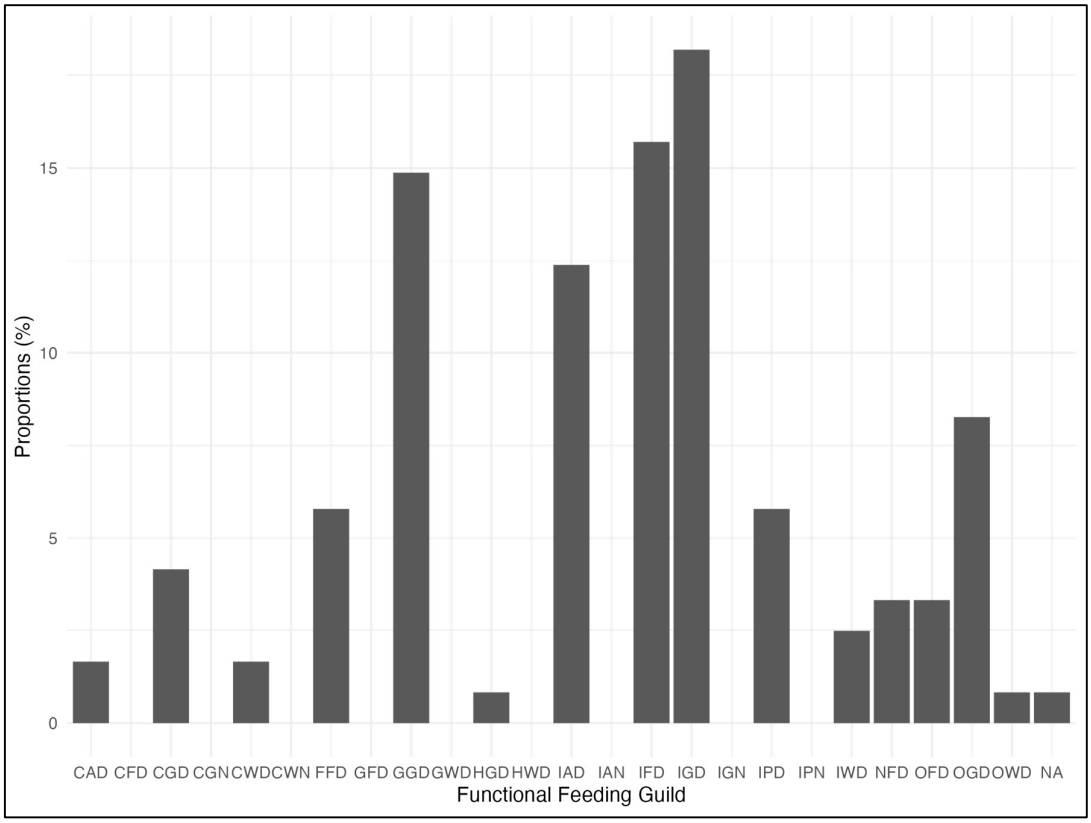


Figure 3-13 Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance

Note: 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

3.3.2 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 Project. Flight analysis is also important for species that exhibit dual 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.

A detailed nest survey was conducted, but no nests were observed during the two surveying periods.

3.4 Habitat Assessment

The main habitat types identified across the PAOI were initially delineated largely based on aerial imagery. These main habitat types were then refined based on the field coverage and data collected during the field surveys. Emphasis was placed on limiting timed meander searches to within the most functional habitats, and therefore habitats with a higher potential of hosting SCC.

Four (4) main habitat types were delineated, and these are mapped in Figure 3-14 below. Water resources are discussed in a separate Wetland Assessment Report (TBC, 2026).

The four (4) main habitat types delineated include:

- Alien Stand;
- Disturbed Grassland;
- Modified; and
- Water Resources (HGM 1 – Unchannelled Valley Bottom and HGM 2 – Seep).

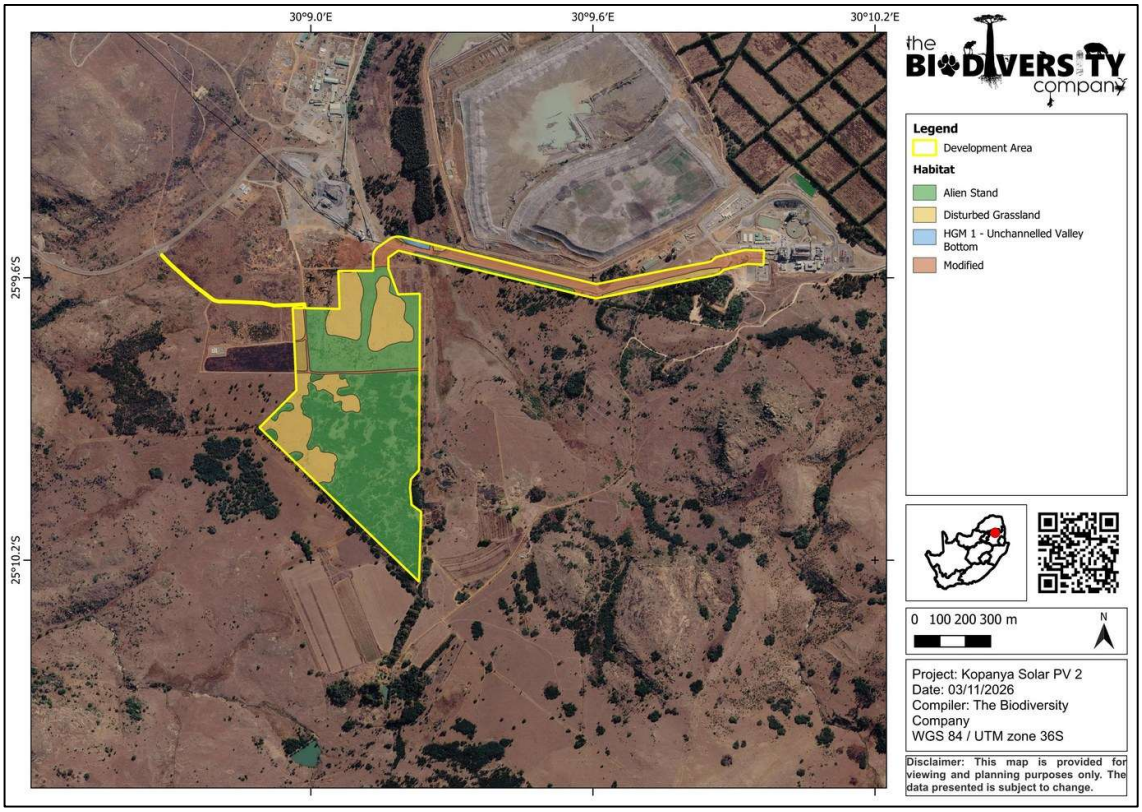


Figure 3-14 Map illustrating the habitats identified within the development area

3.4.1 Alien Stand

Characterised by grassland that has completely been invaded by AIPs, most dominantly Acacia spp. in the south and Datura stramonium, Salvia tiliifolia and Solanum mauritianum in the north. This habitat has very little indigenous vegetation remaining. The habitat is not entirely modified but in a constant disturbed state and cannot recover to a more natural state due to ongoing infestation and spread of AIPs. Most birds will use this habitat for foraging; however, this habitat can provide the avifaunal community within the PAOI with suitable habitat for refuge and nesting sites (Figure 3-15).

SCCs possible occupying this habitat: Black-winged Kite, Hamerkop, Secretarybird, and Tawny Eagle.



Figure 3-15 Example of the Alien Stand at 25°09'54.09"S 30°09'11.76"E

3.4.2 Disturbed Grassland

Characterised by open grassland impacted by weed populations, low pioneer grasses, and Alien and Invasive Plants (AIPs). The habitat is not entirely modified but in a constant disturbed state and cannot recover to a more natural state due to ongoing disturbances and impacts received from grazing, edge effects from land use and mismanagement. This habitat can be found in different conditions of disturbance, but in many cases has either been infested by AIPs or impacted by grazing and other edge effects.

This habitat is somewhat representative of the Sekhukhune Montane Grassland, although in a disturbed state.Avifaunal species within the PAOI are expected to use the area opportunistically, primarily for foraging, but some species will use the area for breeding and residency, including SCCs (Figure 3-16).

SCCs possible occupying this habitat: African Marsh Harrier, Black-winged Kite, Cape Vulture, Denham's Bustard, Grey Crowned Crane, Gurney's Sugarbird, Hamerkop, Secretarybird, Southern Bald Ibis, Tawny Eagle, White-bellied Bustard, Yellow-billed Egret, and Yellow-breasted Pipit.



Figure 3-16 Example of the Disturbed Grassland habitat at 25°09'38.53"S 30°09'09.21"E

3.4.3 Modified

This habitat has been modified from its original state and has little to no remaining natural vegetation due to land transformation by mining, roads and other anthropogenic infrastructure. These habitats exist in a constant disturbed state as they cannot recover to a more natural state due to ongoing disturbances and impacts it receives (Figure 3-17). No SCC are likely to occur here.



Figure 3-17 Example of the Modified habitat at 25°09'34.78"S 30°09'53.23"E

3.4.4 Water Resources (HGM 1 and HGM 2)

Impacted permanently to seasonally wet portions of land, as delineated by the wetland specialist. Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system locally and regionally and an important habitat for various avifauna. It is anticipated that this habitat provides a suitable foraging and nesting habitat for a large number of avifauna species, including SCCs.

SCCs possibly occupying this habitat: African Darter, African Marsh Harrier, Grey Crowned Crane, Half-collared Kingfisher, Hamerkop, Red-billed Teal, Yellow-billed Duck, and Yellow-billed Egret.



Figure 3-18 Example of the Wetland habitat at 25°09'42.84"S 30°09'17.65"E

3.5 Site Ecological Importance

All habitats within the PAOI were allocated a sensitivity category (Table 3-7). In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the PAOI are mapped in Figure 3-19.

It is important to note that this map (Figure 3-19) does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments. Refer to the Wetland Assessment Report for more details pertaining to the sensitivities of the Water Resources (TBC, 2026).

Table 3-7 Summary of habitat types delineated within the field assessment area

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance Guidelines
Alien Stand	**Medium** Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (Critically Endangered (CR), Endangered (EN), Vulnerable (VU)) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Low** Several minor and major current negative ecological impacts.	**Low**	**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** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Disturbed Grassland	**High**	**Medium**	**Medium**	**Medium**	**Medium**

	Confirmed or highly likely occurrence of CR, EN, VU species that have a global extent of occurrence (EOO) of > 10 km^2. International Union for Conservation of Nature (IUCN) threatened species (CR, EN, VU) must be listed under any criterion other than A.	Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.		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.	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Modified	**Low** No confirmed or highly likely populations of Species of Conservation Concern (SCC). No confirmed or highly likely populations of range-restricted species.	**Low** Several minor and major current negative ecological impacts.	**Low**	**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..	**Very Low** Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Water Resources (HGM 1 and HGM 2)	**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	**High** Only minor current negative ecological impacts with no signs of major past disturbance and good 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.

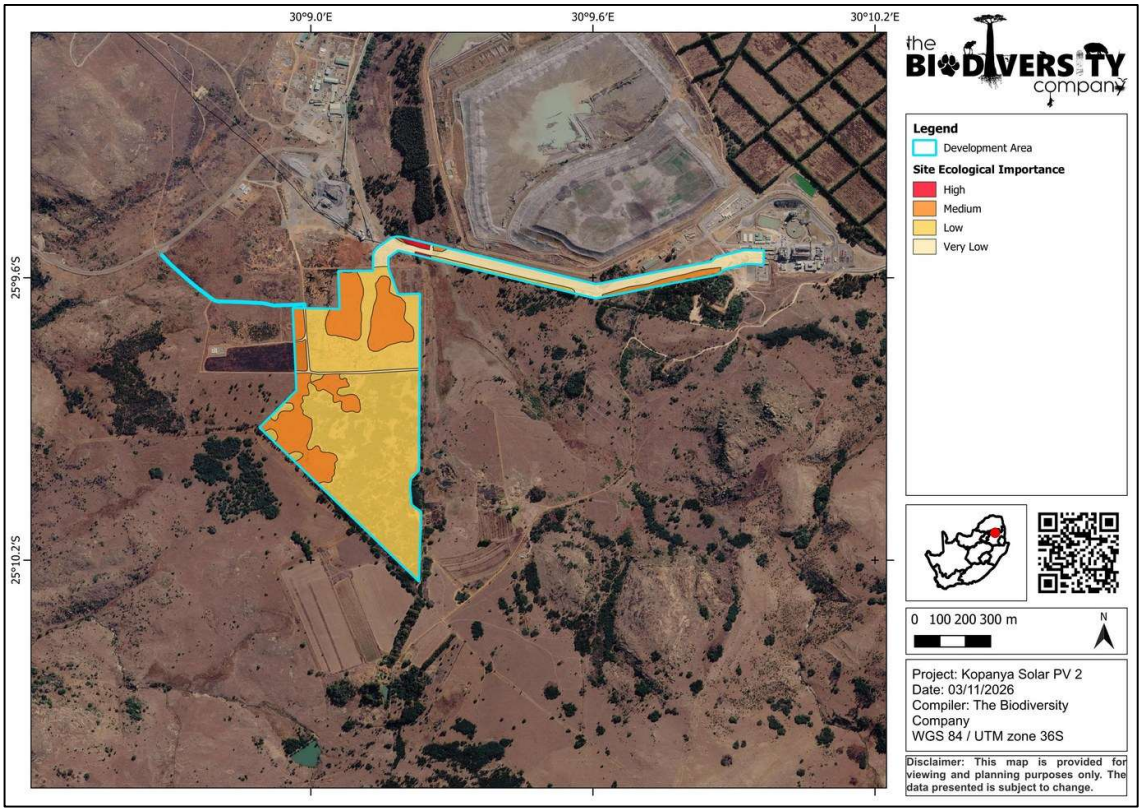


Figure 3-19 Map illustrating the Site Ecological Importance of the development area

3.5.1 Desktop Ecological Sensitivity

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

- Animal Species Theme Sensitivity is 'High' for the proposed PAOI, with the possibility of Avifauna SCC being present (Figure 3-20).

- The following avifauna species triggered the Animal Species Theme (Screening Report generated 23 January 2026): Denham's Bustard (*Neotis denhami*), Grey Crowned Crane (*Balearica regulorum*), Southern Bald Ibis (*Geronticus calvus*) and White-bellied Korhaan (*Eupodotis senegalensis*) at 'High' sensitivity; and African Marsh Harrier (*Circus ranivorus*), together with the four species above, at 'Medium' sensitivity. The theme was also triggered by mammal features, which fall outside the scope of this avifaunal assessment. The avifauna features mapped by the DFFE Screening Tool are shown in Figure 3-20.

- Avifauna Theme Sensitivity is "Low" for the proposed Project Area, with no species-specific avian features mapped within the PAOI (Figure 3-21).

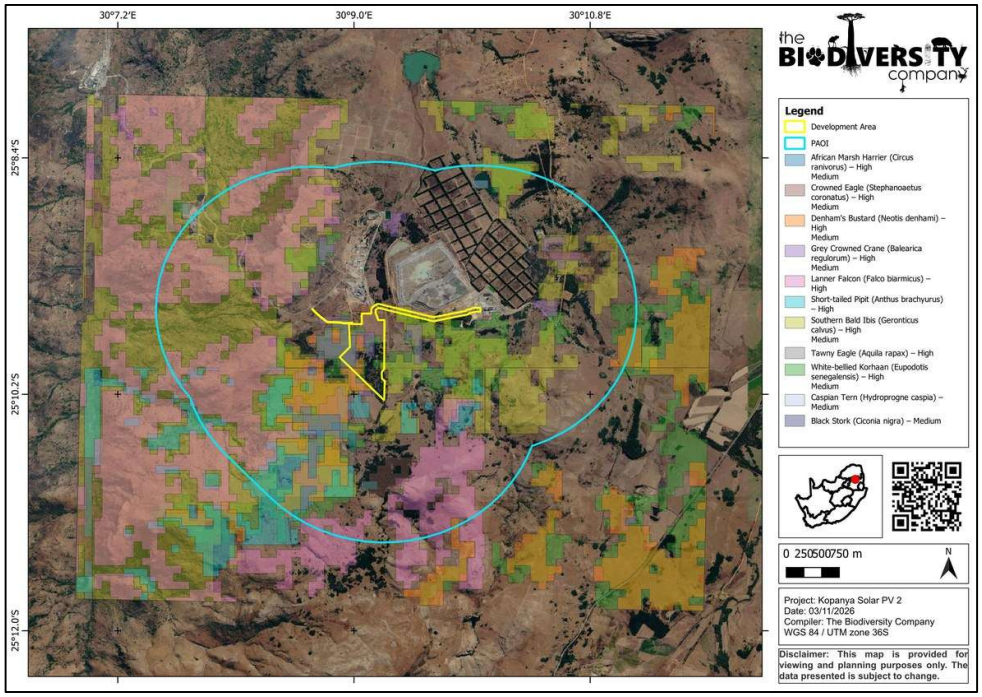


Figure 3-20 Relative animal species theme sensitivity for the PAOI (avifauna features mapped by the DFFE Screening Tool within the map extent)

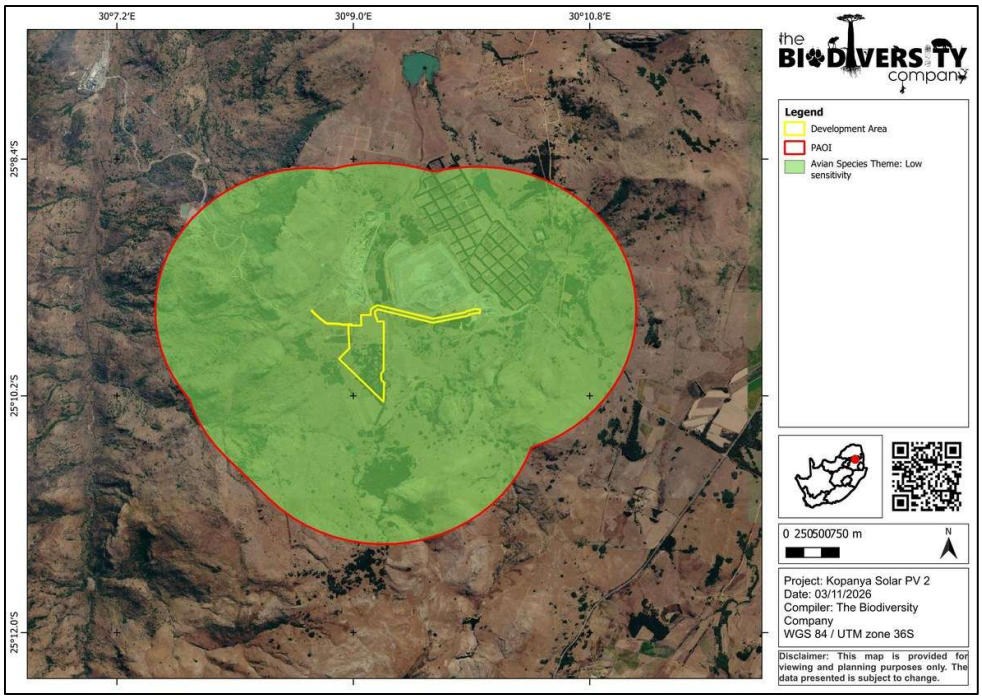


Figure 3-21 Avian species theme sensitivity for the PAOI (Low sensitivity throughout the PAOI)

3.5.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-8 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 protected species.

Table 3-8 Summary of the screening tool vs specialist assigned sensitivities

Screening Tool Theme	Screening Tool	Habitat	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	High	Alien Stand	Low	Disputed – Habitat present is not natural and is an indication of major disturbance. However, this habitat does provide suitable habitat for avifauna and some SCCs.
		Disturbed Grassland	Medium	Disputed – Habitat has been impacted but still supports the avifaunal community, including providing nesting and foraging habitat for SCCs.
		Modified	Very Low	Disputed – Habitat has been severely altered and has limited potential to support SCC.
		Water Resources	High	Validated – Habitat was not fully assessed but is inferred to be in a condition that is suitable for various waterfowl, including SCCs.

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Avian Theme	Low	Medium	Disputed – Although some of the habitat has been altered from its natural state, the habitat can still support numerous SCC.

4 Impact Risk Assessment

4.1 Avifauna Risk Assessment Method

The sections below serve to outline and summarise the types of perceived impacts from the proposed Project activities on the terrestrial biodiversity and ecology of the PAOI. The associated significance of each impact is evaluated as relevant to the local biodiversity and the likely proposed Project activities. The standard impact assessment methodology may be used in the capture of generic anticipated impacts and potential mitigation measures for Basic Assessment Reports and Environmental Impact Assessment (EIA) Reports. The methodology described herein complies with the requirements of the EIA Regulations (2014), promulgated in terms of the NEMA. The impacts assessed here are based on the loss of the full area of the site as well as all habitats present.

Refer to Appendix G: Impact Rating in section 7.57.3 for the impact assessment methodology.

4.2 Current Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, negative impacts to biodiversity were observed within the PAOI (Figure 4-1). These include:

- Alien Invasive Plants (AIPs);
- Roads, associated traffic and wildlife mortalities;
- Overhead rope conveyor;
- Powerlines;
- Mining operations; and
- Fences.



Figure 4-1 ***Photographs illustrating some of the impacts to biodiversity. A – Powerlines and roads, B – Fences, roads, and mining infrastructure, and C – Alien and Invasive Plants.***

4.3 Identification of Additional Potential Impacts

This section describes the potential impacts on avifauna associated with the construction, operational and decommissioning phases of the proposed Project. During the construction phase vegetation clearing and brush cutting of vegetation for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise and cause dust pollution. Should non-environmentally friendly dust suppressants be used, chemical pollution can take place. Increased human presence can lead to poaching and the increase in vehicle traffic will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemical for the cleaning of the solar PV panels and habitat loss. Solar PV panels have been implicated as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This “lake effect” hypothesis has not been substantiated or refuted to date (Visser *et al.*, 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser *et al.* (2019) performed a study at a utility-scale PV SEF in the Northern Cape and found that most of the species affected by the facility were passerine species. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties.

Fencing of the solar PV site can influence birds in six ways (Birdlife SA, 2015):

- Snagging – Occurs when a body part is impaled on one or more barbs or razor points of a fence;
- Snaring – When a birds foot/leg becomes trapped between two overlapping wires;
- Impact injuries – birds flying into a fence, the impact may kill or injure the bird;
- Snarling – When birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon);
- Electrocution – Electrified fence can kill or severely injure birds; and
- Barrier effect – Fences may limit flightless birds (e.g., moulting waterfowl) from resources.

Chemical pollution from solar PV panel cleaning, if not environmentally friendly, will result in either long-term or short-term poisoning. Should this chemical run into the water sources it would also impact the whole bird population and not just species found in and around the PV footprint.

PV sites leads to a significant loss of vegetation, to minimise the risk of fire (Birdlife, 2017), which will lead to the displacement of various avifauna species.

The preliminary layout also includes blasting, roads, a perimeter fence of approximately 3.2 km and a conservancy tank, which are assessed in Table 4-3. Blasting (where rock is shallow, for cable trenches and building footings) generates noise, ground vibration, dust and flyrock that can disturb nesting and roosting birds, cause nest abandonment and displace avifauna, particularly large raptors and other SCC that are sensitive to disturbance during the breeding season. The access, perimeter and service roads remove habitat along their footprint and increase dust, noise and vehicle traffic, which can lead to roadkill and edge effects. The conservancy tank may leak, overflow or spill sewage, which can pollute soil and water resources used by waterbirds, and the tankers that service it add to vehicle traffic.

4.4 Alternatives Considered

No alternative layouts or alternative sites were provided for the proposed Project at the time of writing this report. A single preliminary layout (Kopanya Solar PV 2 Preliminary Layout, October 2026) was provided by GCS on behalf of the Applicant and is the layout assessed in this report (Figure 4-2, with the infrastructure hub shown in detail in Figure 4-3). The preliminary layout comprises the fenced PV site (approximately 3.2 km of fence), PV blocks and MV collector cables, an infrastructure hub (substation and control room, O&M building, storage warehouse, site office, guard house, entrance gate and parking), a conservancy tank, an access road (6 m wide), a perimeter road (4–6 m wide), service roads (4 m wide), construction and alternative laydown areas, an equipment delivery zone, a spoil stockpile (approximately 1 500 m³), a topsoil stockpile (approximately 3 000 m³) and the preferred overhead powerline (OHL) route. Only one OHL route was provided. The PV boundary and the OHL buffer supplied with the layout files are also shown in Figure 4-2.

The layout and the Project activities described in this report are preliminary. The Applicant is still confirming specific details, including the extent of blasting that may be required where rock is shallow (for cable trenches and building footings). The impacts and mitigation measures in this report were assessed on a precautionary basis and must be reviewed by the avifauna specialist should the layout or activities change materially.

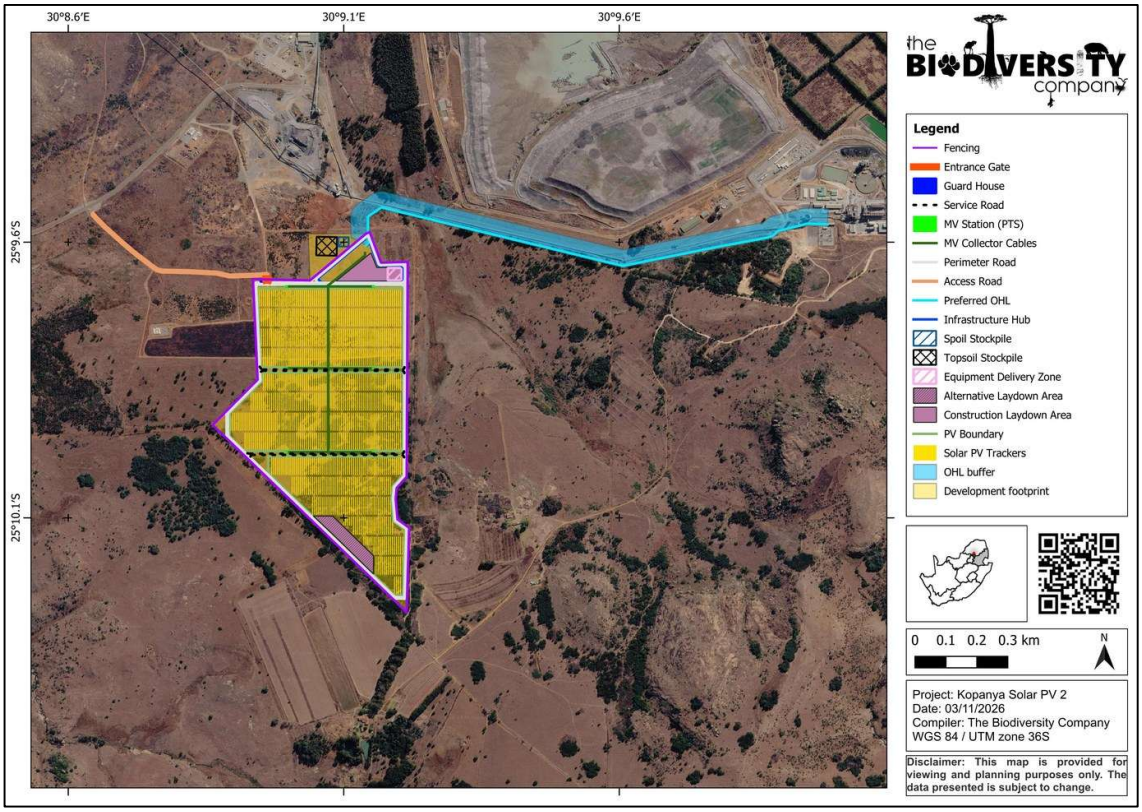


Figure 4-2 ***Preliminary layout of the proposed Project in relation to the development footprint (the conservancy tank and the individual hub buildings are shown in Figure 4-3)***

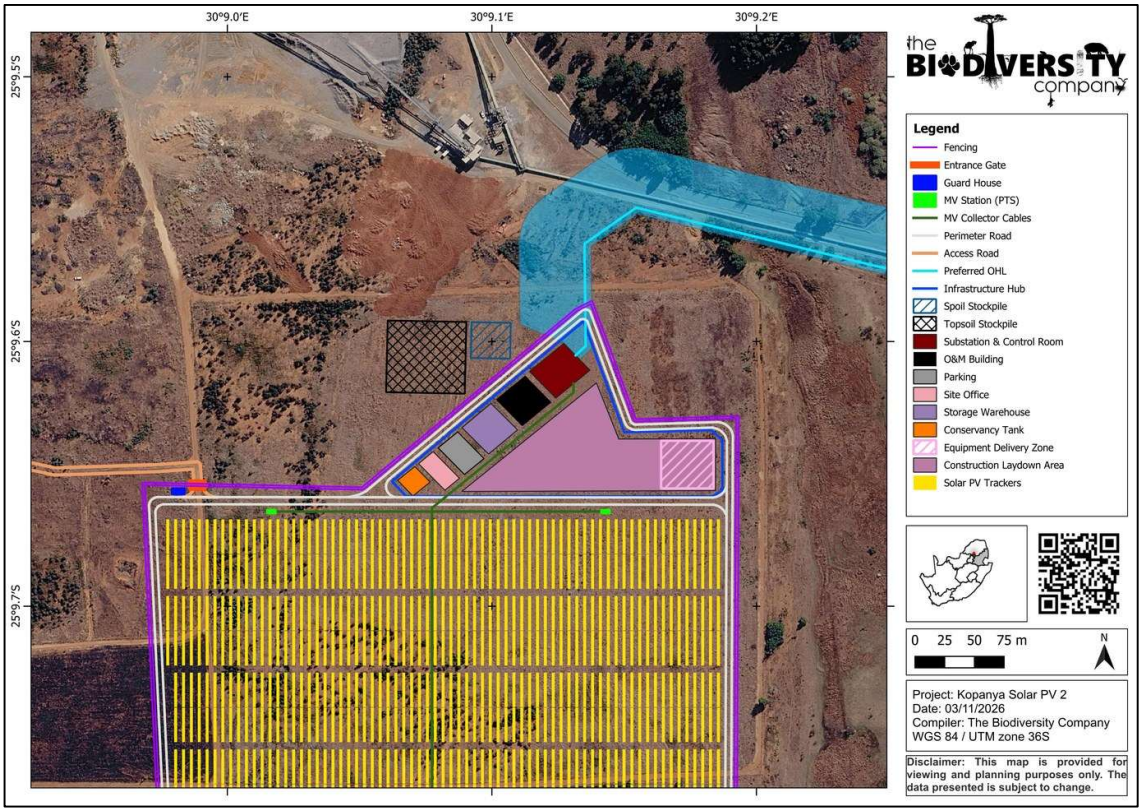


Figure 4-3 Detail of the infrastructure hub, construction laydown area, equipment delivery zone and stockpiles in the preliminary layout (the development footprint, OHL buffer and PV boundary are as in Figure 4-2)

4.5 Quantitative Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the PAOI, specifically the proposed Project footprint area. Bennun *et al* (2021) describe 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 because 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. Three phases were considered for the impact assessment:

- Construction phase;
- Operational phase; and

- Decommissioning phase.

4.5.1 Construction Phase

The following impacts were considered during the construction phase:

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

The impacts associated with blasting, the construction of the access, perimeter and service roads and the installation of the perimeter fence, which form part of the preliminary layout, are assessed in Table 4-3.

Table 4-1 Impacts to avifauna and mitigation measures associated with the construction phase

Activity	Pre- Mitigation							Post Mitigation							Confidence
	Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Significance	Duration	Extent	Severity	Potential for impact on irreplaceable resources	Consequence	Probability	Significance	
Destruction, loss and fragmentation of habitats, functional ecosystems and the vegetation community including SCC and protected species	4	3	2	-2	-24	2	-48	2	2	-1	1	-18	1	-18	High
Recommended Mitigation Measures	- A pre-clearance avifauna walkdown must be undertaken prior to vegetation clearance to identify active nests, roosts or breeding activity within the development footprint and immediately adjacent areas. - If active nests or breeding activity are identified, the relevant area must be treated as a temporary no-go area and an avifauna specialist must be consulted to recommend an appropriate buffer, timing restriction or permit requirement. - Solar panels should, where feasible, be mounted on pile-driven or screw-type foundations rather than extensive concrete foundations, to reduce soil disturbance and maintain natural soil functioning. - Solar panels with anti-reflective coating should be considered, where technically and commercially feasible, to reduce glare-related disturbance and collision risk. - The final layout must, as far as reasonably practicable, use existing disturbed areas, existing roads and existing access routes to reduce additional habitat disturbance. - Electrical infrastructure must be designed to reduce avifauna collision and electrocution risk. This must include insulation of exposed live components, use of bird-safe designs and installation of bird diverters on high-risk overhead powerline sections where required. - Maintain indigenous vegetation under solar panels where possible (subject to terrestrial specialist recommendation) to ensure biodiversity is maintained and prevent soil erosion. - Compile and implement an Invasive Alien Plant Management Plan. - Implement rotational grazing or mowing to maintain grassland structure for ground-nesting birds. - All areas denuded during construction must be re-vegetated with indigenous vegetation to prevent erosion and reduce likelihood of alien invasive plant species encroachment. - Utilise topsoil and re-vegetate all disturbed areas with plant and grass species indigenous to the vegetation type. - Rehabilitate disturbed areas post-construction with native species.														
Loss of avifauna species	4	3	2	-2	-24	2	-48	2	2	-1	1	-18	1	-18	High
Recommended Mitigation Measures	- Implement and enforce strict speed limits (40 km/h maximum) on all internal roads to minimise dust and road kills. - Designate specific routes to concentrate traffic and minimise habitat disturbance. - Schedule heavy machinery operations outside peak avifauna activity periods (early morning, dusk). - All construction and maintenance motor vehicle operators must undergo environmental induction including instruction on speed limit compliance and respect for all forms of wildlife. - Provide all personnel with avifauna awareness training. - Contact avifauna specialist if nesting species are found on site, during the construction period. - Outside lighting must be minimised and designed to reduce disturbance to fauna. Lighting must be downward-facing, low intensity where possible, and directed away from sensitive habitats, watercourses and natural areas. - Conduct annual avifauna surveys (rotate to include seasons) to track displacement and community changes.														

	-														
Destruction, degradation and fragmentation of surrounding habitats due to noise pollution	4	3	2	-2	-15	2	-30	2	2	-1	1	-10	1	-10	High
Recommended Mitigation Measures	- All Project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna populations in the region. - Schedule noisy activities during the heat of the day. - Limit construction hours to 06:00-18:00 (avoid dawn chorus and dusk activity). - Use quieter equipment alternatives where available (e.g., hydraulic vs. pneumatic tools). - Implement noise barriers (temporary screens, berms) around high-noise activities. - Maintain equipment to minimise mechanical noise.														
Displacement/emigration of avifauna community (including SCC)	4	3	2	-2	-20	2	-40	2	1	-1	1	-10	1	-10	High
Recommended Mitigation Measures	- Implement and enforce strict speed limits (40 km/h maximum) on all internal roads to minimise dust and road kills. - Designate specific routes to concentrate traffic and minimise habitat disturbance. - Schedule heavy machinery operations outside peak avifauna activity periods (early morning, dusk). - All construction and maintenance motor vehicle operators must undergo environmental induction including instruction on speed limit compliance and respect for all forms of wildlife. - Provide all personnel with avifauna awareness training. - Contact avifauna specialist if nesting species are found on site, during the construction period. - Outside lighting must be minimised and designed to reduce disturbance to fauna. Lighting must be downward-facing, low intensity where possible, and directed away from sensitive habitats, watercourses and natural areas. - Conduct annual avifauna surveys (rotate to include seasons) to track displacement and community changes.														
Direct mortality from persecution or poaching of avifauna species and collection of eggs	4	2	1	-2	-14	2	-28	2	1	-1	1	-4	1	-4	High
Recommended Mitigation Measures	- Implement a visitor log and restrict access to authorised personnel only - All personnel must undergo environmental induction regarding avifauna - Provide specific awareness about not harming, collecting, or hunting terrestrial species and owls (which are often persecuted out of superstition) - Display signs to enforce wildlife protection policies - Display signage prohibiting hunting and trapping - Establish clear protocols for reporting and responding to poaching incidents - Maintain records of all incidents and enforcement actions														

4.5.2 Operation Phase

This phase refers to when construction has been completed and the proposed infrastructure has been built and is functional. The impacts of daily activities associated with the operational phase of the proposed Project are anticipated to further spread the AIP species, and lead to the further deterioration of habitats due to the continuing presence of dust and other edge effect impacts; however, these impacts will be minimal. Dust inhibits the ability of plants to photosynthesise and thus leads to the degradation of surrounding natural areas; however, these impacts will be minimal. Additionally, moving vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will also lead to displacement and direct faunal mortalities due to collisions.

The operational phase is often the longest phase of a project and as such, the effects from impacts have the opportunity to cumulate over long periods of time and cause cumulative damage to the environment. It is important to actively and continuously implement and update the relevant mitigation measures for this phase so as to effectively reduce this compounding effect. The following potential impacts on avifauna were considered for the operational phase (Table 4-2):

- Collisions with infrastructure associated with the solar PV facility;
- Electrocution due to infrastructure associated with the solar PV Facility;
- Direct mortality from vehicle collisions, 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 solar PV panels.

The impacts associated with the use of the access, perimeter and service roads and with the conservancy tank, which form part of the preliminary layout, are assessed in Table 4-3.

Table 4-2 Impacts to avifauna and mitigation measures associated with the operation phase

Activity	Pre- Mitigation							Post Mitigation							Confidence
	Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Significance	Duration	Extent	Severity	Potential for impact on irreplaceable resources	Consequence	Probability	Significance	
Collisions with infrastructure associated with the PV facility	4	2	2	-3	-24	2	-48	3	1	-2	1	-15	1	-15	High
Recommended Mitigation Measures	- Avifauna mortalities, injuries or collision incidents must be recorded in an incident register and reported to the ECO. - If repeated bird collisions or mortalities are recorded, the avifauna specialist must be consulted and additional mitigation must be implemented where required. - Conduct fatality monitoring quarterly during the first 3 years of operation and develop a database that will be shared with Birdlife Africa. - Install diverters along the entire power line route - Operational lighting must be kept to the minimum required for safety and security and must be directed away from natural areas and watercourses.														
Electrocution due to infrastructure associated with the PV Facility	4	2	1	-3	-21	2	-42	3	1	-2	1	-15	1	-15	High
Recommended Mitigation Measures	- Electrical infrastructure must be inspected and maintained to ensure that insulation, bird-safe designs and bird diverters remain effective. - Damaged insulation, exposed live components or damaged bird diverters must be repaired or replaced as soon as reasonably practicable. - Conduct fatality monitoring quarterly during the first 3 years of operation and develop a database that will be shared with Birdlife Africa. - Operational lighting must be kept to the minimum required for safety and security and must be directed away from natural areas and watercourses.														
Direct mortality from vehicle collisions, persecution or poaching of avifauna species and collection of eggs	4	2	1	-2	-14	2	-28	3	1	-1	1	-5	1	-5	High
Recommended Mitigation Measures	- Vehicle movement must be restricted to designated internal roads and maintenance tracks, and the 40 km/h speed limit must remain in place. - Implement regular road maintenance to prevent dust clouds that obscure visibility - Conduct fatality monitoring during the first 3 years of operation and develop a database that will be shared with BirdLife Africa - Maintain a database of collisions to identify hotspots requiring additional mitigation														
Direct mortalities and hinderance of movement from fencing infrastructure	4	2	1	-2	-14	2	-28	3	1	-1	1	-5	2	-10	High
Recommended Mitigation Measures	- Use ClearVu or similar type fencing with markers placed on the fence to enhance visibility - Ensure fencing is clearly visible to birds to prevent collisions - Conduct fatality monitoring during the first 3 years of operation and develop a database that will be shared with BirdLife Africa - Maintain a log of collisions to identify hotspots requiring additional mitigation - Maintain a database of collisions to identify hotspots requiring additional mitigation														

Pollution of water sources and surrounding habitat due to cleaning products of the PV panels.	4	2	1	-2	-14	2	-28	3	2	-1	1	-6	1	-6	High
Recommended Mitigation Measures	- A hydrocarbon spill management plan must be developed and implemented - Maintain rehabilitated areas - Only environmentally friendly or biodegradable cleaning products may be used for panel cleaning. Harsh chemicals, detergents or substances that may contaminate soil or water resources must be avoided.														
Heat radiation from the PV panels;	4	2	1	-2	-14	2	-28	3	1	0	1	0	1	0	High
Recommended Mitigation Measures	- Maintain indigenous vegetation under and around panels - Ensure adequate moisture retention in soil through indigenous vegetation cover - Monitor indigenous vegetation cover and adjust management practices accordingly														

4.5.3 Additional Activities in the Preliminary Layout

The preliminary layout (Figure 4-2) and the information provided by the Applicant include four activities that were not considered in the impact tables above: blasting (where rock is shallow, for cable trenches and building footings), roads (an access road of 6 m, a perimeter road of 4–6 m and service roads of 4 m), the perimeter fence around the PV site (approximately 3.2 km) and a conservancy tank (sewage will be taken to the municipal sewage works). These activities are preliminary and the Applicant is still confirming the specifics (Section 1.4). The ratings in Table 4-3 were therefore assigned on a precautionary basis, using the criteria in Appendix G, and must be reviewed by the avifauna specialist once the locations, extent and frequency of the activities are confirmed.

Blasting may disturb nesting, roosting and foraging birds through noise, ground vibration, dust and flyrock, and may lead to nest abandonment or displacement of avifauna, including SCC. The locations, frequency and charge sizes of the blasts have not been provided; the impact was assumed to be short-term (confined to the construction period) and local, because noise and vibration extend beyond the development area.

The new roads will remove habitat along their footprint and will increase dust, noise and traffic. Most of the development area consists of Alien Stand, Disturbed Grassland and Modified habitat; however, the access road and overhead power line corridor in the north-west of the development area overlap approximately 0.29 ha of High SEI Water Resource habitat, which must be avoided. Direct mortality from vehicles on the roads is assessed in Table 4-1 and Table 4-2.

The installation of the perimeter fence will result in clearing along the fence line and temporary disturbance, while the fence itself (assessed in Table 4-2) presents a long-term collision, snagging and barrier risk. The conservancy tank presents a risk of leaks, overflow and spillage of sewage, and of disturbance from the tankers that remove the sewage; these risks are most relevant if the tank is located close to the Water Resource habitat or drainage lines.

Table 4-3 Impacts to avifauna and mitigation measures associated with blasting, roads, the perimeter fence and the conservancy tank (preliminary layout)

Activity	Pre- Mitigation							Post Mitigation							Confidence
	Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Significance	Duration	Extent	Severity	Potential for impact on irreplaceable resources	Consequence	Probability	Significance	
Construction – Disturbance, displacement and breeding failure of avifauna (including SCC) due to blasting (noise, vibration, dust and flyrock)	2	3	1	-2	-12	2	-24	1	2	-1	0	-3	1	-3	Medium
Recommended Mitigation Measures	- The Applicant must provide the locations, frequency and charge sizes of all planned blasts to the avifauna specialist for review before blasting starts. - Blasting must be limited to the minimum required (shallow rock for cable trenches and building footings) and must be confined to the approved development footprint. - An avifauna walkdown must be undertaken before each blasting campaign to identify active nests, roosts or breeding activity of priority species and SCC. - No blasting may take place within the buffer around active nests of raptors and large-bodied SCC. The buffer must be confirmed by the avifauna specialist; Verburgt et al. (2026) (SANBI Species Environmental Assessment Guideline, Table 10.9) recommend at least 1 km for these nests under high-intensity disturbance, which may be reduced for low-intensity developments such as renewable energy projects. - Active nests near planned blasting must be monitored during the EIA phase and construction (repeat visits and camera traps), and blasting must stop pending specialist advice if breeding failure or abandonment is recorded. - Where practicable, schedule blasting outside the breeding season of the priority species and SCC recorded, during daylight hours only and not at dawn or dusk. - Use controlled blasting techniques (small, delayed charges and blast mats) to limit noise, vibration and flyrock, and consider hydraulic rock breakers where rock conditions allow. - Suppress dust with environmentally friendly methods. - Keep a register of all blasts and of any avifauna incidents.														
Construction – Habitat loss and fragmentation, dust and	4	1	0	-2	-10	2	-20	4	1	-1	0	-5	2	-10	High

noise from the construction of the access, perimeter and service roads															
Recommended Mitigation Measures	- Use existing roads and tracks as far as reasonably practicable and keep the new roads to the widths in the layout (access road 6 m, perimeter road 4–6 m and service roads 4 m). - Align the access road and the overhead power line corridor so that the High SEI Water Resource habitat and its buffer are avoided. - Clear vegetation only within the road footprint, after a pre-clearance avifauna walkdown. - Implement and enforce a speed limit of 40 km/h and prohibit off-road driving. - Control dust with environmentally friendly suppressants. - Design drainage structures so that runoff is not concentrated into the Water Resource habitat. - Rehabilitate road verges and disturbed edges with indigenous vegetation and control alien invasive plants.														
Construction – Clearing along the fence line and disturbance during installation of the perimeter fence	2	1	0	-1	-3	2	-6	1	1	-1	0	-2	1	-2	High
Recommended Mitigation Measures	• Clear only the fence line and use existing disturbed areas and access routes. • Do not align the fence across the Water Resource habitat or drainage lines. • Use fencing that is visible to birds (e.g. ClearVu or similar, with visibility markers) and do not use razor wire, barbed wire on the lower strands or electrified strands without approval from the avifauna specialist (BirdLife SA, 2015). • Install the visibility markers at the time of installation and inspect them regularly. • Remove all construction waste and off-cuts from the fence line.														
Operation – Dust, noise, disturbance and edge effects from the use and maintenance of the access, perimeter and service roads	4	2	0	-1	-6	2	-12	3	1	-1	0	-4	1	-4	High

Recommended Mitigation Measures	• Enforce the 40 km/h speed limit and prohibit off-road driving. • Control dust with environmentally friendly suppressants and maintain the roads regularly. • Maintain drainage structures so that runoff is not concentrated into the Water Resource habitat. • Maintain rehabilitated road verges and disturbed edges with indigenous vegetation and control alien invasive plants.														
Operation – Leaks, overflow or spillage from the conservancy tank, and disturbance from sewage tankers	4	2	0	-2	-12	1	-12	2	1	-1	0	-3	1	-3	Medium
Recommended Mitigation Measures	• Install a sealed, covered, leak-proof tank on an impermeable base with a level alarm. • Locate the tank outside the Water Resource habitat, drainage lines and the wetland buffer determined by the freshwater specialist. • Have the sewage removed by licensed service providers before the tank reaches capacity and taken to the municipal sewage works. • Keep servicing records and inspect the tank and connections regularly. • Tankers must use the designated roads and obey the 40 km/h speed limit. • Develop and implement a spill response procedure.														

4.5.4 Decommissioning Phase

The following impact was considered during the decommissioning phase:

- Disturbance, displacement and mortality of avifauna and loss of habitat during the dismantling and removal of infrastructure, including the fence, roads and conservancy tank, and during rehabilitation.

Table 4-4 Impacts to avifauna and mitigation measures associated with the decommissioning phase

Activity	Pre- Mitigation							Post Mitigation							Confidence
	Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Significance	Duration	Extent	Severity	Potential for impact on irreplaceable resources	Consequence	Probability	Significance	
Decommission phase	**4**	**2**	**2**	**-3**	**-24**	**2**	**-48**	**2**	**0**	**-1**	**1**	**-5**	**0**	**0**	**High**
Mitigations	• A pre-decommissioning avifauna inspection must be undertaken before vegetation clearance or infrastructure removal. • If active nests or breeding activity are identified, the area must be temporarily avoided until the ECO or avifauna specialist confirms the appropriate management response. • Decommissioning activities must be restricted to the approved footprint and existing access routes as far as reasonably practicable. • Redundant infrastructure, waste, cabling, panels and hazardous materials must be removed from site and reused, recycled or disposed of at appropriately licensed facilities. • Disturbed and compacted areas must be ripped, stabilised and rehabilitated where required. • Rehabilitated areas must be revegetated with indigenous species or an approved seed mix suitable for the local vegetation type. • Alien and invasive plant species must be controlled during rehabilitation and post-closure monitoring. • Rehabilitated areas must be monitored for vegetation establishment, erosion, alien invasive plants and any avifauna-related incidents.														

4.5.5 Cumulative Impacts

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 pre-existing 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 proposed Project on local fauna and flora specifically.

Cumulative impacts are assessed within the context of the extent of the proposed PAOI, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include those from operations that are close enough (within 50 km) to potentially cause additive effects on the local environment or any sensitive receptors (relevant operations include nearby large road networks, other solar PV facilities, and power infrastructure). Relevant impacts include the overall reduction of foraging and habitat where reproduction takes place, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, increase risk of collisions; and groundwater and surface water quality depletion.

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 game parks and reserves. In order to spatially quantify the cumulative effects of the proposed development, the Project in isolation is compared with the overall effects of surrounding developments (including total transformation and transformation as a result of new and proposed developments of a similar type, i.e., solar).

The total area within the 50 km buffer around the development footprint amounts to 812 113.00 ha, but when considering the transformation (255 281.18 ha) that has taken place within this radius, 556 831.82 ha of remnant habitat remains according to the 2025 National Biodiversity Assessment remnant layer (Skowno et al., 2026). Therefore, the area within 50 km of the proposed Project has experienced approximately 31.43% loss in natural habitat. Considering this context, the development footprint (50.75 ha, preliminary layout) and similar solar projects that exist in the 50 km region (as per the latest South African Renewable Energy EIA Application Database, Q2 2026) amount to 5 722.28 ha. This means that the total amount of remaining habitat lost as a result of the solar Project amounts to 1.04% (the proposed Project and similar projects as a percentage of the total remaining habitat), which means that the total cumulative loss for the 50 km area amounts to 32.47%. Table 4-5 for the spatial assessment of cumulative impacts.

In consideration of the aforementioned information, the cumulative impact was determined to be of a negative Moderate significance, post mitigation (Table 4-6). Figure 4-4 illustratesTable 4-6Figure 4-4 the cumulative impacts of the proposed Project.

Table 4-5 Cumulative impact assessment of the proposed Project

Total Habitat (ha)	Tot. Remaining Habitat (ha)	Tot. Habitat Loss (ha)	Total Historical Loss	Footprint (ha)	Similar Projects (ha)	Habitat Lost	Cumulative Habitat Lost
812113.00	556831.82	255281.18	31.43%	50.75	5722.28	1.04%	32.47% (31.43% + 1.04%)

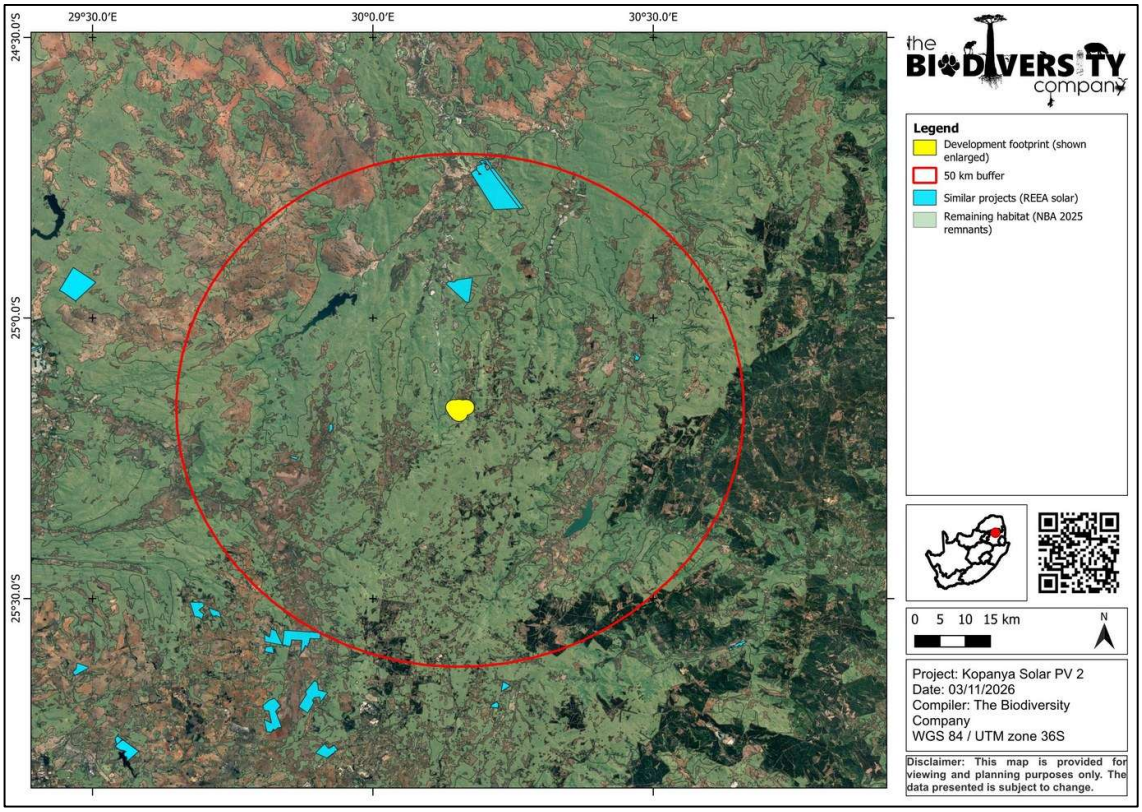


Figure 4-4 ***Cumulative habitat loss in 50 km surrounding the development footprint (shown enlarged), according to the National Biodiversity Assessment 2025 remnant layer (Skowno et al., 2026) and the Renewable Energy Environmental Authorisations Database dataset (Q2, 2026)***

Table 4-6 ***Cumulative impacts to biodiversity associated with the proposed Project***

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation						
			Duration	Extent	Severity	Potential for Irreplaceable Resources	Consequence	Probability	Significance
Avifauna	Construction and operation of the Project	Impact in isolation	4	3	-3	0	-21	1	-21
		Cumulative Impact	4	3	-3	1	-24	2	-48
Component Being Impacted On	Activity Which May Cause the Impact	Activity	Post Mitigation						
			Duration	Extent	Severity	Potential for Irreplaceable Resources	Consequence	Probability	Significance
Avifauna	Construction and	Impact in isolation	4	2	-3	0	-18	1	-18

	operation of the Project	Cumulative Impact	4	3	-2	1	-16	2	-32

4.5.6 General Mitigation Measures

Mitigation measures are discussed for each phase in the previous relative sections. However, Table 4-7 general mitigation measures applicable to the proposed development and up to the EAP to be included.

Table 4-7 General mitigation measures for the proposed Project

Mitigation: Action/control

• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.
  ○ Reduce the dust generated by operational vehicles and earth moving machinery, through dust mitigation m putting up signs to enforce speed limits to enforce reduced speeds.
  ○ No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.
• Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used.
• 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.
• Leaking equipment and vehicles must be repaired immediately or be removed from Project area to facilitate repair.
• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.
  ○ Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.
  ○ No servicing of equipment on site unless necessary.
  ○ All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.
  ○ Appropriately 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 from leaking and entering the environment.
  ○ Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.
  ○ All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.

5 Conclusion

With strict implementation of mitigation measures, the proposed Project's impact on avifauna can be reduced to neutral or very Low Negative significance, making the Project ecologically viable. The site, while overlapping with high-value ecological areas (Sekhukhune Montane Grassland, Mpumalanga Grasslands, and the Steelpoort KBA), is already significantly disturbed by mining and AIPs. The majority of the PAOI consists of Alien Stand and Modified habitats with reduced ecological integrity, limiting the likelihood of SCC presence.

5.1 Impact Statement

The proposed Project will generate impacts across three distinct phases, with varying levels of significance before and after mitigation measures are implemented. During the construction phase, impacts range from Moderate to High Negative significance, with habitat destruction, avifauna displacement, and direct mortality from increased vehicle traffic representing the primary concerns. The operational phase introduces additional impact pathways, including collisions with infrastructure, electrocution hazards, fencing-related mortalities, and potential pollution of water sources from panel cleaning products, all rated as Moderate to High Negative significance. When considered cumulatively within the broader landscape context, the proposed Project contributes to an overall Moderate Negative cumulative impact, with the proposed Project and similar projects representing 1.04% of the remaining habitat within a 50-kilometre radius, bringing the cumulative habitat loss in the region to 32.47%.

The additional activities in the preliminary layout (Table 4-3) were rated on a precautionary basis: blasting was rated Low Negative significance before mitigation and Neutral–Very Low after mitigation; the construction of roads Low Negative before and Neutral–Very Low after mitigation; the installation of the perimeter fence, the use of the roads and the conservancy tank were all rated Neutral–Very Low, before and after mitigation. These ratings must be confirmed once the Applicant has finalised the layout and the locations, frequency and extent of blasting.

However, with the implementation of comprehensive mitigation measures, these impacts can be substantially reduced. During the construction phase, impacts are reduced to Low Negative significance through habitat restoration protocols, implementation of strict speed limits on internal roads, noise management strategies, and wildlife protection protocols. The operational phase impacts are similarly reduced to Low Negative significance through modifications to infrastructure design, including insulation of electrical components, anti-perch devices, fatality monitoring programs, and environmentally friendly cleaning product specifications. The cumulative impact assessment, when mitigation measures are factored in, is reduced to Moderate Negative significance, indicating that the proposed Project's contribution to regional habitat loss is manageable within the broader landscape context.

Field surveys conducted during the assessment recorded 119 bird species within the study area, of which five were confirmed as SCC: African Finfoot, Cape Vulture, Gurney's Sugarbird, Half-collared Kingfisher, and Tawny Eagle. The specialist assessment significantly downgraded the national screening tool's sensitivity classification from "High" to more nuanced ratings of "Very Low" for Modified habitats; “High” for Water Resources; "Medium" for Disturbed Grassland habitats and "Low" for Alien Stand habitats, reflecting the actual ecological conditions rather than theoretical conservation designations.

5.2 Specialist Opinion

The specialist recommends approval of the proposed Project subject to the following conditions: mandatory implementation of all listed mitigation measures as detailed in the construction, operational and decommissioning phase impact tables and in the mitigation measures for blasting, roads, the perimeter fence and the conservancy tank (Table 4-3); a pre-blast avifauna walkdown and nest monitoring before and during any blasting; avoidance of the High SEI Water Resource habitat by the access road and overhead power line corridor; a review of this assessment by the avifauna specialist once the preliminary layout and activities are finalised; annual avifauna monitoring (rotated to include seasons) during the construction phase and the first three years of operation, with adaptive management protocols triggered by pre-established fatality thresholds; strict adherence to the AIP Management Plan throughout the Project lifecycle; and comprehensive environmental awareness training for all personnel involved in construction and operation. The confidence level in these recommendations is high, based on two seasonal field surveys conducted in January and April 2026, comprehensive desktop analysis utilising the latest available spatial datasets, and established best practice guidelines for solar PV avifauna assessments.

6 References

Bird Atlas Project (SABAP2). (2022). http://vmus.adu.org.za/

BirdLife International. 2021. The IUCN Red List of Threatened Species 2021

BirdLife South Africa. 2015. Fences & birds, minimising unintended impacts. https://www.birdlife.org.za/what-we-do/landscape-conservation/what-we-do/birds-and-fences/

BirdLife South Africa. 2017. Birds and Solar Energy Best Practice Guidelines. https://www.birdlife.org.za/wp-content/uploads/2020/03/BLSA-Guidelines-Solar-and-Energy.pdf

Buckland, S., Anderson, D., Burnham, K.P. and Laake, J. 1993. Distance Sampling: Estimating Abundance of Biological Populations. 440 pgs., Chapman and Hall, London

Coordinated Avifaunal Roadcounts (CAR) (2020). http://car.birdmap.africa/index.php

Cumming, G.S. & Henry, D.A.W. 2019. Point counts outperform line transects when sampling birds along routes in South African protected areas. African Zoology, 54(4): 187-198. doi: 10.1080/15627020.2019.1658540.

Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. (1996). HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.

Department of Forestry, Fisheries and the Environment (DFFE). 2023a. SACAD (South Africa Conservation Areas Database) and SAPAD (South Africa Protected Areas Database). http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021b. National Protected Areas Expansion Strategy. http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021c. Renewable Energy EIA Application Database. http://egis.environment.gov.za.

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). 2015. The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Horvath, G., Blaho, M., Egri A., Kriska, G., Seres, I. & Robertson, B. 2010. Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects Conservation biology 24 (6) 1644-1653

IUCN. (2021). The IUCN Red List of Threatened Species. www.iucnredlist.org

Jenkins, A.R., van Rooyen, C.S., Smallie, J.J., Harrison., J.A., Diamond., M., Smit-Robinson., H.A. & Ralston., S. 2015. Birds and Wind-Energy Best-Practice Guidelines. Birds and Wind-Energy Best-Practice Guidelines.

Key Biodiversity Areas National Coordination Groups. 2024. National Coordination Groups | Key Biodiversity Areas | Key Biodiversity Areas

Lovich, J.E. & Ennen, J.R. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61:982-992.

Mpumalanga Tourism and Parks Agency (MTPA). 2023. Mpumalanga Biodiversity Sector Plan & Bioregional Plans. https://mtpa.maps.arcgis.com/home/index.htm

Prinsen, H.A.M., Smallie, J.J., Boere, G.C. & Píres, N. (Compilers). 2012. Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region. AEWA Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWA Technical Series No. 50, CMS Raptors MOU Technical Series No. 3, Bonn, Germany.

Ralston Paton, S., Smallie J., Pearson A., & Ramalho, R. 2017. Wind energy's impacts on birds in South Africa: A preliminary review of the results of operational monitoring at the first wind farms of the Renewable Energy Independent Power Producer Procurement Programme in South Africa. BirdLife South Africa Occasional Report Series No. 2. BirdLife South Africa, Johannesburg, South Africa

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Skowno, A.L. et al. 2026. National Biodiversity Assessment 2025: Remnant natural habitat (terrestrial realm). South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2016. Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.

South African National Biodiversity Institute (SANBI). 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Verburgt et al. 2026. Species Environmental Assessment Guideline (Table 10.9). South African National Biodiversity Institute (SANBI), Pretoria.

7 Appendix Items

7.1 Appendix A: Methodology

7.1.1 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.

7.1.1.1 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 2505_3005; 2505_3010; 2510_3005; 2500_3000; 2505_3000; 2510_3000; 2500_3005; 2500_3010; 2510_3010; 2500_3015; 2505_3015; 2510_3015; 2515_3000; 2515_3005; 2515_3010; and

- Compilation of a Coordinated Water Bird Count (CWAC) species list if the PAOI was found to be in a vicinity of a CWAC site.

7.1.1.2 Spatially Relevant Legislative Boundaries

Two aspects of legislation apply with regards to the development of certain project types within South Africa, and these have important implications for the EA processes for these project types. These two aspects are briefly discussed below. Where relevant the spatial orientation of the proposed project is referenced with respect to these important legislative boundaries, as the applicable legislation may be relevant to not only the overall EIA process, but also the specialist assessment process that is to be followed.

Strategic Transmission Corridors (EGI):

On the 16th of 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 the 29th of 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.

In June 2022 the Standard for the Development and Expansion of Power Lines and Substations within Identified Geographical Areas Revision 2, Prepared by the CSIR and SANBI, was published. This standard was then adopted as per Government Notice No. 2313 of Government Gazette No. 47095 of 27 July 2022. The Standard was prepared to allow a proponent to achieve planning, routing, siting and remediation objectives that will ensure the acceptability of the impacts of the development of EGI (including substations) on the environment, independently from the need for an assessment by the competent authority. The standard enforces the following key environmental principles as part of its application with regards to the planning of powerline routes and substation positions (Note: several additional principles apply as relevant to avifauna assessments, however these are not included below):

- There must be no removal of threatened plant species;

- There must be no impact on Tier 1 plant species (i.e. threatened species reliant on critical habitat) identified through the screening process and site verification process;

- Clear-cutting during construction must be kept to a maximum of 8 m; and

- Wetlands must be avoided or, where wetland crossing is unavoidable, the power line should be routed over the narrowest part of the wetland. For the most part, wetlands and rivers can be traversed by the power line with little to no impact by placing the pylons outside of the wetland.

Renewable Energy Development Zones (REDZs):

On 16 February 2018, Minister Edna Molewa published Government Notice No. 114 in Government Gazette No. 41445 which identified 8 renewable energy development zones important for the development of large scale wind and solar photovoltaic facilities. The Government Notice included the procedure to be followed when applying for environmental authorisation for large scale wind and solar photovoltaic energy facilities when occurring in these REDZs.

On 26 February 2021, Minister Barbara Dallas Creecy, published Government Notice No. 142, 144 and 145 in Government Gazette No. 44191 which identified 3 additional REDZs for implementation as well as the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large scale wind and solar photovoltaic energy facilities in these REDZs.

7.1.1.3 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al,* 2019) (NBA) - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:

- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. 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 (Skowno & Monyeki, 2021).

- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more

protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 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.

- Mpumalanga Biodiversity Sector Plan (MBSP) (Table 7-1):

  - The key output of this systematic biodiversity plan is a map of biodiversity priority areas (Mpumalanga Tourism and Parks Agency (MTPA), 2022). The MBSP CBA map delineates Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA), Protected Areas (PA), and areas that have been irreversibly modified from their natural state (MTPA, 2014).
  - **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. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species (MTPA, 2014). 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 (SANBI-BGIS, 2017).
  - The Mpumalanga Biodiversity Sector Plan (MBSP) specifies two different CBA areas, **Irreplaceable CBAs and Optimal CBAs**. Irreplaceable CBAs include: (1) areas required to meet targets and with irreplaceability biodiversity values of more than 80%; (2) critical linkages or pinch-points in the landscape that must remain natural; or (3) CR ecosystems (MTPA, 2014).
  - **ESAs** are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services. CBAs and ESA may be terrestrial or aquatic (SANBI-BGIS, 2017).
  - **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 (SANBI-BGIS, 2017).
  - **Moderately or Heavily Modified Areas** (sometimes called ‘transformed’ areas) are areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets (MTPA, 2014). Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly, and in many cases irreversibly, compromised.

Table 7-1 Land use guidelines for terrestrial Critical Biodiversity Areas (Mpumalanga Biodiversity Sector Plan Handbook, 2014)

MAP CATEGORY	DESIRED MANAGEMENT OBJECTIVE	GENERAL GUIDELINES
Protected Areas	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.	■ All operational aspects of managing these areas must be subject to their main purpose, which is to protect and maintain biodiversity and ecological integrity, and should be governed by a formally approved management plan and land-use activities that support the primary function of these areas as primary sites for biodiversity conservation. ■ The management plan must identify allowable activities, which should be consistent at least with the CBA Irreplaceable category; the location of these allowable activities should be captured in a zonation plan in the management plan. ■ Activities relating to the construction of roads, administrative or tourism infrastructure and services (such as water reticulation systems, power lines and the likes) that are required to support the primary function of the protected area and its allowable activities, must be subject to at least a basic scoping report, or a full EIA, as specified by NEMA, and the protected area management plan. ■ In the case of **Protected Environments,** a variety of agricultural land uses may be allowed, such as livestock grazing, plantation forestry and some cultivation. The location of these land-use activities must be informed by the CBA maps, and should be specified in the zonation plan of the management plan for the protected environment. All areas of natural habitat that are zoned for conservation use, should be subject to implementation of the land-use guidelines for protected areas, CBAs, and ESAs.
Critical Biodiversity Areas	Maintain in a natural state with no further loss of natural habitat.	■ Allow low-impact land-uses that are compatible with maintaining CBAs in a natural state, with no loss of habitat or species. ■ Earmark CBAs as priority sites for land care projects such as Working for Water, Working for Wetlands, and Working on Fire and other compatible, conservation activities. ■ Avoid activities identified in the three Listing Notices (R544, R545 and R546), if at all possible, as they are in conflict with the desired management objectives for terrestrial CBAs. Where they cannot be avoided, the impacts of these activities should be minimised and remedied, and EIA conditions should be strictly applied by the competent authority. ■ In larger geographically sensitive areas, environmental management frameworks (provided for under sections 24 (5)(i) and 44 of NEMA) should be developed and implemented to inform environmental authorisations, promote sustainability, secure biodiversity and ecological functionality and promote co-operative governance. The information and maps of the MBSP should be used to promote and support compilation of any Environmental Management Frameworks.

Irreplaceable CBAs	Maintain in a natural state with no further loss of natural habitat.	■ Biodiversity loss and land-use change in Irreplaceable CBAs should be monitored as a matter of priority, to prevent unauthorised land-use change or degradation by neglect or ignorance. ■ Where appropriate, these areas should be incorporated into the formal Protected Area system through biodiversity stewardship agreements (contract Nature Reserves or Protected Environments). ■ Ideally, conservation management activities should be the primary land-use in all irreplaceable areas, *or* they should at least be managed in ways that have no negative impact on species, ecosystems or ecosystem services. ■ Extensive (widespread, low-intensity) livestock or game ranching, if well-managed, is compatible with the desired management objectives for these areas. These land-uses are acceptable if they take into account the specific biodiversity features (e.g. rare species or vegetation remnants) and vulnerabilities (e.g. infestation by invasive alien plants) at each site, if they comply with recommended stocking rates, if any associated infrastructure (required to support the ranching activities) is kept to low levels.	■ In general, Irreplaceable sites must be avoided in terms of the mitigation hierarchy. ■ A specialist study must be part of the Scoping and EIA process for all land-use applications in these areas, using the services of an experienced and locally knowledgeable biodiversity expert who is approved by the MTPA. ■ Applications for land use of any kind should be referred to the biodiversity specialists in MTPA and DARDLEA for evaluation. ■ Degraded areas included in the land parcel, but not the land-use proposal, should be restored to natural ecosystem functioning where possible. ■ Provision of alternative land as a 'biodiversity offset' in exchange for biodiversity loss in these areas CANNOT be considered except in exceptional circumstances and would need to be considered on a case by case basis.
Optimal CBAs (referred to as Important and Necessary in MBCP)	Maintain in a natural state with no further loss of natural habitat.	■ Acceptable land uses are those that are least harmful to biodiversity, such as conservation management, or extensive livestock or game farming. Large-scale cultivation, mining and urban or industrial development are not appropriate. ■ Extensive (widespread, low-intensity) livestock and game ranching, if well-managed (see above), is compatible with the desired management objectives for these areas.	■ If small-scale land-use change is unavoidable, it must be located and designed to be as biodiversity-sensitive as possible. ■ A specialist study must be part of the scoping and EIA process for all land-use applications in these areas, using the services of an experienced and locally knowledgeable biodiversity expert who is SACNASP registered. ■ Provision for biodiversity offsets in exchange for biodiversity loss should only be considered as a last resort and at a ratio consistent with national policy.

Ecological Support Areas	The desired management objective for all ESAs is to maintain the land in a near-natural and ecologically functional state, even if some loss of ecosystem composition or structure takes place.		
ESA: Landscape and Local-scale Corridors	Maintain ecological functionality in support of biodiversity connectivity by retaining the existing natural vegetation cover in a healthy ecological state, and restore 'critical-linkages' where necessary.	A greater range of land uses over wider areas is appropriate, subject to an authorisation process that ensures the underlying biodiversity objectives are not compromised.	■ Certain activities covered under Listing Notice 3 trigger the EIA process in ESA corridors. ■ Restoration of corridors is important, particularly in terms of the Working for Water programs. ■ The impact of land-use proposals on the functionality of ecological corridors must be assessed by the relevant biodiversity specialist as part of the EIA/Scoping report. ■ Impenetrable fences that restrict animal movement should be discouraged.
ESA: Species Specific Sites	Maintain the prevailing ecological processes that support the specific species, and manage for no further habitat loss.	Although these areas may be located in production landscapes, and may be heavily modified in parts, a change in land use to anything other than conservation management should be discouraged as it would most likely result in a loss of the target species from the area.	■ The impact of any changes in land use on the population viability of listed species, such as blue cranes, should be assessed by a registered specialist. ■ Restoration of degraded areas and invasive alien plant control is recommended, particularly clearing the small wattle 'jungles' that large birds avoid.

ESA: Protected Area Buffers	To minimise the impacts of surrounding land-uses on the ecological integrity, character and tourism potential of protected areas.	When assessing the impacts of proposed land uses in protected area buffers, consideration needs to be given to both direct (e.g. plantation forestry blocking view-sheds and reducing water flows into a Protected Area) and indirect impacts (e.g. light and noise pollution).	■ Buffer distances vary according to the nature of the Protected Area, as follows:
			  ■ National Parks: 10 km buffer as indicated in Listing Notice 3.
			  ■ Nature Reserves: 5 km buffer as indicated in Listing Notice 3.
			  ■ Protected Environments: 1 km buffer as these may include production landscapes.
			■ Land-use change applications within the buffer zone may be referred to the protected area manager or ecologist for evaluation.
			■ A viewshed analysis of the potential visual impact of the proposed land-use on adjacent protected areas should be undertaken where necessary.

Other Natural Areas	The overall objective should be to ensure ecosystem functionality and minimise loss of natural habitat and species through strategic landscape planning.	■ These areas have the greatest flexibility in terms of management objectives and permissible land-uses. ■ Where possible, avoid modifying any remaining natural habitat by locating land-uses, including cultivation and plantations, in already-modified areas. ■ Authorisation may be required for high-impact land-uses (such as intensive industry or urban development) and standard application of EIA regulations and other planning procedures is required. Note: These areas may still contain species of conservation concern but either have not yet been surveyed, or the data were not available for incorporation into the MBSP. The presence or absence of important species should always be established through site visits before proceeding with a land-use change.
Heavily or Moderately Modified Areas	Manage land-use in a biodiversity-friendly manner, aiming to maximise ecological functionality. In old lands, stabilise ecosystems and manage them to restore ecological functionality, particularly soil carbon and water-related functionality, using indigenous plant cover. Old lands should be burnt and grazed appropriately.	■ Areas with no natural habitat remaining are preferred sites for higher-impact land-uses, and new projects should be located in these areas before modifying any remaining natural habitat. ■ Restoration and re-vegetation should be prioritised where heavily modified areas occur close to land of high biodiversity value, or are located such that they could potentially serve useful ecological connectivity functions (such as in ecological corridors). ■ For individual parcels of land identified as having specific actual or potential biodiversity values, develop incentives to restore lost biodiversity and connectivity. ■ When locating land-uses in these modified areas, consider the off-site impacts they may have on neighbouring areas of natural habitat, especially if these are of high biodiversity value. For example, controlling use of pesticides in modified areas, because of the impacts on neighbouring areas of natural habitat. ■ Encourage landowners and developers to use indigenous plants, especially trees, where aesthetic or functional options exist.

- Key Biodiversity Areas (KBAs) (SANBI, 2024) – KBAs are identified using the Global Standard for the Identification of KBAs, developed by the International Union for the Conservation of Nature (IUCN). The standard involves applying five criteria to gauge an area's importance for biodiversity. These criteria consider the presence of threatened species or ecosystems, species with limited global distributions, pristine wilderness, significant biological processes, or irreplaceable biodiversity. Each criterion has specific quantitative thresholds to determine if they are met. As of 2023, over 16,000 KBAs have been identified globally, covering more than 20 million square kilometres. South Africa completed its first comprehensive national assessment in 2023, evaluating over 9,900 species or ecosystem types and identifying 260+ individual KBAs.

Freshwater Ecology:

- 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.

- National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

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

7.1.2 Avifauna Survey

Point Counts

Standardised 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 standardised point count technique was utilised 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 metres. 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.

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.

7.1 Appendix D: Avifauna Expected Species

Common Name	Scientific Name	Family Name	Regional	Global	Endemisim
Abdim's Stork	*Ciconia abdimii*	Ciconiidae			
Acacia Pied Barbet	*Tricholaema leucomelas*	Lybiidae			
African Barred Owlet	*Glaucidium capense*	Strigidae			
African Black Duck	*Anas sparsa*	Anatidae			
African Black Swift	*Apus barbatus*	Apodidae			
African Crake	*Crecopsis egregia*	Rallidae			
African Darter	*Anhinga rufa*	Anhingidae	NT	LC	
African Dusky Flycatcher	*Muscicapa adusta*	Muscicapidae			
African Firefinch	*Lagonosticta rubricata*	Estriididae			
African Fish Eagle	*Haliaeetus vocifer*	Accipitridae			
African Goshawk	*Accipiter tachiro*	Accipitridae			
African Grass Owl	*Tyto capensis*	Strigidae	VU	LC	
African Green Pigeon	*Treron calvus*	Columbidae			
African Grey Hornbill	*Lophoceros nasutus*	Bucerotidae			
African Harrier-hawk	*Polyboroides typus*	Accipitridae			
African Hawk-eagle	*Aquila spilogaster*	Accipitridae			
African Hoopoe	*Upupa africana*	Upupidae			
African Marsh Harrier	*Circus ranivorus*	Accipitridae	VU	LC	
African Olive Pigeon	*Columba arquatrix*	Columbidae			
African Palm Swift	*Cypsiurus parvus*	Apodidae			
African Paradise Flycatcher	*Terpsiphone viridis*	Monarchidae			
African Pied Wagtail	*Motacilla aguimp*	Motacillidae			
African Pipit	*Anthus cinnamomeus*	Motacillidae			
African Pygmy Kingfisher	*Ispidina picta*	Alcedinidae			
African Rail	*Rallus caerulescens*	Rallidae			
African Sacred Ibis	*Threskiornis aethiopicus*	Threskiornithidae			
African Snipe	*Gallinago nigripennis*	Scolopacidae			
African Stonechat	*Saxicola torquatus*	Muscicapidae			
African Swamphen	*Porphyrio madagascariensis*	Rallidae			
African Wattled Lapwing	*Vanellus senegallus*	Charadriidae			
African Wood Owl	*Strix woodfordii*	Strigidae			
African Yellow Warbler	*Iduna natalensis*	Acrocephalidae			
Alpine Swift	*Tachymarptis melba*	Apodidae			
Amethyst Sunbird	*Chalcomitra amethystina*	Nectariniidae			
Amur Falcon	*Falco amurensis*	Falconidae			
Ant-eating Chat	*Myrmecocichla formicivora*	Muscicapidae			
Arrow-marked Babbler	*Turdoides jardineii*	Leiothrichidae			
Ashy Flycatcher	*Muscicapa caerulescens*	Muscicapidae			
Baillon's Crake	*Zapornia pusilla*	Rallidae	NT	LC	
Banded Martin	*Neophedina cincta*	Hirundinidae			
Bar-throated Apalis	*Apalis thoracica*	Cisticolidae			
Barn Swallow	*Hirundo rustica*	Hirundinidae			

Bearded Woodpecker	*Chloropicus namaquus*	Picidae			
Black Crake	*Zapornia flavirostra*	Rallidae			
Black Cuckoo	*Cuculus clamosus*	Cuculidae			
Black Cuckooshrike	*Campephaga flava*	Campephagidae			
Black Saw-wing	*Psalidoprocne pristoptera*	Hirundinidae			
Black Sparrowhawk	*Accipiter melanoleucus*	Accipitridae			
Black Stork	*Ciconia nigra*	Ciconiidae	EN	LC	
Black-backed Puffback	*Dryoscopus cubla*	Malaconotidae			
Black-bellied Bustard	*Lissotis melanogaster*	Otididae			
Black-chested Prinia	*Prinia flavicans*	Cisticolidae			
Black-chested Snake Eagle	*Circaetus pectoralis*	Accipitridae			
Black-collared Barbet	*Lybius torquatus*	Lybiidae			
Black-crowned Night Heron	*Nycticorax nycticorax*	Ardeidae	NT	LC	
Black-crowned Tchagra	*Tchagra senegalus*	Malaconotidae			
Black-headed Heron	*Ardea melanocephala*	Ardeidae			
Black-headed Oriole	*Oriolus larvatus*	Oriolidae			
Black-rumped Buttonquail	*Turnix nanus*	Turnicidae	EN	LC	
Black-throated Canary	*Crithagra atrogularis*	Fringillidae			
Black-winged Kite	*Elanus caeruleus*	Accipitridae	NT	LC	
Black-winged Lapwing	*Vanellus melanopterus*	Charadriidae			
Blacksmith Lapwing	*Vanellus armatus*	Charadriidae			
Blue Crane	*Anthropoides paradiseus*	Gruidae	VU	VU	
Blue Waxbill	*Uraeginthus angolensis*	Estrildidae			
Blue-billed Teal	*Spatula hottentota*	Anatidae			
Bokmakierie	*Telophorus zeylonus*	Malaconotidae			
Brimstone Canary	*Crithagra sulphurata*	Fringillidae			
Bronze Mannikin	*Spermestes cucullata*	Estrildidae			
Brown Snake Eagle	*Circaetus cinereus*	Accipitridae			
Brown-backed Honeybird	*Prodotiscus regulus*	Indicatoridae			
Brown-crowned Tchagra	*Tchagra australis*	Malaconotidae			
Brown-hooded Kingfisher	*Halcyon albiventris*	Alcedinidae			
Brown-throated Martin	*Riparia paludicola*	Hirundinidae			
Brubru	*Nilaus afer*	Malaconotidae			
Buff-spotted Flufftail	*Sarothrura elegans*	Sarothruridae			
Buff-streaked Chat	*Campicoloides bifasciatus*	Muscicapidae			SLS
Buffy Pipit	*Anthus vaalensis*	Motacillidae			
Burchell's Coucal	*Centropus burchellii*	Cuculidae			
Bush Blackcap	*Sylvia nigricapillus*	Sylviidae	VU	VU	SLS
Bushveld Pipit	*Anthus caffer*	Motacillidae			
Cape Batis	*Batis capensis*	Platysteiridae			
Cape Bunting	*Emberiza capensis*	Emberizidae			
Cape Canary	*Serinus canicollis*	Fringillidae			
Cape Crow	*Corvus capensis*	Corvidae			
Cape Eagle Owl	*Bubo capensis*	Strigidae			

Cape Grassbird	*Sphenoeacus afer*	Macrosphenidae			NE
Cape Longclaw	*Macronyx capensis*	Motacillidae			
Cape Robin-chat	*Cossypha caffra*	Muscicapidae			
Cape Rock Thrush	*Monticola rupestris*	Muscicapidae			SLS
Cape Sparrow	*Passer melanurus*	Passeridae			
Cape Starling	*Lamprotornis nitens*	Sturnidae			
Cape Teal	*Anas capensis*	Anatidae			
Cape Vulture	*Gyps coprotheres*	Accipitridae	VU	VU	
Cape Wagtail	*Motacilla capensis*	Motacillidae			
Cape Weaver	*Ploceus capensis*	Ploceidae			NE
Cape White-eye	*Zosterops virens*	Zosteropidae			NE
Capped Wheatear	*Oenanthe pileata*	Muscicapidae			
Cardinal Woodpecker	*Dendropicos fuscescens*	Picidae			
Chinspot Batis	*Batis molitor*	Platysteiridae			
Chorister Robin-chat	*Cossypha dichroa*	Muscicapidae			SLS
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae			
Cloud Cisticola	*Cisticola textrix*	Cisticolidae			NE
Common Buttonquail	*Turnix sylvaticus*	Turnicidae			
Common Buzzard	*Buteo buteo*	Accipitridae			
Common House Martin	*Delichon urbicum*	Hirundinidae			
Common Moorhen	*Gallinula chloropus*	Rallidae			
Common Myna	*Acridotheres tristis*	Sturnidae			
Common Ostrich	*Struthio camelus*	Struthionidae			
Common Quail	*Coturnix coturnix*	Phasianidae			
Common Reed Warbler	*Acrocephalus baeticatus*	Acrocephalidae			
Common Scimitarbill	*Rhinopomastus cyanomelas*	Phoeniculidae			
Common Swift	*Apus apus*	Apodidae			
Common Waxbill	*Estrilda astrild*	Estrildidae			
Coqui Francolin	*Peliperdix coqui*	Phasianidae			
Corn Crake	*Crex crex*	Rallidae			
Crested Barbet	*Trachyphonus vaillantii*	Lybiidae			
Crested Francolin	*Dendroperdix sephaena*	Phasianidae			
Croaking Cisticola	*Cisticola natalensis*	Cisticolidae			
Crowned Eagle	*Stephanoaetus coronatus*	Accipitridae	VU	NT	
Crowned Lapwing	*Vanellus coronatus*	Charadriidae			
Cuckoo Finch	*Anomalospiza imberbis*	Viduidae			
Cut-throat Finch	*Amadina fasciata*	Estriididae			
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae			
Denham's Bustard	*Neotis denhami*	Otididae	VU	NT	
Diederik Cuckoo	*Chrysococcyx caprius*	Cuculidae			
Drakensberg Prinia	*Prinia hypoxantha*	Cisticolidae			SLS
Dusky Indigobird	*Vidua funerea*	Viduidae			
Eastern Clapper Lark	*Mirafra fasciolata*	Alaudidae			
Eastern Long-billed Lark	*Certhilauda semitorquata*	Alaudidae			SLS

Egyptian Goose	*Alopochen aegyptiaca*	Anatidae			
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae			
Eurasian Hobby	*Falco subbuteo*	Falconidae			
European Bee-eater	*Merops apiaster*	Meropidae			
European Honey Buzzard	*Pernis apivorus*	Accipitridae			
Familiar Chat	*Oenanthe familiaris*	Muscicapidae			
Fan-tailed Grassbird	*Catriscus brevirostris*	Locustellidae			
Fan-tailed Widowbird	*Euplectes axillaris*	Ploceidae			
Fiery-necked Nightjar	*Caprimulgus pectoralis*	Caprimulgidae			
Fiscal Flycatcher	*Melaenornis silens*	Muscicapidae			NE
Flappet Lark	*Mirafra rufocinnamomea*	Alaudidae			
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae			
Freckled Nightjar	*Caprimulgus tristigma*	Caprimulgidae			
Gabar Goshawk	*Micronisus gabar*	Accipitridae			
Giant Kingfisher	*Megaceryle maxima*	Alcedinidae			
Glossy Ibis	*Plegadis falcinellus*	Threskiornithidae			
Golden-breasted Bunting	*Emberiza flaviventris*	Emberizidae			
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae			
Great Egret	*Ardea alba*	Ardeidae	NT	LC	
Great Reed Warbler	*Acrocephalus arundinaceus*	Acrocephalidae			
Greater Double-collared Sunbird	*Cinnyris afer*	Nectariniidae			SLS
Greater Honeyguide	*Indicator indicator*	Indicatoridae			
Greater Kestrel	*Falco rupicoloides*	Falconidae			
Greater Striped Swallow	*Cecropis cucullata*	Hirundinidae			
Green Wood Hoopoe	*Phoeniculus purpureus*	Phoeniculidae			
Green-backed Camaroptera	*Camaroptera brachyura*	Cisticolidae			
Green-capped Eremomela	*Eremomela scotops*	Cisticolidae			
Green-winged Pytilia	*Pytilia melba*	Estrildidae			
Grey Crowned Crane	*Balearica regulorum*	Gruidae	VU	EN	
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae			
Grey Heron	*Ardea cinerea*	Ardeidae			
Grey Penduline Tit	*Anthoscopus caroli*	Remizidae			
Grey Tit-flycatcher	*Myioparus plumbeus*	Muscicapidae			
Grey-backed Camaroptera	*Camaroptera brevicaudata*	Cisticolidae			
Grey-headed Bushshrike	*Malaconotus blanchoti*	Malaconotidae			
Grey-rumped Swallow	*Pseudhirundo griseopyga*	Hirundinidae			
Grey-winged Francolin	*Scleroptila afra*	Phasianidae			SLS
Ground Woodpecker	*Geocolaptes olivaceus*	Picidae	NT	NT	SLS
Groundscraper Thrush	*Turdus litsitsirupa*	Turdidae			
Gurney's Sugarbird	*Promerops gurneyi*	Promeropidae	LC	NT	NE
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae			
Half-collared Kingfisher	*Alcedo semitorquata*	Alcedinidae	VU	LC	
Hamerkop	*Scopus umbretta*	Scopidae	NT	LC	
Helmeted Guineafowl	*Numida meleagris*	Numididae			

Holub's Golden Weaver	*Ploceus xanthops*	Ploceidae			
Horus Swift	*Apus horus*	Apodidae			
House Sparrow	*Passer domesticus*	Passeridae			
Indian Peafowl	*Pavo cristatus*	Phasianidae			
Jackal Buzzard	*Buteo rufofuscus*	Accipitridae			NE
Jacobin Cuckoo	*Clamator jacobinus*	Cuculidae			
Jameson's Firefinch	*Lagonosticta rhodopareia*	Estriididae			
Karoo Thrush	*Turdus smithi*	Turdidae			NE
Klaas's Cuckoo	*Chrysococcyx klaas*	Cuculidae			
Knob-billed Duck	*Sarkidiornis melanotos*	Anatidae	NT	LC	
Kurrichane Thrush	*Turdus libonyana*	Turdidae			
Lanner Falcon	*Falco biarmicus*	Falconidae	NT	LC	
Large Rock Martin	*Ptyonoprogne fuligula*	Hirundinidae			
Laughing Dove	*Spilopelia senegalensis*	Columbidae			
Lazy Cisticola	*Cisticola aberrans*	Cisticolidae			
Lesser Honeyguide	*Indicator minor*	Indicatoridae			
Lesser Kestrel	*Falco naumanni*	Falconidae	VU	LC	
Lesser Masked Weaver	*Ploceus intermedius*	Ploceidae			
Lesser Moorhen	*Paragallinula angulata*	Rallidae			
Lesser Striped Swallow	*Cecropis abyssinica*	Hirundinidae			
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	Acrocephalidae			
Levaillant's Cisticola	*Cisticola tinniens*	Cisticolidae			
Levaillant's Cuckoo	*Clamator levaillantii*	Cuculidae			
Little Bee-eater	*Merops pusillus*	Meropidae			
Little Egret	*Egretta garzetta*	Ardeidae			
Little Grebe	*Tachybaptus ruficollis*	Podicipedidae			
Little Rush Warbler	*Bradypterus baboecala*	Locustellidae			
Little Sparrowhawk	*Accipiter minullus*	Accipitridae			
Little Swift	*Apus affinis*	Apodidae			
Lizard Buzzard	*Kaupifalco monogrammicus*	Accipitridae			
Long-billed Crombec	*Sylvietta rufescens*	Macrosphenidae			
Long-crested Eagle	*Lophaetus occipitalis*	Accipitridae			
Long-tailed Paradise Whydah	*Vidua paradisaea*	Viduidae			
Long-tailed Widowbird	*Euplectes progne*	Ploceidae			
Malachite Kingfisher	*Corythornis cristatus*	Alcedinidae			
Malachite Sunbird	*Nectarinia famosa*	Nectariniidae			
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae			
Marsh Owl	*Asio capensis*	Strigidae	NT	LC	
Marsh Sandpiper	*Tringa stagnatilis*	Scolopacidae			
Marsh Warbler	*Acrocephalus palustris*	Acrocephalidae			
Martial Eagle	*Polemaetus bellicosus*	Accipitridae	EN	EN	
Mocking Cliff Chat	*Thamnolaea cinnamomeiventris*	Muscicapidae			
Mountain Wagtail	*Motacilla clara*	Motacillidae			
Mountain Wheatear	*Myrmecocichla monticola*	Muscicapidae			

Namaqua Dove	*Oena capensis*	Columbidae			
Narina Trogon	*Apaloderma narina*	Trogonidae			
Natal Spurfowl	*Pternistis natalensis*	Phasianidae			
Neddicky	*Cisticola fulvicapilla*	Cisticolidae			
Nicholson's Pipit	*Anthus nicholsoni*	Motacillidae			
Olive Bushshrike	*Chlorophoneus olivaceus*	Malaconotidae			
Olive Thrush	*Turdus olivaceus*	Turdidae			
Olive Woodpecker	*Dendropicos griseocephalus*	Picidae			
Orange-breasted Bushshrike	*Chlorophoneus sulfureopectus*	Malaconotidae			
Orange-breasted Waxbill	*Amandava subflava*	Estrildidae			
Pale Flycatcher	*Melaenornis pallidus*	Muscicapidae			
Pale-crowned Cisticola	*Cisticola cinnamomeus*	Cisticolidae			
Pearl-breasted Swallow	*Hirundo dimidiata*	Hirundinidae			
Peregrine Falcon	*Falco peregrinus*	Falconidae			
Pied Crow	*Corvus albus*	Corvidae			
Pied Kingfisher	*Ceryle rudis*	Alcedinidae			
Pied Starling	*Lamprotornis bicolor*	Sturnidae			SLS
Pin-tailed Whydah	*Vidua macroura*	Viduidae			
Plain-backed Pipit	*Anthus leucophrys*	Motacillidae			
Purple Heron	*Ardea purpurea*	Ardeidae			
Purple-crested Turaco	*Tauraco porphyreolophus*	Musophagidae			
Quailfinch	*Ortygospiza atricollis*	Estrildidae			
Rattling Cisticola	*Cisticola chiniana*	Cisticolidae			
Red-backed Shrike	*Lanius collurio*	Laniidae			
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae			
Red-billed Quelea	*Quelea quelea*	Ploceidae			
Red-billed Teal	*Anas erythrorhyncha*	Anatidae	NT	LC	
Red-breasted Swallow	*Cecropis semirufa*	Hirundinidae			
Red-capped Lark	*Calandrella cinerea*	Alaudidae			
Red-capped Robin-chat	*Cossypha natalensis*	Muscicapidae			
Red-chested Cuckoo	*Cuculus solitarius*	Cuculidae			
Red-chested Flufftail	*Sarothrura rufa*	Sarothruridae			
Red-collared Widowbird	*Euplectes ardens*	Ploceidae			
Red-eyed Dove	*Streptopelia semitorquata*	Columbidae			
Red-faced Cisticola	*Cisticola erythrops*	Cisticolidae			
Red-faced Mousebird	*Urocolius indicus*	Coliidae			
Red-headed Finch	*Amadina erythrocephala*	Estriididae			
Red-headed Weaver	*Anaplectes rubriceps*	Ploceidae			
Red-knobbed Coot	*Fulica cristata*	Rallidae			
Red-necked Spurfowl	*Pternistis afer*	Phasianidae			
Red-throated Wryneck	*Jynx ruficollis*	Picidae			
Red-winged Francolin	*Scleroptila levaillantii*	Phasianidae			
Red-winged Starling	*Onychognathus morio*	Sturnidae			
Reed Cormorant	*Microcarbo africanus*	Phalacrocoracidae			

Retz's Helmetshrike	*Prionops retzii*	Vangidae			
Ring-necked Dove	*Streptopelia capicola*	Columbidae			
Rock Dove	*Columba livia*	Columbidae			
Rock Kestrel	*Falco rupicolus*	Falconidae			
Rufous-breasted Sparrowhawk	*Accipiter rufiventris*	Accipitridae			
Rufous-cheeked Nightjar	*Caprimulgus rufigena*	Caprimulgidae			
Rufous-naped Lark	*Mirafra africana*	Alaudidae			
Sabota Lark	*Calendulauda sabota*	Alaudidae			
Sand Martin	*Riparia riparia*	Hirundinidae			
Scaly-throated Honeyguide	*Indicator variegatus*	Indicatoridae			
Secretarybird	*Sagittarius serpentarius*	Sagittariidae	VU	EN	
Sedge Warbler	*Acrocephalus schoenobaenus*	Acrocephalidae			
Sentinel Rock Thrush	*Monticola explorator*	Muscicapidae	LC	NT	SLS
Shelley's Francolin	*Scleroptila shelleyi*	Phasianidae			
Short-tailed Pipit	*Anthus brachyurus*	Motacillidae	VU	LC	
Sombre Greenbul	*Andropadus importunus*	Pycnonotidae			
South African Shelduck	*Tadorna cana*	Anatidae			
Southern Bald Ibis	*Geronticus calvus*	Threskiornithidae	NT	NT	SLS
Southern Black Flycatcher	*Melaenornis pammelaina*	Muscicapidae			
Southern Black Tit	*Melaniparus niger*	Paridae			
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae			
Southern Double-collared Sunbird	*Cinnyris chalybeus*	Nectariniidae			NE
Southern Fiscal	*Lanius collaris*	Laniidae			
Southern Grey-headed Sparrow	*Passer diffusus*	Passeridae			
Southern Masked Weaver	*Ploceus velatus*	Ploceidae			
Southern Pochard	*Netta erythrophthalma*	Anatidae	NT	LC	
Southern Red Bishop	*Euplectes orix*	Ploceidae			
Southern White-faced Owl	*Ptilopsis granti*	Strigidae			
Southern Yellow-billed Hornbill	*Tockus leucomelas*	Bucerotidae			
Speckled Mousebird	*Colius striatus*	Coliidae			
Speckled Pigeon	*Columba guinea*	Columbidae			
Spectacled Weaver	*Ploceus ocularis*	Ploceidae			
Spotted Eagle Owl	*Bubo africanus*	Strigidae			
Spotted Flycatcher	*Muscicapa striata*	Muscicapidae			
Spotted Thick-knee	*Burhinus capensis*	Burhinidae			
Spur-winged Goose	*Plectropterus gambensis*	Anatidae			
Squacco Heron	*Ardeola ralloides*	Ardeidae			
Streaky-headed Seedeater	*Crithagra gularis*	Fringillidae			
Striped Kingfisher	*Halcyon chelicuti*	Alcedinidae			
Striped Pipit	*Anthus lineiventris*	Motacillidae			
Swainson's Spurfowl	*Pternistis swainsonii*	Phasianidae			
Swallow-tailed Bee-eater	*Merops hirundineus*	Meropidae			
Swee Waxbill	*Coccopygia melanotis*	Estrildidae			NE
Tambourine Dove	*Turtur tympanistria*	Columbidae			

Tawny Eagle	*Aquila rapax*	Accipitridae	EN	VU	
Tawny-flanked Prinia	*Prinia subflava*	Cisticolidae			
Temminck's Courser	*Cursorius temminckii*	Glareolidae			
Thick-billed Weaver	*Amblyospiza albifrons*	Ploceidae			
Three-banded Plover	*Charadrius tricollaris*	Charadriidae			
Verreaux's Eagle	*Aquila verreauxii*	Accipitridae	VU	LC	
Village Weaver	*Ploceus cucullatus*	Ploceidae			
Violet-backed Starling	*Cinnyricinclus leucogaster*	Sturnidae			
Wahlberg's Eagle	*Hieraaetus wahlbergi*	Accipitridae			
Wailing Cisticola	*Cisticola lais*	Cisticolidae			
Wattled Crane	*Grus carunculata*	Gruidae	EN	VU	
Wattled Starling	*Creatophora cinerea*	Sturnidae			
Western Barn Owl	*Tyto alba*	Strigidae			
Western Cattle Egret	*Bubulcus ibis*	Ardeidae			
Whiskered Tern	*Chlidonias hybrida*	Laridae			
White Stork	*Ciconia ciconia*	Ciconiidae			
White-backed Duck	*Thalassornis leuconotus*	Anatidae	NT	LC	
White-backed Night Heron	*Gorsachius leuconotus*	Ardeidae	VU	LC	
White-backed Vulture	*Gyps africanus*	Accipitridae	CR	CR	
White-bellied Bustard	*Eupodotis senegalensis*	Otididae	VU	LC	
White-bellied Sunbird	*Cinnyris talatala*	Nectariniidae			
White-breasted Cormorant	*Phalacrocorax lucidus*	Phalacrocoracidae			
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae			
White-browed Sparrow-weaver	*Plocepasser mahali*	Ploceidae			
White-crested Helmetshrike	*Prionops plumatus*	Vangidae			
White-faced Whistling Duck	*Dendrocygna viduata*	Anatidae			
White-fronted Bee-eater	*Merops bullockoides*	Meropidae			
White-necked Raven	*Corvus albicollis*	Corvidae			
White-rumped Swift	*Apus caffer*	Apodidae			
White-throated Robin-chat	*Cossypha humeralis*	Muscicapidae			
White-throated Swallow	*Hirundo albigularis*	Hirundinidae			
White-winged Tern	*Chlidonias leucopterus*	Laridae			
White-winged Widowbird	*Euplectes albonotatus*	Ploceidae			
Willow Warbler	*Phylloscopus trochilus*	Phylloscopidae			
Wing-snapping Cisticola	*Cisticola ayresii*	Cisticolidae			
Wood Sandpiper	*Tringa glareola*	Scolopacidae			
Woodland Kingfisher	*Halcyon senegalensis*	Alcedinidae			
Yellow Bishop	*Euplectes capensis*	Ploceidae			
Yellow-billed Duck	*Anas undulata*	Anatidae	NT	LC	
Yellow-billed Egret	*Ardea brachyrhyncha*	Ardeidae	NT	LC	
Yellow-billed Kite	*Milvus aegyptius*	Accipitridae			
Yellow-breasted Apalis	*Apalis flavida*	Cisticolidae			
Yellow-breasted Pipit	*Anthus chloris*	Motacillidae	VU	VU	E
Yellow-crowned Bishop	*Euplectes afer*	Ploceidae			

Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae			
Yellow-fronted Tinkerbird	*Pogoniulus chrysoconus*	Lybiidae			
Yellow-throated Bush Sparrow	*Gymnoris superciliaris*	Passeridae			
Zitting Cisticola	*Cisticola juncidis*	Cisticolidae			

7.1 Appendix E: Bird Species Recorded in the Field Assessment

Common Name	Scientific Name	Family Name	Endemisim	Regional	Global
African Black Swift	*Apus barbatus*	Apodidae			
African Finfoot	*Podica senegalensis*	Heliornithidae		VU	LC
African Firefinch	*Lagonosticta rubricata*	Estriididae			
African Fish Eagle	*Haliaeetus vocifer*	Accipitridae			
African Harrier-hawk	*Polyboroides typus*	Accipitridae			
African Hoopoe	*Upupa africana*	Upupidae			
African Olive Pigeon	*Columba arquatrix*	Columbidae			
African Palm Swift	*Cypsiurus parvus*	Apodidae			
African Paradise Flycatcher	*Terpsiphone viridis*	Monarchidae			
African Stonechat	*Saxicola torquatus*	Muscicapidae			
Amethyst Sunbird	*Chalcomitra amethystina*	Nectariniidae			
Arrow-marked Babbler	*Turdoides jardineii*	Leiothrichidae			
Ashy Flycatcher	*Muscicapa caerulescens*	Muscicapidae			
Bar-throated Apalis	*Apalis thoracica*	Cisticolidae			
Barn Swallow	*Hirundo rustica*	Hirundinidae			
Bearded Woodpecker	*Chloropicus namaquus*	Picidae			
Black Cuckoo	*Cuculus clamosus*	Cuculidae			
Black Cuckooshrike	*Campephaga flava*	Campephagidae			
Black Saw-wing	*Psalidoprocne pristoptera*	Hirundinidae			
Black-backed Puffback	*Dryoscopus cubla*	Malaconotidae			
Black-collared Barbet	*Lybius torquatus*	Lybiidae			
Black-crowned Tchagra	*Tchagra senegalus*	Malaconotidae			
Black-headed Oriole	*Oriolus larvatus*	Oriolidae			
Bokmakierie	*Telophorus zeylonus*	Malaconotidae			
Brown-hooded Kingfisher	*Halcyon albiventris*	Alcedinidae			
Brown-throated Martin	*Riparia paludicola*	Hirundinidae			
Brubru	*Nilaus afer*	Malaconotidae			
Bushveld Pipit	*Anthus caffer*	Motacillidae			
Cape Batis	*Batis capensis*	Platysteiridae			
Cape Bunting	*Emberiza capensis*	Emberizidae			
Cape Grassbird	*Sphenoeacus afer*	Macrosphenidae	NE		
Cape Robin-chat	*Cossypha caffra*	Muscicapidae			
Cape Sparrow	*Passer melanurus*	Passeridae			
Cape Vulture	*Gyps coprotheres*	Accipitridae		VU	VU
Cape Wagtail	*Motacilla capensis*	Motacillidae			
Cape Weaver	*Ploceus capensis*	Ploceidae	NE		
Cape White-eye	*Zosterops virens*	Zosteropidae	NE		

Chinspot Batis	*Batis molitor*	Platysteiridae			
Cinnamon-breasted Bunting	*Emberiza tahapisi*	Emberizidae			
Common Buzzard	*Buteo buteo*	Accipitridae			
Common Moorhen	*Gallinula chloropus*	Rallidae			
Common Myna	*Acridotheres tristis*	Sturnidae			
Common Waxbill	*Estrilda astrild*	Estrildidae			
Crowned Lapwing	*Vanellus coronatus*	Charadriidae			
Dark-capped Bulbul	*Pycnonotus tricolor*	Pycnonotidae			
Egyptian Goose	*Alopochen aegyptiaca*	Anatidae			
Emerald-spotted Wood Dove	*Turtur chalcospilos*	Columbidae			
European Bee-eater	*Merops apiaster*	Meropidae			
Familiar Chat	*Oenanthe familiaris*	Muscicapidae			
Fork-tailed Drongo	*Dicrurus adsimilis*	Dicruridae			
Golden-tailed Woodpecker	*Campethera abingoni*	Picidae			
Greater Striped Swallow	*Cecropis cucullata*	Hirundinidae			
Green-backed Camaroptera	*Camaroptera brachyura*	Cisticolidae			
Green-capped Eremomela	*Eremomela scotops*	Cisticolidae			
Grey Go-away-bird	*Corythaixoides concolor*	Musophagidae			
Grey-headed Bushshrike	*Malaconotus blanchoti*	Malaconotidae			
Groundscraper Thrush	*Turdus litsitsirupa*	Turdidae			
Gurney's Sugarbird	*Promerops gurneyi*	Promeropidae	NE	LC	NT
Hadada Ibis	*Bostrychia hagedash*	Threskiornithidae			
Half-collared Kingfisher	*Alcedo semitorquata*	Alcedinidae		VU	LC
Helmeted Guineafowl	*Numida meleagris*	Numididae			
Klaas's Cuckoo	*Chrysococcyx klaas*	Cuculidae			
Kurrichane Thrush	*Turdus libonyana*	Turdidae			
Laughing Dove	*Spilopelia senegalensis*	Columbidae			
Lazy Cisticola	*Cisticola aberrans*	Cisticolidae			
Lesser Striped Swallow	*Cecropis abyssinica*	Hirundinidae			
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	Acrocephalidae			
Levaillant's Cisticola	*Cisticola tinniens*	Cisticolidae			
Little Rush Warbler	*Bradypterus baboecala*	Locustellidae			
Little Swift	*Apus affinis*	Apodidae			
Malachite Sunbird	*Nectarinia famosa*	Nectariniidae			
Marico Flycatcher	*Melaenornis mariquensis*	Muscicapidae			
Marico Sunbird	*Cinnyris mariquensis*	Nectariniidae			
Mocking Cliff Chat	*Thamnolaea cinnamomeiventris*	Muscicapidae			
Natal Spurfowl	*Pternistis natalensis*	Phasianidae			
Neddicky	*Cisticola fulvicapilla*	Cisticolidae			
Olive Thrush	*Turdus olivaceus*	Turdidae			
Orange-breasted Bushshrike	*Chlorophoneus sulfureopectus*	Malaconotidae			
Pied Crow	*Corvus albus*	Corvidae			
Pin-tailed Whydah	*Vidua macroura*	Viduidae			
Purple-crested Turaco	*Tauraco porphyreolophus*	Musophagidae			

Quailfinch	*Ortygospiza atricollis*	Estrildidae		
Red-backed Shrike	*Lanius collurio*	Laniidae		
Red-billed Oxpecker	*Buphagus erythrorynchus*	Buphagidae		
Red-billed Quelea	*Quelea quelea*	Ploceidae		
Red-collared Widowbird	*Euplectes ardens*	Ploceidae		
Red-eyed Dove	*Streptopelia semitorquata*	Columbidae		
Red-faced Cisticola	*Cisticola erythrops*	Cisticolidae		
Red-faced Mousebird	*Urocolius indicus*	Coliidae		
Red-winged Starling	*Onychognathus morio*	Sturnidae		
Ring-necked Dove	*Streptopelia capicola*	Columbidae		
Rock Kestrel	*Falco rupicolus*	Falconidae		
Rufous-naped Lark	*Mirafra africana*	Alaudidae		
Southern Black Flycatcher	*Melaenornis pammelaina*	Muscicapidae		
Southern Black Tit	*Melaniparus niger*	Paridae		
Southern Boubou	*Laniarius ferrugineus*	Malaconotidae		
Southern Fiscal	*Lanius collaris*	Laniidae		
Southern Grey-headed Sparrow	*Passer diffusus*	Passeridae		
Southern Red Bishop	*Euplectes orix*	Ploceidae		
Speckled Mousebird	*Colius striatus*	Coliidae		
Speckled Pigeon	*Columba guinea*	Columbidae		
Spectacled Weaver	*Ploceus ocularis*	Ploceidae		
Spotted Flycatcher	*Muscicapa striata*	Muscicapidae		
Striped Pipit	*Anthus lineiventris*	Motacillidae		
Tawny Eagle	*Aquila rapax*	Accipitridae	EN	VU
Tawny-flanked Prinia	*Prinia subflava*	Cisticolidae		
Thick-billed Weaver	*Amblyospiza albifrons*	Ploceidae		
Village Weaver	*Ploceus cucullatus*	Ploceidae		
Wahlberg's Eagle	*Hieraaetus wahlbergi*	Accipitridae		
White-breasted Cormorant	*Phalacrocorax lucidus*	Phalacrocoracidae		
White-browed Scrub Robin	*Cercotrichas leucophrys*	Muscicapidae		
White-fronted Bee-eater	*Merops bullockoides*	Meropidae		
White-rumped Swift	*Apus caffer*	Apodidae		
Willow Warbler	*Phylloscopus trochilus*	Phylloscopidae		
Yellow-billed Kite	*Milvus aegyptius*	Accipitridae		
Yellow-breasted Apalis	*Apalis flavida*	Cisticolidae		
Yellow-fronted Canary	*Crithagra mozambica*	Fringillidae		
Yellow-fronted Tinkerbird	*Pogoniulus chrysoconus*	Lybiidae		
Zitting Cisticola	*Cisticola juncidis*	Cisticolidae		

7.2 Appendix F: 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 species of conservation concern and their ecosystem processes.

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 7-2 and Table 7-3, respectively.

Table 7-2 Summary of Conservation Importance (CI) criteria

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

Table 7-3 Summary of Functional Integrity (FI) criteria

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

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

BI can be derived from a simple matrix of CI and FI as provided in Table 7-4.

Table 7-4 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 7-5.

Table 7-5 Summary of Resource Resilience (RR) criteria

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

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 7-6.

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

Table 7-7 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.

7.3 Appendix G: Impact Rating

7.3.1 Methodology for Assessing Impacts

The impacts of the proposed project will be assessed and rated according to the methodology described below and which was developed to align with the requirements of Appendix 3 of the EIA Regulations, 2014. The assessment process will follow a structured approach comprising four key activities:

- Identification and assessment of potential impacts likely to result from the project activities.
- Prediction of the nature, magnitude, extent, and duration of these impacts, with specific focus on those that may be significant.
- Identification of appropriate mitigation measures to reduce, avoid, or manage the severity or significance of the potential impacts.
- Evaluation of residual impacts to determine the significance of the impact after implementation of mitigation measures.

The assessment of significance was guided by a set of criteria, including:

- Cumulative impacts in the broader environmental and social context.
- Nature of the impact, i.e., whether it is positive, negative, direct, or indirect.
- Extent of the impact, ranging from localised to regional or national scale.
- Probability of occurrence of the impact.
- Reversibility of the impact, i.e., whether it can be restored to pre-impact conditions.
- Irreplaceability of affected resources, considering whether resources lost can be substituted or recovered.
- Potential for mitigation, i.e., the extent to which the impact can be avoided, minimised, or offset.

The evaluation of significance followed a consequence–probability approach:

Consequence = (Duration + Extent + Irreplaceability of resource) × Severity

The overall significance of an impact was then determined using the formula:

Significance = Consequence × Probability

A summary of the criteria used to assess the significance of impacts is provided in Table 7-8, with detailed explanations presented in Table 7-9.

Table 7-8 Criteria and Rating Scales to be used in the Assessment of the Potential Impacts

Criteria	Rating Scales	Notes
Nature	Positive (+)	An evaluation of the effect of the impact related to the proposed development.
	Negative (-)	
Duration	Temporary (1)	The duration of the activity associated with the impact will last 0 - 6 months.
	Short-term (2)	The duration of the activity associated with the impact will last 6-18 months.
	Medium-term (3)	The duration of the activity associated with the impact will last 18 months - 5 years.

	Long-term (4)	The duration of the activity associated with the impact will last more than 5 years.
Extent	Footprint (1)	The impact only affects the area in which the proposed activity will occur.
	Site (2)	The impact will affect only the development area.
	Local (3)	The impact affects the development area and adjacent properties.
	Regional (4)	The effect of the impact extends beyond municipal boundaries.
	National (5)	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International (6)	The effect of the impact extends beyond country borders.
Severity	Low (1)	Where the impact affects the environment in such a way that natural, cultural, and social functions and processes are minimally affected.
	Moderate (2)	Where the affected environment is altered but natural, cultural, and social functions and processes continue albeit, in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.
	High (3)	Where natural, cultural, or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease, and valued, important, sensitive, or vulnerable systems or communities are substantially affected.
Potential for impact on irreplaceable resources	No (0)	No irreplaceable resources will be impacted.
	Yes (1)	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental (-25 to -33)	A combination of extent, duration, intensity, and the potential for impact on irreplaceable resources.
	Highly detrimental (-19 to -24)	
	Moderately detrimental (-13 to -18)	
	Slightly detrimental (-7 to -12)	
	Negligible (-6 to 0)	
	Slightly beneficial (0 to 6)	
	Moderately beneficial (13 to 18)	
	Highly beneficial (19 to 24)	
	Extremely beneficial (25 to 33)	
Probability (the likelihood of the impact occurring)	Improbable (0)	It is highly unlikely or less than 50% likely that an impact will occur.
	Probable (1)	It is between 50 and 70% certain that the impact will occur.
	Definite (2)	It is more than 75% certain that the impact will occur or the impact will occur.
Significance	Very high – negative (-49 to -66)	A function of Consequence and Probability.
	High – negative (-37 to -48)	
	Moderate – negative (-25 to -36)	
	Low – negative (-13 to -24)	
	Neutral - Very low (0 to -12)	
	Low positive (0 to 12)	
	Moderate–positive (13 to 24)	
	High–positive (37 to 48)	
	Very high – positive (49 to 66)	

Table 7-9 Explanation of Assessment Criteria

Criteria	Explanation
Nature	This is an evaluation of the type of effect the construction, operation, and management of the proposed development would have on the affected environment. Will the impact of change on the environment be positive, negative, or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. The extent of the impact is described as footprint (affecting only the footprint of the development), site (limited to the site), and regional (limited to the immediate surroundings and closest towns to the site). The extent of scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of a small extent, are of very high importance, e.g., impacts on species of very restricted range. To avoid "double counting," specialists have been requested to indicate spatial

	significance under "intensity" or "impact on irreplaceable resources" but not under "extent" as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium, and long-term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced should it be impacted. A resource could be replaced by natural processes (e.g., by natural colonisation from surrounding areas), through artificial means (e.g., by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems, substitutes are often possible (e.g., by constructing new social facilities for those who are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable, e.g., red data species that are restricted to a particular site or habitat to a very limited extent.
Consequence	The consequence of the potential impacts is a summation of the above criteria, namely the extent, duration, intensity, and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact occurring is based on the professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between the probability of the impact occurring and the probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	Impact significance is defined to be a combination of the consequence (as described below) and the probability of the impact occurring. The relationship between consequence and probability highlights that the impact (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact occurring. In simple terms, if the consequence and probability of an impact are high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision making.
Degree of confidence in predictions	Specialists and the environmental team were required to indicate the degree of confidence (low, medium, or high) that there is in the predictions made for each impact based on the available information and their level of knowledge and expertise. The degree of confidence is not considered in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

7.3.2 Cumulative Assessment Methodology

"Cumulative impact, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities."

The cumulative impact assessment will be undertaken using a structured, qualitative methodology, supported by quantitative indicators where feasible. The assessment will evaluate the contribution of the proposed project in combination with existing developments and reasonably foreseeable future activities occurring within the surrounding landscape.

Cumulative impacts will be clearly defined and, where practicable, quantified, including but not limited to:

- Cumulative land transformation (expressed in hectares).
- Loss and fragmentation of natural and semi-natural habitats.

- Reduction in ecological connectivity.
- Cumulative pressure on aquatic systems and wetlands.
- Cumulative visual and landscape character change.
- Additive disturbance to biodiversity and ecosystem processes.

The identified cumulative impacts will be assessed and rated using the same significance rating methodology applied to project-specific impacts.

7.3.2.1 Cumulative Spatial Context

A transparent and traceable cumulative assessment process will be followed. Each specialist will be required to demonstrate:

- How surrounding developments were identified and spatially mapped.
- How cumulative interaction pathways were evaluated.
- How existing baseline degradation and development pressure were considered.
- How mitigation measures and findings from similar developments in the area informed the assessment.
- How proposed mitigation measures contribute to reducing cumulative effects.

This process will be clearly documented within the individual specialist reports.

7.3.2.2 Use of Cumulative Impact Findings

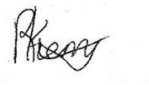
A clear cumulative impact environmental statement will be provided, indicating whether the proposed project should proceed in the context of existing and reasonably foreseeable developments within the surrounding area.

7.4 Appendix I: Specialist Declaration of Independence

DECLARATION

I, Ryno Kemp, 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 taken 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 Regulation 71 and is punishable in terms of Section 24F of the Act.



Ryno Kemp

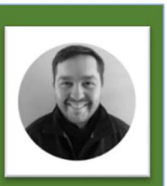
Ecologist

The Biodiversity Company

April 2026

7.5 Appendix II: Specialist CV

Dr Ryno KEMP



Pr Sci Nat 117462/17 +27 83 273 3488 ryno@thebiodiversitycompany.com

PROFILE SUMMARY

Avifauna and ecological specialist with 5 years' consulting experience, with international working experience. Specialist experience in project exploration, mining, hydropower, renewable energy, and private sector developments. Project management of national and international multi-disciplinary projects. Provides specialist guidance, technical support, and facilitation for compliance with in-country legislative requirements and international lender standards. Registered Pr Sci Nat with the South African Council for Natural Scientific Professions.

PERSONAL INFO

Nationality: South African
Date of birth: 09 October 1991

EXPERIENCE

Lender reporting requirements
Environmental Impact Assessments (EIA)
Environmental Management Programme (EMP)
Project Management
Avifaunal Conservation Surveys
Unit manager

SKILLS

- ✓ Habitat Modelling
- ✓ Flight path modelling
- ✓ Critical Habitat Assessments
- ✓ Avifauna, Faunal and Bat Assessments
- ✓ Long-term Monitoring (Avifauna)
- ✓ Monitoring & Management Plans
- ✓ GIS spatial analysis

LANGUAGES

English – Proficient
Afrikaans – Proficient

ACADEMIC QUALIFICATIONS

University of Pretoria, Pretoria, South Africa (2017 - 2024): PhD in Zoology
Title: Investigates the impacts of climate change on threatened arid-zone Red Lark (*Calendulauda burra*) using a mechanistic model

University of Pretoria, Pretoria, South Africa (2016): BSc Honours in Zoology
Title: Investigated the thermoregulation ability in free-ranging Ground Woodpeckers during cold winter months.

University of Pretoria, Pretoria, South Africa (2011 - 2015): BSc in Zoology

UNISA, South Africa (2020): Certificate in Environmental Law and Liabilities for the Regulated Community (Short course).

PROFESSIONAL EXPERIENCE

Nov 2022 – Present	**The Biodiversity Company** Ecologist / Avifauna Specialist/Unit Manager
Feb 2020 – Nov 2022	**VulPro** Research Manager
Sept 2021 – Nov 2022	**ZESC** Avifauna specialist

INTERNATIONAL EXPERIENCE

Angola, Zambia, South Africa

Signed: Ryno Kemp