PROPOSED LIMESTONE PV2 SOLAR PHOTOVOLTAIC FACILITY PROJECT – AVIFAUNA IMPACT ASSESSMENT

Z F Mgcawu District Municipality, Northern Cape

April 2022

CLIENT

Prepared by:

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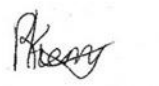
Report Writer & Fieldwork	**Ryno Kemp** 
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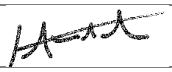
Reviewer	**Andrew Husted** 
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 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.

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1. Introduction

1.1 Background

The Biodiversity Company was appointed to undertake an avifauna assessment for the proposed Limestone PV2 project and associated infrastructure. The project comprises a development area referred to as Limestone PV2. The project is located on Portion 4 of the Farm Engeland 300, near Danielskuil, Northern Cape Province. (**Error! Reference source not found.**). A 200 m buffer was added to the Project area for the assessments, referred to as the Project Area of Influence (PAOI) (Figure 1-2).

Each project will have a contracted capacity up to 150MW Maximum Export Capacity. A broader study area of 1842 ha and a preferred project site with an extent of up to 350ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the PV facilities. Each facility is proposed to include the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost;
- Inverters and transformers;
- Low voltage cabling between the PV modules to the inverters;
- Fence around the project development area with security and access control;
- Camera surveillance;
- Internet connection;
- 33 kV cabling between the project components and the facility substation;
- 33/132 kV onsite facility substation;
- Battery Energy Storage System (BESS) with a footprint of 6ha;
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors;
- Laydown/staging area less site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha);
- Access roads (up to 6 m wide) and internal distribution roads (up to 5m wide);
- Temporary concrete batching facility; and
- Stormwater management infrastructure as required.

The PAOI is in the Kgatelopele Local Municipality in the ZF Mgcawu District Municipality of the Northern Cape Province, South Africa. The area is approximately 9 km northeast of Lime Acres and 10 km northwest of the town of Witputs. The PAOI is also found approximately 8.3 km west of the R385 road and 6.4 km north of the R31 road. The surrounding land use includes limestone mining, watercourses, livestock, and game farming activities.

This desktop assessment and sensitivity verification was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the sensitivity for the terrestrial and animal biodiversity themes for the PAOI as “Very High” and “High”, respectively.

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.

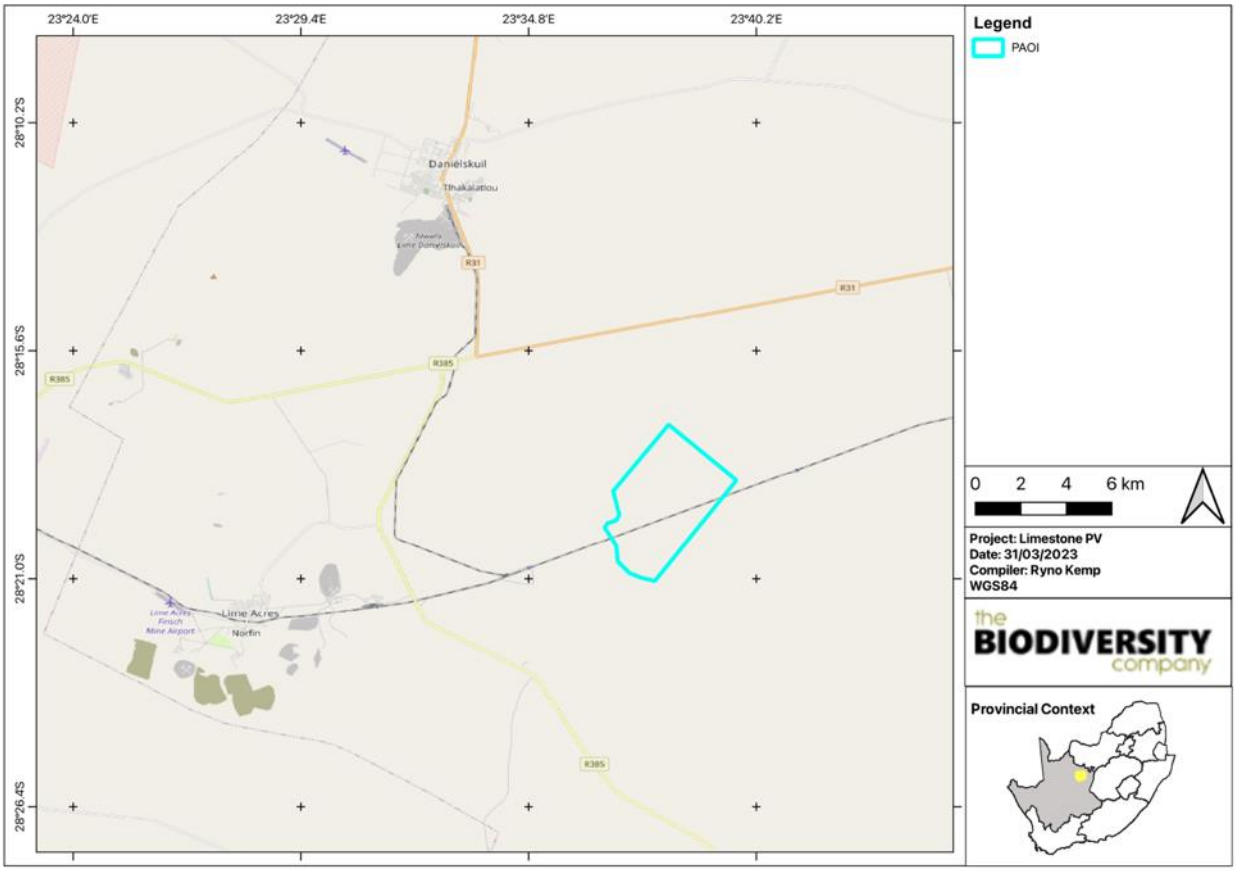


Figure 1-1 The Project Area of Influence in proximity to nearby towns

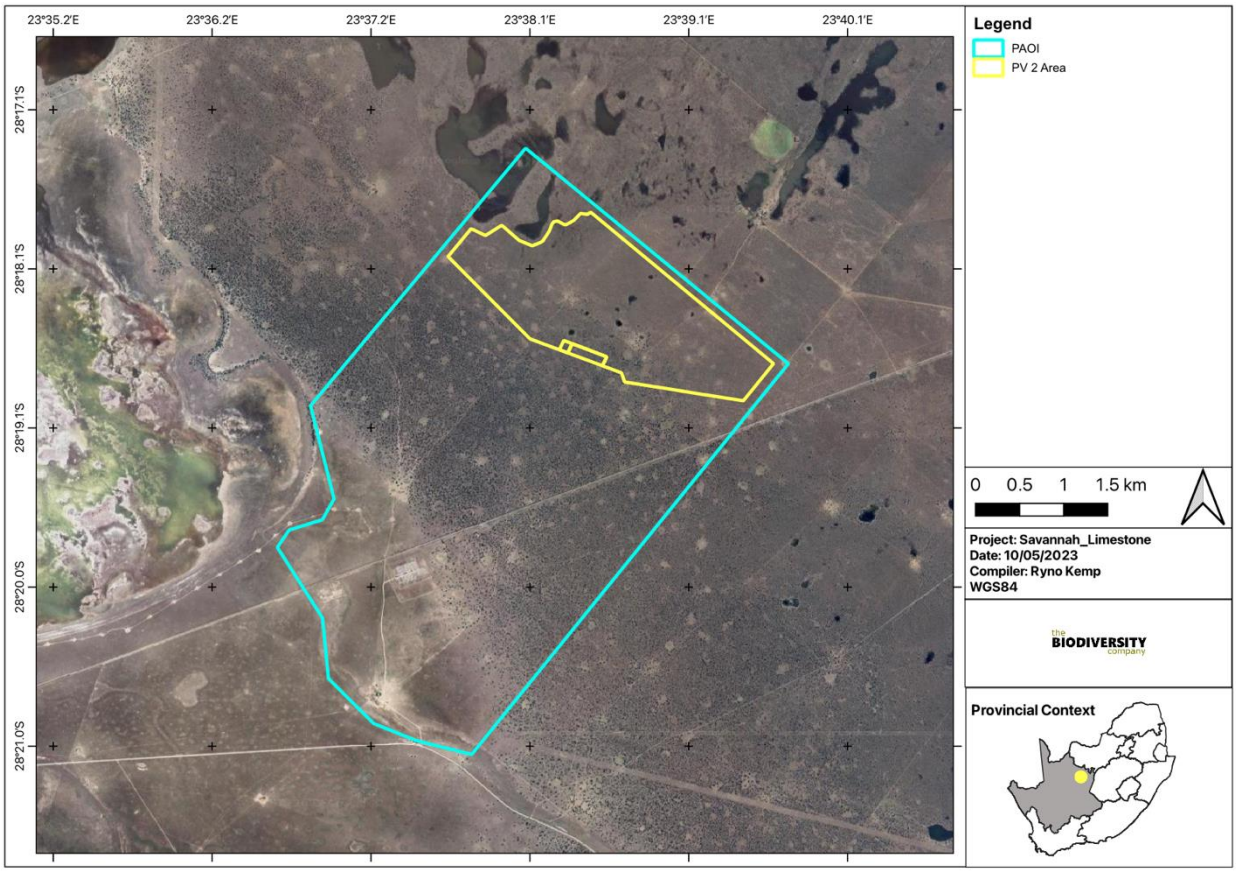


Figure 1-2 Map illustrating the layout design of the Project Area of Influence

1.2 Scope of Work

This assessment was undertaken in accordance with the Best Practice Guidelines for Birds and Solar Energy (BirdLife South Africa, 2017). A desktop assessment and a field survey were undertaken to ascertain the area's baseline avifauna and present a detailed description of the receiving environment. The scope of the Basic Avifauna Assessment included the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the PAOI;
- Identify the manner in which the proposed project impacts based on the site assessment and desktop information and evaluate the level of risk of these potential impacts;
- Identify specific regions and avian habitats in and outside the study area that could be regarded as sensitive, or which may harbour Species of Conservation Concern (SCC); and
- Identify significant bird breeding, roosting or feeding sites and possible avian flight paths or migratory routes.
- Impact assessment, mitigation measures to prevent or reduce the possible impacts.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this assessment:

- For the purposes of this assessment, the results from the desktop evaluation and field survey considered the entire PAOI;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- Although considerable time has been spent to ensure that the information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists);
- The GPS used for the assessment is accurate to 5 metres, and therefore any spatial features may be offset by this distance;
- Any alterations and/or missing GIS information pertaining to the development layout subsequent to this assessment may affect the accuracy and/or outcomes of the assessment;
- The fieldwork component of this assessment comprised of two surveys. The field investigation was completed between 13-16 September 2022 (dry season) and 14-16 February 2023 (wet season).

1.4 Key Legislative Requirements

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

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

Region	Legislation / Guideline
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)

Region	Legislation / Guideline
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Northern Cape Planning and Development Act no. 7 of 1998
	Northern Cape Nature Conservation act no. 9 of 2009

2. Definitions

2.1 Project Area of Influence

The Project Area of Influence (PAOI) encompasses the geographical extent of the potential impacts of the proposed development on the receiving environment. Essentially, the PAOI is defined according to the important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities (Figure 1-2).

2.2 Species of Conservation Concern (SCC)

According to the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species with high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of conservation status categories, as illustrated in Figure 2-1.

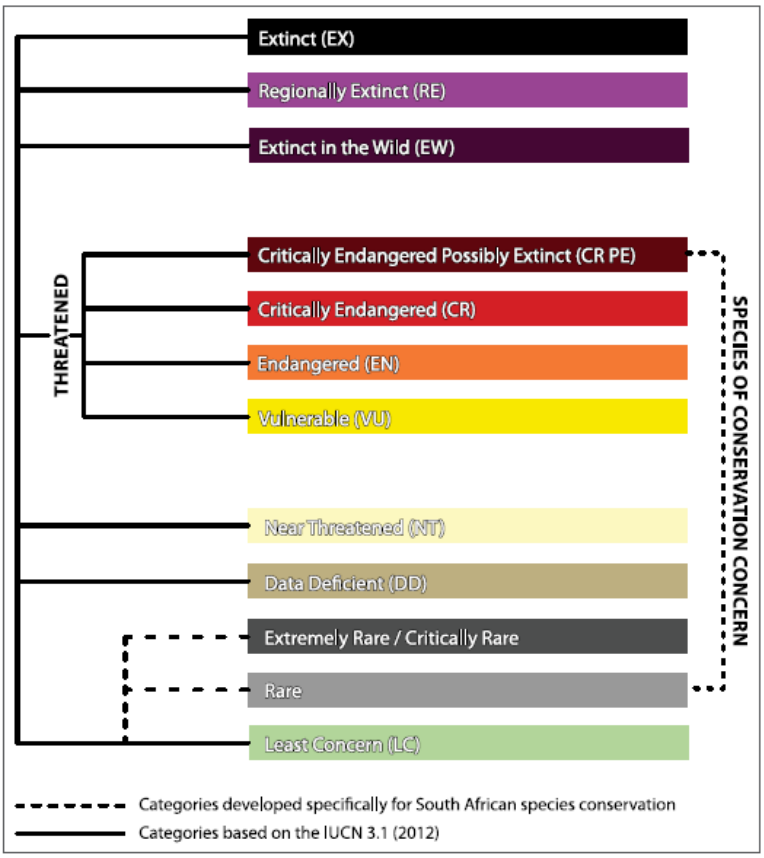


Figure 2-1 The different Species of Conservation Concern categories were modified from the IUCN's extinction risk categories. Source: SANBI (2020)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction, and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna and the IUCN categories for this report.

2.3 Priority Species

Priority species are susceptible to impacts from energy developments (Ralston Paton *et al.* 2017). These species are typically susceptible to collisions. This list (Ralston Paton *et al.* 2017) was developed initially for use with Wind Energy Facilities; however, the collision, electrocution and habitat loss risks are considered appropriate for renewable energy developments and so are utilised here. Also utilised here is

the Eskom and EWT poster: Birds and Powerlines (Eskom and EWT, Date unknown), which identifies birds most prone to collision and electrocution from powerlines. Some birds are not included in these lists, but are considered by the TBC avifauna specialists as risk species for collisions, electrocutions and habitat loss as a result of Solar PV infrastructure. All of species are referred to collectively in this report as “Risk Species”.

3. Methods

3.1 Desktop Assessment

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

3.1.1 Ecologically Important Landscape Features

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

- Northern Cape Critical Biodiversity Areas (CBAs) (SANBI, 2016) - The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes. CBA categories are based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- 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 the 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 – an indicator of an ecosystem's well-being based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - Ecosystem Protection Level – 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.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) (DFFE, 2022) – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attribute information for formally protected areas and areas with less formal protection. SAPAD is updated continuously and forms the basis for the Register of Protected Areas, a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

  - National Protected Areas Expansion Strategy (NPAES) (DFFE, 2021) – The NPAES provides spatial information on areas suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and, therefore, highly important for biodiversity, climate resilience and freshwater protection.

- Hydrological Setting:
  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Impact Assessment of 2018. It is a collection of data layers that represent the extent of the river and inland wetland ecosystem types as well as the pressures on these systems.
  - Strategic Water Source Areas (SWSAs) (Lotter *et al*, 2021) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and, therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.
  - National Freshwater Ecosystem Priority 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.

3.1.2 Expected Avifauna Species

The following resources were considered during the desktop assessment and for the compilation of the expected species list:

- South African Bird Atlas Project 2 (SABAP2). Full protocol data from 8 relevant pentads (2815_2330; 2815_2335; 2820_2330; 2820_2335; 2820_2340; 2825_2330; 2825_2335; 2825_2340) were used to compile the expected species list;
- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is done through a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php;
- Coordinated Avifaunal Roadcounts (CAR) – The Coordinated Avifaunal Roadcounts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/ADU project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). Presently it monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method;
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria;
- Hockey *et al*. (2005), Roberts Birds of Southern Africa (7th edition). The primary source for species identification, geographic range, and life history information;
- Sinclair and Ryan (2010), Birds of Africa. Secondary source for identification; and
- Taylor *et al*. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland. Used for conservation status, nomenclature, and taxonomical ordering.

3.2 Field Assessment

The fieldwork component of this assessment comprised of two surveys. The field investigation was completed between 13-16 September 2022 (dry season) and 14-16 February 2023 (wet season). Sampling consisted of standardised point counts within the PAOI (Figure 3-1). 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 (Cumming & Henry, 2019). Each point count was run over a 10 min period. The horizontal detection limit was set at 150 m. At each point, the observer would document the date, start time, and 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 important conservation species. Diurnal incidental searches were conducted to supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count protocol. This involved opportunistic species sampling between point count periods, random meandering, and road cruising.

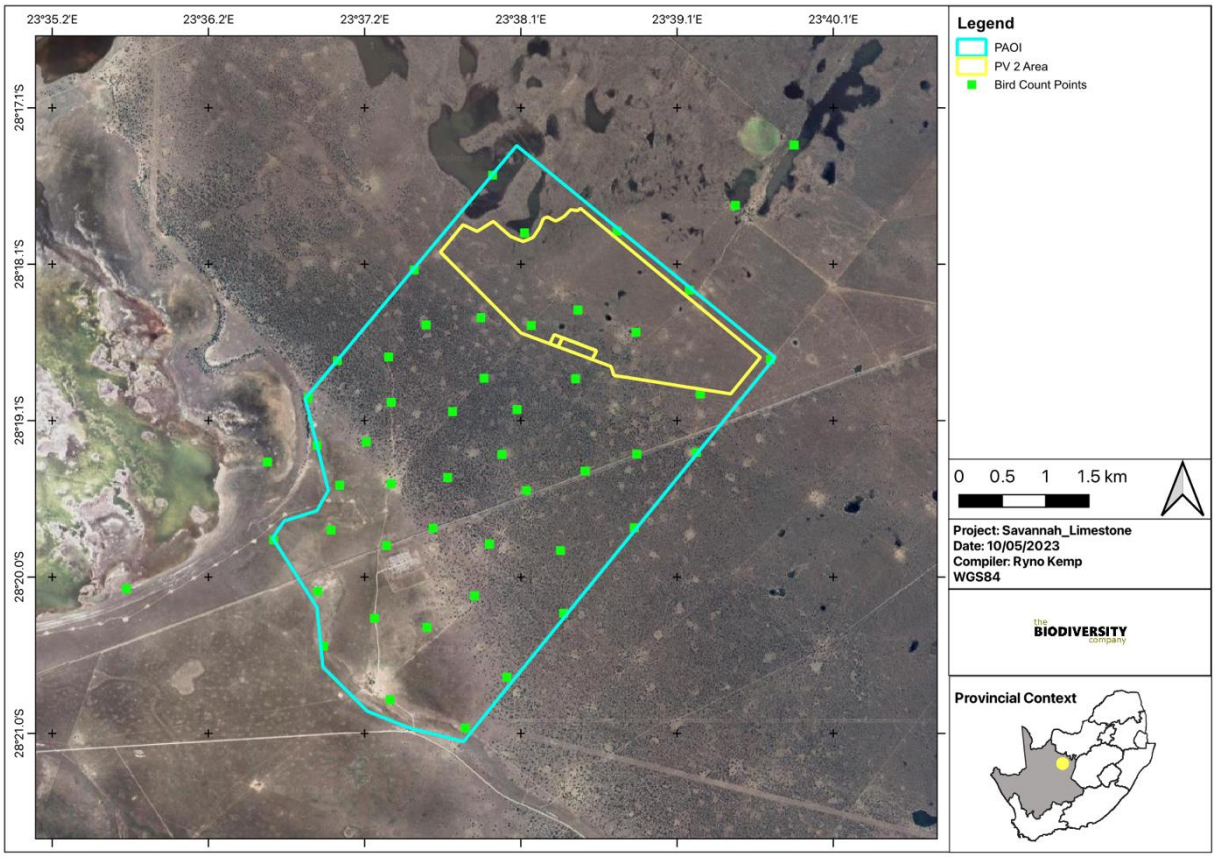


Figure 3-1 Map illustrating the field survey and locations of standardised point counts

3.3 Data Analysis

The analyses described below only used the data collected from the standardised point counts. Identification of the dominant species within the PAOI was based on the density and frequency of occurrence. The number of individuals counted within each point count was used to calculate the density of the avifauna species recorded within the PAOI. The detection limit for each point count was set to 150 m to avoid overlap, which is also the radius as the observer is located within the middle of a circle. The frequency of occurrence was determined by the ratio of the number of points a species recorded to the total number of points. Lastly, present species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore). By the medium

upon/within which they most frequently forage (ground, water, foliage, air) and their activity period (nocturnal or diurnal).

3.4 Avifauna Site Ecological Importance

The different habitat types within the project area have been delineated and identified based on observations during the field assessment and available satellite imagery. These habitat types have been 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).

BI is a function of Conservation Importance (CI), and the receptor's Functional Integrity (FI) is as follows. The CI and FI rating criteria are provided in Table 3-1 and

Table 3-2, respectively.

Table 3-1 Summary of Conservation Importance (CI) criteria

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

Table 3-2 Summary of Functional Integrity (FI) criteria

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

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

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

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

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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 3-4.

Table 3-4 Summary of Receptor Resilience (RR) criteria

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

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 3-5.

Table 3-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in Table 3-6.

Table 3-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

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

4. Results & Discussion

4.1 Desktop Assessment

4.1.1 Ecologically Important Landscape Features

The following features describe the general area and habitat. This assessment is based on spatial data from various sources, such as the provincial environmental authority and SANBI. The desktop analysis and its relevance to this project are listed in Table 4-1.

Table 4-1 Summary of the relevance of the proposed development to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
Biodiversity Spatial Plan	Relevant - The PAOI overlaps with CBA1 and CBA2	4.1.1.1
Ecosystem Threat Status	Irrelevant - The proposed PAOI overlaps with a LC ecosystem	4.1.1.2
Ecosystem Protection Level	Relevant - The proposed PAOI project overlaps with mainly with NP ecosystem, with a small portion being MP	4.1.1.3
Protected Areas	Irrelevant - The PAOI is situated 25 km north of the Rockwood Nature Reserve	4.1.1.4
National Protected Areas Expansion Strategy	Relevant - The PAOI is 2.2 km from the nearest NPAES areas	4.1.1.5
Important Bird and Biodiversity Areas	Irrelevant - The PAOI does not overlap with any IBA	4.1.1.6
Coordinated Avifaunal Road Count	Irrelevant - The PAOI does not overlap with any Coordinated Avifaunal Roadcount	4.1.1.7
Coordinated Waterbird Count	Relevant - The PAOI is in close proximity to two Coordinated Waterbird Count sites	4.1.1.8
Strategic Water Source Areas	Irrelevant - The PAOI does not fall within any Strategic Water Source Areas	4.1.1.9
South African Inventory of Inland Aquatic Ecosystems	Relevant - The PAOI overlaps with unclassified and LC wetlands and a CR river	4.1.1.9
National Freshwater Priority Area	Relevant - The PAOI overlaps with moderately modified rivers and FEPA wetlands	4.1.1.9
Powerline Corridor	Irrelevant - The PAOI does not overlap with any EGI corridor	4.1.1.10
Renewable Energy Development Zone (REDZ)	Irrelevant - The PAOI does not overlap with any REDZ	4.1.1.11
Renewable Energy EIA Application Database (REEA)	Relevant - The PAOI overlaps with already approved REEA projects.	4.1.1.12

4.1.1.1 Northern Cape Conservation Plan

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map, which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape.

Identifying Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating patterns and processes and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.

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

Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets. Still, they play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering

ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

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

Relevant - The PAOI overlaps with CBA1 and CBA2 (Figure 4-1).

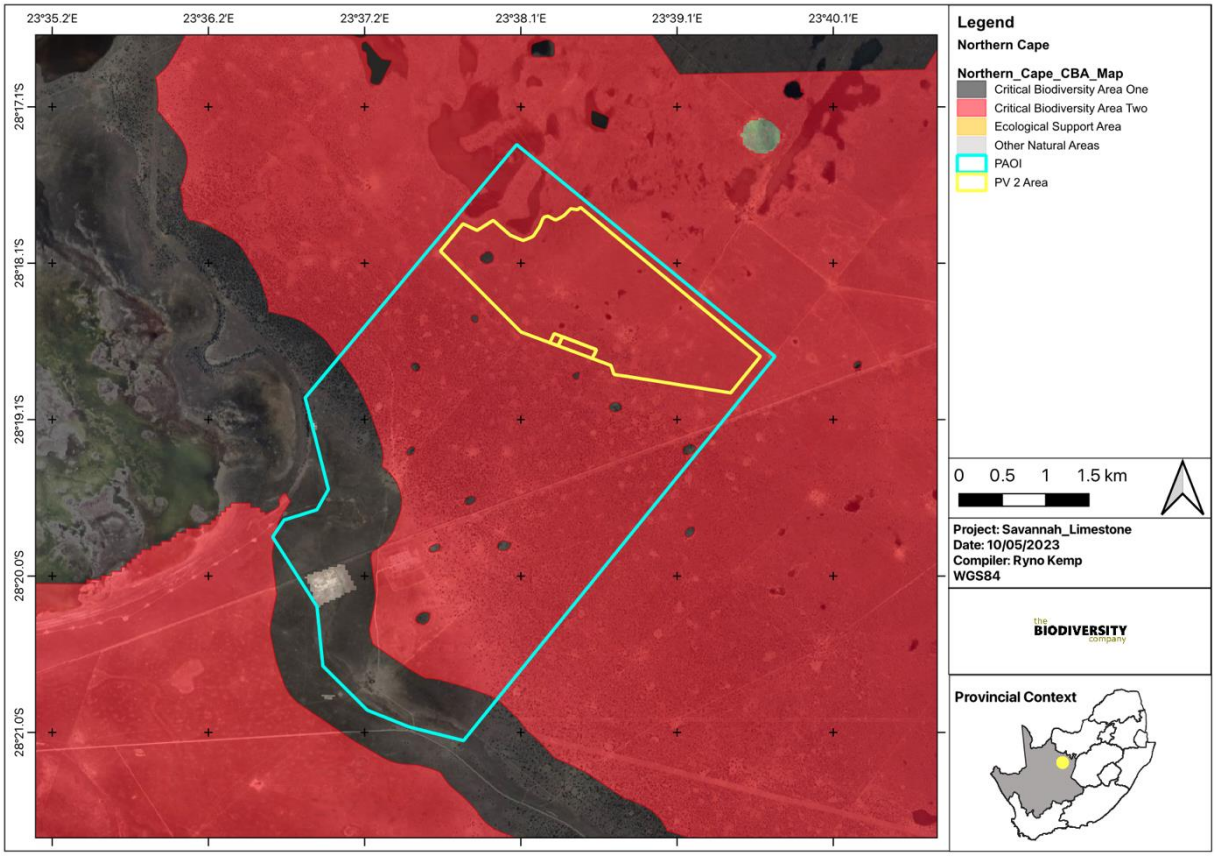


Figure 4-1 Map illustrating the location of Critical Biodiversity and Ecological Support Areas proximal to the Project Area of influence.

4.1.1.2 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's well-being 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.

Irrelevant - The proposed PAOI overlaps with a LC ecosystem (Figure 4-2).

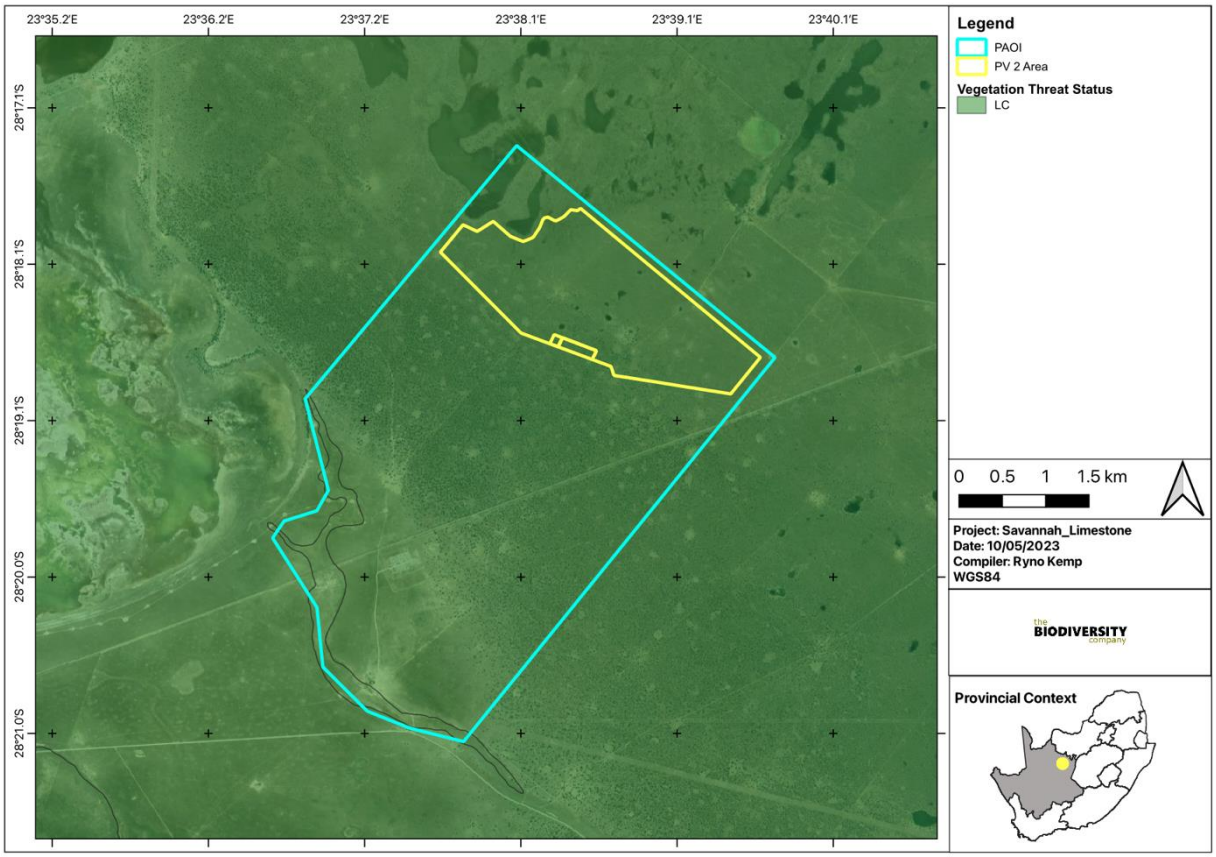


Figure 4-2 Map illustrating the ecosystem threat status associated with the PAOI.

4.1.1.3 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.

Relevant - The proposed PAOI project overlaps with mainly with NP ecosystem, with a small portion being MP (Figure 4-3).

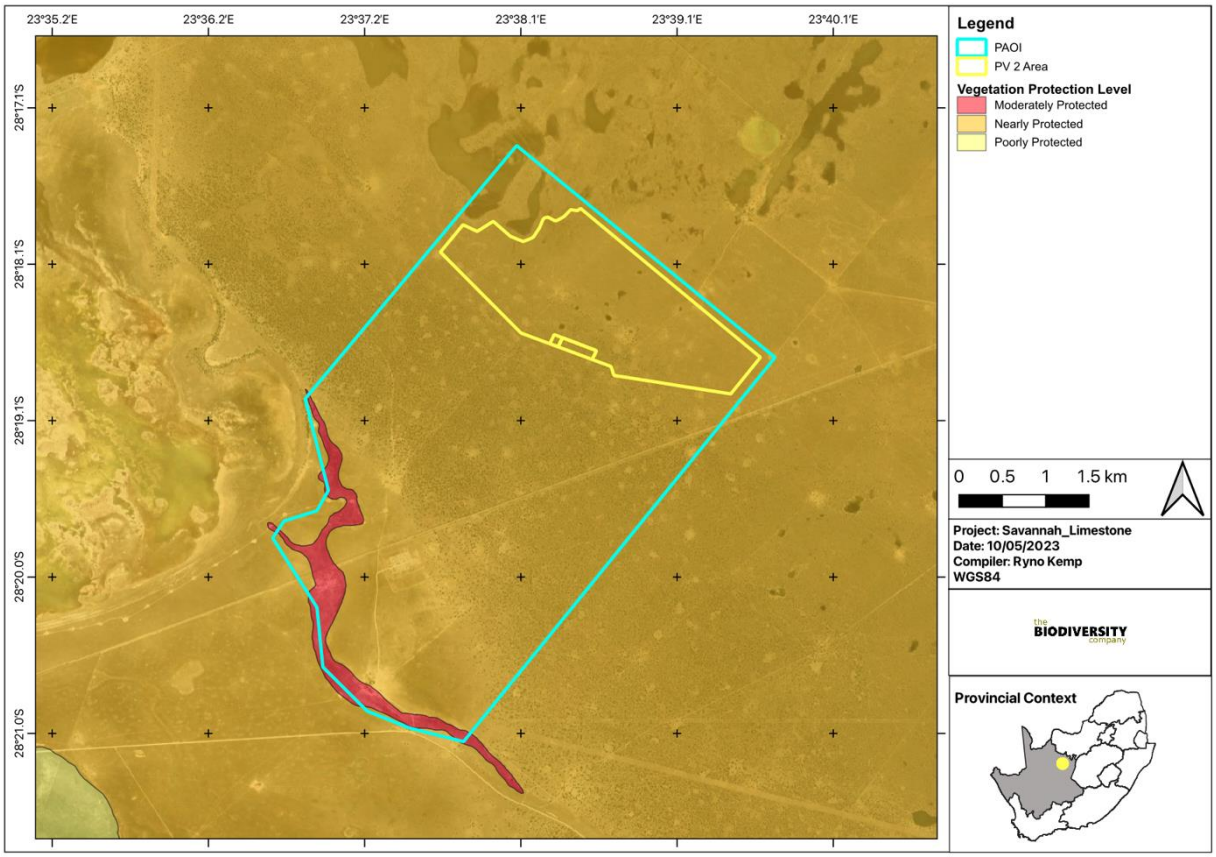


Figure 4-3 Map illustrating the ecosystem protection level associated with the PAOI

4.1.1.4 Protected Areas

According to the protected area spatial datasets from SAPAD (DFFE, 2022) and SACAD (DFFE, 2022).

Irrelevant - The PAOI is situated 25 km north of the Rockwood Nature Reserve (Figure 4-4**Error! Reference source not found.**).

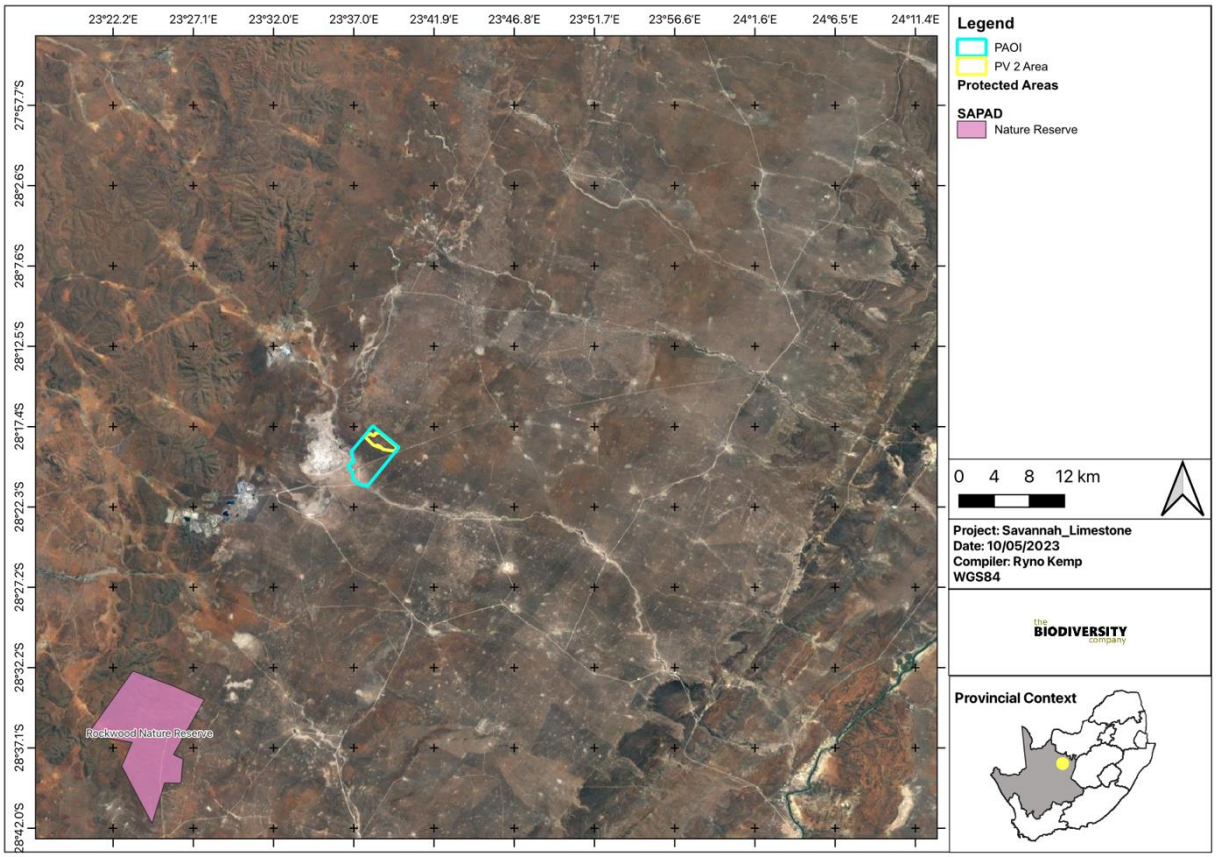


Figure 4-4 Map illustrating the Project Area of Influence (PAOI) in relation to Conservation and Protected Areas

4.1.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy (NPAES) areas were identified through a systematic biodiversity planning process. They presented the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases, only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning, which may identify different priority sites based on local requirements, constraints and opportunities (DFFE, 2021).

Relevant - The PAOI is 2.2 km from the nearest NPAES areas (Figure 4-5).

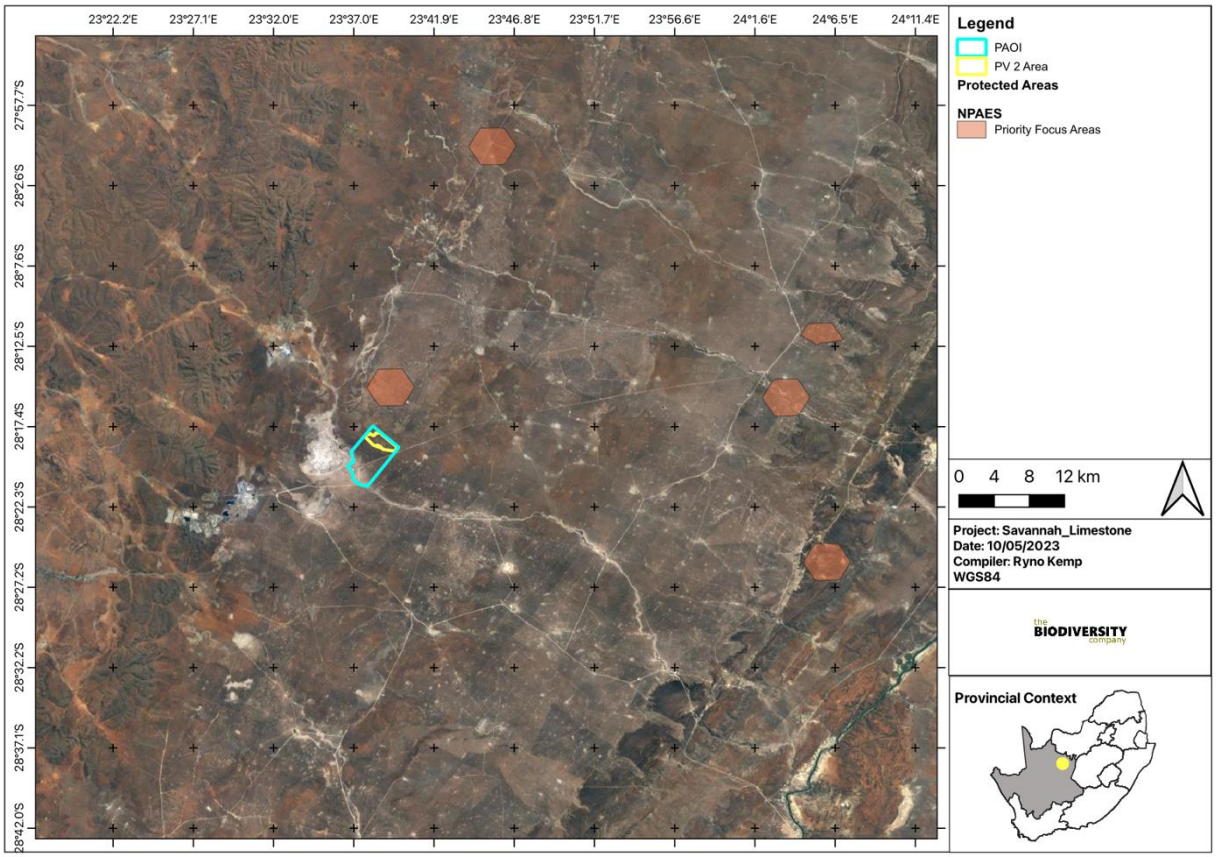


Figure 4-5 Map illustrating the Project Area of Influence (PAOI) in relation to NPAES Focus Areas

4.1.1.6 Important Bird and Biodiversity Area

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (BirdLife South Africa, 2017).

According to Birdlife South Africa (2017), selecting IBAs is achieved by applying quantitative ornithological criteria grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among and enabling comparability between sites at national, continental and global levels.

Irrelevant - The PAOI does not overlap with any IBA (Figure 4-6).

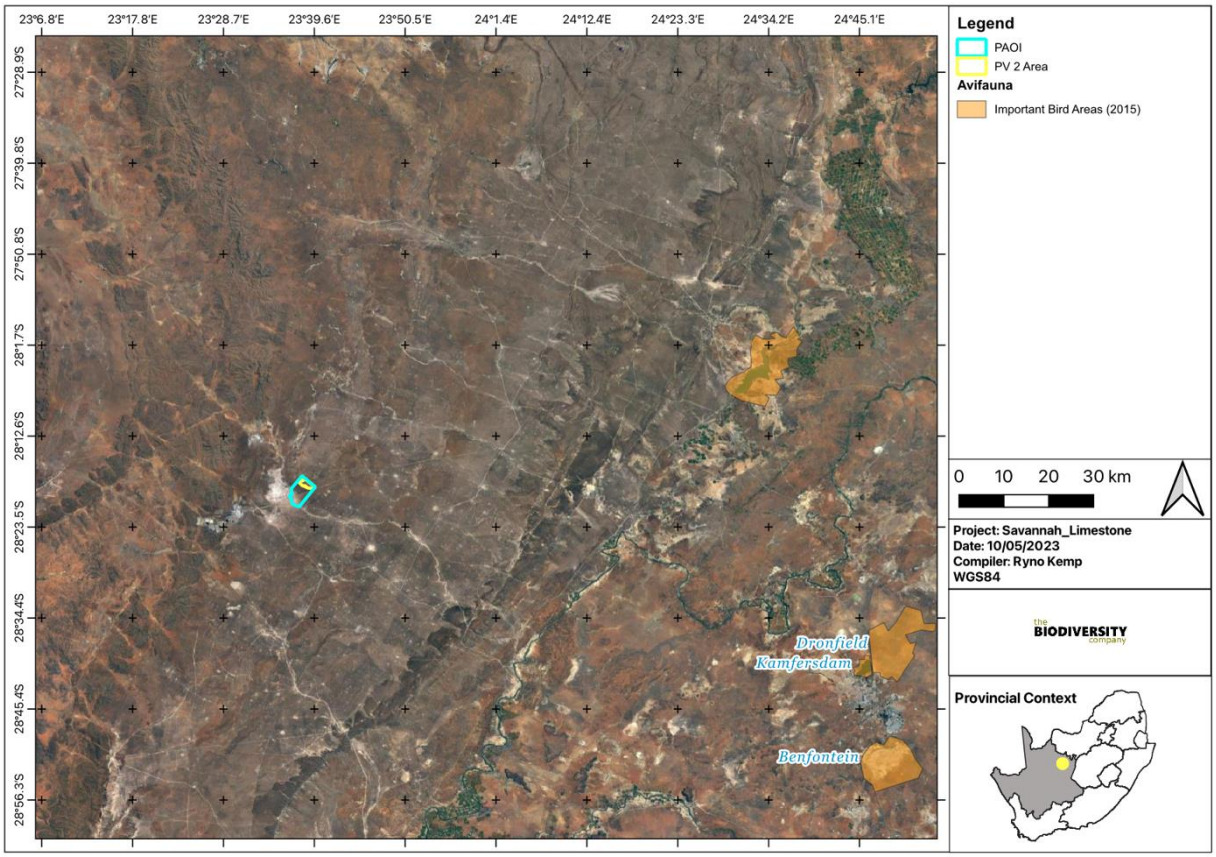


Figure 4-6 Map illustrating the locations of Important Bird and Biodiversity Areas proximal to the Project Area of Influence (PAOI)

4.1.1.7 Coordinated Avifaunal Roadcount (CAR)

The Animal Demographic Unit (ADU)/Cape bird club pioneered the avifaunal road counts of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis Denham*). Today it has been expanded to monitor 36 species of large terrestrial birds (cranes, bustards, korhaans and storks) along 350 fixed routes covering over 19 000 km. Road counts are carried out twice yearly in midsummer (the last Saturday in January) and midwinter (the last Saturday in July) using this standardised method. These counts are essential for conserving these larger species that are under threat due to habitat loss through land use changes, increases in crop agriculture and human population densities, poisoning, and man-made structures like powerlines. With the prospect of increasing wind and solar farms, using renewable energy sources and monitoring these species is most important (CAR, 2020).

Irrelevant - The PAOI does not overlap with any Coordinated Avifaunal Roadcount (Figure 4-7).

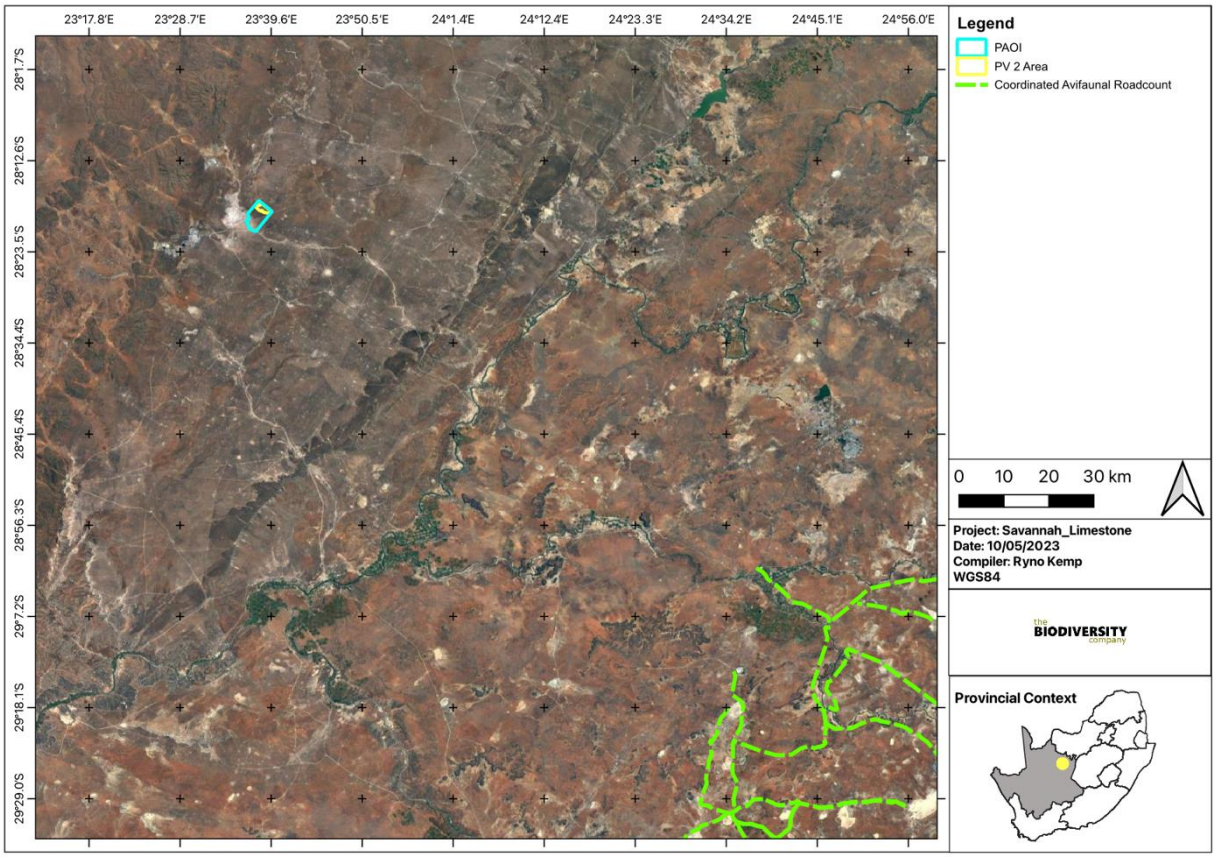


Figure 4-7 Map illustrating the Project Area of Influence (PAOI) in relation to Coordinated Avifaunal Roadcounts (CAR)

4.1.1.8 Coordinated Waterbird Count

The ADU launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds, including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC, please refer to http://cwac.birdmap.africa/about.php.

Relevant - The PAOI is in close proximity to two Coordinated Waterbird Count sites (Figure 4-8).

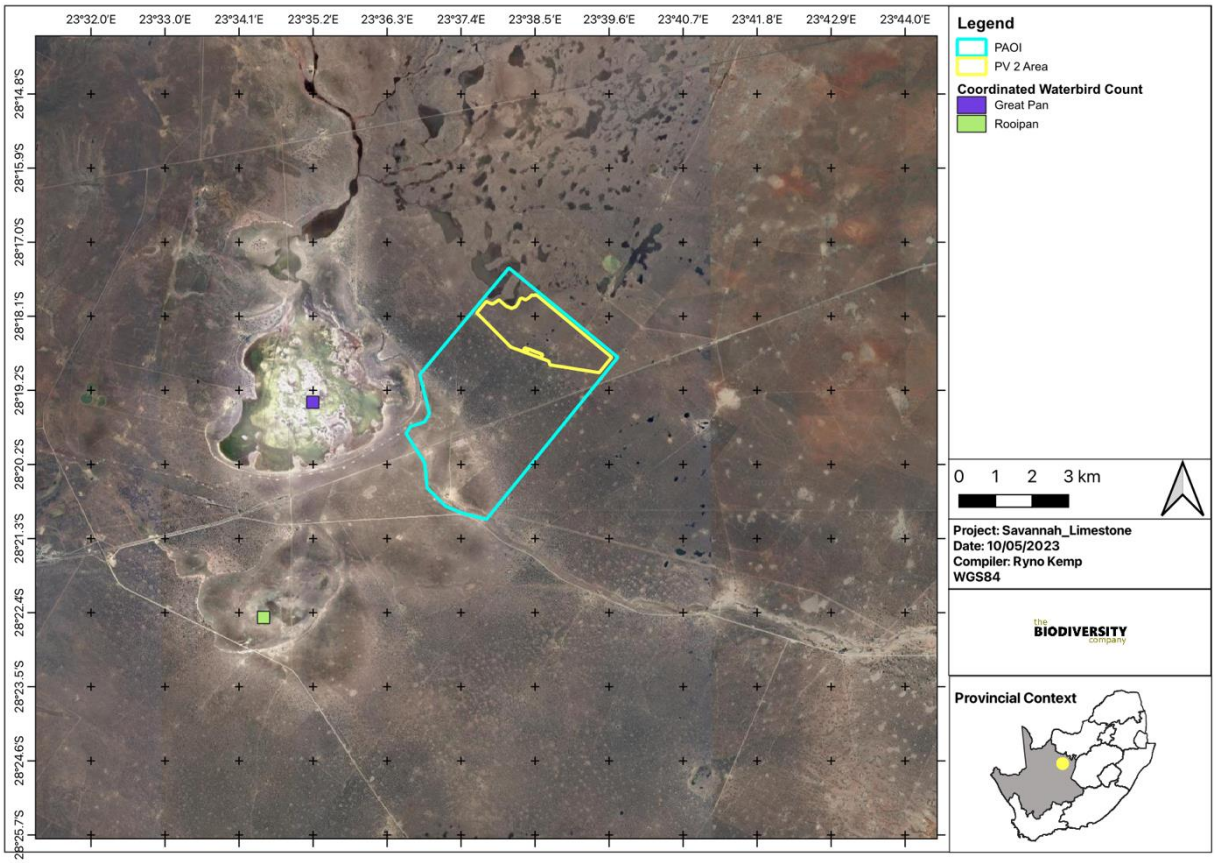


Figure 4-8 Map illustrating the Project Area of Influence (PAOI) in relation to Coordinated Waterbird Counts (CWAC)

4.1.1.9 Hydrological Context

Irrelevant - The PAOI does not fall within any Strategic Water Source Areas (SWSA).

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. The ecosystem threat status (ETS) of the river and wetland ecosystem types is based on the extent to which each river ecosystem type has been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019). Relevant - The PAOI overlaps with unclassified and LC wetlands and a CR river (Figure 4-9).

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al., 2011). The FEPAs are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEMBA) biodiversity goals (Nel et al., 2011). *Relevant* - The PAOI overlaps with moderately modified rivers and FEPA wetlands (Figure 4-10).

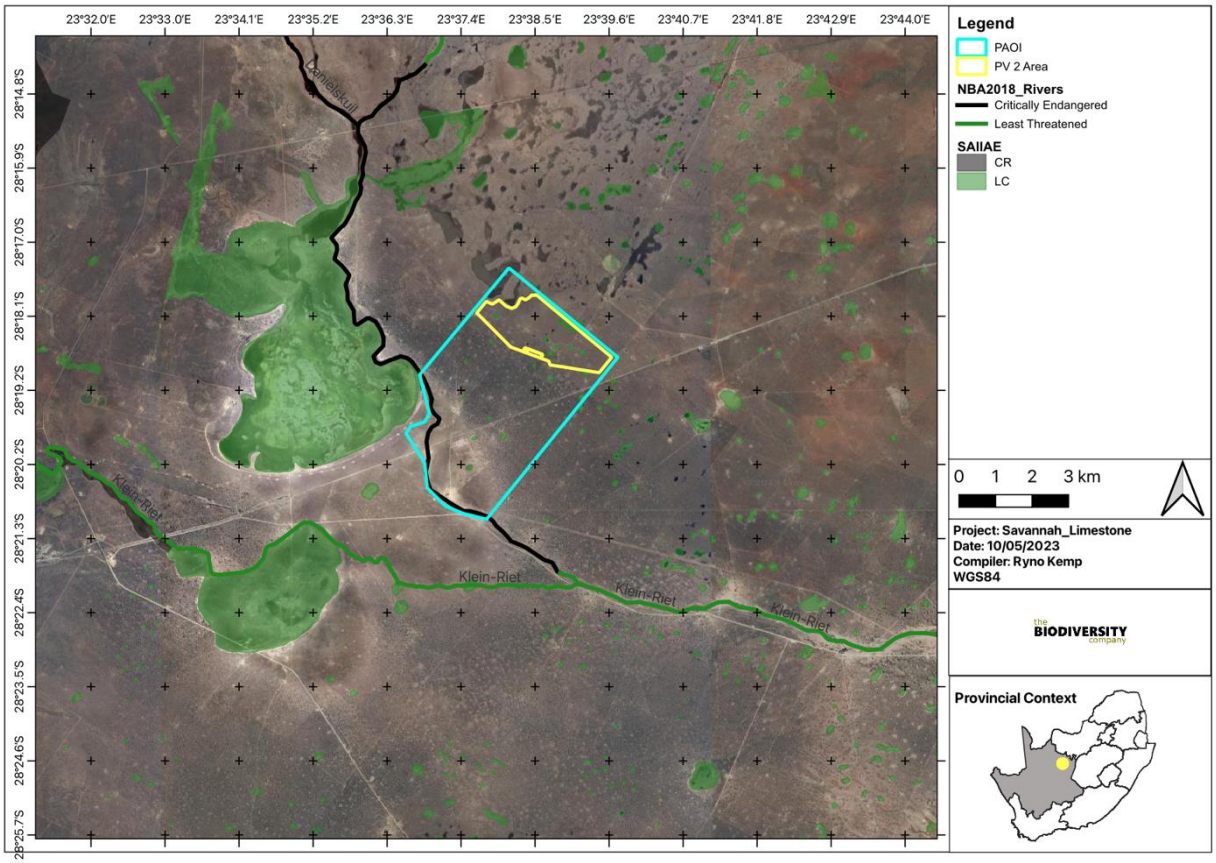


Figure 4-9 Map illustrating the Project Area of Influence (PAOI) in relation to South African Inventory of Inland Aquatic Ecosystems (SAIIAE) features

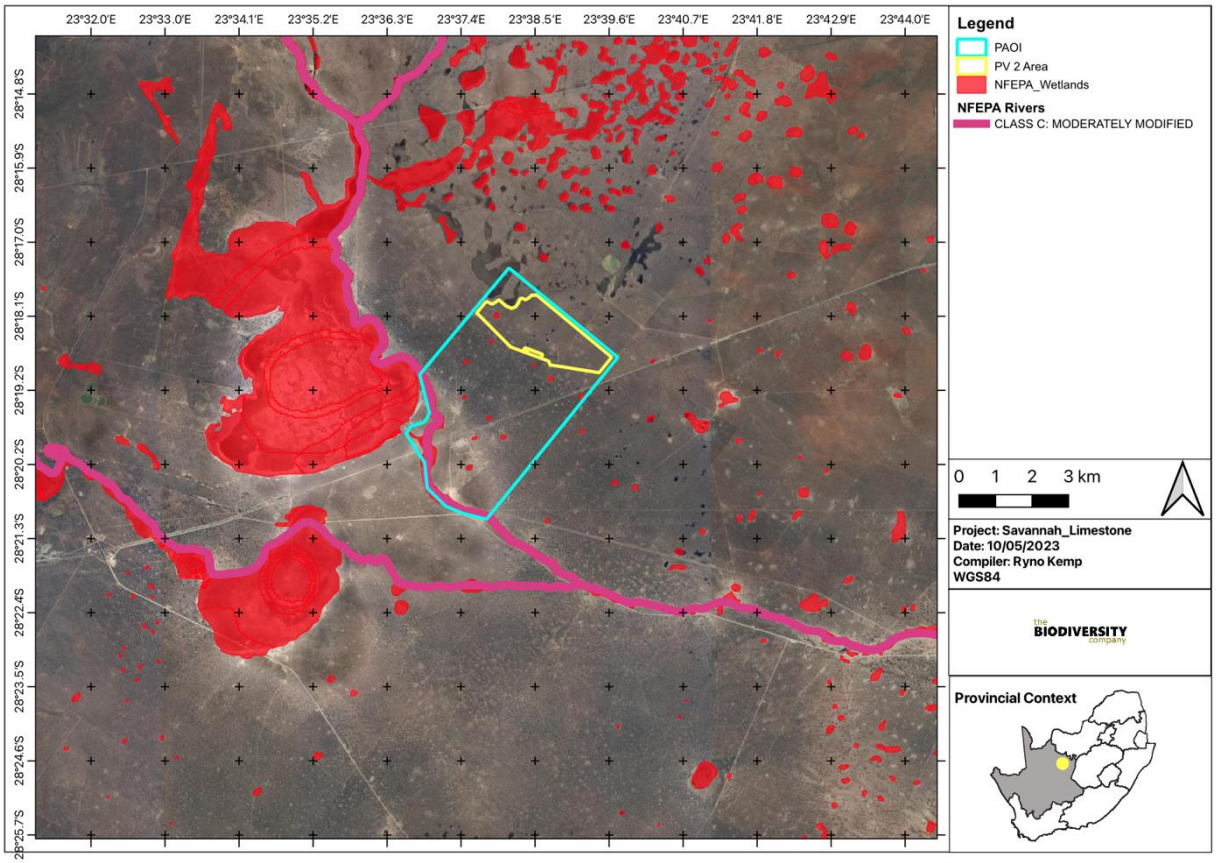


Figure 4-10 Map illustrating the Project Area of Influence (PAOI) in relation to the National Freshwater Ecosystem Priority Areas

4.1.1.10 Strategic Transmission Corridors (EGI)

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

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

Irrelevant - The PAOI does not overlap with any EGI corridor (Figure 4-11).

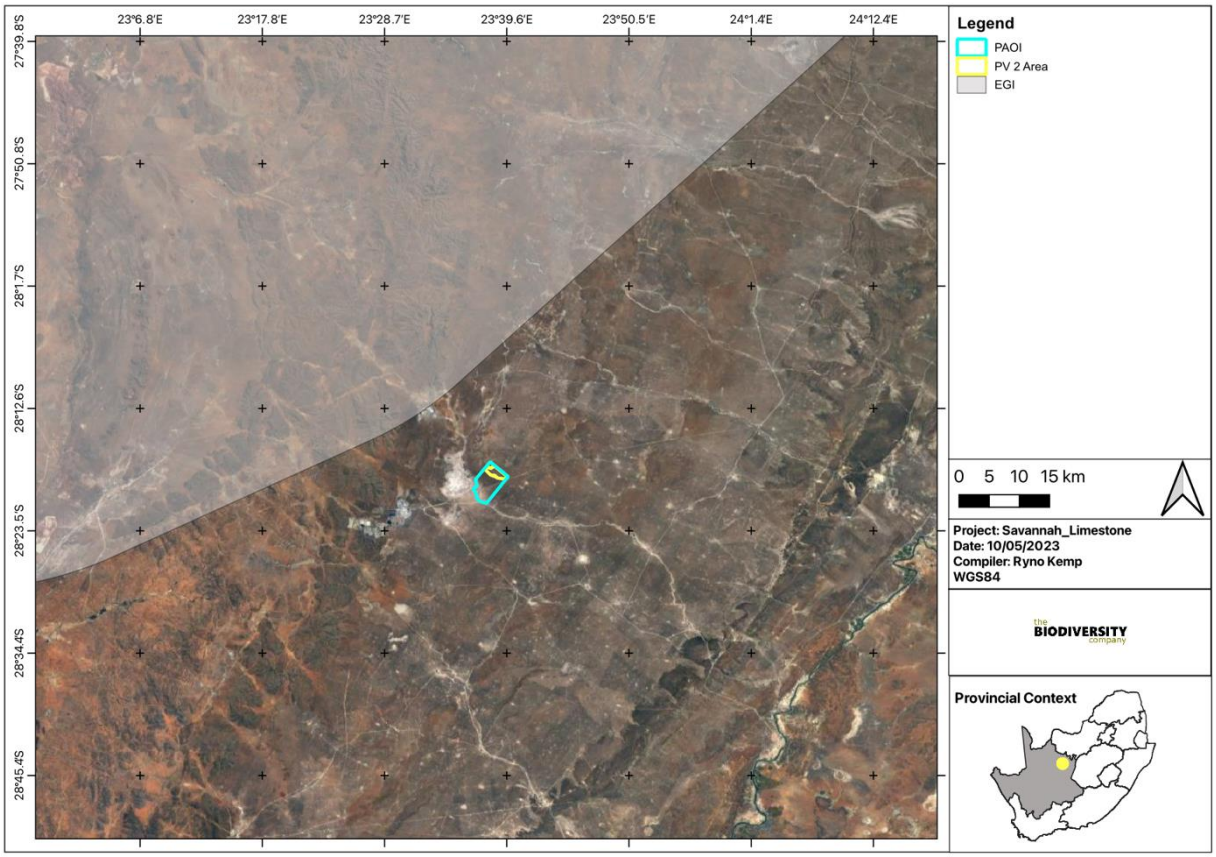


Figure 4-11 Map illustrating the location of the Strategic Transmission Corridors proximal to the Project Area of influence.

4.1.1.11 Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large-scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

Irrelevant - The PAOI does not overlap with any REDZ (Figure 4-12).

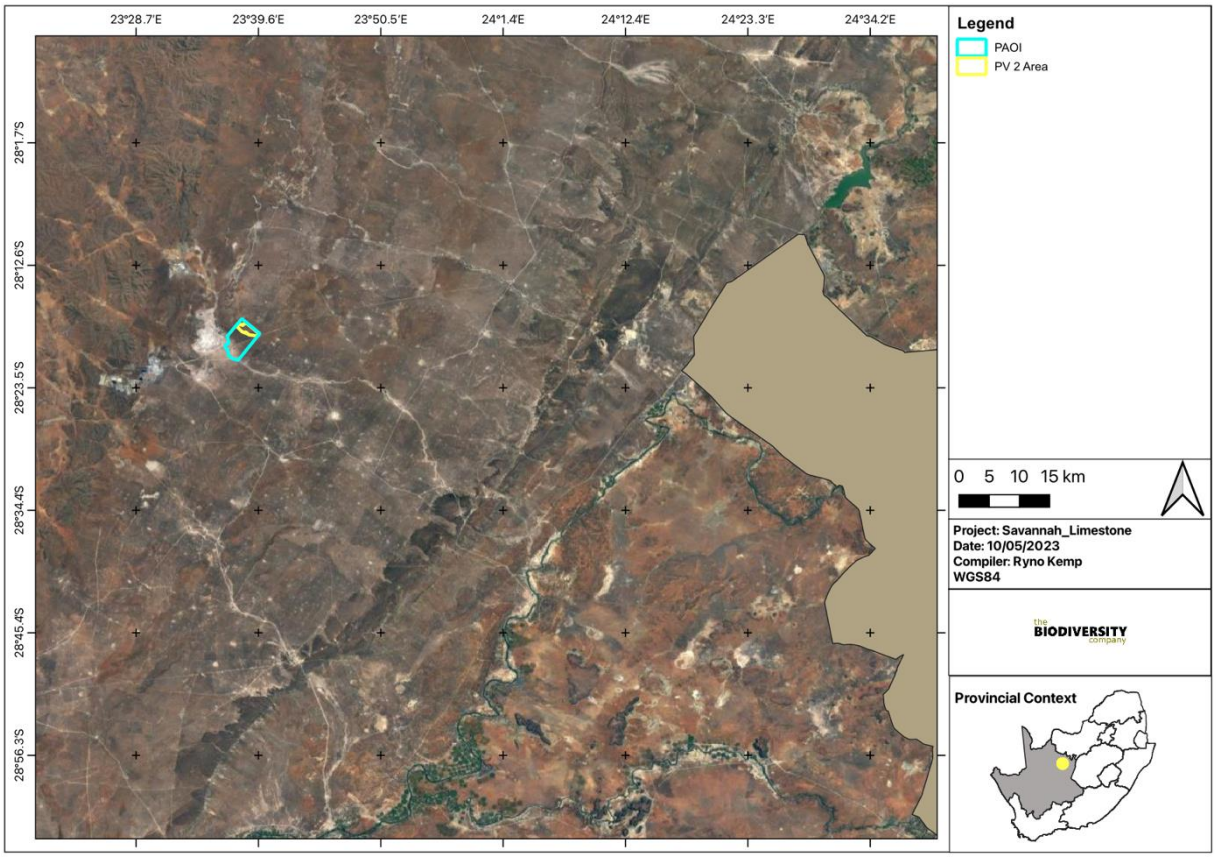


Figure 4-12 The PAOI in relation to the Renewable Energy Development Zones in the area.

4.1.1.12 Renewable Energy EIA Application Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there several other projects in the near vicinity (Figure 4-13). This increases the overall impact on the habitats in the area. Relevant - The PAOI overlaps with already approved REEA projects.

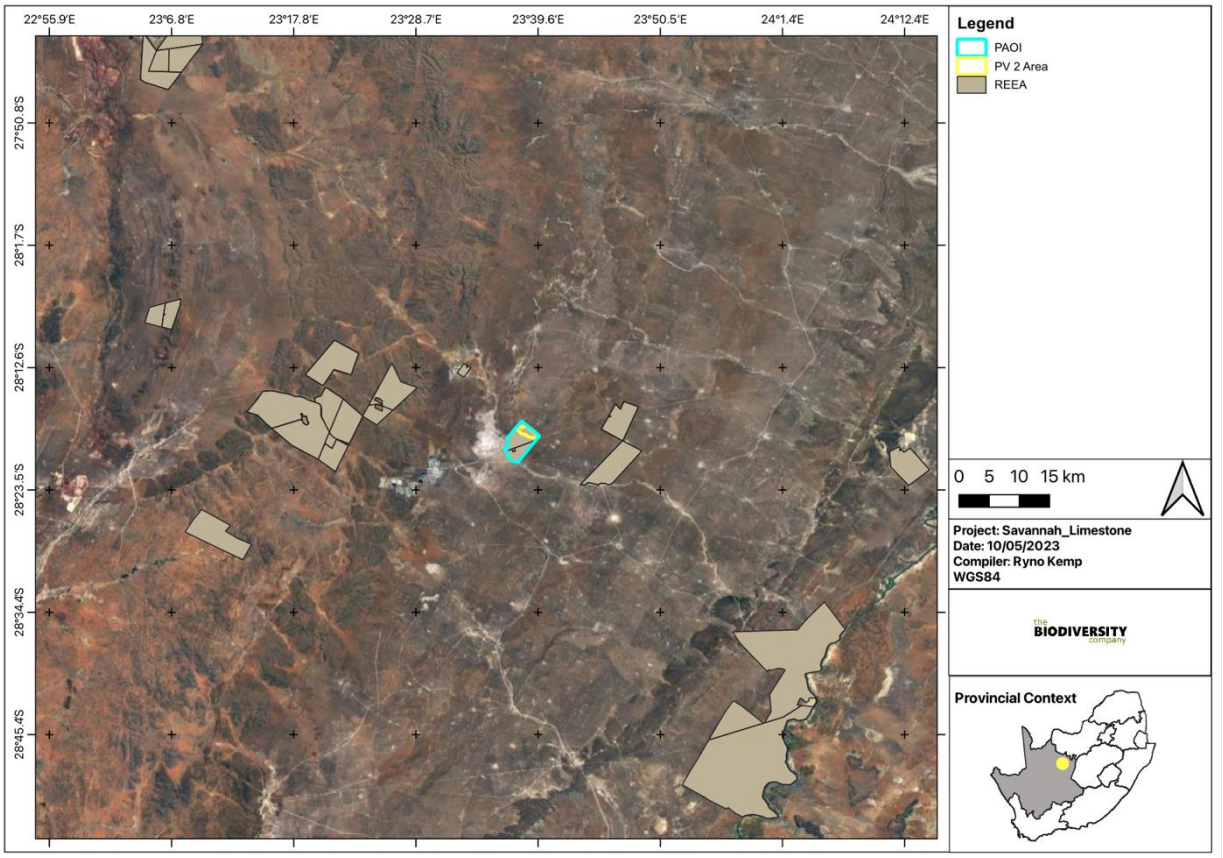


Figure 4-13 The PAOI in relation to the Renewable Energy EIA Application Database projects in the area.

4.1.2 Expected Avifauna Species of Conservation Concern (SCC)

The SABAP2 Data lists 167 avifauna species that could be expected to occur within the landscape (Appendix A) obtained from 9 pentads (Figure 4-14). Eight expected species are considered SCC (Table 4-2). These species are further described below.

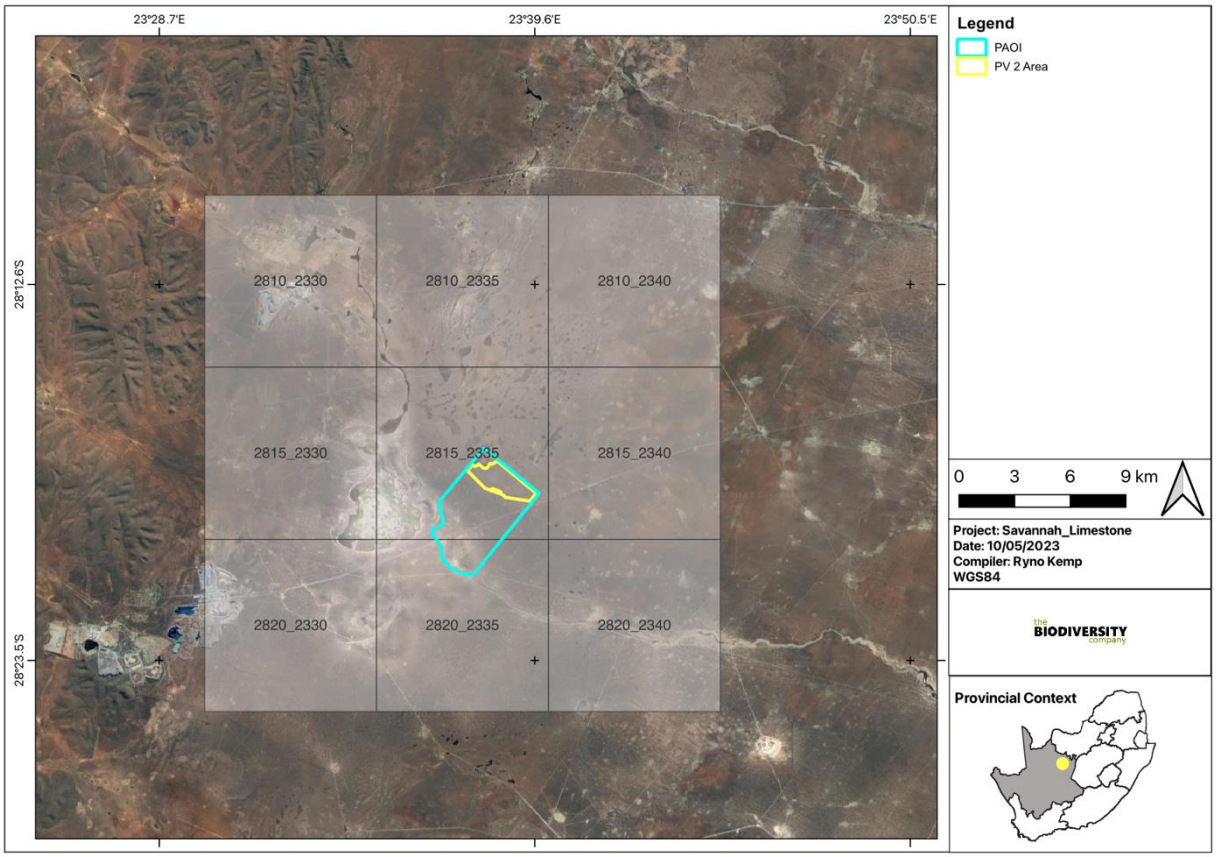


Figure 4-14 Map illustrating the SABAP2 pentads used to compile the expected species list

Table 4-2 Avifauna Species of Conservation Concern (SCC) that are expected to occur within the Project Area of Influence (PAOI). EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable.

Scientific Name	Common Name	Regional	Global	Likelihood of Occurrence	Collisions	Electrocutions	Disturbance/Habitat Loss
Aquila verreauxii	Verreaux's Eagle	VU	LC	Low	X	X	X
Ciconia nigra	Black Stork	VU	LC	High	X	X	X
Cursorius rufus	Burchell's Courser	VU	LC	Moderate			X
Falco biarmicus	Lanner Falcon	VU	LC	High		X	
Neotis ludwigii	Ludwig's Bustard	EN	EN	Moderate	X		X
Oxyura maccoa	Maccoa Duck	NT	EN	Low	X		
Polemaetus bellicosus	Martial Eagle	EN	EN	Moderate	X	X	X
Sagittarius serpentarius	Secretarybird	VU	EN	Moderate	X		X

Aquila verreauxii (Verreaux's Eagle) is listed globally VU on a regional scale (Taylor *et al*, 2015). The species occupies mountainous areas including savannah and semi-desert, where there is a relatively high abundance of *Procavia capensis* (Rock Hyrax) (BirdLife International, 2016a). More than 60% of its prey are Rock Hyraxes but it will occasionally also take other mammals, birds, tortoises and rarely, other reptiles. The population is estimated to be in the tens of thousands. The principal threat in in southern Africa is persecution where it coincides with livestock farms, but because the species does not take

carrion, is little threatened by poisoned carcasses. Furthermore, numbers have declined in areas where Rock Hyraxes have been intensely hunted (BirdLife International, 2016a). Recent threats include impacts from renewable energy developments.

Ciconia nigra (Black Stork) is native to South Africa, and inhabits old, undisturbed, open forests. They are known to forage in shallow streams, pools, marshes swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands, especially where there are stands of reeds or long grass (IUCN, 2017). It is unlikely that this species would breed in the project area due to the lack of forested areas, however some suitable foraging habitat remains in the form of the open grasslands and wetland areas.

Cursorius rufus (Burchell's Courser) is categorised as vulnerable on a regional scale. It inhabits open short-sward grasslands, dry savannas, fallow fields, overgrazed or burnt grasslands and pastures, bare or sparsely vegetated sandy or gravelly deserts, stony areas dotted with small shrubs and saltpans (IUCN, 2017). The species is threatened in the south of its range by habitat degradation as a result of poor grazing practices and agricultural intensification.

Falco biarmicus (Lanner Falcon) is listed as LC on a global scale (BirdLife International, 2016b) but VU on a regional scale (Taylor *et al*, 2015). They may occur in groups up to 20 individuals or individually. Their diet is mainly composed of small birds such as pigeons and francolins. Threats include trapping, persecution, pesticide use and habitat loss.

Neotis ludwigii (Ludwig's Bustard) is listed as EN on a global scale (BirdLife International, 2018a). The species has a large range centred on the dry biomes of the Karoo and Namib in southern Africa, being found in the extreme south-west of Angola, western Namibia and South Africa. This species inhabits open lowland and upland plains with grass, light thornbush, sandy open shrub-veld, and semi-desert in the arid and semi-arid Namib and Karoo biomes. Ludwig's Bustard is nomadic and a partial migrant, moving to the western winter-rainfall part of its range in winter. The diet includes invertebrates, small vertebrates and vegetable matter. The global population is estimated to be 100 000 – 499 999 individuals. The primary threat to the species is collisions with overhead power lines, with potentially thousands of individuals involved in such collisions each (BirdLife International, 2018a). Collision rates on high voltage transmission lines in the Karoo may exceed one Ludwig's Bustard per kilometre per year. Bustards have limited frontal vision, so they may not see power lines, even if they are marked.

Oxyura maccoa (Maccoa Duck) has a large range, divided into a northern population occurring in Eritrea, Ethiopia, Kenya and Tanzania, and a southern population found in Angola, Botswana, Namibia, South Africa and Zimbabwe. During the breeding season it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds and sedges on which it relies for nesting, although it can breed in anthropogenic systems such as farm dams and sewerage treatment plants (BirdLife International, 2021b). It exhibits a preference for habitats with a bottom of mud or silt and minimal amounts of floating vegetation, since this provides the best foraging conditions. Outside the breeding season it will wander over larger, deeper lakes and brackish lagoons. Currently the links between population trends and threats facing this species are poorly understood. Pollution is a primary concern, since the species feeds mainly on benthic invertebrates, and is therefore more vulnerable to bio-accumulation of pollutants than other duck species (BirdLife International, 2021b). Hunting and poaching, competition with alien benthic fish and habitat alteration by invasive plants are further threats.

Polemaetus bellicosus (Martial Eagle) is widely distributed throughout sub-Saharan Africa. The global population has not been quantified but the population in South Africa, Lesotho and Eswatini is believed to be around 800 pairs (Taylor *et al*, 2015). Declines have taken place across much of this species' range owing to habitat loss, deliberate and incidental poisoning, collisions with power lines, and pollution (BirdLife International, 2020a). Direct persecution by farmers and indirect poisoning are by far the most important causes of losses. In some areas, birds may be killed for use in traditional medicine, and parts have been found in muthi markets in Johannesburg. In South Africa, the highest declines were observed

in areas with the greatest increase in temperature and areas with high densities of power lines, probably due to collisions and electrocutions (BirdLife International, 2020a).

Sagittarius serpentarius (Secretarybird) is listed as EN on a global scale (BirdLife International, 2020b). The species has a wide distribution across sub-Saharan Africa, but surveyed densities suggest that the total population size does not exceed a five-figure number. Ad-hoc records, localised surveys and anecdotal observations indicate apparent declines in many parts of the species' range, especially in South Africa where reporting rates decreased by at least 60% of quarter degree grid cells used in Southern African Bird Atlas Projects. Threats include excessive burning of grasslands that may suppress populations of prey species, whilst the intensive grazing of livestock is also probably degrading otherwise suitable habitat. Disturbance by humans is likely to negatively affect breeding. The species is captured and traded; however, it is unknown how many deaths occur in captivity and transit. Direct hunting and nest-raiding for other uses and indiscriminate poisoning at waterholes are also further threats. A proposed conservation action is that landowners of suitable properties should join biodiversity stewardship initiatives and manage their properties in a sustainable way for the species' populations (BirdLife International, 2020b).

4.2 Field Assessment

4.2.1 Avifauna species

One hundred and six (106) avifauna species were recorded from point counts within the PAOI. The full list of species (125) recorded in the general area is provided in Appendix B, which accounts for 75% of the expected species. Two SCC were recorded from the PAOI and surrounding landscape.

4.2.2 Species of Conservation Concern

Four SCC (Figure 4-15) were recorded across the PAOI. They were *Phoenicopterus roseus* (*Greater Flamingos*), *Cursorius rufus* (*Burchell's Courser*), *Falcon biarmicus* (*Lanner Falcon*) and *Ciconia nigra* (Black Stork).

Figure 4-15 ***The SCCs recorded during the first assessment, A) Phoenicopterus roseus (Greater Flamingos), B) Cursorius rufus (Burchell's Courser) and C) Falcon biarmicus (Lanner Falcon)***

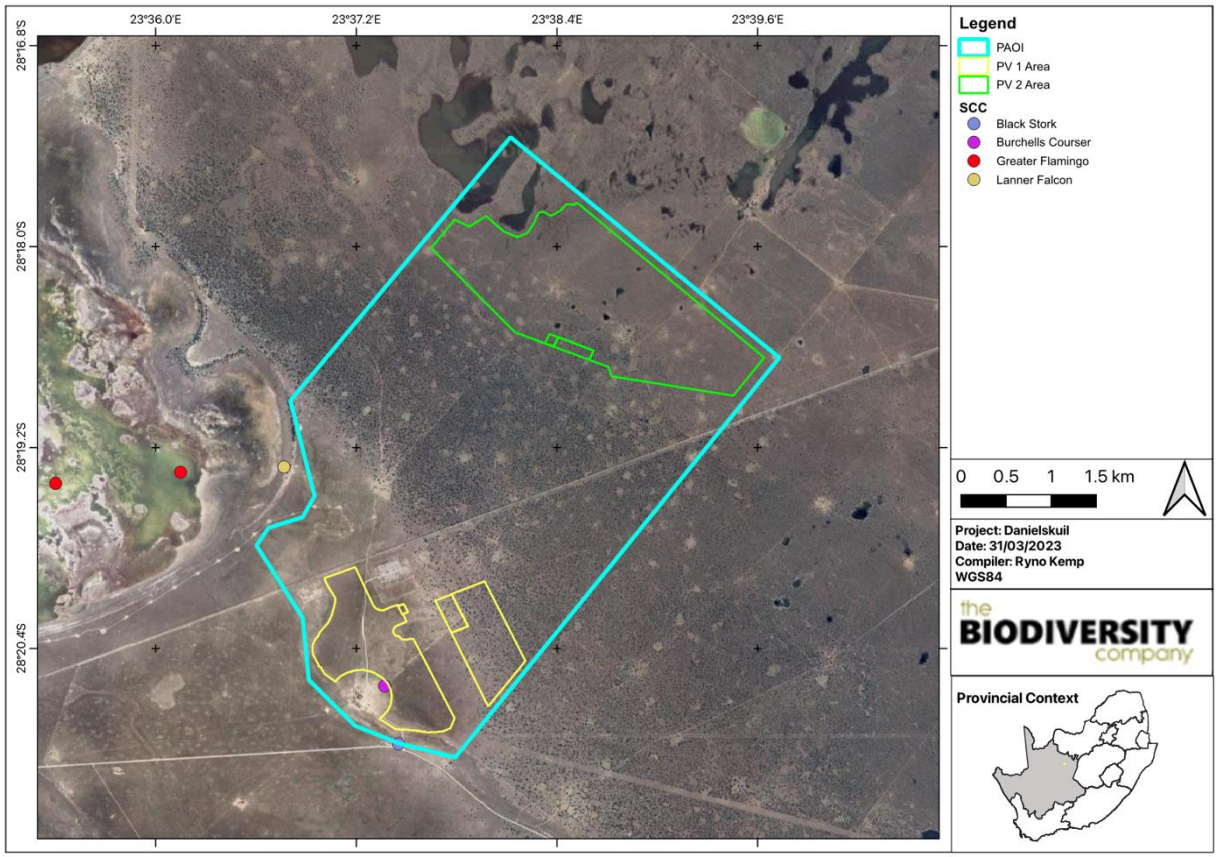


Figure 4-16 Map illustrating the locations of the SCCs recorded.

4.2.3 Risk Species

As aforementioned, Priority species are considered threatened, rare or prone to impacts from energy development (Ralston Paton et al, 2017). TBC has defined Risk Species as those species that are listed in Raklston 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 or habitat loss as a result of the proposed activity. (Table 4 3). A total of 25 Risk species are known to occupy the PAOI and surrounding landscapes, based on observations during the present surveys.

Table 4-3 At risk species found in the survey.

Scientific Name	Common Name	Sources	Collision	Disturbance/Habitat Loss
Elanus caeruleus	Black-winged Kite	X		
Hieraaetus pennatus	Booted Eagle	X	X	X
Anas capensis	Cape Teal	O	X	
Alopochen aegyptiaca	Egyptian Goose	O	X	
Phoenicopterus roseus	Greater Flamingo	X	X	
Falco rupicoloides	Greater Kestrel	X	X	
Ardea cinerea	Grey Heron	O	X	
Falco biarmicus	Lanner Falcon	X		
Egretta garzetta	Little Egret	O	X	
Melierax canorus	Pale Chanting Goshawk	X	X	
Anas erythrorhyncha	Red-billed Teal	O	X	
Microcarbo africanus	Reed Cormorant	O	X	

Tadorna cana	South African Shelduck	O	X	
Afrotis afraoides	Northern Black Korhaan	X	X	
Falco amurensis	Amur Falcon	X		
Lophotis ruficrista	Red-crested Korhaan	O	X	
Spatula smithii	Cape Shoveler	O	X	
Dendrocygna viduata	White-faced Whistling Duck	O	X	
Anas undulata	Yellow-billed Duck	O	X	
Spatula hottentota	Blue-billed Teal	O	X	
Falco vespertinus	Red-footed Falcon	X		X
Ciconia nigra	Black Stork	X	X	X
Circaetus cinereus	Brown Snake Eagle	X	X	X
Circaetus pectoralis	Black-chested Snake Eagle	X	X	X
Thalassornis leuconotus	White-backed Duck	O	X	X

* "X" represent priority species that are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). Whereas "O" represents species at risk of collision or electrocution but might not be considered a priority species.

4.2.4 Dominant Species

Appendix C provides a list of the dominant species during the field survey and the frequency with which each species appeared in the point count samples. The data shows that the *Creatophera cinerea* (Wattled Starling) was the most abundant, with a relative abundance of 0.471 and a frequency of 32.929%. Additionally, the most frequently species was *Pycnonotus nigricans* (African Red-eyed Bulbul) and *Curruca subcoerulea* (Chestnut-vented Warbler), with a frequency of occurrence of 56% (Table 4-4).

Table 4-4 List of most 20 dominant bird species during the point count.

Scientific Name	Common Name	Relative abundance	Frequency
Creatophora cinerea	Wattled Starling	0.471	32.979
Phoenicopterus roseus	Greater Flamingo	0.118	3.191
Fulica cristata	Red-knobbed Coot	0.058	5.319
Himantopus himantopus	Black-winged Stilt	0.034	6.383
Plegadis falcinellus	Glossy Ibis	0.025	7.447
Anas capensis	Cape Teal	0.023	7.447
Spatula smithii	Cape Shoveler	0.022	5.319
Pycnonotus nigricans	African Red-eyed Bulbul	0.022	56.383
Sporopipes squamifrons	Scaly-feathered Weaver	0.019	25.532
Curruca subcoerulea	Chestnut-vented Warbler	0.013	56.383
Crithagra flaviventris	Yellow Canary	0.013	22.340
Streptopelia capicola	Ring-necked Dove	0.010	43.617
Prinia flavicans	Black-chested Prinia	0.010	52.128
Corvus albus	Pied Crow	0.010	27.660
Anas erythrorhyncha	Red-billed Teal	0.009	5.319
Columba guinea	Speckled Pigeon	0.008	6.383
Passer melanurus	Cape Sparrow	0.007	11.702
Cercotrichas paena	Kalahari Scrub Robin	0.007	40.426
Colius colius	white-backed Mousebird	0.006	19.149
Urocolius indicus	Red-faced Mousebird	0.006	13.830

4.2.5 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources similarly (González-Salazar et al., 2014). The guild classification used in this assessment is as per González-Salazar et al. (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity (Figure 4-18). The most dominant guild was the Invertivore Ground Diurnal (IGD) which accounted for approximately 31% of the species recorded Figure 4-17.

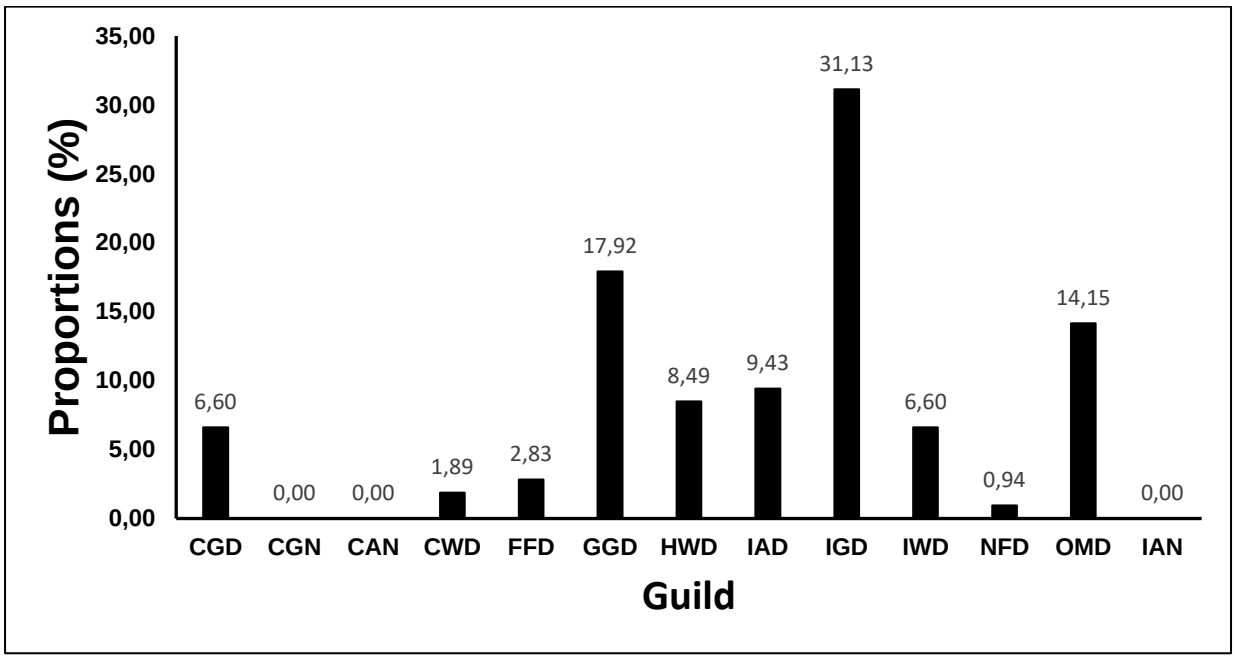


Figure 4-17 ***Column plot illustrating the Functional Feeding Guild richness recorded within the Project Area of Influence (PAOI) during the field survey. CGD = Carnivore Ground Diurnal, CGN = Carnivore Ground Nocturnal, GGD = Granivore Ground Diurnal, IGD = Invertivore Ground Diurnal, OMD = Omnivore Multiple Diurnal, SD = Scavenger Diurnal and FCD = Frugivore Canopy Diurnal***

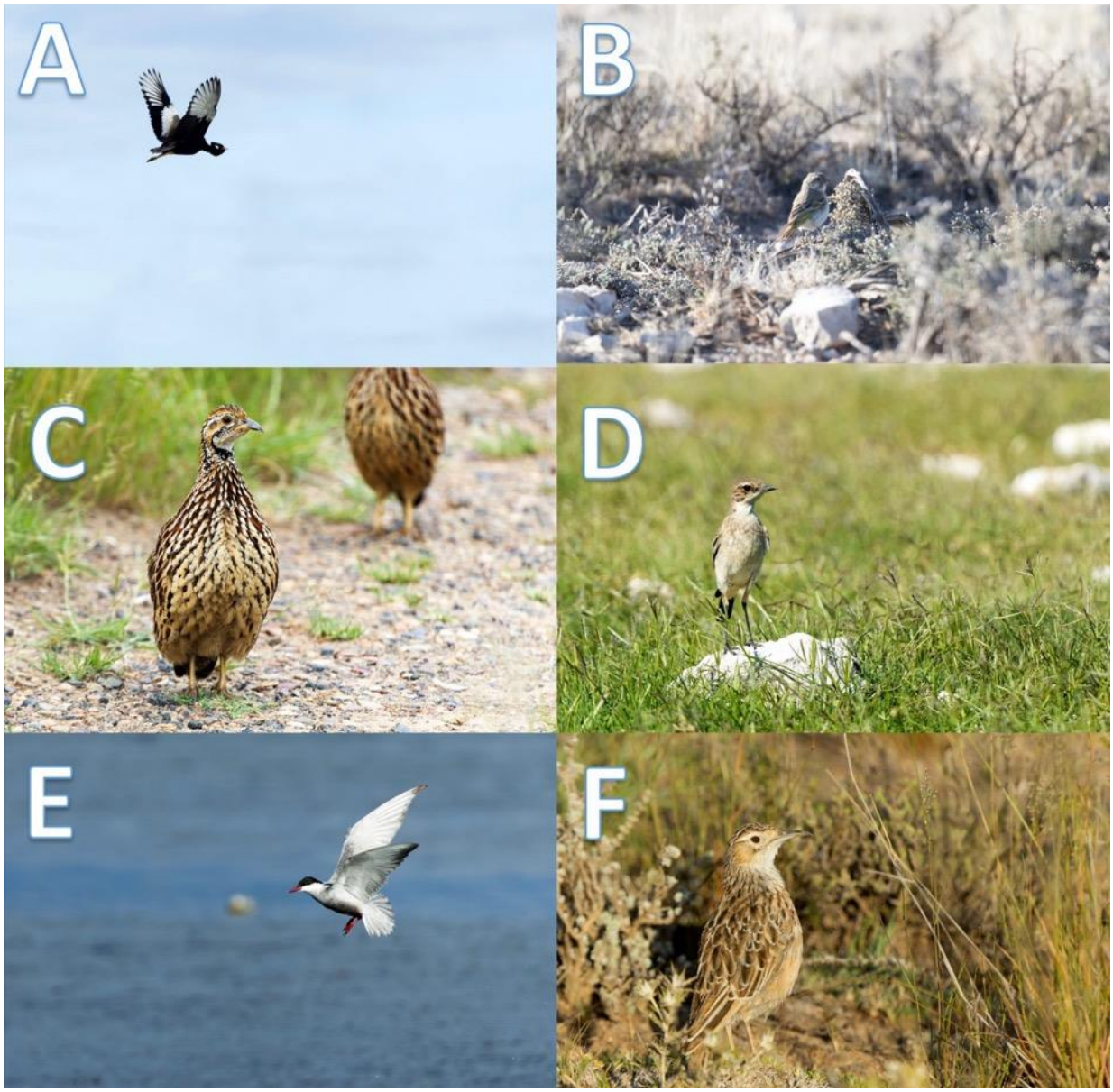


Figure 4-18 ***Photographs illustrating a portion of the avifauna species recorded in the assessment area: A: Afrotis afraoides (Northern Black Korhaan), B: Crithagra albogularis (White-throated Canary), C: Scleroptila gutturalis (Orange River Francolin), D: Oenanthe pileate (Capped Wheatear), E: Chlidonia hybrida (Whiskern Tern), F: Chersomanes albofasciata (Spike-heeled Lark).***

4.2.6 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. However, due to the limited survey time, no flight analysis was undertaken for these groups. No nests were observed during the field surveys.

5. Site Assessment

5.1.1 Vegetation and Habitats

The different habitat types (*Figure 5-1* to *Figure 5-7*) within the PAOI 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. In relation to vegetation the sensitivity of the area related more to the structural vegetation component rather than diversity as such, due to the low diversity (which is expected) versus the large number of the provincially protected woody species, such as the Wild Olive (*Olea europaea* subsp. *africana*)). Wild Olive is known an extremely slow-growing and valuable tree in the arid regions.

5.1.1.1 Watercourse/Riviers

Channels/Areas through which surface water naturally flows and collects. An ephemeral system (Figure 5-1 & Figure 5-2).

5.1.1.2 Woodeed Vaalbosveld

Terrain consists of a low to zero slope Mainly consists of woody tree species interspersed with variable in the presence or absence of grass species and shrub density (Figure 5-3)

5.1.1.3 Open Shrubveld

Terrain consists of a low to zero slope Mainly consists of Tarchonanthus (Shrub) species interspersed with variable in the presence or absence of grass species and shrub density (Figure 5-4)

5.1.1.4 Open Grasslands

Terrain consists of a low to zero slope Mainly presence of grass species with small shrubs (Figure 5-5).

5.1.1.5 Transformed Habitat

Homesteads and associated infrastructure as well as prominent roads and all agricultural areas and grid infrastructure (Figure 5-7).

Figure 5-1 Watercourse habitat from the PAOI

Figure 5-2 Depression (Pan) habitat from the PAOI

Figure 5-3 Wooded Vaalbosveld habitat from the PAOI

Figure 5-4 Open Shrubveld habitat from the PAOI

Figure 5-5 Open Grassland habitat from the PAOI

Figure 5-6 Pan (non-wetland) habitat from the PAOI

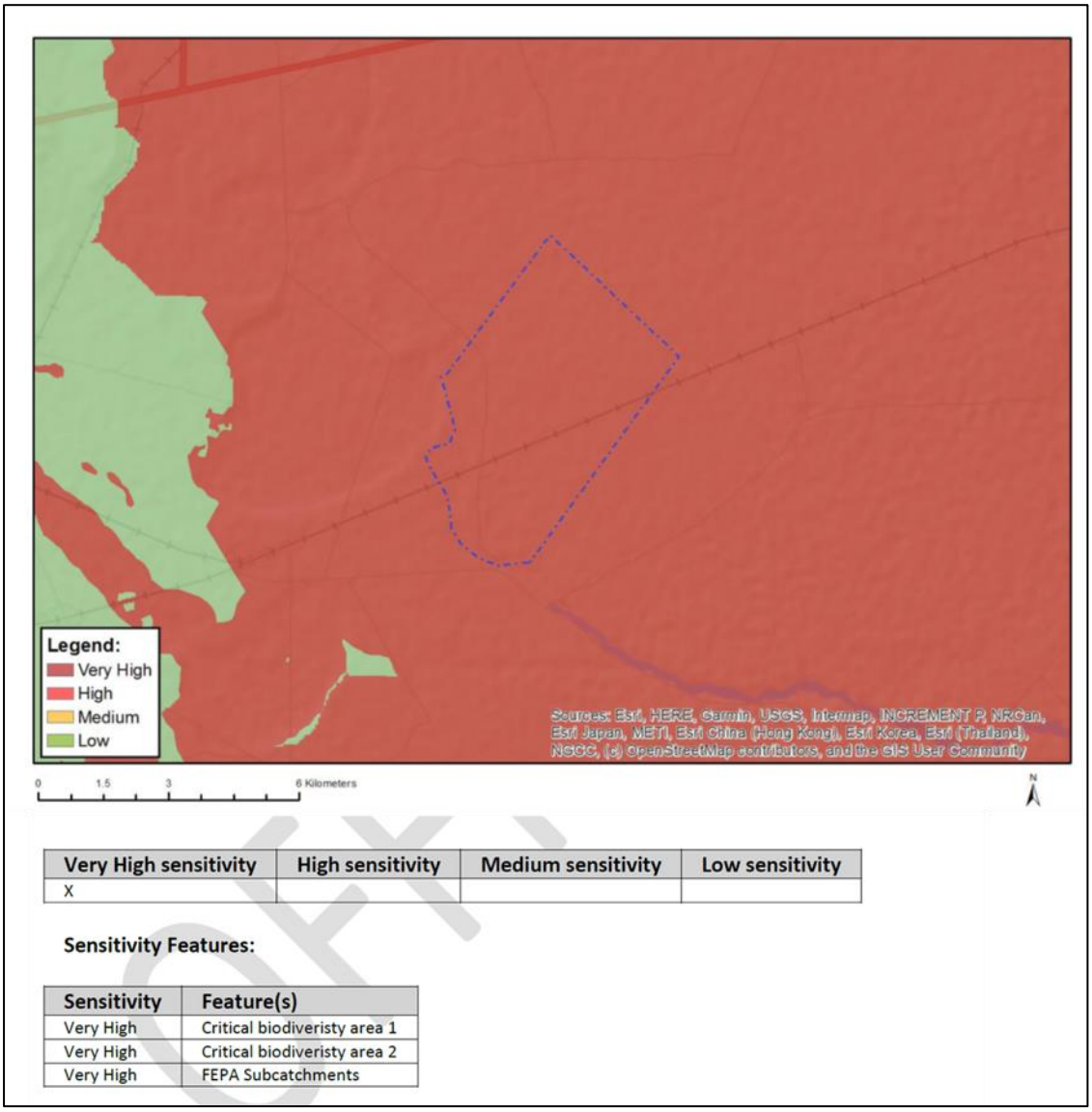
Figure 5-7 Transformed habitat from the PAOI

6. Site Sensitivity

6.1 Screening Report

The following is deduced from the National Web-based Environmental Screening Tool:

- Terrestrial Biodiversity Theme sensitivity is Very High for the PAOI, with the possibility of a CBA1 and CBA2 (

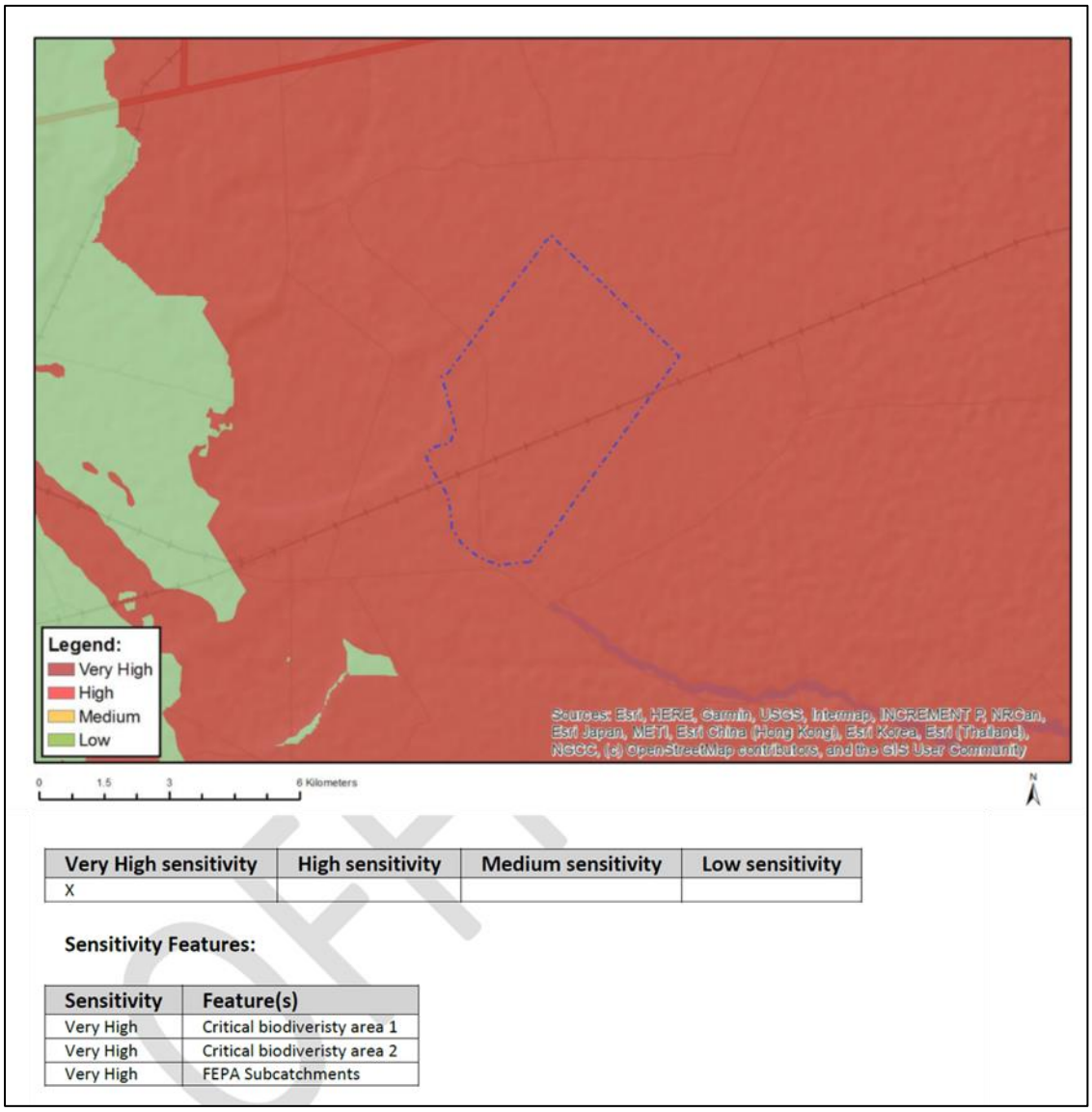


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	FEPA Subcatchments

- Figure 6-1);
- Animal Species Theme sensitivity is High for the PAOI, with 1 sensitive avifauna species possibly being present (Figure 6-2);
    - *Sagittarius serpentarius* (Secretarybird)
- Avian Species Theme sensitivity is low for the PAOI. However, this layer is applicable to wind energy developments and for all other projects, the user must evaluate the animal species sensitivity's theme for any avifaunal triggers.

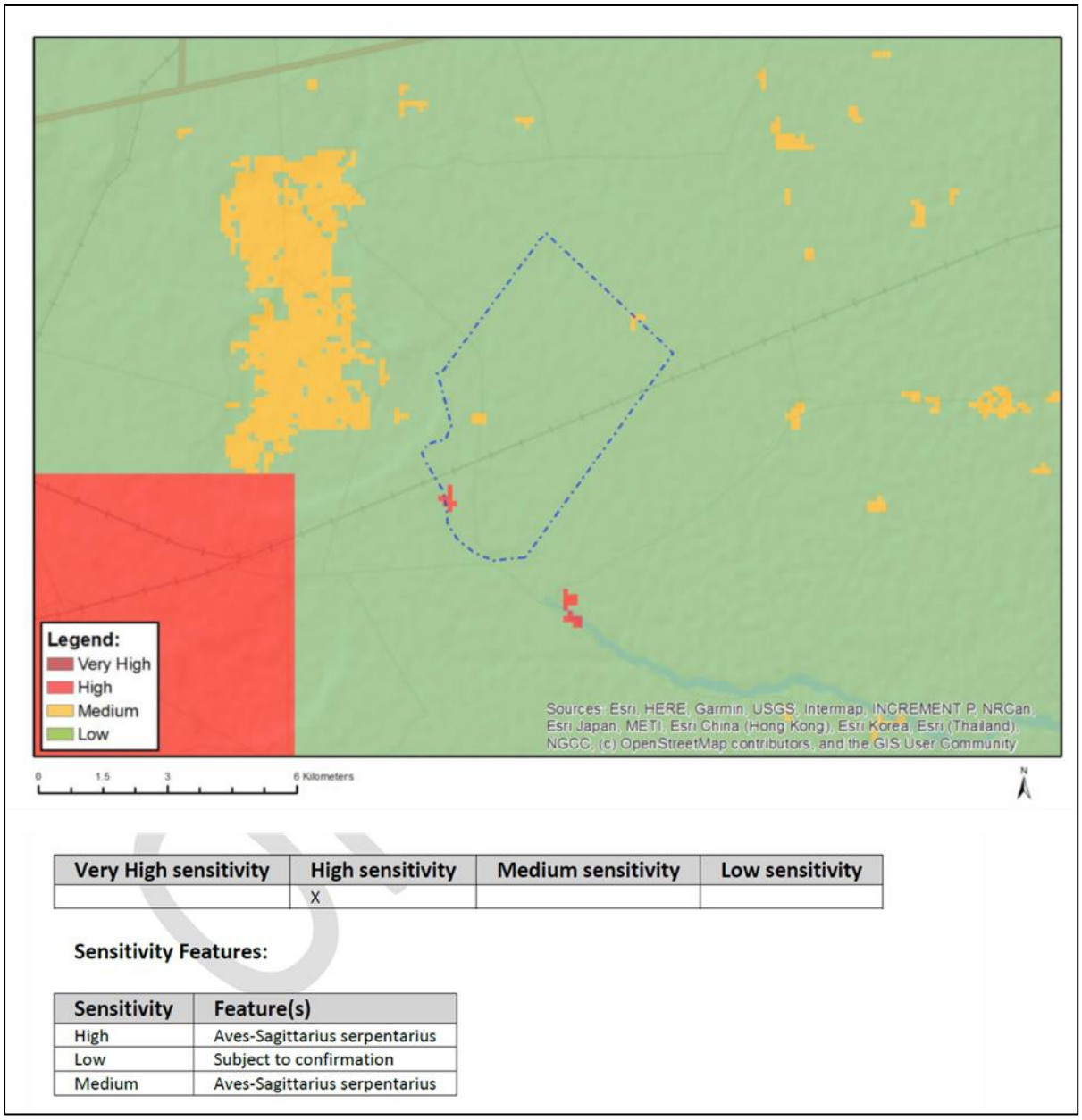


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	FEPA Subcatchments

Figure 6-1 Terrestrial Biodiversity Theme Sensitivity



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Sagittarius serpentarius
Low	Subject to confirmation
Medium	Aves-Sagittarius serpentarius

Figure 6-2 Animal Species Theme Sensitivity

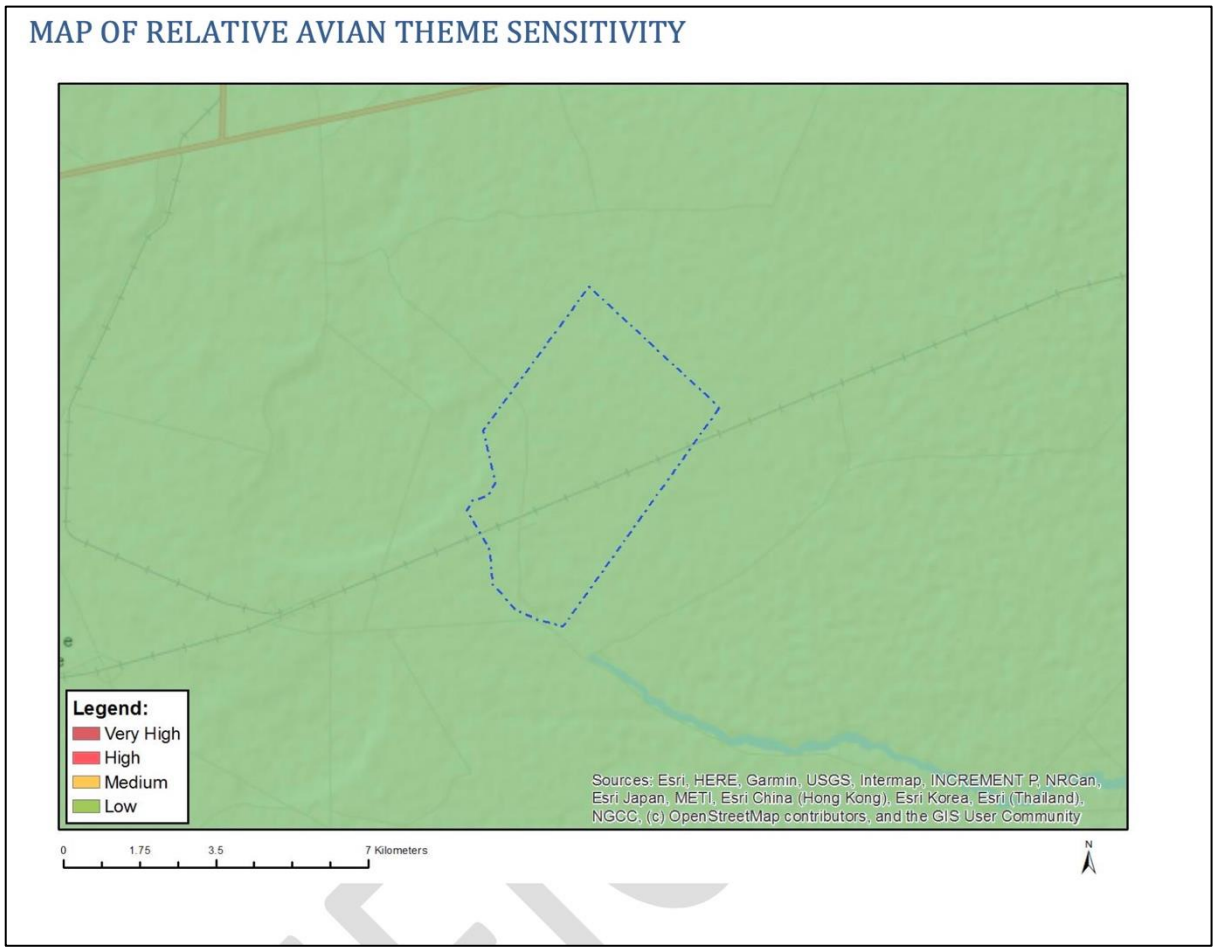


Figure 6-3 Avian Species Theme Sensitivity

Table 6-1 Summary of the Screening Tool Sensitivity versus the Specialist assigned Site Ecological Importance (SEI) for the proposed Solar Power Plant (SPP) Project Area

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	High	High	Validated – Even though no Secretarybirds were observed it during the site visit various other SCC were observed within and around the PAOI. Therefore, we agree with the screening tool.
Terrestrial Biodiversity Theme	Very High	Very High	Validated – Even though the habitat has been disturbed by cattle grazing the overall habitat is still intact especially the CBA areas which play to the bird community within the area.
Avian Theme	Low	High	Disputed – Theme does not provide a true representation of the avifauna sensitivity at the site.

6.2 Site Ecological Importance (SEI)

A site assessment was carried out in September 2022 and February 2023, which constitutes a dry season and wet season survey. The different habitat types within the PAOI were delineated and identified based on observations during the field assessment and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Five (5) main different terrestrial habitat types were delineated within the PAOI, which includes an assigned water resource habitat unit (**Error! Reference source not found.**). Based on the criteria

provided in Section 3.4 of this report, all habitats within the PAOI were allocated a sensitivity category. The sensitivities of the habitat types delineated are illustrated in Figure 6-5.

Table 6-2 Summary of preliminary habitat types delineated within the Project Area of Influence (PAOI)

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
Watersource	Channels/Areas through which surface water naturally flows and collects. An ephemeral system.	Provides surface water resources within the landscape. Aids in water quality amelioration by trapping sediment and nutrients carried by surface runoff. Corridor for fauna dispersion within the landscape and important foraging and nesting habitat.	Very High Globally significant populations of congregatory species (> 10% of global population).	High Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN	Very High	Very Low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring.	Very High Avoidance mitigation – no destructive development activities should be considered. Applicable buffer may be added to the habitats.
Wooded Vaalbosveld	Terrain consists of a low to zero slope Mainly consists of woody tree species interspersed with variable in the presence or absence of grass species and shrub density.	Provides foraging and nesting resources for indigenous avifauna.	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.	High Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.	High	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.	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.
Open Shrubveld	Terrain consists of a low to zero slope Mainly consists of Tarchonanthus (Shrub) species interspersed with variable in the presence or absence of grass species and shrub density.	Provides foraging and nesting resources for indigenous avifauna.	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	High Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN	High	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	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

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
			listed under any criterion other than A.	ecosystem types.		disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.	acceptable. Offset mitigation may be required for high impact activities.
Open Grasslands	Terrain consists of a low to zero slope Mainly presence of grass species with small shrubs.	Provides foraging and nesting resources for indigenous avifauna.	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.	High Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.	High	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.	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.
Critical Modified	Homesteads and associated infrastructure as well as prominent roads and all agricultural areas.	Provides forage areas for avifauna that are tolerant of the modified landscape.	Very Low No natural habitat remaining.	Very Low Several major current negative ecological impacts.	Very Low	Very High Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor .	Very Low Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

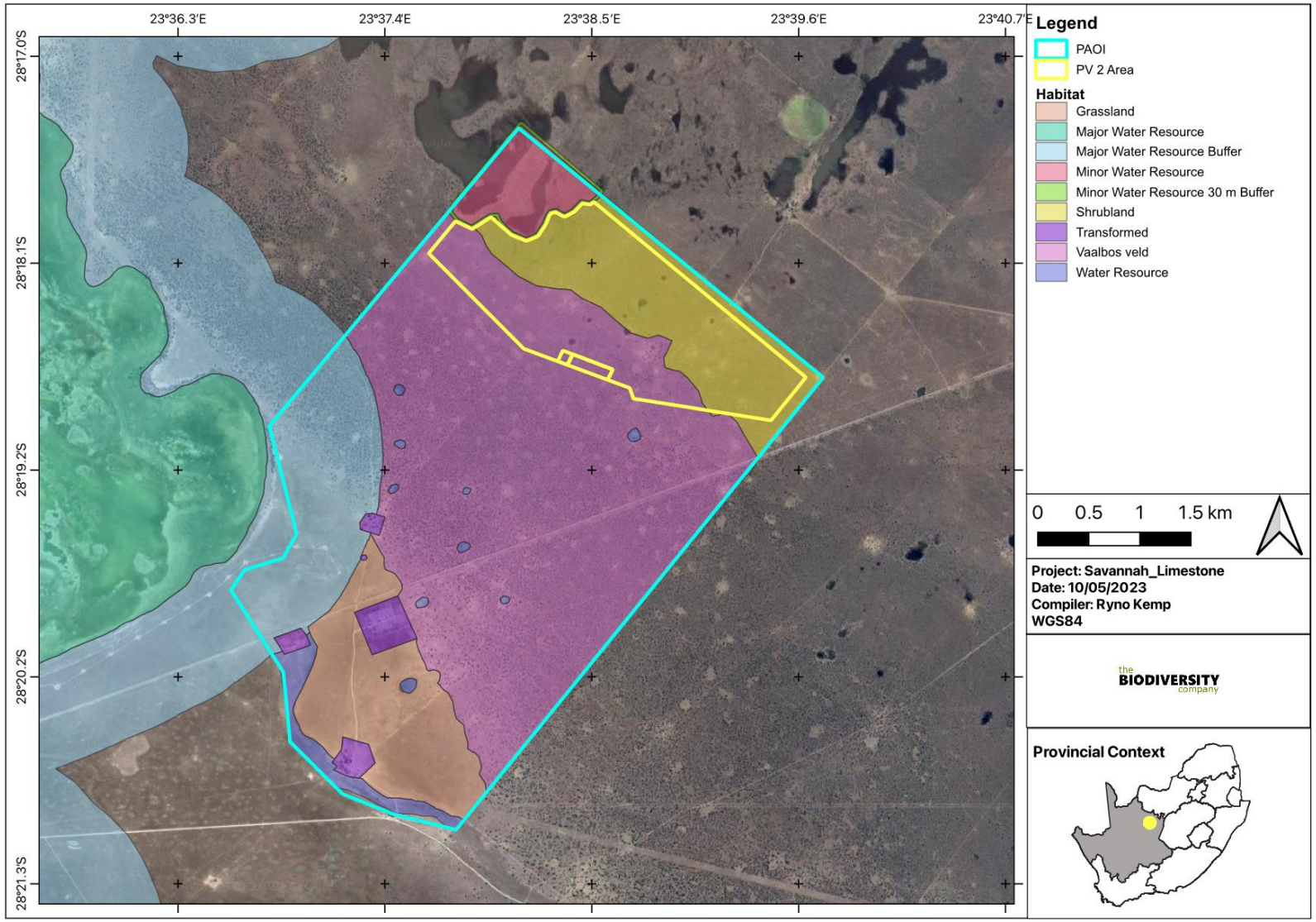


Figure 6-4 Avifauna Habitat of the PAOI

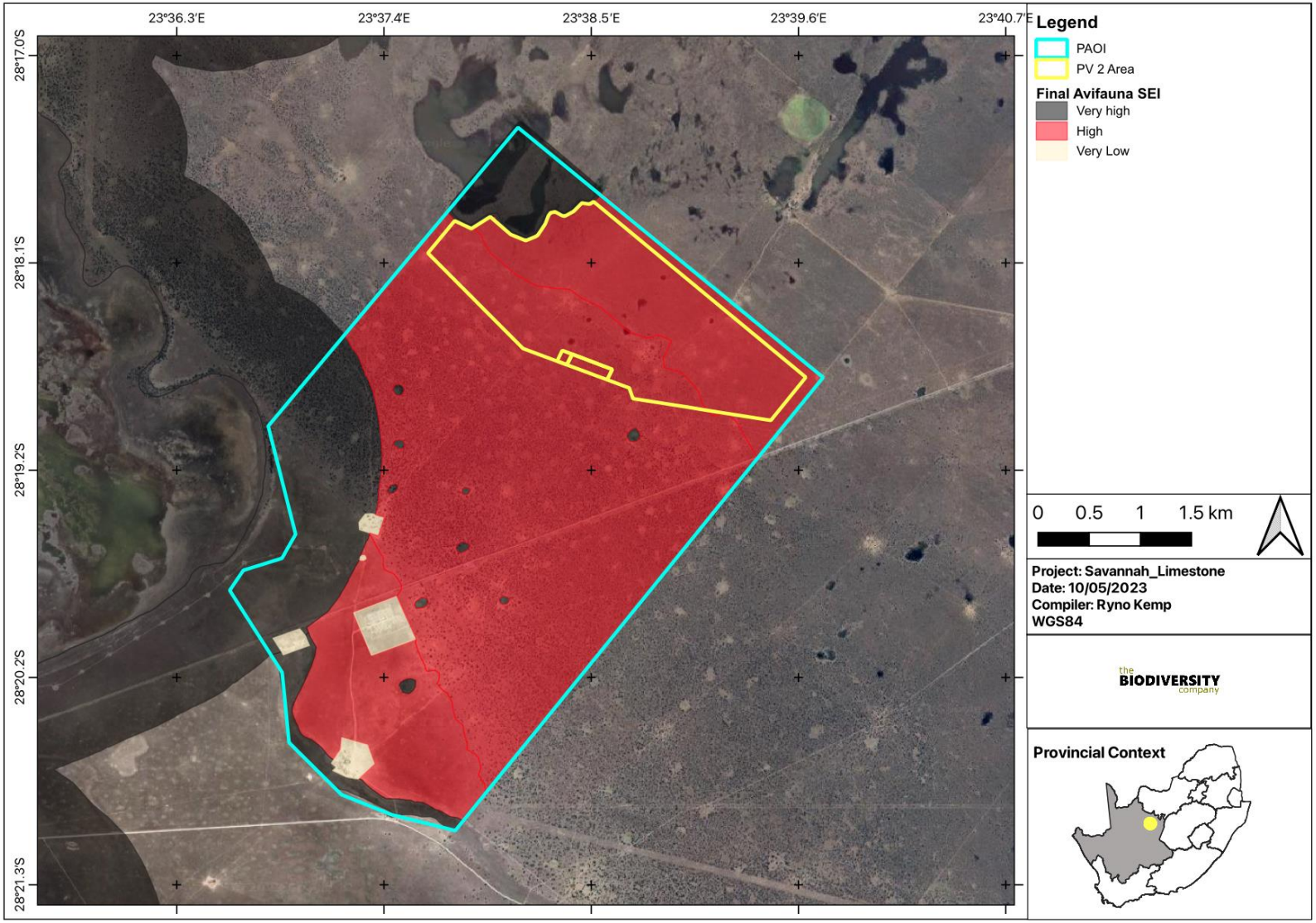


Figure 6-5 Avifauna SEI of the PAOI

7. Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project area, specifically the proposed development footprint area.

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah Environmental (Pty) Ltd.

Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat frag- mentation as a result of project infrastructure and species disturbance or mortality as a result of project operations.
- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence.
- 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 was undertaken in consideration of the following:

- Extent of impact;
- Duration of impact;
- Magnitude of impact;
- Probability of impact; and
- Reversibility.

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
- Closure/Rehabilitation Phase.

7.1 Present Impacts on Biodiversity

Considering the anthropogenic activities and influences within the landscape, limited negative impacts on biodiversity were observed within the study area. These include:

- Livestock grazing land use and associated infrastructure;
- Roads and associated vehicle traffic and road kill;
- Powerline infrastructure; and
- Fence lines.

Photographic evidence of a selection of these impacts is provided in Figure 7-1.

Figure 7-1 Photographs illustrating impacts to biodiversity A) Overgrazing, B & D) Livestock and C) Existing powerline and substation infrastructure.

7.2 Avifauna Impact Assessment

This section describes the potential impacts on avifauna associated with the construction, operational and decommissioning phases of the proposed development. 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 PV panels and habitat loss. Solar 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 avifauna 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 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 PV 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 to the displacement of various avifauna species.

7.3 Alternatives Considered

No Alternatives were considered.

7.4 Loss of Irreplaceable Resources

The proposed development could result in the loss of 'High' SEI habitats with Very Low Receptor Resilience.

7.5 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report. The PV facility, roads and powerlines are all assessed simultaneously unlessotherwise specified.

7.5.1 Construction Phase

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

The following potential impacts were considered:

- Loss of habitat within the project footprint (Table 7-1);
- Destruction, fragmentation and degradation of surrounding habitats (Table 7-2);
- Displacement of avifauna community (including SCC) due to disturbance from increased human presence and noise pollution (Table 7-3); and
- Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs (Table 7-4).

Table 7-1 Construction Phase Impact – Destruction of habitats within the PV footprint

Impact Nature: Loss of habitat within development footprint		
Habitat destruction within the direct project footprint		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)

Significance	**Medium (56)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation:		
• All 'Very High' habitats must be avoided. • Avoid the disturbance or destruction of Water bodies ('Very High' SEI areas) as far as possible. Offset mitigation will be required for construction activities within these areas. • Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers and signage. • Do not clear areas of indigenous vegetation outside of the direct project footprint. • Minimise vegetation clearing to the minimum required. • Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site. • Compile and implement a Rehabilitation Plan from the onset of the project. • Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover. • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities. • Pre-construction environmental induction for all staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc.		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 7-2 Construction Phase Impact – Destruction, degradation, and fragmentation of surrounding habitats

Impact Nature: Loss of habitat within development footprint		
Habitat destruction within the direct project footprint		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation:		
• All 'Very High' habitats must be avoided. • Avoid the disturbance or destruction of Water bodies ('Very High' SEI areas) as far as possible. Offset mitigation will be required for construction activities within these areas. • Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers and signage. • Do not clear areas of indigenous vegetation outside of the direct project footprint. • Minimise vegetation clearing to the minimum required. • Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site. • Compile and implement a Rehabilitation Plan from the onset of the project. • Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover. • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities. • Pre-construction environmental induction for all staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc.		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 7-3 Construction Phase Impact – Displacement of avifauna community (including SCC) due to disturbance from increased human presence and noise pollution

Impact Nature: Displacement of avifauna community (including SCC) due to noise pollution		
Noise pollution generated from construction activities will lead to emigration of fauna. Noise pollution leads to changes in vocal communication and concomitantly to reproductive success. Many species may consequently avoid these areas completely. Larger species tend to also be wary of humans and therefore will emigrate the area from increased human presence.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (3)	Short term (2)
Magnitude	Moderate (6)	Low (4)

Probability	Highly probable (4)	Probable (3)
Significance	**Medium (48)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit only to a certain level. Impacts are difficult to mitigate against.	
Mitigation:		
• The increased presence of humans cannot be well mitigated against. Staff must be advised to not leave the boundary of the project footprint. • Noise must be kept to minimum and when possible, no construction activity is to occur during dawn to avoid impacts to the dawn chorus in the surrounding areas. • Generators used must have baffle boxes.		
Residual Impacts:		
Due to the sensitivity and furtive behaviour of the SCC within the region, residual impacts are expected to remain with this impact.		

Table 7-4 Construction Phase Impact - Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs

Impact Nature: Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs		
Direct mortality may arise when the area is cleared for construction, especially for species in which their predator response is to remain still and camouflaged against the substrate, as well as those species that are ground-nesting. Increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Immediately prior to the removal of vegetation, at least two (2) staff members must traverse the clearance area to create a disturbance so that species have the opportunity to vacate the area. • Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • Poaching must be made a punishable offence and any incidences must be reported to the relevant conservation body. • All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof of attendance.		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any avifauna species.		

7.5.2 Operational Phase

The Operational Phase impact of daily activities is anticipated to lead to collisions and electrocutions. Moving vehicles do not only cause sensory disturbances to avifauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions. Operational Phase activities such as maintenance and solid waste management must not impact surrounding habitats.

The following potential impacts were considered:

- Destruction and degradation of surrounding habitats (Table 7-5);
- Collisions with PV panels, associated grid connection infrastructure and fences (Table 7-6); and
- Direct mortality from increased vehicle traffic and poaching, including the collection of eggs (Table 7-7).

Table 7-5 Operational Phase Impact – Destruction and degradation of surrounding habitats

Impact Nature: Destruction, degradation, and fragmentation of surrounding habitats		
Operational phase activities may lead to impacts to surrounding habitats such as unauthorised clearing of vegetation and poor solid waste management. This may have larger scale consequences due to the presence of habitat specialist SCC.		
	Without mitigation	**With mitigation**
Extent	High (4)	Very low (1)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (68)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes.	
Mitigation:		
• Demarcate operational physical barriers and signage. • Do not clear areas of indigenous vegetation outside of the direct project footprint. • Minimise vegetation clearing to the minimum required. • Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site. • A Solid Waste Management Plan must be implemented and solid waste legally discarded off site and not dumped into surrounding areas.		
Residual Impacts:		
There may be effects of dust pollution, but residual impacts are expected to be minimal.		

Table 7-6 Operational Phase Impact – Collisions with PV panels and fences

Impact Nature: Collisions with PV panels and fences		
As described above, there is the potential for species collisions with components of the PV development, resulting in mortality or injury.		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very Low (1)
Duration	Long term (4)	Long term (4)

Impact Nature: Collisions with PV panels and fences		
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• The design of the proposed solar plant must be as endorsed by Jenkins et al. (2017) Best Practice Guidelines Birds & Solar Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • White strips must be placed on the edge of the solar panels to reduce reflection and prevent collisions. This is especially pertinent to the project area as species exhibits diel movement between water resources and feeding/nesting areas. These species may recognise the panel array as water bodies (lake effect) and collide with the panels, causing mortality. • Fencing mitigations: o Top 2 strands must be smooth wire. o Routinely retention loose wires. o Minimum 30 cm between wires.		
Residual Impacts:		
It is unlikely that residual impacts are expected if the appropriate mitigation measures are implemented. However, there may still be collisions.		

Table 7-7 Operational Phase Impact – Direct mortality from increased vehicle traffic and poaching, including the collection of eggs

Impact Nature: Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs		
Direct mortality may arise due to increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Immediately prior to the removal of vegetation, at least two (2) staff members must traverse the clearance area to create a disturbance so that species have the opportunity to vacate the area. • Any fauna threatened by the operational activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All operational vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • Poaching must be made a punishable offence and any incidences must be reported to the relevant conservation body.		

• All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof of attendance.
Residual Impacts:
There is still potential for roadkill to occur albeit this may not likely affect the viability of the local population.

7.5.3 Decommissioning Phase

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

The following potential impacts were considered:

- Direct mortality of avifauna due to earthworks, vehicle collisions and persecution (Table 7-8); and
- Inability of avifauna species to immigrate due to continued habitat degradation (Table 7-9).

Table 7-8 Decommissioning Phase Impact – Direct mortality due to earthworks, vehicle collisions and persecution.

Impact Nature: Direct mortality of fauna		
Decommissioning activity will likely lead to direct mortality of avifauna due to earthworks, vehicle collisions and persecution.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	MIinor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
• All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species. • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate. • Any fauna threatened by deconstruction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any avifauna species.		

Table 7-9 Decommissioning Phase Impact – Inability of avifauna species to immigrate due to continued habitat degradation

Impact Nature: Continued habitat degradation		
Disturbance created during decommissioning will leave the development area vulnerable to erosion and encroachment by Alien Invasive Plants.		
	Without Mitigation	**With Mitigation**
Extent	Moderate (3)	Local (1)
Duration	Permanent (5)	Long-term (3)
Magnitude	Very High (10)	Minor (2)
Probability	Definite (5)	Improbable (2)
Significance	**High (90)**	**Low (12)**
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
• Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas that have been modified during the Operational Phase and disturbed during the Decommissioning Phase. • Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.		
Residual Impacts:		
No significant residual risks are expected, although AIP encroachment and erosion might still occur but would have a negligible impact if effectively managed.		

7.6 Cumulative Impact

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 project on local fauna and flora specifically.

Cumulative impacts are assessed within the context of the extent of the proposed project area, 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 30 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 the adjacent 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 development (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 30 km buffer around the PV development area amounts to 302904.44ha, but when considering the transformation (5256,86 ha) that has taken place within this radius, 297645.82ha of intact habitat remains according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 1.77 % loss in natural habitat. Considering this context, the PV infrastructure footprint for is 329.56 ha (as provided) and similar projects exists (which includes the project area) in the 30 km region measuring a maximum of 17789.4ha (as per the latest South African Renewable Energy EIA Application Database) which means that the total amount of remaining habitat lost as a result of the solar project amounts to 5.98% (PV developments as a percentage of the total remaining habitat). Table 7-10 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 7-10 Total cumulative habitat loss

	Total Habitat (ha)	Total Loss (ha)	Tot. Remaining Habitat (ha) (Remnants)	Total Historical Loss	PV Development Similar Projects including Project	Tot. Remaining Habitat (ha)	Cumulative Habitat Lost
Approximate Solar development cumulative effects (Spatial)	302904.44	5258.63	297645.82	**1.77 %**	17789.04	279856.78	**5.98 %**

The overall cumulative impact assessment is presented in Figure 7-2 and Table 7-11 below. Note that this also accounts for the relative importance of the habitats within and adjacent to the development area, in the context of the value of the regional habitat. Approximately 1.77% of the habitat has already been lost, and as discussed above the proposed solar developments will result in a cumulative loss of approximately 5.98 % from the development in the area. The expected cumulative impact of PV development as a whole is expected to be of a 'Moderate' significance, however, the contribution of the project development footprint itself (329.56 ha) is calculated at 1.85% of the total (PV Development Projects), with overall low significance when considering the contribution in isolation. Even though the overall cumulative impact of PV development are on the border of High, we support the project due to small PV footprint in comparison to other PV projects in the area.

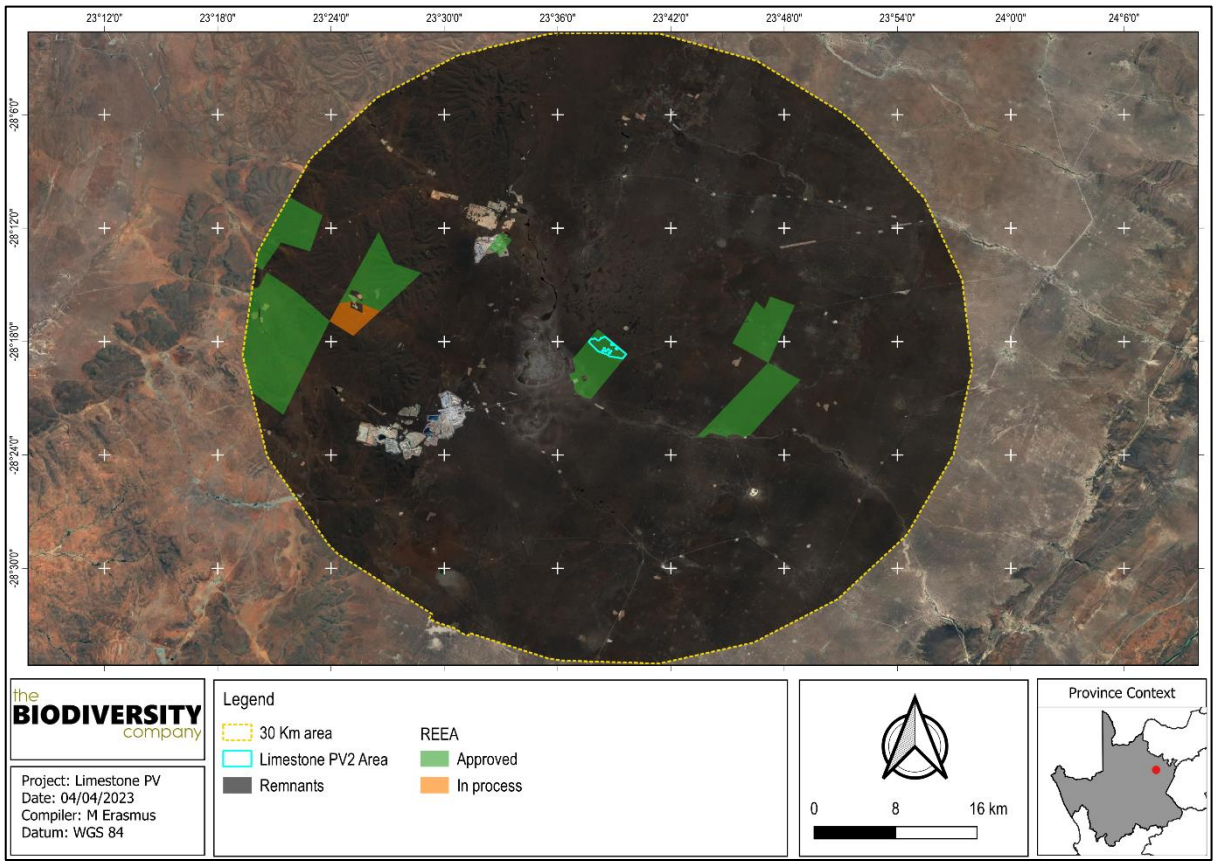


Figure 7-2 Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types

Table 7-11 Cumulative Impact Assessment

Impact Nature: Cumulative habitat loss within the region		
The development of the proposed infrastructure will contribute to cumulative habitat loss and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Very low (1)	Low (2)
Duration	Moderate term (3)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**Medium (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation:		
• Over and above all provided mitigation measures; ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

8. Management Objectives

The aim of the Management Objectives is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 8-1 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators within an avifauna context.

Table 8-1 Mitigation measures including requirements for timeframes, roles and responsibilities for this report

OBJECTIVE: Minimise the habitat degradation of avifauna habitats

Project component/s	Impacts of the PV facility and associated infrastructure on the avifauna habitat.
Potential Impact	Destruction, fragmentation, and degradation of habitats.
Activity/risk source	Land clearing, fire and dust.
Mitigation: Target/Objective	Avoidance mitigation measures / minimisation of the project footprint.

Mitigation: Action/control	**Responsibility**	**Timeframe**
• All 'Very High' and 'High' SEI slope habitats are to be avoided. • Avoid the disturbance or destruction of water resource as far as possible. Offset mitigation will be required for high impact activities within these areas. • Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. • Where possible, existing access routes and walking paths must be made use of. • Do not clear areas of indigenous vegetation outside of the direct project footprint. • Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site. • Compile and implement a Rehabilitation Plan from the onset of the project. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. A drift fence must be erected during construction to impede dust pollution into surrounding habitats. • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.	Project Manager Environmental Officer	Construction Phase
Performance Indicator	- Project footprint - Dust pollution - Solid waste - Surrounding areas of indigenous vegetation - Rehabilitation areas	
Monitoring	- Continuous monitoring during construction and operational phase - Quarterly monitoring of rehabilitated areas for 3 years subsequent to decommissioning.	

OBJECTIVE: Minimise the displacement of the avifauna community (including confirmed and possible SCC)

Project component/s	Construction, Operational and Decommissioning Phase activities that generate noise and dust pollution.
Potential Impact	Displacement of avifauna species including SCC
Activity/risk source	Noise and dust pollution. Increased human presence.
Mitigation: Target/Objective	Avoidance / minimisation noise, dust and general disturbance.

Mitigation: Action/control	**Responsibility**	**Timeframe**
• Minimise disturbance impact by abbreviating construction time. • Generators must be placed in baffle boxes. • Clearly demarcate construction and operational areas to prevent disturbance into these areas. • A Solid Waste Management Plan must be developed and implemented to avoid impacts to surrounding habitats. • Suitable sanitary facilities must be provided in accordance with the requirements of the Health and Safety Act. Sanitary facilities must be maintained twice a day. • Development and implementation of an Avifauna Monitoring Plan for surrounding areas. Knowledge of the influence of the construction, operation and decommissioning activities on avifauna SCC species is lacking and therefore, the project provides the opportunity to collate this information.	Project Manager Environmental Officer	Life of Project
Performance Indicator	- Presence of SCC within the surrounding habitats.	
Monitoring	- Monitoring of SCC within the surrounding habitats must occur during the construction, operational and decommissioning phases.	

OBJECTIVE: Minimise collisions with the proposed project infrastructure

Project component/s	PV panels and fences.
Potential Impact	Mortality and severe injuries.
Activity/risk source	PV panels and fences.
Mitigation: Target/Objective	Avoidance / minimisation of collision with the proposed project infrastructure.

Mitigation: Action/control	**Responsibility**	**Timeframe**
• The design of the proposed solar plant must be as endorsed by Jenkins et al. (2017) Best Practise Guidelines Birds & Solar Energy and the power line structure must be as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership, considering the mitigation guidelines recommended by Birdlife South Africa. • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines. • White strips must be placed on the edge of the solar panels to reduce reflection and prevent collisions. This is especially pertinent as several species exhibit daily movement between water resources and feeding/nesting areas. The species may recognise the panel array as water bodies (lake effect as described above) and collide with the panels, causing mortality. • Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted along the entire length of the OHL. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites.	Project Manager Environmental Officer	Operational Phase
Performance Indicator	- Fatality estimates (presence of dead birds) / Injured birds.	
Monitoring	- Monitoring as prescribed in Jenkins *et al* (2017) - Birds & Solar Energy - Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. - An Avifauna Monitoring Management Plan must be implemented with follow-ups of at least two visits per year for four years. However, thereafter annual checks need to be conducted on the condition of the mitigations and needs to be replaced if damaged. The monitoring will be conducted over a period of four years, which will include two annual walk transects along the proposed power line route to look at the effectiveness of these mitigations. The location, identity and number of all electrocution and/or collision causalities found.	

9. Conclusion and Impact Statement

9.1 Conclusion

The SABAP2 Data lists 167 avifauna species that could be expected to occur within the landscape. Eight of these expected species are regarded as SCC with four of these species confirmed to occur within the PAOI. A total of 106 species of avifauna, were recorded within the PAOI during the field survey of the current assessment. This accounts for 63% of the total expected species. The most abundant recorded within the PAOI during the two field surveys was *Creatophora cinerea* (Wattled Starling)

The development will lead to the clearing of vegetation and an alteration in the undeveloped nature of the area. Based on the medium receptor resilience and the medium functional integrity, the assessment area was given high site ecological importance, with transformed areas having a very low site ecological importance (SEI).

The development will also lead to collision and electrocution risks, which can be effectively mitigated, but the loss of habitat cannot be mitigated.

9.2 Impact Statement

The main expected impacts of the proposed Limestone PV1 SEF to the avifauna community will include the following:

- Habitat loss and fragmentation;
- Emigration/displacement due to disturbance; and
- Collisions.

These impacts are especially pertinent due to the presence of several SCC within the PAOI, and also accounts for the 'Very High' SEI of particular habitats within the PAOI. Based on the loss of 'Very High' SEI habitat and its associated avifauna, the residual impacts are expected to be moderate to high.

The mitigation hierarchy implemented in this report is as per the information provided in section 2(4)(a)(i) of NEMA as well as the overall policy on Environmental offsetting (Biodiversity Offset Guidelines, section 24 J of NEMA, Sept 2021). The mitigation hierarchy is a step-by-step tool used to limit the negative impacts of development projects. The mitigation hierarchy for biodiversity in general consists of the following in order of which impacts should be mitigated (Figure 9-1):

- Avoid/prevent impact;
- Minimise impact;
- Rehabilitate impact; and
- Offset impact.

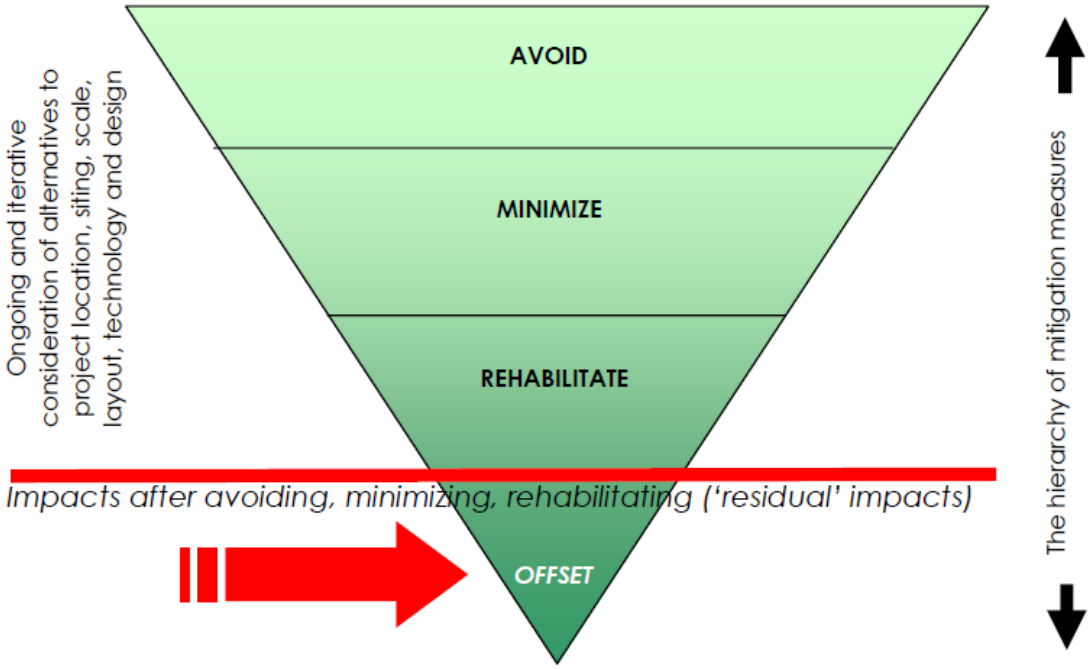


Figure 9-1 Schematic diagram of the mitigation hierarchy as legislated in section 2(4)(a)(i) of NEMA

The specialist believes the proposed development is favourable as it avoided all the "Very High" sensitivity areas as was recommended in the scoping report (TBC 2022). Nevertheless, favourability is under the condition that all of the mitigation measures and Management Objectives provided in this report must be implemented.

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11. Appendix Items

11.1 Appendix A - Avifauna species expected to occur in the area surrounding the PAOI.

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	Global (IUCN)
Accipitridae	*Aquila verreauxii*	Verreaux's Eagle	NA	LC
Accipitridae	*Buteo buteo*	Common Buzzard	Unlisted	Unlisted
Accipitridae	*Circaetus pectoralis*	Black-chested Snake Eagle	Unlisted	Unlisted
Accipitridae	*Elanus caeruleus*	Black-winged Kite	Unlisted	Unlisted
Accipitridae	*Haliaeetus vocifer*	African Fish Eagle	Unlisted	Unlisted
Accipitridae	*Melierax canorus*	Pale Chanting Goshawk	Unlisted	Unlisted
Accipitridae	*Micronisus gabar*	Gabar Goshawk	Unlisted	Unlisted
Accipitridae	*Polemaetus bellicosus*	Martial Eagle	EN	EN
Acrocephalidae	*Acrocephalus baeticatus*	Common Reed Warbler	Unlisted	Unlisted
Acrocephalidae	*Acrocephalus gracilirostris*	Lesser Swamp Warbler	Unlisted	Unlisted
Alaudidae	*Calandrella cinerea*	Red-capped Lark	Unlisted	Unlisted
Alaudidae	*Calendulauda africanoides*	Fawn-colored Lark	Unlisted	Unlisted
Alaudidae	*Calendulauda sabota*	Sabota Lark	Unlisted	Unlisted
Alaudidae	*Chersomanes albofasciata*	Spike-heeled Lark	Unlisted	Unlisted
Alaudidae	*Eremopterix verticalis*	Grey-backed Sparrow-Lark	Unlisted	Unlisted
Alaudidae	*Mirafra fasciolata*	Eastern Clapper Lark	Unlisted	Unlisted
Alaudidae	*Spizocorys conirostris*	Pink-billed Lark	Unlisted	Unlisted
Alaudidae	*Spizocorys starki*	Stark's Lark	Unlisted	Unlisted
Alcedinidae	*Ceryle rudis*	Pied Kingfisher	Unlisted	Unlisted
Alcedinidae	*Corythornis cristatus*	Malachite Kingfisher	Unlisted	Unlisted
Anatidae	*Alopochen aegyptiaca*	Egyptian Goose	Unlisted	Unlisted
Anatidae	*Anas capensis*	Cape Teal	Unlisted	Unlisted
Anatidae	*Anas erythrorhyncha*	Red-billed Teal	Unlisted	Unlisted
Anatidae	*Anas undulata*	Yellow-billed Duck	Unlisted	Unlisted
Anatidae	*Netta erythrophthalma*	Southern Pochard	Unlisted	Unlisted
Anatidae	*Oxyura maccoa*	Maccoa Duck	NT	EN
Anatidae	*Plectropterus gambensis*	Spur-winged Goose	Unlisted	Unlisted
Anatidae	*Spatula smithii*	Cape Shoveler	Unlisted	Unlisted
Anatidae	*Tadorna cana*	South African Shelduck	Unlisted	Unlisted
Anatidae	*Thalassornis leuconotus*	White-backed Duck	Unlisted	Unlisted
Apodidae	*Apus affinis*	Little Swift	Unlisted	Unlisted
Apodidae	*Apus caffer*	White-rumped Swift	Unlisted	Unlisted
Apodidae	*Cypsiurus parvus*	African Palm Swift	Unlisted	Unlisted
Apodidae	*Tachymarptis melba*	Alpine Swift	Unlisted	Unlisted
Ardeidae	*Ardea cinerea*	Grey Heron	Unlisted	Unlisted
Ardeidae	*Ardea melanocephala*	Black-headed Heron	Unlisted	Unlisted
Ardeidae	*Bubulcus ibis*	Western Cattle Egret	Unlisted	Unlisted
Burhinidae	*Burhinus capensis*	Spotted Thick-knee	Unlisted	Unlisted
Caprimulgidae	*Caprimulgus rufigena*	Rufous-cheeked Nightjar	Unlisted	Unlisted
Charadriidae	*Charadrius tricollaris*	Three-banded Plover	Unlisted	Unlisted

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	Global (IUCN)
Charadriidae	*Vanellus armatus*	Blacksmith Lapwing	Unlisted	Unlisted
Charadriidae	*Vanellus coronatus*	Crowned Lapwing	Unlisted	Unlisted
Ciconiidae	*Ciconia nigra*	Black Stork	VU	LC
Cisticolidae	*Cisticola aridulus*	Desert Cisticola	Unlisted	Unlisted
Cisticolidae	*Cisticola fulvicapilla*	Neddicky	Unlisted	Unlisted
Cisticolidae	*Cisticola subruficapilla*	Grey-backed Cisticola	Unlisted	Unlisted
Cisticolidae	*Cisticola tinniens*	Levaillant's Cisticola	Unlisted	Unlisted
Cisticolidae	*Eremomela icteropygialis*	Yellow-bellied Eremomela	Unlisted	Unlisted
Cisticolidae	*Malcorus pectoralis*	Rufous-eared Warbler	Unlisted	Unlisted
Cisticolidae	*Prinia flavicans*	Black-chested Prinia	Unlisted	Unlisted
Coliidae	*Colius colius*	White-backed Mousebird	Unlisted	Unlisted
Coliidae	*Urocolius indicus*	Red-faced Mousebird	Unlisted	Unlisted
Columbidae	*Columba guinea*	Speckled Pigeon	Unlisted	Unlisted
Columbidae	*Oena capensis*	Namaqua Dove	Unlisted	Unlisted
Columbidae	*Spilopelia senegalensis*	Laughing Dove	Unlisted	Unlisted
Columbidae	*Streptopelia capicola*	Ring-necked Dove	Unlisted	Unlisted
Columbidae	*Streptopelia semitorquata*	Red-eyed Dove	Unlisted	Unlisted
Corvidae	*Corvus albus*	Pied Crow	Unlisted	Unlisted
Corvidae	*Corvus capensis*	Cape Crow	Unlisted	Unlisted
Cuculidae	*Chrysococcyx caprius*	Diederik Cuckoo	Unlisted	Unlisted
Cuculidae	*Clamator jacobinus*	Jacobin Cuckoo	Unlisted	Unlisted
Emberizidae	*Emberiza capensis*	Cape Bunting	Unlisted	Unlisted
Emberizidae	*Emberiza flaviventris*	Golden-breasted Bunting	Unlisted	Unlisted
Emberizidae	*Emberiza impetuani*	Lark-like Bunting	Unlisted	Unlisted
Emberizidae	*Emberiza tahapisi*	Cinnamon-breasted Bunting	Unlisted	Unlisted
Estriidae	*Amadina erythrocephala*	Red-headed Finch	Unlisted	Unlisted
Estriidae	*Lagonosticta senegala*	Red-billed Firefinch	Unlisted	Unlisted
Estrildidae	*Brunhilda erythronotos*	Black-faced Waxbill	Unlisted	Unlisted
Estrildidae	*Estrilda astrild*	Common Waxbill	Unlisted	Unlisted
Estrildidae	*Granatina granatina*	Violet-eared Waxbill	Unlisted	Unlisted
Estrildidae	*Ortygospiza atricollis*	Quailfinch	Unlisted	Unlisted
Estrildidae	*Pytilia melba*	Green-winged Pytilia	Unlisted	Unlisted
Falconidae	*Falco biarmicus*	Lanner Falcon	VU	LC
Falconidae	*Falco naumanni*	Lesser Kestrel	Unlisted	Unlisted
Falconidae	*Falco rupicoloides*	Greater Kestrel	Unlisted	Unlisted
Falconidae	*Falco rupicolus*	Rock Kestrel	Unlisted	Unlisted
Fringillidae	*Crithagra albogularis*	White-throated Canary	Unlisted	Unlisted
Fringillidae	*Crithagra atrogularis*	Black-throated Canary	Unlisted	Unlisted
Fringillidae	*Crithagra flaviventris*	Yellow Canary	Unlisted	Unlisted
Glareolidae	*Cursorius rufus*	Burchell's Courser	VU	LC
Glareolidae	*Rhinoptilus africanus*	Double-banded Courser	Unlisted	Unlisted
Hirundinidae	*Cecropis cucullata*	Greater Striped Swallow	Unlisted	Unlisted

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	Global (IUCN)
Hirundinidae	*Cecropis semirufa*	Red-breasted Swallow	Unlisted	Unlisted
Hirundinidae	*Delichon urbicum*	Common House Martin	Unlisted	Unlisted
Hirundinidae	*Hirundo albigularis*	White-throated Swallow	Unlisted	Unlisted
Hirundinidae	*Hirundo rustica*	Barn Swallow	Unlisted	Unlisted
Hirundinidae	*Ptyonoprogne fuligula*	Rock Martin	Unlisted	Unlisted
Hirundinidae	*Riparia cincta*	Banded Martin	Unlisted	Unlisted
Hirundinidae	*Riparia paludicola*	Brown-throated Martin	Unlisted	Unlisted
Laniidae	*Lanius collaris*	Southern Fiscal	Unlisted	Unlisted
Laniidae	*Lanius collurio*	Red-backed Shrike	Unlisted	Unlisted
Laniidae	*Lanius minor*	Lesser Grey Shrike	Unlisted	Unlisted
Laridae	*Chlidonias hybrida*	Whiskered Tern	Unlisted	Unlisted
Lybiidae	*Lybius torquatus*	Black-collared Barbet	Unlisted	Unlisted
Lybiidae	*Trachyphonus vaillantii*	Crested Barbet	Unlisted	Unlisted
Lybiidae	*Tricholaema leucomelas*	Acacia Pied Barbet	Unlisted	Unlisted
Macrosphenidae	*Sylvietta rufescens*	Long-billed Crombec	Unlisted	Unlisted
Malaconotidae	*Laniarius atrococcineus*	Crimson-breasted Shrike	Unlisted	Unlisted
Malaconotidae	*Tchagra australis*	Brown-crowned Tchagra	Unlisted	Unlisted
Malaconotidae	*Telophorus zeylonus*	Bokmakierie	Unlisted	Unlisted
Meropidae	*Merops apiaster*	European Bee-eater	Unlisted	Unlisted
Meropidae	*Merops bullockoides*	White-fronted Bee-eater	Unlisted	Unlisted
Meropidae	*Merops hirundineus*	Swallow-tailed Bee-eater	Unlisted	Unlisted
Motacillidae	*Anthus cinnamomeus*	African Pipit	Unlisted	Unlisted
Motacillidae	*Anthus vaalensis*	Buffy Pipit	Unlisted	Unlisted
Motacillidae	*Motacilla capensis*	Cape Wagtail	Unlisted	Unlisted
Muscicapidae	*Cercotrichas coryphoeus*	Karoo Scrub Robin	Unlisted	Unlisted
Muscicapidae	*Cercotrichas paena*	Kalahari Scrub Robin	Unlisted	Unlisted
Muscicapidae	*Cossypha caffra*	Cape Robin-Chat	Unlisted	Unlisted
Muscicapidae	*Melaenornis infuscatus*	Chat Flycatcher	Unlisted	Unlisted
Muscicapidae	*Melaenornis silens*	Fiscal Flycatcher	Unlisted	Unlisted
Muscicapidae	*Monticola brevipes*	Short-toed Rock Thrush	Unlisted	Unlisted
Muscicapidae	*Muscicapa striata*	Spotted Flycatcher	Unlisted	Unlisted
Muscicapidae	*Myrmecocichla formicivora*	Ant-eating Chat	Unlisted	Unlisted
Muscicapidae	*Myrmecocichla monticola*	Mountain Wheatear	Unlisted	Unlisted
Muscicapidae	*Oenanthe familiaris*	Familiar Chat	Unlisted	Unlisted
Muscicapidae	*Oenanthe pileata*	Capped Wheatear	Unlisted	Unlisted
Muscicapidae	*Saxicola torquatus*	African Stonechat	Unlisted	Unlisted
Muscicapidae	*Stenostira scita*	Fairy Flycatcher	Unlisted	Unlisted
Nectariniidae	*Cinnyris fuscus*	Dusky Sunbird	Unlisted	Unlisted
Nectariniidae	*Cinnyris talatala*	White-bellied Sunbird	Unlisted	Unlisted
Numididae	*Numida meleagris*	Helmeted Guineafowl	Unlisted	Unlisted
Otididae	*Afrotis afraoides*	Northern Black Korhaan	Unlisted	Unlisted
Otididae	*Lophotis ruficrista*	Red-crested Korhaan	Unlisted	Unlisted

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	Global (IUCN)
Otididae	*Neotis ludwigii*	Ludwig's Bustard	EN	EN
Paridae	*Melaniparus cinerascens*	Ashy Tit	Unlisted	Unlisted
Passeridae	*Passer diffusus*	Southern Grey-headed Sparrow	Unlisted	Unlisted
Passeridae	*Passer domesticus*	House Sparrow	Unlisted	Unlisted
Passeridae	*Passer melanurus*	Cape Sparrow	Unlisted	Unlisted
Phalacrocoracidae	*Microcarbo africanus*	Reed Cormorant	Unlisted	Unlisted
Phasianidae	*Scleroptila gutturalis*	Orange River Francolin	Unlisted	Unlisted
Phoeniculidae	*Rhinopomastus cyanomelas*	Common Scimitarbill	Unlisted	Unlisted
Phylloscopidae	*Phylloscopus trochilus*	Willow Warbler	Unlisted	Unlisted
Picidae	*Campethera abingoni*	Golden-tailed Woodpecker	Unlisted	Unlisted
Platysteiridae	*Batis pririt*	Pririt Batis	Unlisted	Unlisted
Ploceidae	*Euplectes afer*	Yellow-crowned Bishop	Unlisted	Unlisted
Ploceidae	*Euplectes orix*	Southern Red Bishop	Unlisted	Unlisted
Ploceidae	*Plocepasser mahali*	White-browed Sparrow-Weaver	Unlisted	Unlisted
Ploceidae	*Ploceus velatus*	Southern Masked Weaver	Unlisted	Unlisted
Ploceidae	*Quelea quelea*	Red-billed Quelea	Unlisted	Unlisted
Ploceidae	*Sporopipes squamifrons*	Scaly-feathered Weaver	Unlisted	Unlisted
Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	Unlisted	Unlisted
Pteroclidae	*Pterocles namaqua*	Namaqua Sandgrouse	Unlisted	Unlisted
Pycnonotidae	*Pycnonotus nigricans*	African Red-eyed Bulbul	Unlisted	Unlisted
Rallidae	*Fulica cristata*	Red-knobbed Coot	Unlisted	Unlisted
Rallidae	*Gallinula chloropus*	Common Moorhen	Unlisted	Unlisted
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	Unlisted	Unlisted
Remizidae	*Anthoscopus minutus*	Cape Penduline Tit	Unlisted	Unlisted
Sagittariidae	*Sagittarius serpentarius*	Secretarybird	VU	EN
Strigidae	*Bubo africanus*	Spotted Eagle-Owl	Unlisted	Unlisted
Struthionidae	*Struthio camelus*	Common Ostrich	Unlisted	Unlisted
Sturnidae	*Acridotheres tristis*	Common Myna	Unlisted	Unlisted
Sturnidae	*Creatophora cinerea*	Wattled Starling	Unlisted	Unlisted
Sturnidae	*Lamprotornis bicolor*	Pied Starling	Unlisted	Unlisted
Sturnidae	*Lamprotornis nitens*	Cape Starling	Unlisted	Unlisted
Sturnidae	*Onychognathus nabouroup*	Pale-winged Starling	Unlisted	Unlisted
Sylviidae	*Curruca subcoerulea*	Chestnut-vented Warbler	Unlisted	Unlisted
Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	Unlisted	Unlisted
Threskiornithidae	*Platalea alba*	African Spoonbill	Unlisted	Unlisted
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	Unlisted	Unlisted
Threskiornithidae	*Threskiornis aethiopicus*	African Sacred Ibis	Unlisted	Unlisted
Turdidae	*Turdus litsitsirupa*	Groundscraper Thrush	Unlisted	Unlisted
Turdidae	*Turdus smithi*	Karoo Thrush	Unlisted	Unlisted
Upupidae	*Upupa africana*	African Hoopoe	Unlisted	Unlisted
Viduidae	*Vidua macroura*	Pin-tailed Whydah	Unlisted	Unlisted
Viduidae	*Vidua regia*	Shaft-tailed Whydah	Unlisted	Unlisted

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	Global (IUCN)
Zosteropidae	*Zosterops pallidus*	Orange River White-eye	Unlisted	Unlisted

* Global red List status (IUCN 2019) and the regional Red List Status (Taylor et al. 2015)

11.2 Appendix B – Avifauna species recorded within the PAOI.

Family Name	Scientific Name	Common Name	Red List Status* (Regional, Global)
Accipitridae	*Circaetus cinereus*	Brown Snake Eagle	0
Accipitridae	*Circaetus pectoralis*	Black-chested Snake Eagle	0
Accipitridae	*Elanus caeruleus*	Black-winged Kite	0
Accipitridae	*Hieraaetus pennatus*	Booted Eagle	0
Accipitridae	*Melierax canorus*	Pale Chanting Goshawk	0
Acrocephalidae	*Acrocephalus baeticatus*	Common Reed Warbler	0
Acrocephalidae	*Hippolais icterina*	Icterine Warbler	0
Alaudidae	*Calandrella cinerea*	Red-capped Lark	0
Alaudidae	*Calendulauda africanoides*	Fawn-colored Lark	0
Alaudidae	*Calendulauda sabota*	Sabota Lark	0
Alaudidae	*Chersomanes albofasciata*	Spike-heeled Lark	0
Alaudidae	*Eremopterix verticalis*	Grey-backed Sparrow-Lark	0
Alaudidae	*Mirafra fasciolata*	Eastern Clapper Lark	0
Alaudidae	*Spizocorys conirostris*	Pink-billed Lark	0
Anatidae	*Alopochen aegyptiaca*	Egyptian Goose	0
Anatidae	*Anas capensis*	Cape Teal	0
Anatidae	*Anas erythrorhyncha*	Red-billed Teal	0
Anatidae	*Anas undulata*	Yellow-billed Duck	0
Anatidae	*Dendrocygna viduata*	White-faced Whistling Duck	0
Anatidae	*Spatula hottentota*	Blue-billed Teal	0
Anatidae	*Spatula smithii*	Cape Shoveler	0
Anatidae	*Tadorna cana*	South African Shelduck	0
Anatidae	*Thalassornis leuconotus*	White-backed Duck	0
Apodidae	*Apus affinis*	Little Swift	0
Apodidae	*Apus caffer*	White-rumped Swift	0
Ardeidae	*Ardea cinerea*	Grey Heron	0
Ardeidae	*Bubulcus ibis*	Western Cattle Egret	0
Ardeidae	*Egretta garzetta*	Little Egret	0
Ardeidae	*Nycticorax nycticorax*	Black-crowned Night Heron	0
Charadriidae	*Charadrius tricollaris*	Three-banded Plover	0
Charadriidae	*Vanellus armatus*	Blacksmith Lapwing	0
Charadriidae	*Vanellus coronatus*	Crowned Lapwing	0
Ciconiidae	*Ciconia nigra*	Black Stork	VU, LC
Cisticolidae	*Cisticola aridulus*	Desert Cisticola	0
Cisticolidae	*Cisticola fulvicapilla*	Neddicky	0
Cisticolidae	*Cisticola juncidis*	Zitting Cisticola	0
Cisticolidae	*Cisticola textrix*	Cloud Cisticola	0
Cisticolidae	*Cisticola tinniens*	Levaillant's Cisticola	0
Cisticolidae	*Malcorus pectoralis*	Rufous-eared Warbler	0
Cisticolidae	*Prinia flavicans*	Black-chested Prinia	0
Coliidae	*Colius colius*	white-backed Mousebird	0

Family Name	Scientific Name	Common Name	Red List Status* (Regional, Global)
Coliidae	*Urocolius indicus*	Red-faced Mousebird	0
Columbidae	*Columba guinea*	Speckled Pigeon	0
Columbidae	*Columba livia*	Rock Dove	0
Columbidae	*Oena capensis*	Namaqua Dove	0
Columbidae	*Spilopelia senegalensis*	Laughing Dove	0
Columbidae	*Streptopelia capicola*	Ring-necked Dove	0
Corvidae	*Corvus albus*	Pied Crow	0
Corvidae	*Corvus capensis*	Cape Crow	0
Emberizidae	*Emberiza tahapisi*	Cinnamon-breasted Bunting	0
Estriididae	*Amadina erythrocephala*	Red-headed Finch	0
Estriididae	*Lagonosticta senegala*	Red-billed Firefinch	0
Estrildidae	*Granatina granatina*	Violet-eared Waxbill	0
Estrildidae	*Ortygospiza atricollis*	Quailfinch	0
Falconidae	*Falco amurensis*	Amur Falcon	0
Falconidae	*Falco biarmicus*	Lanner Falcon	VU, LC
Falconidae	*Falco rupicoloides*	Greater Kestrel	0
Falconidae	*Falco vespertinus*	Red-footed Falcon	NT, VU
Fringillidae	*Crithagra flaviventris*	Yellow Canary	0
Hirundinidae	*Cecropis cucullata*	Greater Striped Swallow	0
Hirundinidae	*Cecropis semirufa*	Red-breasted Swallow	0
Hirundinidae	*Ptyonoprogne fuligula*	Rock Martin	0
Hirundinidae	*Riparia cincta*	Banded Martin	0
Laniidae	*Lanius collaris*	Southern Fiscal	0
Laniidae	*Lanius minor*	Lesser Grey Shrike	0
Laridae	*Chlidonias hybrida*	Whiskered Tern	0
Lybiidae	*Tricholaema leucomelas*	Acacia Pied Barbet	0
Macrosphenidae	*Sylvietta rufescens*	Long-billed Crombec	0
Malaconotidae	*Laniarius atrococcineus*	Crimson-breasted Shrike	0
Malaconotidae	*Nilaus afer*	Brubru	0
Malaconotidae	*Tchagra australis*	Brown-crowned Tchagra	0
Meropidae	*Merops apiaster*	European Bee-eater	0
Motacillidae	*Anthus cinnamomeus*	African Pipit	0
Motacillidae	*Anthus vaalensis*	Buffy Pipit	0
Motacillidae	*Motacilla capensis*	Cape Wagtail	0
Muscicapidae	*Cercotrichas coryphoeus*	Karoo Scrub Robin	0
Muscicapidae	*Cercotrichas paena*	Kalahari Scrub Robin	0
Muscicapidae	*Emarginata sinuata*	Sickle-winged Chat	0
Muscicapidae	*Melaenornis silens*	Fiscal Flycatcher	0
Muscicapidae	*Monticola brevipes*	Short-toed Rock Thrush	0
Muscicapidae	*Myrmecocichla formicivora*	Ant-eating Chat	0
Muscicapidae	*Oenanthe familiaris*	Familiar Chat	0
Muscicapidae	*Oenanthe pileata*	Capped Wheatear	0

Family Name	Scientific Name	Common Name	Red List Status* (Regional, Global)
Muscicapidae	*Stenostira scita*	Fairy Flycatcher	0
Nectariniidae	*Cinnyris mariquensis*	Marico Sunbird	0
Numididae	*Numida meleagris*	Helmeted Guineafowl	0
Otididae	*Afrotis afraoides*	Northern Black Korhaan	0
Otididae	*Lophotis ruficrista*	Red-crested Korhaan	0
Paridae	*Melaniparus cinerascens*	Ashy Tit	0
Passeridae	*Passer diffusus*	Southern Grey-headed Sparrow	0
Passeridae	*Passer melanurus*	Cape Sparrow	0
Phalacrocoracidae	*Microcarbo africanus*	Reed Cormorant	0
Phasianidae	*Scleroptila gutturalis*	Orange River Francolin	0
Phoenicopteridae	*Phoenicopterus roseus*	Greater Flamingo	NT, LC
Phoeniculidae	*Rhinopomastus cyanomelas*	Common Scimitarbill	0
Platysteiridae	*Batis pririt*	Pririt Batis	0
Ploceidae	*Euplectes orix*	Southern Red Bishop	0
Ploceidae	*Plocepasser mahali*	White-browed Sparrow-Weaver	0
Ploceidae	*Ploceus velatus*	Southern Masked Weaver	0
Ploceidae	*Sporopipes squamifrons*	Scaly-feathered Weaver	0
Podicipedidae	*Podiceps cristatus*	Great Crested Grebe	0
Podicipedidae	*Podiceps nigricollis*	Black-necked Grebe	0
Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	0
Pteroclidae	*Pterocles namaqua*	Namaqua Sandgrouse	0
Pycnonotidae	*Pycnonotus nigricans*	African Red-eyed Bulbul	0
Rallidae	*Fulica cristata*	Red-knobbed Coot	0
Rallidae	*Gallinula chloropus*	Common Moorhen	0
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	0
Recurvirostridae	*Recurvirostra avosetta*	Pied Avocet	0
Remizidae	*Anthoscopus minutus*	Cape Penduline Tit	0
Scolopacidae	*Calidris minuta*	Little Stint	0
Scolopacidae	*Tringa glareola*	Wood Sandpiper	0
Sturnidae	*Acridotheres tristis*	Common Myna	0
Sturnidae	*Creatophora cinerea*	Wattled Starling	0
Sturnidae	*Lamprotornis nitens*	Cape Starling	0
Sturnidae	*Onychognathus nabouroup*	Pale-winged Starling	0
Sylviidae	*Curruca subcoerulea*	Chestnut-vented Warbler	0
Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	0
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	0
Turdidae	*Turdus litsitsirupa*	Groundscraper Thrush	0
Turdidae	*Turdus smithi*	Karoo Thrush	0
Turnicidae	*Turnix sylvaticus*	Kurrichane Buttonquail	0
Upupidae	*Upupa africana*	African Hoopoe	0
Viduidae	*Vidua regia*	Shaft-tailed Whydah	0
Zosteropidae	*Zosterops pallidus*	Orange River White-eye	0

* Global red List status (IUCN 2019) and the regional Red List Status (Taylor et al. 2015)

11.3 Appendix C – Dominant avifauna observed within the PAOI.

Scientific Name	Common Name	Relative abundance	Frequency
Creatophora cinerea	Wattled Starling	0.471	32.979
Phoenicopterus roseus	Greater Flamingo	0.118	3.191
Fulica cristata	Red-knobbed Coot	0.058	5.319
Himantopus himantopus	Black-winged Stilt	0.034	6.383
Plegadis falcinellus	Glossy Ibis	0.025	7.447
Anas capensis	Cape Teal	0.023	7.447
Spatula smithii	Cape Shoveler	0.022	5.319
Pycnonotus nigricans	African Red-eyed Bulbul	0.022	56.383
Sporopipes squamifrons	Scaly-feathered Weaver	0.019	25.532
Curruca subcoerulea	Chestnut-vented Warbler	0.013	56.383
Crithagra flaviventris	Yellow Canary	0.013	22.340
Streptopelia capicola	Ring-necked Dove	0.010	43.617
Prinia flavicans	Black-chested Prinia	0.010	52.128
Corvus albus	Pied Crow	0.010	27.660
Anas erythrorhyncha	Red-billed Teal	0.009	5.319
Columba guinea	Speckled Pigeon	0.008	6.383
Passer melanurus	Cape Sparrow	0.007	11.702
Cercotrichas paena	Kalahari Scrub Robin	0.007	40.426
Colius colius	white-backed Mousebird	0.006	19.149
Urocolius indicus	Red-faced Mousebird	0.006	13.830
Spizocorys conirostris	Pink-billed Lark	0.005	4.255
Tachybaptus ruficollis	Little Grebe	0.005	6.383
Zosterops pallidus	Orange River White-eye	0.005	15.957
Tricholaema leucomelas	Acacia Pied Barbet	0.005	26.596
Eremopterix verticalis	Grey-backed Sparrow-Lark	0.005	2.128
Tadorna cana	South African Shelduck	0.004	8.511
Vanellus armatus	Blacksmith Lapwing	0.004	4.255
Calandrella cinerea	Red-capped Lark	0.004	11.702
Anthus cinnamomeus	African Pipit	0.004	13.830
Euplectes orix	Southern Red Bishop	0.004	1.064
Melaenornis silens	Fiscal Flycatcher	0.003	14.894
Myrmecocichla formicivora	Ant-eating Chat	0.003	9.574
Amadina erythrocephala	Red-headed Finch	0.003	2.128
Ortygospiza atricollis	Quailfinch	0.003	4.255
Passer diffusus	Southern Grey-headed Sparrow	0.003	1.064
Chersomanes albofasciata	Spike-heeled Lark	0.002	7.447
Sylvietta rufescens	Long-billed Crombec	0.002	11.702
Cisticola fulvicapilla	Neddicky	0.002	12.766
Calendulauda africanoides	Fawn-colored Lark	0.002	12.766
Merops apiaster	European Bee-eater	0.002	2.128
Cisticola aridulus	Desert Cisticola	0.002	10.638
Stenostira scita	Fairy Flycatcher	0.002	9.574

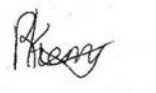
Scientific Name	Common Name	Relative abundance	Frequency
Afrotis afraoides	Northern Black Korhaan	0.001	8.511
Numida meleagris	Helmeted Guineafowl	0.001	3.191
Apus caffer	White-rumped Swift	0.001	1.064
Cecropis cucullata	Greater Striped Swallow	0.001	4.255
Mirafra fasciolata	Eastern Clapper Lark	0.001	7.447
Laniarius atrococcineus	Crimson-breasted Shrike	0.001	8.511
Bostrychia hagedash	Hadada Ibis	0.001	4.255
Spilopelia senegalensis	Laughing Dove	0.001	7.447
Granatina granatina	Violet-eared Waxbill	0.001	4.255
Turdus litsitsirupa	Groundscraper Thrush	0.001	4.255
Calendulauda sabota	Sabota Lark	0.001	6.383
Recurvirostra avosetta	Pied Avocet	0.001	1.064
Spatula hottentota	Blue-billed Teal	0.001	1.064
Gallinula chloropus	Common Moorhen	0.001	2.128
Oenanthe pileata	Capped Wheatear	0.001	3.191
Upupa africana	African Hoopoe	0.001	5.319
Podiceps nigricollis	Black-necked Grebe	0.001	1.064
Vanellus coronatus	Crowned Lapwing	0.001	2.128
Tchagra australis	Brown-crowned Tchagra	0.001	4.255
Lanius collaris	Southern Fiscal	0.001	3.191
Lagonosticta senegala	Red-billed Firefinch	0.001	4.255
Dendrocygna viduata	White-faced Whistling Duck	0.001	1.064
Ptyonoprogne fuligula	Rock Martin	0.001	2.128
Melierax canorus	Pale Chanting Goshawk	0.001	3.191
Apus affinis	Little Swift	0.001	2.128
Cisticola textrix	Cloud Cisticola	0.001	2.128
Charadrius tricollaris	Three-banded Plover	0.001	1.064
Plocepasser mahali	White-browed Sparrow-Weaver	0.001	2.128
Lophotis ruficrista	Red-crested Korhaan	0.001	3.191
Anas undulata	Yellow-billed Duck	0.001	1.064
Oenanthe familiaris	Familiar Chat	0.001	2.128
Cisticola tinniens	Levaillant's Cisticola	0.000	2.128
Oena capensis	Namaqua Dove	0.000	1.064
Ploceus velatus	Southern Masked Weaver	0.000	1.064
Motacilla capensis	Cape Wagtail	0.000	1.064
Alopochen aegyptiaca	Egyptian Goose	0.000	1.064
Falco rupicoloides	Greater Kestrel	0.000	2.128
Onychognathus nabouroup	Pale-winged Starling	0.000	1.064
Pterocles namaqua	Namaqua Sandgrouse	0.000	1.064
Hieraaetus pennatus	Booted Eagle	0.000	2.128
Hippolais icterina	Icterine Warbler	0.000	2.128
Tringa glareola	Wood Sandpiper	0.000	1.064
Falco biarmicus	Lanner Falcon	0.000	1.064

Scientific Name	Common Name	Relative abundance	Frequency
Malcorus pectoralis	Rufous-eared Warbler	0.000	1.064
Emarginata sinuata	Sickle-winged Chat	0.000	1.064
Cecropis semirufa	Red-breasted Swallow	0.000	1.064
Anthoscopus minutus	Cape Penduline Tit	0.000	1.064
Cisticola juncidis	Zitting Cisticola	0.000	1.064
Falco amurensis	Amur Falcon	0.000	1.064
Vidua regia	Shaft-tailed Whydah	0.000	1.064
Nilaus afer	Brubru	0.000	1.064
Acrocephalus baeticatus	Common Reed Warbler	0.000	1.064
Anthus vaalensis	Buffy Pipit	0.000	1.064
Bubulcus ibis	Western Cattle Egret	0.000	1.064
Monticola brevipes	Short-toed Rock Thrush	0.000	1.064
Batis pririt	Pririt Batis	0.000	1.064
Cinnyris mariquensis	Marico Sunbird	0.000	1.064
Emberiza tahapisi	Cinnamon-breasted Bunting	0.000	1.064
Riparia cincta	Banded Martin	0.000	1.064
Melaniparus cinerascens	Ashy Tit	0.000	1.064
Circaetus cinereus	Brown Snake Eagle	0.000	1.064
Rhinopomastus cyanomelas	Common Scimitarbill	0.000	1.064
Turnix sylvaticus	Kurrichane Buttonquail	0.000	1.064
Circaetus pectoralis	Black-chested Snake Eagle	0.000	1.064

11.4 Appendix D – Specialist Declaration of Independence

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

Biodiversity Specialist

The Biodiversity Company

April 2023