APPENDIX F5: Avifaunal Impact Assessment

Proposed Expansion of the Mossdustria Precinct near Mossel Bay, Western Cape

Avifaunal Impact Assessment

Project Reference: GE39111

Compiled for

GIBB ENVIRONMENTAL

By

Cossypha Ecological

April 2025

REPORT PRODUCTION

Specialist	Role	Project Component	Qualifications and Professional Registration
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SPECIALIST DECLARATION OF INDEPENDENCE

I, **Robyn Phillips**, in my capacity as a specialist consultant, hereby declare that I –

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- Do not have and will not have vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the Competent Authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member;
- Based on information provided to me by the project proponent and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional ability;
- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field; and
- Undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study for which I am registered.

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Terrestrial Ecologist
SACNASP Reg. No. 400401/12

11 June 2025
Date

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ABBREVIATIONS

BA	Basic Assessment
BESS	Battery Energy Storage System
BI	Biological Importance
BIRP	Birds in Reserves Project
CAR	Co-ordinated Avifaunal Road Counts
CI	Conservation Importance
CR	Critically Endangered
CWAC	Co-ordinated Wetland Counts
DEA	Department of Environmental Affairs (now DFFE)
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
EOO	Extent of Occurrence
EWT	Endangered Wildlife Trust
FI	Functional Integrity
GBIF	Global Biodiversity Information Facility
GN	General Notice
ha	Hectares
IUCN	International Union for Conservation of Nature
LC	Least Concern
LT	Least Threatened
MAP	Mean Annual Precipitation
MW	Megawatt
NEMA	National Environmental Management Act 107 of 1998
NT	Near Threatened
PAOI	Project Area of Influence
PV	Photovoltaic
QDGC	Quarter Degree Grid Cell
RR	Receptor Resilience
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEF	Solar Energy Facility
SEI	Site Ecological Importance
VU	Vulnerable
WCBSP	Western Cape Biodiversity Sector Plan

1. INTRODUCTION AND PROJECT DESCRIPTION

The Mossel Bay Local Municipality proposes to expand the industrial precinct at Mossel Bay (Mossdustria) in the Western Cape. GIBB Environmental (Pty) Ltd was appointed to undertake the environmental process required in terms of the National Environmental Management Act 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982, as amended by GN R326) for the proposed project. Cossypha Ecological was appointed to conduct an Avifaunal Assessment for the proposed development to inform the process.

1.1. PROJECT DESCRIPTION

The proposed new Mossdustria development entails the expansion of the industrial complex by 13 ha, the construction of a photovoltaic (PV) solar energy facility (SEF) with a capacity of 22 MW covering 22ha, and the development of a motor sport raceway arena on 38 ha, including parking facilities and a business hub. The total development area is approximately 90 ha in extent, of which ~15 ha has been set aside as a conservation area (**Figure 1**).

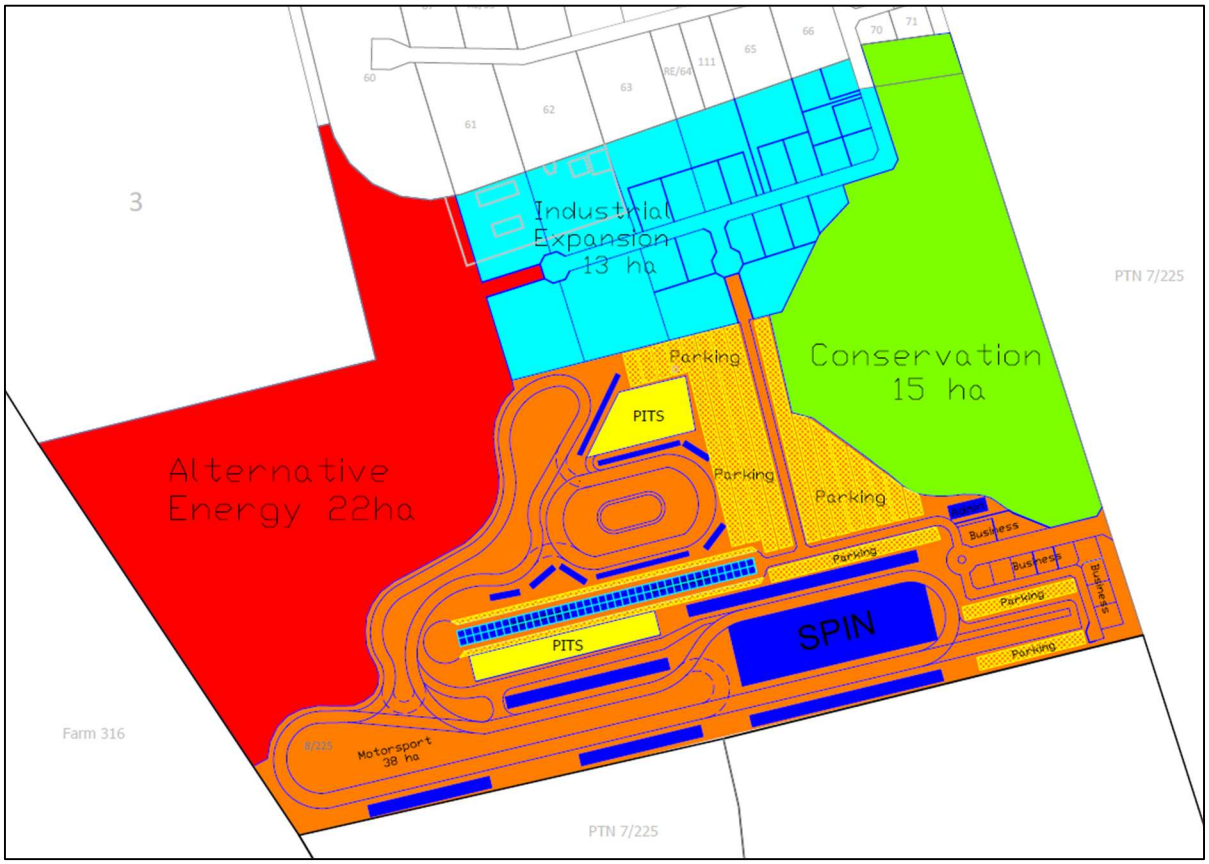


Figure 1: Proposed layout of the Mossdustria expansion project

1.2. LOCATION OF THE STUDY AREA

The study area is located approximately 10 km to the west of the town of Mossel Bay within Mossel Bay Local Municipality in the Garden Route District of the Western Cape Province (**Figure 2**). The study area is ~90 ha in extent and occurs on Portion 8 of the Farm Rietvalley 225. The site falls mostly within Quarter Degree Grid Cell (QDGC) 3422AA and marginally within 3421BB and lies between 34°09'42.92" and 34°10'17.70" south and 21°59'50.03" and 22°00'46.23" east. The study area is mostly flat with a range in altitude from around 162 to 178 m above mean sea level (a.m.s.l).

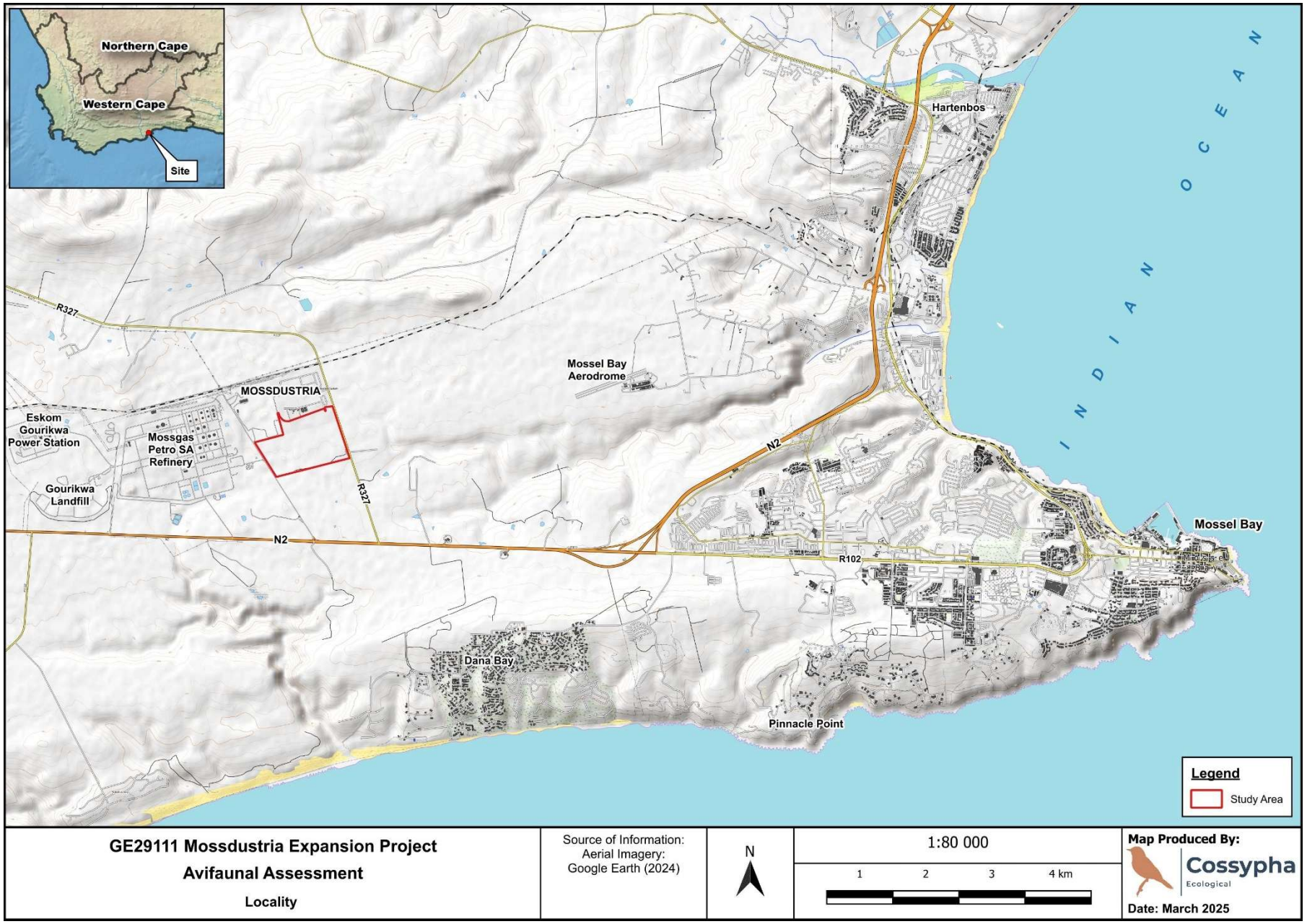


Figure 2: Location of the study area

2. REPORTING REQUIREMENTS

2.1. SCREENING TOOL

An environmental site sensitivity report was generated for the project on the 23rd of February 2023 using the Department of Forestry, Fisheries, and the Environment (DFFE) National Web-Based Environmental Screening Tool. For the proposed development site, the Screening Tool Report identified a possible site environmental sensitivities of **Low** for the Avian theme and **High** and **Medium** for Aves under the Animal Species theme due to the potential occurrence of the the following bird Species of Conservation Concern (SCC) within the study area (**Figure 3**):

- High: *Circus ranivorous* African Marsh Harrier (Endangered (EN))
- High: *Polemaetus bellicosus* Martial Eagle (EN)
- High: *Circus maurus* Black Harrier (EN)
- High: *Neotis denhami* Denham's Bustard (Vulnerable (VU))
- High: *Bradypterus sylvaticus* Knysna Warbler (VU)
- High: *Afrotis afra* Southern Black Korhaan (VU)
- Medium: *Circus ranivorous* African Marsh Harrier (EN)
- Medium: *Bradypterus sylvaticus* Knysna Warbler (VU)
- Medium: *Afrotis afra* Southern Black Korhaan (VU)

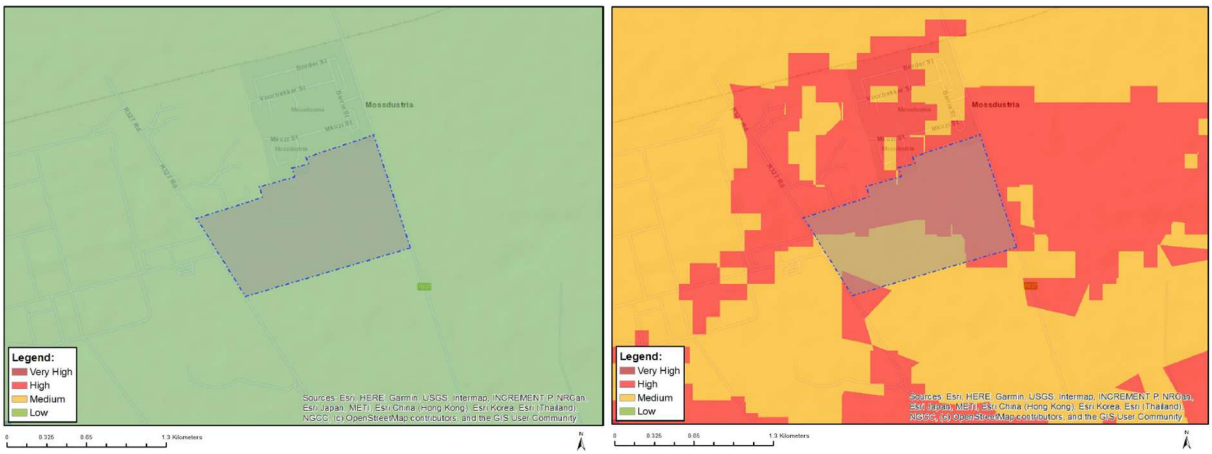


Figure 3: DFFE Screening Tool map of relative sensitivity for the Avian theme (left) and Animal Species theme (right)

Therefore, based on the environmental sensitivities of the proposed development footprint, the screening tool suggested the following applicable specialist assessment for inclusion in the EIA report:

- Avian Impact Assessment

The assessment must be compiled in accordance with the requirements of the *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes when Applying for EA* (GN R320 of 2020) and comply with the following gazetted protocol, which replaces the requirements of Appendix 6 of the EIA Regulations, 2014 (as amended) in terms of NEMA:

- *Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species* (GN 1150 of 30 October 2020) as amended 28 July 2023.

According to the above-mentioned protocol, the report must follow the Species Environmental Assessment Guidelines (SANBI, 2020), which prescribes the Best Practice Guidelines: Birds & Solar Energy (Jenkins *et al.*, 2017)

for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa, established by BirdLife South Africa and the Wildlife and Energy Programme of the Endangered Wildlife Trust (EWT).

The following report comprises an investigation of the avifaunal communities present on the site and an assessment of the ecological sensitivities and potential impacts of the proposed development on avifauna in the study area using the methodology prescribed by the guidelines.

2.2. TERMS OF REFERENCE

The Terms of Reference were to:

- Compile an Avifaunal Impact Assessment Report that provides an overview of the ecological context, an analysis of impacts, and potential red flags to development from an avifaunal perspective.
- Describe the ecological status quo of the site, highlighting any important landscape and habitat features from an avifaunal perspective.
- Compile a photographic record of the characteristics of the study area, including major habitats and sensitive areas.
- Provide an analysis of the site ecological importance and sensitivity pertaining to avifauna.
- Assess the significance of the potential impacts of the proposed project alternatives and related activities - with and without mitigation - on avifaunal species and communities (with regards to potential disturbance, displacement, habitat loss and mortality through collision).
- Provide recommendations regarding actions that should be taken to prevent or, if prevention is not feasible, to mitigate negative impacts during the planning, construction, and operational phases of the development.
- Inform the nature and extent of monitoring required pre-construction.

2.3. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations pertain to this report:

- Habitat boundaries usually consist of subtle transitional zones or ecotones of vegetation, which cannot be captured as distinct lines. Boundaries of habitat types are therefore approximately defined.
- Habitat types were defined and mapped in the context of use by birds and not in terms of botanical species associations. Similarly, the habitat associated with rivers and wetlands described in this report are defined in terms of broad habitat use by avifauna and do not denote the boundaries of wetlands and watercourses.
- Potential impacts of the proposed project were evaluated based on the layout provided at the time of writing, and where necessary, recommendations for the most appropriate mitigation measures have been provided.
- Findings, recommendations, and conclusions provided in this report are based on the author's best scientific and professional knowledge as well as information available at the time of compilation.
- It is assumed that the report will be read in its entirety and that conclusions cannot be made from single sections.

3. METHODOLOGY

The solar energy industry is expanding rapidly in southern Africa, and the nature and implications of potential negative effects on birds, through the destruction of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with the solar infrastructure, are poorly understood. To fully understand and avoid and minimise the possible impacts of solar energy on the region's birds, it is essential that sufficient, project- and site-specific data are gathered to both inform the avifaunal impact assessment process and build our understanding of the impacts and potential mitigation measures (Jenkins *et al.*, 2017).

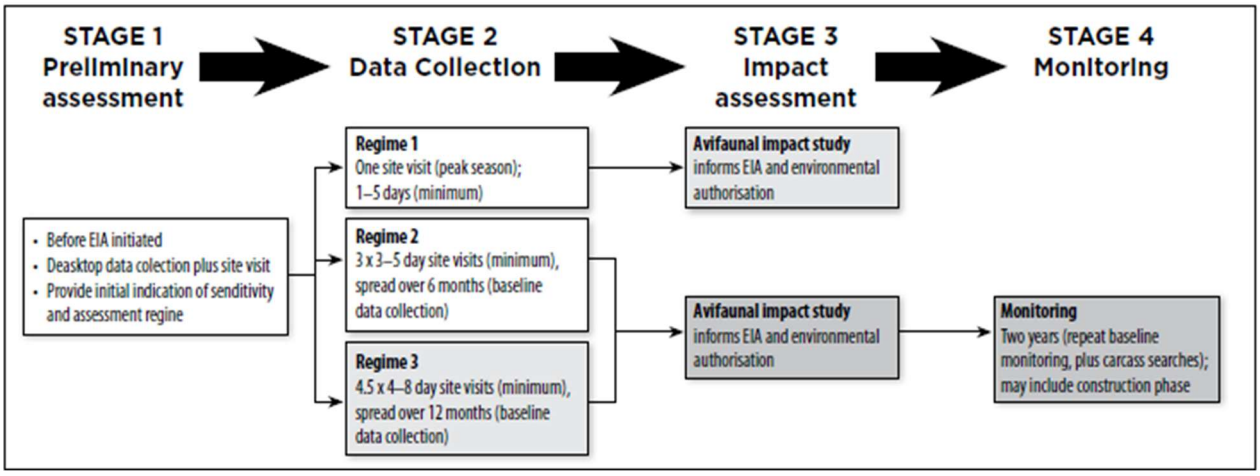
According to Jenkins *et al.* (2017), an avifaunal impact assessment for Solar Energy Facilities (SEFs) must follow a tiered process that follows pre-determined stages depending on the conditions of the site:

Stage 1 – Preliminary Assessment: part of planning for an EIA application (i.e. pre-application). This provides an overview of the ecological context, likely impacts and potential red flags to development, identify alternatives and determine the appropriate assessment regime.

Stage 2 – Data Collection: an in-depth study including structured and repeated data collection on which to base the impact assessment report and provide a baseline against which post-construction monitoring can be compared.

Stage 3 – Impact Assessment: informed by the data collected during Stage 2.

Stage 4 – Monitoring and Mitigation: during construction and post-construction monitoring to inform mitigation, informed by the data collected during Stage 2 (regime 2 and 3 only).



3.1. STAGE 1: PRELIMINARY ASSESSMENT

According to Jenkins *et al.* (2017) the preliminary assessment should describe the relative sensitivity of the study area, highlight any red flags to development, and determine whether additional baseline data collection is necessary to fully inform the Avifaunal Impact Assessment Report. The findings must be incorporated into a report that characterises the study area in terms of habitats present, the overall site sensitivity, and delineates areas that are potentially highly sensitive and no-go areas that need to be avoided by the development. The sensitivity analysis must follow the methodology prescribed in the Species Environmental Assessment Guideline (SANBI, 2020). The preliminary site inspection and field surveys were combined into one site visit and took place on the 26th and 27th of February 2024. The findings of the preliminary assessment have been incorporated into this report.

3.2. STAGE 2: DATA COLLECTION

3.2.1. DESK-TOP ANALYSIS

Prior to the site visit, recent and historical aerial imagery using Google Earth and the Chief Directorate National Geospatial Information (CDNGI) Geospatial Portal (http://www.cdngiportal.co.za/cdngiportal/) was reviewed to differentiate areas with natural vegetation versus modified and transformed areas of the study area. Available online databases relating to regional biodiversity conservation planning, e.g. national vegetation types, threatened ecosystems, the relevant provincial spatial conservation or biodiversity plan, Important Bird Areas (IBAs), and National Protected Areas etc. were also reviewed with the aim of flagging any potentially important areas of the site that would need special attention during the site visit.

3.2.2. FIELD SURVEY

The duration and scope of data collection was guided by the size of the proposed development (small: <30 ha) and informed by the sensitivity of avifauna potentially affected assessed during the preliminary assessment in accordance with the guidelines (Jenkins *et al.*, 2017). Following the preliminary site visit it was determined that the proposed study area had a **medium** to **low** avifaunal sensitivity rating. Therefore, assessment **Regime 1** was applied (refer to **Table 1** for small SEF facilities). The field survey was conducted in the summer season from the from the 26th and 27th of February 2024.

Table 1: Recommended avifaunal assessment regimes (Jenkins *et al.*, 2017)

Type	Size	Avifaunal Sensitivity*		
		Low	Medium	High
All solar technologies except Concentrated Solar Power (CSP)	**Small** (<30 ha / <10 MW)	***Regime 1*** One site visit of 1-5 days	***Regime 1*** One site visit of 1-5 days	***Regime 2*** 2-3 seasonal visits of 3-5 days over 6 months Pre- & post-con monitoring mortality searches
	Medium (30-150 ha / 10-50 MW)	***Regime 1*** One site visit of 1-5 days	***Regime 2*** 2-3 seasonal visits of 3-5 days over 6 months Pre- & post-con monitoring mortality searches	***Regime 2*** 2-3 seasonal visits of 3-5 days over 6 months Pre- & post-con monitoring mortality searches
	Large (>150 ha / >50 MW)	***Regime 2*** 2-3 seasonal visits of 3-5 days over 6 months Pre- & post-con monitoring mortality searches	***Regime 2*** 2-3 seasonal visits of 3-5 days over 6 months Pre- & post-con monitoring mortality searches	***Regime 3*** 4-5 seasonal visits of 4-8 days over 12 months Pre- & post-con monitoring mortality searches
CSP	All	***Regime 3*** 4-5 seasonal visits of 4-8 days over 12 months Pre- & post-con monitoring mortality searches		

* The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national, or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development

Prior to the site visit, a comprehensive list of bird species occurring in the area was compiled using electronic databases within Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011) where distribution maps have been interpreted and updated from the Atlas of Southern African Birds (Harrison *et al.*, 1997). The search

was confined to the quarter degree grid cell (QDGC) in which the study area falls (i.e. atlas area of 15' × 15' – roughly 24 × 27 km) to get a comprehensive list of species for the region. The data was supplemented with current Southern African Bird Atlas Project 2 (SABAP2, 2023) data, which is recorded per pentad (a 5' x 5' coordinate spatial grid reference – one QDGC comprises of nine pentads). Species of conservation concern (SCC) that could potentially occur in the greater study area were noted and their habitat requirements determined by consulting the relevant literature. Bird names follow the International Ornithological Congress (IOC) World Bird List (v13.2) (Gill *et al*., 2023) while conservation status follows the latest Red Data Book of Birds (Taylor *et al*., 2015). Other online databases such as Co-ordinated Wetland Counts (CWAC), Co-ordinated Avifaunal Road Counts (CAR), Birds in Reserves Project (BIRP), Global Biodiversity Information Facility (GBIF), and iNaturalist were searched for avifaunal SCC potentially occurring in the area.

Survey techniques included on-site meander searches, observations for priority species, and focussed counts at habitats such as wetlands, dams, and koppies. During meander searches through the study area, changes in land cover and habitat, as well as avifauna present in the study area were observed and recorded. Landscape features that were considered of high ecological importance were mapped.

3.3. STAGE 3: IMPACT ASSESSMENT

The impact assessment phase was based on data collected from the field survey. The results of this analysis were used to:

- Develop a topographical map indicating the area that would be impacted by the proposed development alternatives and the location of any key habitats and flyways that should not be developed or otherwise transformed.
- Inform the final layout of solar arrays or define any no go areas and areas that should be sufficiently buffered.
- Assess the significance of the potential impact of the proposed project alternatives and related activities - with and without mitigation - on avifaunal species and communities.
- Inform actions that should be taken to prevent or, if prevention is not feasible, to mitigate negative impacts during the planning, construction, and operational phases of the development.
- Inform the nature and extent of monitoring required during construction and the operational phase.
- Determine whether the proposed development (or parts thereof) is fatally flawed and should not be recommended for approval and highlight this finding.
- Provide a description of where other solar facilities are proposed or have been approved in or near to the development in question and assess the significance of cumulative impacts.

3.4. STAGE 4: MONITORING

According to Jenkins *et al*. (2017) for higher-risk projects (assessment regimes 2 and 3), post-construction monitoring is necessary to a) determine the actual impacts of the SEF, b) determine if additional mitigation is required at the SEF, and c) learn about impacts and improve future assessments. Post-construction monitoring is not required for lower-risk projects (assessment regime 1), although it is encouraged. Any incidents of bird injury or mortality observed during operations should be recorded and reported. Recommendations regarding post-construction monitoring for the current project will be included in the impact assessment section.

4. DESKTOP ASSESSMENT RESULTS

4.1. DESCRIPTION OF THE STUDY AREA AND SURROUNDS

4.1.1. REGIONAL VEGETATION AND ECOSYSTEMS

The study area lies in the southern Cape coastal region of the country, which is characterised by cool winters and mild summers with rain falling throughout the year, peaking slightly in winter. Mean Annual Precipitation (MAP) is 580 mm, while temperatures reach around 27°C in summer and minimum temperatures drop to around 4°C in winter (Mucina and Rutherford, 2006). The north-eastern corner of the study area falls within the Fynbos Biome and the Southern Fynbos Bioregion, within the North Langeberg Sandstone Fynbos vegetation type, and the remainder of the site falls within the Albany Thicket Biome and Bioregion, within the Hartenbos Dune Thicket vegetation type (Rutherford and Westfall, 1994; Mucina and Rutherford, 2006; SANBI, 2018).

North Langeberg Sandstone Fynbos is distributed in the Western Cape Province from the northern slopes of the Langeberg mountains near Worcester, and from Albertinia to Mossel Bay, at a broad altitudinal range of 100–1 800 m a.m.s.l. The vegetation occurs on gentle to steep, north-facing slopes, and consists mainly of proteoid and restioid fynbos, with ericaceous fynbos at higher altitudes, and asteraceous fynbos on the lower slopes. Ravines support thicket vegetation (Mucina and Rutherford, 2006). North Langeberg Sandstone Fynbos vegetation type (Mucina and Rutherford, 2006; 2018), which is currently listed as a **Least Threatened** ecosystem at both a national level (SANBI, 2021; DFFE, 2022) and in the Western Cape (Pool-Stanvliet *et al.*, 2017).

Hartenbos Dune Thicket occurs in the Western Cape Province in coastal stretches from the Duiwenhoks River Mouth eastward to Glentana near the Great Brak River, at an altitude range of 0–273 m a.m.s.l. Hartenbos Dune Thicket vegetation occurs on flat to moderately undulating coastal dunes. Structurally, the vegetation is mosaic of low thicket, occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests (Mucina and Rutherford, 2006). Hartenbos Dune Thicket is currently classified as **Endangered** with 79% remaining (Mucina and Rutherford, 2006; SANBI, 2021). With a conservation target of 19%, only 5.7% of this vegetation type is conserved in statutory conservation areas and is therefore regarded as Poorly Protected (SANBI, 2021).

4.1.2. LAND USES OF THE SITE AND SURROUNDING AREAS

The study area is currently a vacant piece of land used for grazing livestock, situated on the southern border of the industrial precinct of Mossdustria near Mossel Bay. Industrial land uses such as warehousing and logistics occur to the north, the Mossgas Petro SA fuel refinery is situated to the west, and cultivated fields occur to the south. The areas to the east comprise a mixture of farmlands and natural vegetation. The the Eskom Gourikwa Power Station and Gourikwa Landfill site are situated a further ~2 km to the west. The Mossel Bay Airport occurs ~3.5 km to the east. The remaining surrounding areas are rural in nature and comprised mostly of farmlands with cultivated fields or pastures. The regional road R327 is routed adjacent to the Mossdustria precinct on the east side and the N2 highway occurs ~1 km to the south. The coastline occurs ~4.5 km to the south (**Figure 4**).

4.1.3. HISTORICAL LAND USE OF THE STUDY AREA

According to available historical aerial imagery from 1957 and 1974 (see **Figure 5**), the site has been used for agricultural activities since at least the 1950s. The site is therefore largely in a modified state with the western section of the site still being used for agriculture according to recent Google Earth satellite imagery, and the eastern section of comprising secondary vegetation that has been establishing since around the 1990s.

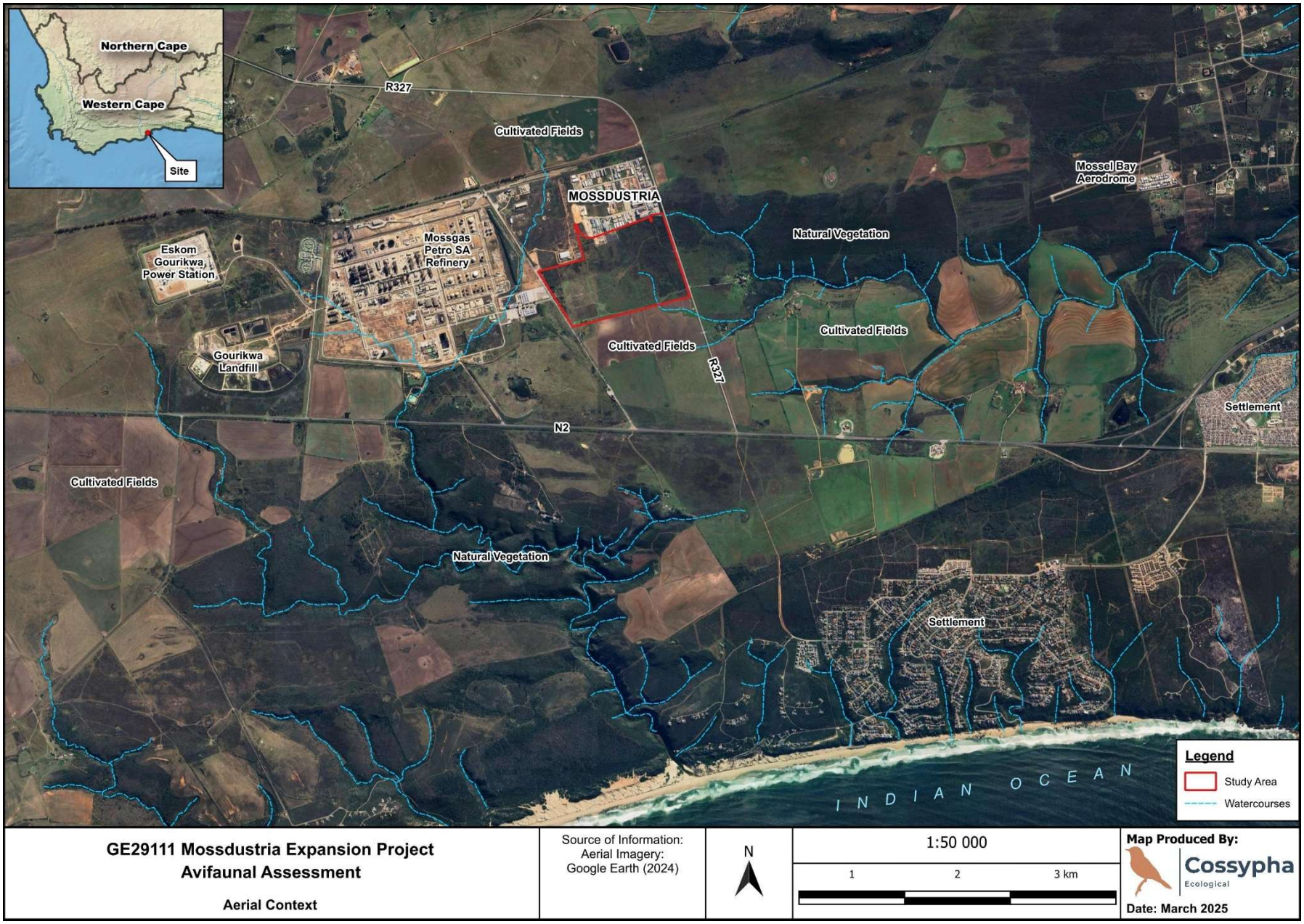


Figure 4: Aerial overview of the study area and surrounds

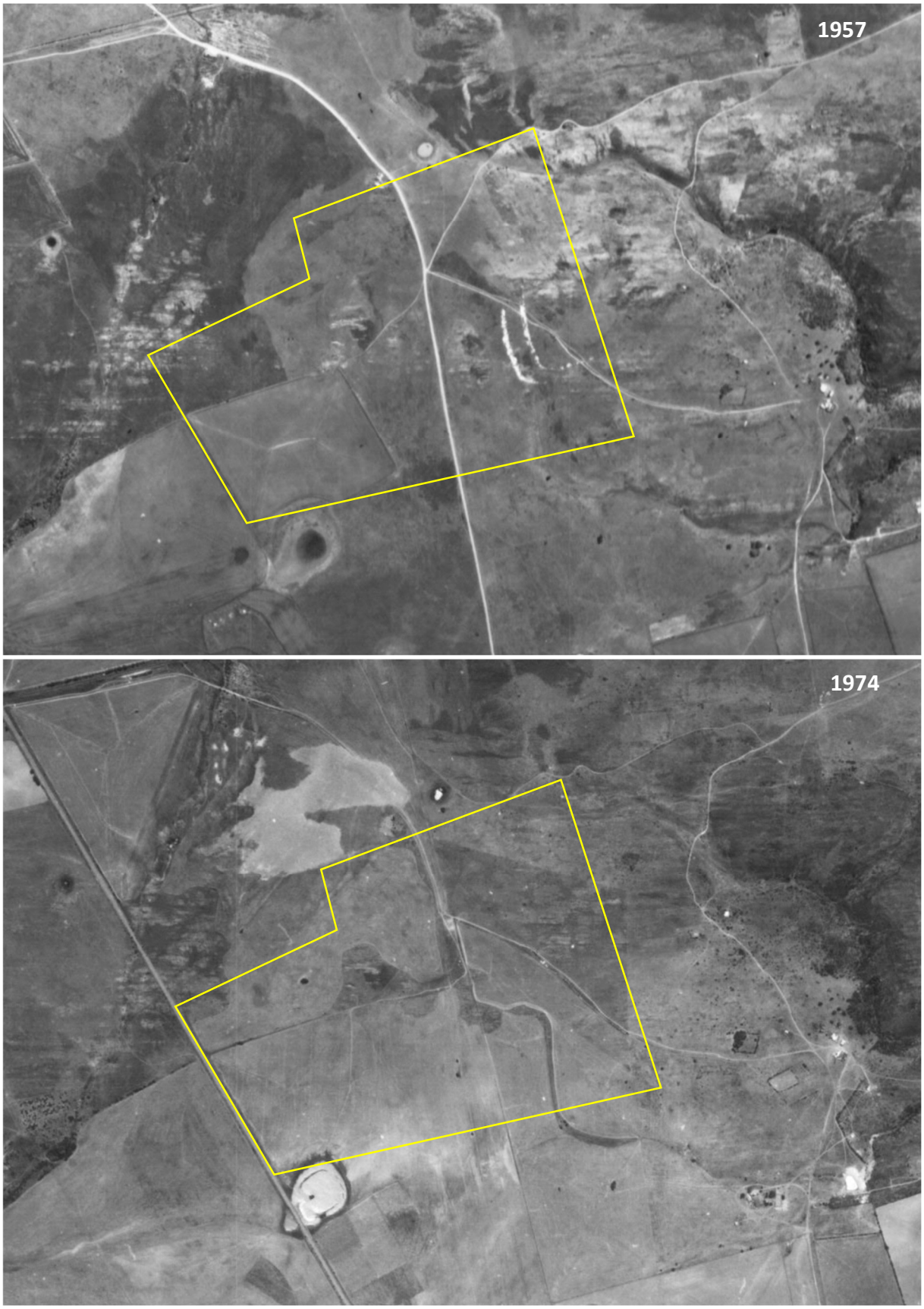


Figure 5: Historical aerial images of the study area (see rough outline in yellow) from 1957 (top) and 1974 (bottom)

4.1.4. WESTERN CAPE BIODIVERSITY SECTOR PLAN

According to the Western Cape Biodiversity Sector Plan (WCBSP; Pool-Stanvliet *et al*., 2017), the majority of the site is classified as Other Natural Area (ONA), with many fragmented sections over the northern half of the site classified as Critical Biodiversity Area (CBA) 1 and CBA2 Terrestrial. A section on the eastern side of the site, and the south-western corner of the site are classified as Ecological Support Area (ESA) 1: Aquatic (**Figure 6**). The reasons given for the CBA and ESA classifications are as follows (Pool-Stanvliet *et al*., 2017):

- Critically Endangered (CR) Vegetation Variant: Petrosa Fynbos-Renosterveld (Vlok variant- CR)
- SA Vegetation Types: North Langeberg Sandstone Fynbos (LT)
- Threatened Vertebrate: Bontebok Extended Distribution Range
- Water Resource Protection: Watercourse protection – Southern Coastal Belt

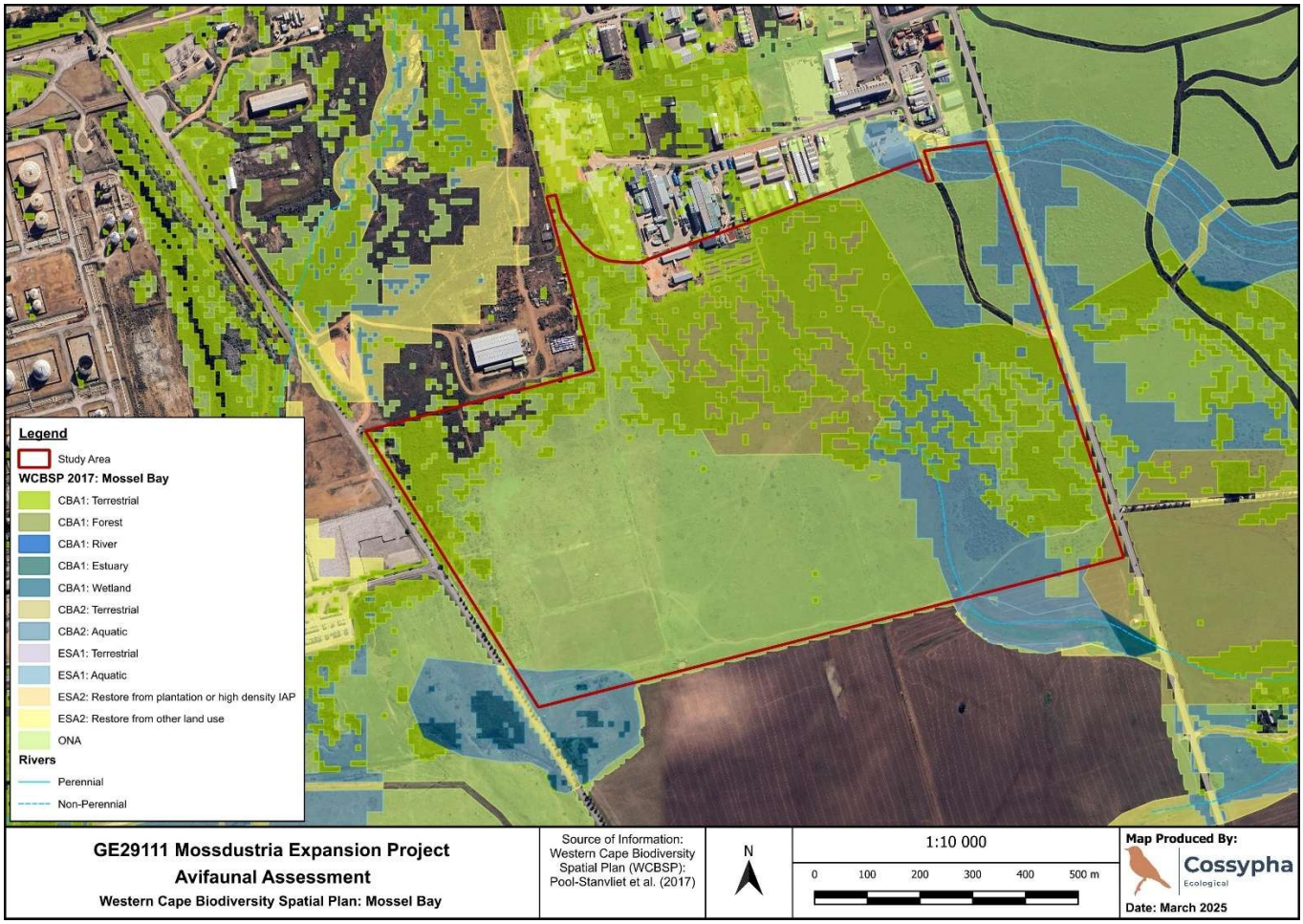


Figure 6: The study area in relation to the WCBSP

4.1.5. PROTECTED AREAS

In terms of Protected Areas (PA), the site falls within the Gouritz Cluster Biosphere Reserve and falls within an industrial area within the Transition Zone of the reserve. The Transition Zone is usually the largest part of the biosphere reserve and is where the greatest development activity is allowed, promoting economic and human development that is socio-culturally and ecologically sustainable. The Core Zone comprises a strictly protected zone that contributes to the conservation of landscapes, ecosystems, species, and genetic diversity, while the Buffer Zone (usually surrounding the Core Zone) is managed to support the conservation objectives of the Core Zone (UNESCO, 2022).

No other PAs occur in the vicinity of the site with the nearest being the Mossel Bay Seal Island Provincial Nature Reserve situated approximately 10 km to the east, just offshore within the Bay, and the Outeniqua Mountains and Langeberg Mountains IBAs occurring 25 km to the north-east and 38 km to the north-west respectively.

4.2. DISTRIBUTION OF AVIFAUNA IN THE STUDY AREA

The region is relatively high in avifaunal diversity with around 354 bird species known to occur within the QDGC (an atlas area of 15' × 15' – roughly 24 × 27 km) that the study area falls within (3422AA), according to the distribution maps in Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011). Approximately 66% of the total species in the QDGCs are associated with farmlands and inland water habitats, which is the character of the study area and surroundings. Due to the disturbed and modified nature if the site, it is not expected that the habitats available are able to support the full suite of species found within the QDGC.

The Southern African Bird Atlas Project (SABAP2) has been collecting data since 2007 and includes data from the previous SABAP1 (1987-1991). SABAP2 aims to map the distribution and relative abundance of birds in southern Africa. SABAP2 data is recorded per pentad (a 5' x 5' coordinate spatial grid reference and a subset of the QDGC – one QDGC comprises of nine pentads. 5' x 5' = roughly 8 x 9 km) and therefore represents a more focussed search. The study area falls mostly within pentads 3405_2200 and 3410_2200, and marginally within pentads 3405_2155 and 5410_2155. The latter two were not included in the search as the small areas of the site occur within the industrial precinct. Reporting rates are expressed as a percentage of the number of times a species was seen in a pentad divided by the number of times the pentad was surveyed. According to SABAP2 data, 224 bird species have been recorded in the pentads in which the study area falls combined, which have been very well sampled with 89 cards and 203 cards submitted to date respectively. This includes 14 species that are either coastal, or marine / pelagic and will not likely been found inland. Of the inland species recorded, 15 are of conservation concern (SCC) and 28 are endemic to South Africa.

Priority species in terms of sensitivity to solar PV development impacts include any Red List species (SCC), range-restricted species, species that congregate in large numbers (gregarious species), and large-bodied species such as waterfowl, herons, gamebirds, and raptors (including owls and vultures) (Jenkins *et al*., 2017). **Table 2** lists priority species that have been recorded within pentads 3405_2200 and 3410_2200 with the SABAP2 reporting rate. The higher the reporting rate, the higher the likelihood of the species occurring in the study area if suitable habitat exists. A reporting rate of zero implies that the bird was recorded with an ad-hoc sighting. See Error! Reference source not found. in **Section 5.3.3** for species recorded in the study area.

Table 2: Avifaunal priority species occurring within pentad 3405_2200 and 3410_2200 including Reporting Rate (RR)

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Cape Weaver	*Ploceus capensis*	Gregarious	LC / LC	88.8
Egyptian Goose	*Alopochen aegyptiaca*	Waterfowl	LC / LC	87.6
Western Cattle Egret	*Bubulcus ibis*	Waterfowl	LC / LC	80.9
Yellow Canary	*Crithagra flaviventris*	Gregarious	LC / LC	79.8
Helmeted Guineafowl	*Numida meleagris*	Gamebird	LC / LC	69.7
Jackal Buzzard	*Buteo rufofuscus*	Raptors and Owls	LC / LC	69.7
African Sacred Ibis	*Threskiornis aethiopicus*	Waterfowl	LC / LC	69.7
Southern Red Bishop	*Euplectes orix*	Gregarious	LC / LC	68.5
Blue Crane	*Grus paradisea*	SCC	NT / VU	60.7

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Cape Spurfowl	*Pternistis capensis*	Gamebird	LC / LC	59.6
Hadada Ibis	*Bostrychia hagedash*	Gamebird	LC / LC	59.6
Red-knobbed Coot	*Fulica cristata*	Waterfowl	LC / LC	57.3
Reed Cormorant	*Microcarbo africanus*	Waterfowl	LC / LC	57.3
Rock Kestrel	*Falco rupicolus*	Raptors and Owls	LC / LC	55.1
Yellow-billed Duck	*Anas undulata*	Waterfowl	LC / LC	52.8
African Darter	*Anhinga rufa*	Waterfowl	LC / LC	52.8
Denham's Bustard	*Neotis denhami*	SCC	VU / NT	49.4
Black-winged Kite	*Elanus caeruleus*	Raptors and Owls	LC / LC	48.3
Common Waxbill	*Estrilda astrild*	Gregarious	LC / LC	48.3
Yellow Bishop	*Euplectes capensis*	Gregarious	LC / LC	47.2
Spur-winged Goose	*Plectropterus gambensis*	Waterfowl	LC / LC	46.1
Grey Heron	*Ardea cinerea*	Waterfowl	LC / LC	42.7
Black-headed Heron	*Ardea melanocephala*	Waterfowl	LC / LC	42.7
Barn Swallow	*Hirundo rustica*	Gregarious	LC / LC	40.4
Red-billed Quelea	*Quelea quelea*	Gregarious	LC / LC	34.8
Common Buzzard	*Buteo buteo*	Raptors and Owls	LC / LC	30.3
White-breasted Cormorant	*Phalacrocorax lucidus*	Waterfowl	LC / LC	30.3
Common Moorhen	*Gallinula chloropus*	Waterfowl	LC / LC	28.1
Little Grebe	*Tachybaptus ruficollis*	Waterfowl	LC / LC	23.6
African Spoonbill	*Platalea alba*	Waterfowl	LC / LC	23.6
Pin-tailed Whydah	*Vidua macroura*	Gregarious	LC / LC	21.3
African Fish Eagle	*Haliaeetus vocifer*	Raptors and Owls	LC / LC	20.2
Little Egret	*Egretta garzetta*	Waterfowl	LC / LC	18
White-throated Canary	*Crithagra albogularis*	Gregarious	LC / LC	18
Cape Teal	*Anas capensis*	Waterfowl	LC / LC	14.6
Cape Shoveler	*Spatula smithii*	Waterfowl	LC / LC	14.6
Grey-winged Francolin	*Scleroptila afra*	Gamebird	LC / LC	13.5
Secretarybird	*Sagittarius serpentarius*	SCC	VU / EN	13.5
Common Quail	*Coturnix coturnix*	Gamebird	LC / LC	11.2
Red-billed Teal	*Anas erythrorhyncha*	Waterfowl	LC / LC	11.2
Southern Masked Weaver	*Ploceus velatus*	Gregarious	LC / LC	9
Black Harrier	*Circus maurus*	SCC	EN / EN	7.9
Yellow-billed Kite	*Milvus aegyptius*	Raptors and Owls	LC / LC	6.7
Amur Falcon	*Falco amurensis*	Raptors and Owls	LC / LC	6.7
South African Shelduck	*Tadorna cana*	Waterfowl	LC / LC	4.5
Black Crake	*Zapornia flavirostra*	Waterfowl	LC / LC	4.5
Lanner Falcon	*Falco biarmicus*	SCC	VU / LC	4.5
Peregrine Falcon	*Falco peregrinus*	Raptors and Owls	LC / LC	3.4
Glossy Ibis	*Plegadis falcinellus*	Waterfowl	LC / LC	3.4
Spotted Eagle-Owl	*Bubo africanus*	Raptors and Owls	LC / LC	2.2
African Swamphen	*Porphyrio madagascariensis*	Waterfowl	LC / LC	2.2

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Black Sparrowhawk	*Accipiter melanoleucus*	Raptors and Owls	LC / LC	2.2
Booted Eagle	*Hieraaetus pennatus*	Raptors and Owls	LC / LC	2.2
Purple Heron	*Ardea purpurea*	Waterfowl	LC / LC	2.2
African Harrier-Hawk	*Polyboroides typus*	Raptors and Owls	LC / LC	2
Rufous-breasted Sparrowhawk	*Accipiter rufiventris*	Raptors and Owls	LC / LC	1.5
Red-necked Spurfowl	*Pternistis afer*	Gamebird	LC / LC	1.1
African Black Duck	*Anas sparsa*	Waterfowl	LC / LC	1.1
Pale Chanting Goshawk	*Melierax canorus*	Raptors and Owls	LC / LC	1.1
Forest Buzzard	*Buteo trizonatus*	SCC	LC / NT	1.1
Verreaux's Eagle	*Aquila verreauxii*	SCC	VU / LC	1.1
Great Crested Grebe	*Podiceps cristatus*	Waterfowl	LC / LC	1.1
Black-crowned Night Heron	*Nycticorax nycticorax*	Waterfowl	LC / LC	1.1
Hamerkop	*Scopus umbretta*	Waterfowl	LC / LC	1.1
Greater Flamingo	*Phoenicopterus roseus*	SCC	NT / LC	1.1
Black Stork	*Ciconia nigra*	SCC	VU / LC	1.1
White Stork	*Ciconia ciconia*	Waterfowl	LC / LC	1.1
Quailfinch	*Ortygospiza atricollis*	Gregarious	LC / LC	1.1
White-faced Whistling Duck	*Dendrocygna viduata*	Waterfowl	LC / LC	1
White-backed Duck	*Thalassornis leuconotus*	Waterfowl	LC / LC	0.5
Cape Eagle-Owl	*Bubo capensis*	Raptors and Owls	LC / LC	0.5
African Marsh Harrier	*Circus ranivorus*	SCC	EN / LC	0
African Goshawk	*Accipiter tachiro*	Raptors and Owls	LC / LC	0
Martial Eagle	*Polemaetus bellicosus*	SCC	EN / EN	0
Long-crested Eagle	*Lophaetus occipitalis*	Raptors and Owls	LC / LC	0
Lesser Kestrel	*Falco naumanni*	Raptors and Owls	LC / LC	0

EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern

5. FIELD RESULTS

5.1. SITE DESCRIPTION

The site is largely in a transformed state, with most of the site modified by farming activities since at least the 1950s. The western portion of the site is currently used for agricultural purposes (livestock holding areas, and fallow fields), while the central and eastern portions are comprised of secondary vegetation that has established since clearing for fields, roads and other human activities since around the 1980s. The central portion is comprised of short grassy vegetation also used for feeding livestock, while the eastern portion has established more woody and thicket-like vegetation. Quite dense vegetation has established around a non-perennial drainage line in the south-eastern portion of the site, which feeds a small dam to the south. A small pan with reedbeds is located just outside the south-western corner of the site. Alien trees (*Acacia* and *Eucalyptus* spp.) are scattered sparsely throughout the site but are concentrated in the northern section likely as a result of disturbance and edge effects from the industrial precinct (**Figure 7**).

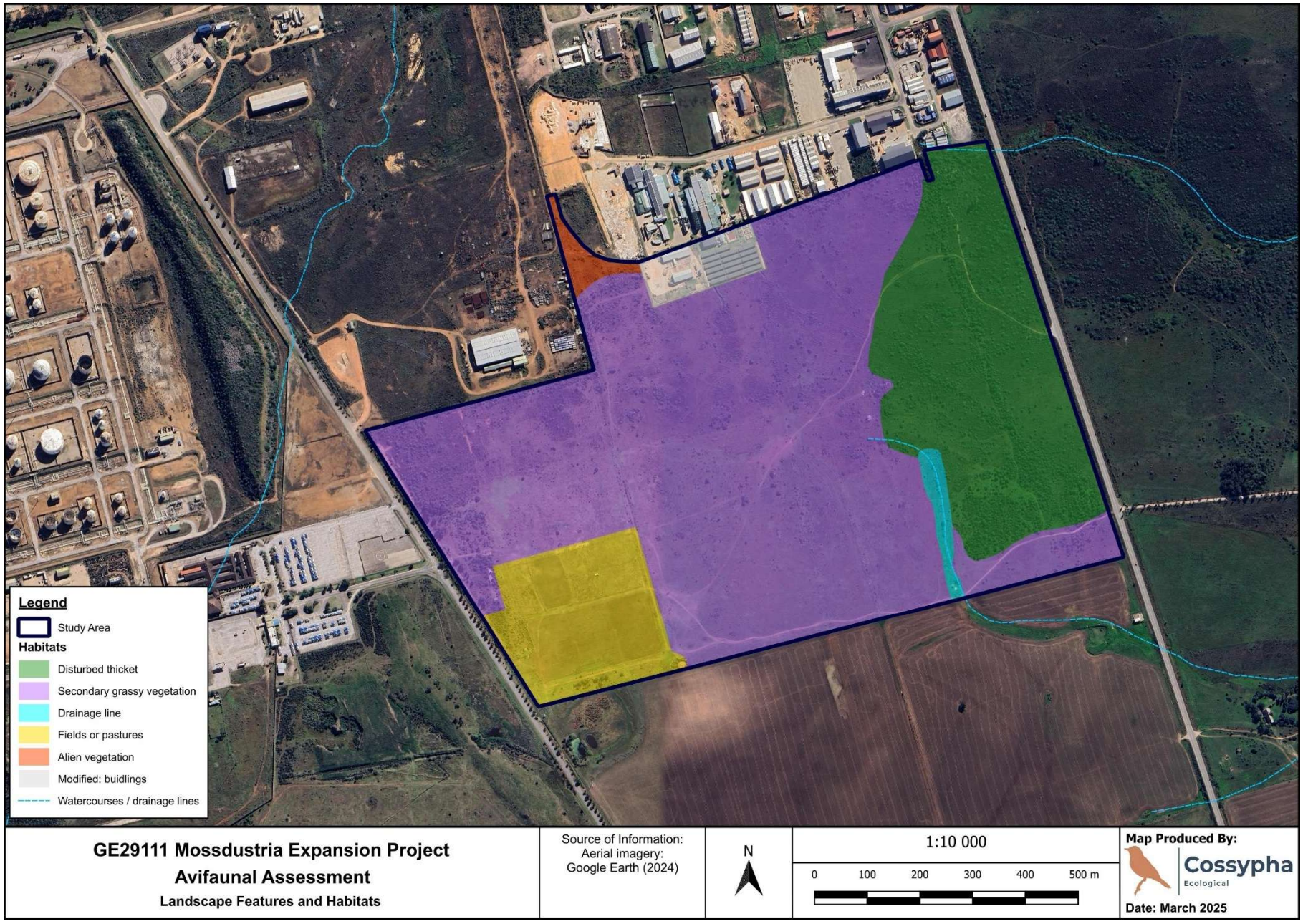


Figure 7: Habitat features of the study area

Fallow fields and farming areas in the western portion of the study area

Livestock holding pens in the western portion of the study area

Open grassy vegetation in the western portion of the study area

Livestock feeding areas in the western and central portions of the study area

North-eastern border of the site

Denser thicket-like vegetation in the eastern portion of the study area

Thick vegetation associated with the drainage line


Disturbed but natural pan with reed beds outside the south-western corner of the site


Alien vegetation in the northern corner of the site

5.2. AVIFAUNAL HABITATS IN THE STUDY AREA AND SURROUNDS

Besides the industrial complex on the north side, the surroundings of the study area are comprised of farmlands with patches of secondary and natural vegetation between cultivated fields and interspersed with a few small pans and farm dams. Extensive agricultural fields occur to the south and south-east of the site, while natural vegetation occurs within steep valleys ~2 km to the south-west of the site. Such natural areas with less human disturbance provide the most important habitat for avifauna in the landscape. Birds are however known to use agricultural fields for foraging and Blue Crane were observed in the fields adjacent to the site on the south side. The site itself is largely in a transformed state, with most areas modified by farming activities in the past and present and has limited natural habitat for avifauna. It is also relatively fragmented by the surrounding industrial and agricultural land uses. The most important habitat for avifauna occurring on the site is the establishing thicket-like vegetation in the eastern portion of the site. Important flowering species such as *Brunsvigia orientalis* contribute to providing important resources for birds.


***Brunsvigia orientalis* scattered in the eastern portion of the study area with a Southern Double-collared Sunbird feeding on the nectar**

5.3. BIRD SPECIES OCCURRENCE IN THE STUDY AREA

5.3.1. BIRD OBSERVATIONS

During the field survey, 37 species of birds were recorded in the study area and immediate surroundings. Birds were identified either by direct observation (sighting and/or call) or by field signs such as tracks or feathers. These are listed in **Table 3** along with their national (Taylor *et al.*, 2015; BirdLife SA, 2025) and global (IUCN Red List of Threatened Species, 2025) conservation status. Bird species observed in the study area included mainly generalist species and only a few typical of the thicket / fynbos vegetation type.

Table 3: Species recorded in the study area and surroundings listed in taxonomic order

Common Name	Scientific Name	National Status	Global Status	Endemism
Cape Spurfowl	*Pternistis capensis*	LC	LC	NE
Helmeted Guineafowl	*Numida meleagris*	LC	LC	
Spur-winged Goose	*Plectropterus gambensis*	LC	LC	
Speckled Mousebird	*Colius striatus*	LC	LC	
Red-faced Mousebird	*Urocolius indicus*	LC	LC	
African Palm Swift	*Cypsiurus parvus*	LC	LC	
Speckled Pigeon	*Columba guinea*	LC	LC	
Red-eyed Dove	*Streptopelia semitorquata*	LC	LC	
Blue Crane	*Grus paradisea*	NT	VU	SLE NE
Crowned Lapwing	*Vanellus coronatus*	LC	LC	
Jackal Buzzard	*Buteo rufofuscus*	LC	LC	NE
Western Cattle Egret	*Bubulcus ibis*	LC	LC	
African Sacred Ibis	*Threskiornis aethiopicus*	LC	LC	
Southern Fiscal	*Lanius collaris*	LC	LC	
Cape Crow	*Corvus capensis*	LC	LC	
Pied Crow	*Corvus albus*	LC	LC	
Bokmakierie	*Telophorus zeylonus*	LC	LC	
Cape Batis	*Batis capensis*	LC	LC	
Cape Robin-Chat	*Cossypha caffra*	LC	LC	
African Stonechat	*Saxicola torquatus*	LC	LC	
Capped Wheatear	*Oenanthe pileata*	LC	LC	
Common Starling	*Sturnus vulgaris*	LC	LC	
Barn Swallow	*Hirundo rustica*	LC	LC	
Cape Bulbul	*Pycnonotus capensis*	LC	LC	E
Neddicky	*Cisticola fulvicapilla*	LC	LC	
Zitting Cisticola	*Cisticola juncidis*	LC	LC	
Karoo Prinia	*Prinia maculosa*	LC	LC	NE
Bar-throated Apalis	*Apalis thoracica*	LC	LC	
Large-billed Lark	*Galerida magnirostris*	LC	LC	NE
Southern Double-collared Sunbird	*Cinnyris chalybeus*	LC	LC	NE
Cape Sparrow	*Passer melanurus*	LC	LC	
Cape Longclaw	*Macronyx capensis*	LC	LC	
African Pipit	*Anthus cinnamomeus*	LC	LC	
Cape Weaver	*Ploceus capensis*	LC	LC	NE

Common Name	Scientific Name	National Status	Global Status	Endemism
Southern Red Bishop	*Euplectes orix*	LC	LC	
Quailfinch	*Ortygospiza atricollis*	LC	LC	
Yellow Canary	*Crithagra flaviventris*	LC	LC	

VU = Vulnerable; NT = Near Threatened; LC = Least Concern

E = endemic; NE = near endemic (i.e. ~70% or more of population in RSA); SLE NE = near endemic to South Africa, Lesotho and Eswatini

5.3.2. BIRDS OF CONSERVATION CONCERN

SCC are those with a Red List status higher than Least Concern at a national level (Taylor *et al*., 2015; BirdLife SA, 2025) and a global level (IUCN, 2025) and/or species Protected at a national level (DFFE, 2023). No SSC were recorded on the site during the field survey, however a small group of Blue Crane *Grus paradisea* (NT / VU) was recorded in the field adjacent to the site on the south side. While the site itself does not provide important habitat for the species, it is likely to move through the area for foraging purposes from time to time. Other SCC such as Secretarybird *Sagittarius serpentarius* (VU / EN), and Denham's Bustard *Neotis denhami* (VU / NT), and Black Harrier *Circus maurus* (EN / EN) have been recorded in the region.

Six bird SCC were identified by the screening tool as potentially occurring in the study area (see **Section 2.1**). Most of these species are either wide-ranging and may cross the study area at times (as mentioned above), or have specific habitat requirements, which are not provided by the proposed development site.

Blue Crane in the fields to the south of the site

5.3.3. PRIORITY SPECIES

Species that may be susceptible to the impacts of solar PV development occurring in the study area and surrounds include SCC as well as large-bodied, ground-welling gamebirds such as bustards, guineafowl, and spurfowl; waterfowl such as ducks, geese, flamingos, and ibises; raptors such as kites, buzzards, and Secretarybirds; and gregarious species such as quelea, swallows, bishops, and widowbirds. Priority species recorded in the study area and surrounding areas are highlighted in **Table 3**.

6. SITE ECOLOGICAL IMPORTANCE AND SENSITIVITY

6.1. PROJECT AREA OF INFLUENCE

To assess the study area in terms of its ecological importance, it's important to first define the Project Area of Influence (PAOI). As a minimum, the proposed development footprint must be assessed for impacts to the receiving environment, however this extent of assessment usually does not provide appropriate consideration of the important ecosystem processes and functions (e.g. habitat connectivity) that could potentially be affected by the proposed development (SANBI, 2020). Therefore, best practice is for the PAOI to be defined based on the spatial location of the project footprint and the potential extent of the impacts of the anticipated activities on important ecosystem processes and functions (SANBI, 2020).

For the construction of the proposed developments, the PAOI was defined in terms of primary (direct footprint), secondary (indirect), and tertiary (downstream) influences. The primary PAOI includes the footprint of the proposed developments, and accounts for direct removal of habitat. The secondary PAOI is defined by a 100 m buffer surrounding the direct footprint to account for potential construction phase disturbances such as noise, dust, vibrations, lights, and disturbance by the vehicle and people. The tertiary PAOI is defined as a 200 m buffer for potential construction and operational phase impacts to downstream watercourses and wetlands.

6.2. DEFINING IMPACT RECEPTORS

Taking the primary and secondary PAOI into consideration, potential impact receptors within the study area were defined. These were defined in terms the kinds of bird species found in the study area, the habitats, vegetation, or structural features they utilise or inhabit, as well as important ecological processes that they depend on. Generally, any patches of remnant natural habitat within the study area can be considered impact receptors if they fall within the primary and secondary PAOI. Any drainage line, stream, or wetland occurring within 200 m of the proposed development would be considered as being within the tertiary PAOI (**Table 4**).

Table 4: Potential impact receptors in the primary, secondary, and tertiary PAOI

PAOI	Potential Impact Receptor	Potentially Affected Species or Ecological Processes
Primary	Disturbed thicket vegetation	Generalist bird species; foraging habitat; structural cover
	Secondary grassy vegetation	Generalist bird species; foraging habitat
	Drainage line	Generalist bird species; Riparian / wetland habitat; water resource; habitat connectivity
	Fields or pastures	Generalist bird species; Blue Crane; foraging habitat
	Alien vegetation	Generalist bird species; structural cover
Secondary	Disturbed thicket vegetation	Generalist bird species; foraging habitat; structural cover
	Fields or pastures	Generalist bird species; Blue Crane; foraging habitat
	Natural pans; drainage lines	Wetland, aquatic, and riparian habitat associated species; Sensitive riparian zone, aquatic habitat; water resource; feeding habitat
Tertiary	Watercourses and wetlands	Wetland, aquatic, and riparian habitat associated species; Sensitive riparian zone, aquatic habitat; water resource; feeding habitat

6.3. SITE SENSITIVITY CRITERIA

The impact receptors within the PAOI were then assessed in terms of ecological importance, which took conservation value (conservation importance) and ecological function (functional integrity) from a faunal perspective, into account, as well as the receptor resilience to impacts. Site Ecological Importance (SEI), and therefore sensitivity to the proposed development, was classified.

According to the methodology described in the Species Environmental Assessment Guideline for the implementation of the Terrestrial Fauna Species Protocols for Environmental Impact Assessments (SANBI, 2020), SEI is considered to be a function of the Biodiversity Importance (BI) of the impact receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts i.e. Receptor Resilience (RR) as follows:

SEI = BI + RR

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

BI = CI + FI

BI can then be derived from a simple matrix of CI and FI as follows:

Biodiversity Importance		**Conservation Importance**				
		Very High	High	Medium	Low	Very Low
Functional Integrity	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**

Following successful evaluation of both BI and RR (see definitions below), SEI is then evaluated from the following final matrix:

Site Ecological Importance		**Biodiversity Importance**				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very Low	**Very High**	**Very High**	**High**	**Medium**	**Low**
	Low	**Very High**	**Very High**	**High**	**Medium**	**Low**
	Medium	**Very High**	**High**	**Medium**	**Low**	**Very Low**
	High	**High**	**Medium**	**Low**	**Low**	**Very Low**
	Very High	**Medium**	**Low**	**Very Low**	**Very Low**	**Very Low**

SEI is described in the above manner for each impact receptor within the PAOI and clearly mapped in relation to the proposed development activities and infrastructure.

Definitions:

Conservation Importance: The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU and NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes (SANBI, 2020). CI criteria are as follows:

Very High – Ecosystems or habitats with high species richness and confirmed to provide suitable habitat for species of conservation concern, or habitats representative of a CR ecosystem. These areas should be maintained for the persistence of biodiversity.

- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare 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 EN ecosystem type.
- Globally significant populations of congregatory species (>10% of global population).

High – Ecosystems or habitats with high species richness and usually provide suitable habitat for species of conservation concern, or habitats representative of an EN ecosystem. These areas should be maintained for the persistence of biodiversity.

- Confirmed or highly likely occurrence of CR, EN, VU species that have a global Extent of Occurrence of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.
- 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 – Ecosystems or habitats with medium species richness and usually provide suitable habitat for species of conservation concern, or habitats representative of a VU ecosystem.

- Confirmed or highly likely occurrence of populations of NT species, and threatened species (CR, EN, VU) listed under A criterion 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 – Ecosystems or habitats with low species richness.

- 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 – Areas with little or no conservation potential and are usually species poor or contain transformed and/or degraded habitat (majority of species are usually alien).

- No confirmed and highly unlikely populations of SCC.
- No confirmed and highly unlikely populations of range-restricted species.
- No natural habitat remaining.

Ecological Function (Functional Integrity): Ecological function describes the intactness of the structure and function of the vegetation communities which in turn support faunal communities. It also refers to the degree of

ecological connectivity between the identified vegetation association and/or habitats and other systems within the landscape. Therefore, systems with a high degree of landscape connectivity among each other are perceived to be more sensitive. FI criteria are as follows:

Very High – Natural areas with no or low evidence of human impact are considered to have intact ecosystem function and are considered important for the maintenance of ecosystem integrity. Most habitats are represented by vegetation communities that are intact and ecosystems with connectivity to other important ecological systems, or are specialised habitats for fauna. These areas also offer valuable ecosystem services or ecological infrastructure.

- 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 (e.g. ploughing).

High – Natural areas with low evidence of human impact are considered to have intact ecosystem function and are considered important for the maintenance of ecosystem integrity. Most habitats are represented by vegetation that is intact with connectivity to other important ecological systems, or are specialised habitats for fauna. These areas also offer valuable ecosystem services or ecological infrastructure.

- 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 (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.

Medium – Habitat that occurs at disturbances of medium intensity and are representative of vegetation communities in secondary successional stages with some degree of connectivity with other ecological systems. These areas, although often disturbed, are usually utilised by fauna.

- Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types.
- Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches.
- Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential.

Low – Disturbed habitat or modified vegetation with little ecological function.

- Small (>1 ha but <5 ha) area.
- Almost no habitat connectivity but migrations still possible across some transformed or degraded natural habitat and a very busy used road network surrounds the area.
- Several minor and major current negative ecological impacts; Low rehabilitation potential

Very Low – Degraded and highly disturbed habitat or modified vegetation with little or no ecological function.

- Very small (<1 ha) area.
- No habitat connectivity except for flying species or flora with wind-dispersed seeds.
- Several major current negative ecological impacts.

Receptor Resilience: RR is defined as the intrinsic capacity of the impact receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.

Very High – Habitat that can recover rapidly (~ less than 5 years) to restore > 70% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.

High – Habitat that can recover relatively quickly (~ 5-10 years) to restore > 70% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.

Medium – Habitat that will recover slowly (~more than 10 years) to restore > 70% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.

Low – Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.

Very Low – Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Interpretation of SEI in the context of the proposed development activities is then provided using the following guidelines:

Table 5: Development guidelines according to SANBI (2020)

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.

6.4. EVALUATION OF SITE ECOLOGICAL IMPORTANCE

Based on the findings of the field assessment, SEI pertaining to birds was evaluated using the above criteria. The features and habitats in the study area identified as impact receptors were evaluated and discussed below. The SEI and thus sensitivity to the proposed development, was then mapped (**Figure 8**).

6.4.1. MEDIUM ECOLOGICAL IMPORTANCE

The secondary thicket vegetation that is establishing in the eastern portion of the site and the small drainage line in the south-eastern section were evaluated to be of medium ecological importance. These were the most diverse and near to natural habitat for avifauna on the site. They are however disturbed and secondary; therefore their conservation importance and functional integrity are compromised. No birds SCC were recorded in these habitats, and none are likely to depend on them.

Minimisation and restoration mitigation applies. Development activities of medium impact are acceptable followed by by appropriate restoration activities.

6.4.2. LOW ECOLOGICAL IMPORTANCE

The secondary grassy vegetation on recovering old fields and patches of alien trees, as well as the fallow fields and pastures were evaluated to be of low ecological importance. These areas are disturbed regularly by current farming practices, and comprise secondary vegetation and relatively poor quality habitat for avifauna. Birds do however utilise these habitats for foraging but are not considered important from a conservation perspective.

Minimisation and restoration mitigation applies. Development activities of medium to high impact are acceptable followed by by appropriate restoration activities.

6.4.3. VERY LOW ECOLOGICAL IMPORTANCE

Areas that have been modified construction of buildings are of very low ecological importance and sensitivity as no natural habitat remains in these areas.

Minimisation mitigation applies. Development activities of medium to high impact are acceptable and restoration activities are not required.

6.4.4. SITE SENSITIVITY VERIFICATION

The majority of the site is comprised of secondary vegetation that has established following past clearance of vegetation for agriculture and other human land uses. The sensitivity rating identified by the screening tool of **Low** for the Avian theme is therefore confirmed, while the sensitivity rating of **High** for the Animal Species theme is not appropriate and can be dropped to **Low** for most of the site and **Medium** for the eastern section.

Table 6: Evaluation of Site Ecological Importance (SEI) of habitats in the PAOI for the study area

Habitat	CI	FI	RR	SEI
Disturbed thicket vegetation; Drainage line	**Medium** Ecosystems or habitats with medium species richness and no confirmed or highly likely populations of SCC and/or range-restricted species	**Medium** Habitat that occurs at disturbances of medium intensity and are representative of vegetation communities in secondary successional stages with some degree of connectivity with other ecological systems. These areas, although often disturbed, are usually utilised by fauna	**Medium** Habitat that will recover slowly (~more than 10 years) to restore > 70% of the original species composition and functionality of the receptor functionality	**MEDIUM** BI = Medium RR = Medium
	BI = Medium			
Secondary grassy vegetation; Patches of alien trees; Fallow fields and pastures	**Low** Ecosystems or habitats with low species richness and no confirmed or highly likely populations of SCC and/or range-restricted species	**Medium** Habitat that occurs at disturbances of medium intensity and are representative of vegetation communities in secondary successional stages with some degree of connectivity with other ecological systems. These areas, although often disturbed, are usually utilised by fauna	**High** Habitat already transformed	**LOW** BI = Low RR = High
	BI = Low			
Modified: buildings	**Very Low** Areas with little or no conservation potential and are usually species poor or contain transformed and/or degraded habitat	**Very Low** Degraded and highly disturbed habitat or modified vegetation with little or no ecological function	**Very High** Habitat already transformed	**VERY LOW** BI = Very Low RR = Very High
	BI = Very Low			

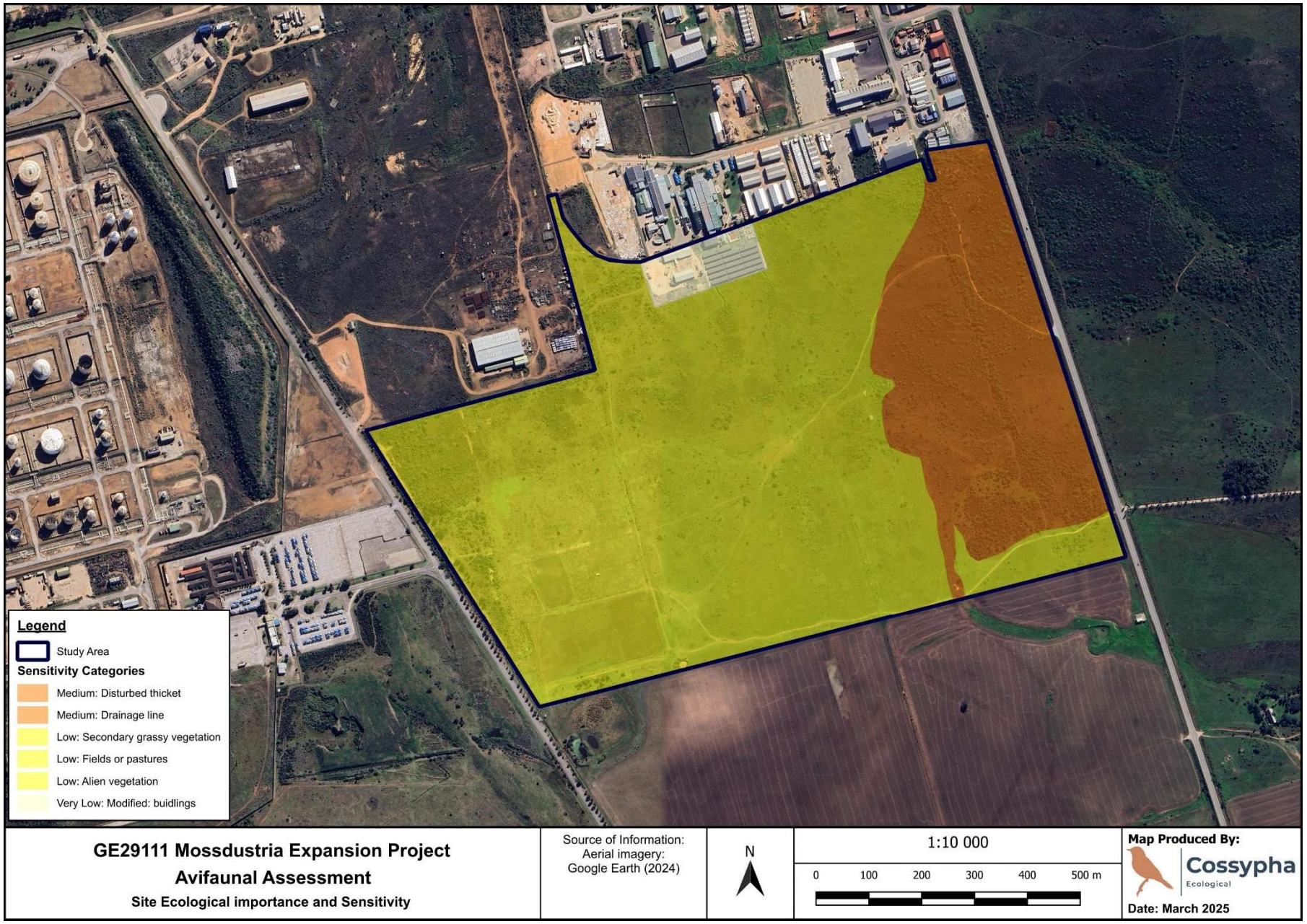


Figure 8: Site Ecological Importance and sensitivity

7. IMPACT ASSESSMENT AND MITIGATION

7.1. IMPACTS OF DEVELOPMENT ON BIODIVERSITY

Any developmental activities in a natural system will impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify and assess the significance of the impacts caused by the proposed development and to provide a description of the mitigation required to limit the perceived impacts on the natural environment.

There are various types of impacts resulting from any development within natural areas and these can be divided into the following four categories:

- **Direct Impacts:** These impacts are directly as a result of the development and include actions such as clearing of land, contamination of natural habitats, ground clearing activities, sedimentation and changes in water tables.
- **Indirect Impacts:** These impacts occur beyond the boundaries of the project site and could include issues such as pollution of water sources.
- **Induced Impacts:** The impacts are not directly attributed to the project but occur because of the presence of the project in the area such as the increase of residential settlements leading to pressure on biodiversity.
- **Cumulative Impacts:** These are impacts from the past, existing, and foreseeable future projects which are all affecting the same biodiversity.

There is an international demand towards greater transparency and accountability from companies to develop a more comprehensive understanding of the impacts of the project or activity with regards to issues such as biodiversity, climate change and water use, and to focus on mitigating impacts more effectively.

Mitigation

The term mitigation covers all the components of the "mitigation hierarchy" (described below) and involves selecting and implementing measures to conserve biodiversity and to protect users of biodiversity as well as other affected stakeholders from potentially detrimental impacts as a result of the development (Guideline for mainstreaming biodiversity into mining (DEA *et al*., 2013)).

Mitigation measures should aim to achieve "no net loss" of biodiversity which is defined by the International Finance Corporation (IFC) as:

"the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale".

Mitigation is a broad term and involves the following steps of the mitigation hierarchy:

1. Avoid or prevent loss to biodiversity and ecosystem services: This is the first option and refers to project location and layout of the project, as well as phasing to avoid impacts on biodiversity. These areas need to be identified early in the development's lifecycle so that impacts can be avoided.
2. Minimise impacts on biodiversity and ecosystem services: The location, layout, technology, and phasing of the project should minimise the impacts on biodiversity. This should be considered even in areas

where the environmental constraints are not particularly high, and every effort should be made to minimise these impacts.

3. Rehabilitate concurrently or progressively with the activity and on cessation of the activity: This refers to the rehabilitation of areas where impacts were unavoidable and impacted areas should be returned to a condition ecologically similar to their pre-development natural state. Unfortunately, rehabilitation is a limited process that usually falls short of replicating the diversity of natural systems. Rehabilitation should occur progressively.
4. Offset significant residual negative impacts on biodiversity or ecosystem services: This refers to the compensation for the remaining and unavoidable negative residual impacts on biodiversity.

7.2. ASSESSMENT CRITERIA

For the current assessment, environmental impacts were assessed with mitigation measures and without mitigation measures and the results are presented in the impact tables, which summarise the assessment. Mitigation and management actions are also recommended with the aim of enhancing positive impacts and minimising negative impacts. A ranking or scoring system was used to evaluate the significance of each impact where the potential significance is a function of consequence (duration, extent, and magnitude) and probability. The impact assessment criteria are described in **Table 7.**

Table 7: Proposed criteria and rating scales which were used in the assessment of the potential impacts

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the effect of the impact related to the proposed development.
	Negative	
Extent	Footprint	The impact only affects the area in which the proposed activity will occur.
	Site	The impact will affect only the development area.
	Local	The impact affects the development area and adjacent properties.
	Regional	The effect of the impact extends beyond municipal boundaries.
	National	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International	The effect of the impact extends beyond country borders.
Duration	Temporary	The duration of the activity associated with the impact will last 0-6 months.
	Short term	The duration of the activity associated with the impact will last 6-18 months.
	Medium term	The duration of the activity associated with the impact will last 18 months-5 years.
	Long term	The duration of the activity associated with the impact will last more than 5 years.
Severity	High negative	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
	Moderate negative	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural

Criteria	Rating Scales	Notes
		and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	Low negative	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural, and social functions and processes are minimally affected.
	Low positive	The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural, and social functions and processes are minimally improved.
	Moderate positive	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected.
	High positive	The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.
Potential for impact on irreplaceable resources	No	No irreplaceable resources will be impacted.
	Yes	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, intensity and the potential for impact on irreplaceable resources.
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	
	Slightly beneficial	
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	
Probability (the likelihood of the impact occurring)	Unlikely	It is highly unlikely or less than 50 % likely that an impact will occur.
	Likely	It is between 50 and 75 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance	Very high - negative	A function of Consequence and Probability.
	High - negative	
	Moderate - negative	
	Low - negative	
	Very low	
	Low - positive	
	Moderate - positive	
	High - positive	
	Very high - positive	

Table 8: Explanation of assessment criteria

Criteria	Explanation
Nature	This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment. Will the impact change in the environment be positive, negative, or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. Extent of the impact is described as **footprint** (affecting only the footprint of the development), **site** (limited to the site) and **regional** (limited to the immediate surroundings and closest towns to the site). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. To avoid "double counting", specialists have been requested to indicate spatial significance under "intensity" or "impact on irreplaceable resources" but not under "extent" as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium, and long term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.
Consequence	The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact occurring. In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.
Degree of confidence in predictions	Specialists and the EIR team were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

Table 9: Impact assessment criteria and rating scales

Duration		Extent		Irreplaceable Resources		Severity	
1	Temporary	1	Footprint	1	Yes	-3	High-negative
2	Short term	2	Site	0	No	-2	Moderate-negative
3	Medium term	3	Local			-1	Low-negative
4	Long term	4	Regional			1	Low-positive
		5	National			2	Moderate-positive
		6	International			3	High-positive
Consequence = (Duration + Extent + Irreplaceability) x Severity		**Likelihood**		**Significance**		**Confidence**	
-25 to -33	Extremely detrimental	1	Unlikely	-73 to -99	Very high-negative	Low	
-19 to -24	Highly detrimental	2	Likely	-55 to -72	High-negative	Medium	
-13 to -18	Moderately detrimental	3	Definite	-37 to -54	Moderate-negative	High	
-7 to -12	Slightly detrimental			-19 to -36	Low-negative		
0 to -6	Negligible			0 to -18	Very low-negative		
0 to 6	Negligible			0 to 18	Very Low-positive		
7 to 12	Slightly beneficial			19 to 36	Low-positive		
13 to 18	Moderately beneficial			37 to 54	Moderate-positive		
19 to 24	Highly beneficial			55 to 72	High-positive		
25 to 33	Extremely beneficial			73 to 99	Very high-positive		

7.3. ASSESSMENT OF IMPACTS

The installation of the proposed project will require clearance of secondary grassy vegetation, fields and pastures, the vegetation associated with the drainage line, and a small amount of the disturbed thicket vegetation during the construction phase. The majority of the site (38 ha) will be comprised of the motorsport arena, with the solar PV arrays taking up 22 ha and the industrial expansion 13 ha during the operational phase.

The overall environmental impacts of solar energy developments are poorly understood globally. Unlike wind energy developments, there is presently no clear pattern in the types of birds negatively affected by solar plants, and collision casualties recorded to date include a wide variety of avian guilds (Jenkins *et al*., 2017). Widely accepted impacts of solar PV include permanent habitat destruction, fragmentation, and the associated bird displacement (particularly for range restricted species), as well as collision with reflective panels as birds mistake large panel arrays for wetlands, otherwise known as the "lake effect" (Lovich and Ennen, 2011; Smit, 2012; DeVault *et al*., 2014; Visser, 2016; Kosciuch *et al*., 2020; Chock *et al*., 2021). Other general impacts documented to date include noise and disturbance caused by construction activities, attraction of novel species through the creation of artificial nest sites and shade, and chemical pollution from panel cleaning (Lovich and Ennen, 2011; DeVault *et al*., 2014; Chock *et al*., 2021). The impacts of additional infrastructure associated with solar energy developments, such as roads, power lines, and substations, must also be considered[1]. These include, habitat destruction, fragmentation, threat of collision, and electrocution (Jenkins *et al.*, 2017).

[1] Note that assessment of linear infrastructure such as power lines for this project are not included in the scope of this report, and will be assessed separately

Possible impacts on avifauna during the construction and operational phases and their sources associated with the proposed development are provided in **Table 10**. The main impact relating to avifauna will be loss of habitat and the displacement of species from the site. Other possible direct impacts include possible collisions of priority species moving through the area with panels and power lines during the operational phase. Possible indirect impacts include spread of invasive alien vegetation due to disturbance to the soil, and potential contamination of the soil and downstream watercourses should chemicals be used to clean the panels.

Table 10: Possible impacts arising from the proposed development

Possible Impact	Development Phase and Potential Source of Impact	Area to be Affected	Nature of Impact
Habitat destruction	**Construction Phase:** • Construction activities and construction vehicles	Clearing vegetation for installation of infrastructure including solar panels, motorsport arena, parking lots, and buildings	Direct
Collision of avifauna with reflective surfaces of solar panels leading to injury or death	**Operational Phase:** • Solar panels perceived to be water body by avifauna	Solar PV development site	Direct
Pollution and/or contamination of the environment by hazardous materials	**Construction Phase:** • Construction activities and construction vehicles **Operational Phase:** • Cleaning of solar panels during operation	Development site and downstream water courses	Direct and Indirect
Disturbance to and displacement of resident bird species	**Construction Phase:** • Construction workers, construction activities, and construction vehicles **Operational Phase:** • Operational and maintenance activities; attraction of novel species	Birds inhabiting the site and those in the natural habitats in the surrounding areas	Indirect
Spread of invasive alien plant species	**Construction Phase:** • Construction activities and construction vehicles	Remaining natural areas in the surrounding landscape	Indirect
Increased disturbance to remaining natural and semi-natural areas; gradual environmental degradation in the region causing reduction in habitat for SCC	**Overall:** • Additional disturbance to remaining natural areas • Adding to existing pressures in the landscape (industrial and farming activities, roads, alien plants)	Remaining natural areas in the surrounding landscape	Cumulative

7.3.1. DIRECT IMPACTS

CONSTRUCTION PHASE

Destruction of avifaunal habitat

The installation of the proposed project will require clearance of secondary grassy vegetation, fields and pastures, the vegetation associated with the drainage line, and a small amount of the disturbed thicket vegetation during the construction phase.

PROJECT PHASE	*Construction phase*			
DIRECT IMPACT	*Destruction of avifaunal habitat*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-12*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-36***	***low negative***		
PROPOSED MITIGATION MEASURES				
Limit the development footprint to areas classified as low and very low sensitivity as far as possible				
The proposed development activities must remain strictly within the approved development footprint				
For the solar site, limit clearing of vegetation where possible and retain as much ground cover as possible				
Construction camps must not be placed in areas of medium sensitivity				
Where possible, vegetation clearing and construction activities should commence during the autumn or winter months (preferably between May and September) to minimise the impacts on breeding birds				
The proposed conservation area on the eastern side is supported and must be implemented to ensure this impact is minimised				
POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-6*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-18***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

Pollution and contamination of the environment

During construction, dust from exposed areas and vehicles on dirt roads, and litter from construction workers have the potential to pollute the surrounding natural vegetation. The use of dust suppressants, as well as hydrocarbons from vehicles and machinery, have the potential to contaminate soils and ground water, and be

washed into the nearby wetlands and watercourses during high rainfall events. This can lead to pollution or contamination of all downstream environments.

PROJECT PHASE	*Construction phase*			
DIRECT IMPACT	*Pollution and contamination of the environment*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-30***	***low negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee all construction activities				
All vehicles and machinery must be checked for leaks and serviced on a regular basis during construction				
Any spillage must be dealt with rapidly and in the most appropriate manner				
Appropriate stormwater management must be implemented during construction				
Construction camps and crews must remain outside of areas of medium sensitivity				
Washing of construction vehicles must not take place on site				
Dumping of solid waste in natural areas, including cigarette butts and litter by construction workers must be prohibited				
Appropriate solid waste disposal facilities must be provided for construction workers				
POST-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-8*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-16***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

OPERATIONAL PHASE

Injury and fatalities caused by collision with solar panels

The reflective surfaces of the PV arrays may cause birds to collide with the solar panels leading to injury or death. Collisions occur when birds mistake the panel surface for open sky reflected within, or results when birds mistake large panel arrays for wetlands, otherwise known as the "lake effect" (Lovich and Ennen, 2011; DeVault *et al*., 2014; Visser, 2016; Kosciuch *et al*., 2020; Chock *et al*., 2021, Smallwood, 2022). The latter is more common at Concentrated Solar Power (CSP) facilities where the panels have highly reflective surfaces. The impact is still possible at PV SEFs, and findings at facilities in North America suggest that collision mortality impacts may be underestimated at PV plants (Horvath *et al*., 2009; Lovich and Ennen, 2011; Smallwood, 2022).

PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Injury and fatalities caused by collision with solar panels*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-12*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-24***	***low negative***		
PROPOSED MITIGATION MEASURES				
Conduct post-construction monitoring to ascertain if collisions of birds with the panels becomes a problem				
If collisions become a problem, bird diverters / visual deterrents that can be installed around the solar tables to break up the continuity and deter birds from perceiving the panels to be open water must be investigated / researched using the latest available information from the global solar industry				
Tracking panels are preferred to fixed panels as the movement of the panel will aid in altering the light reflected				
The cumulative effect of this impact is not well documented and results from research and monitoring is required to assess the efficacy of mitigation measures. It is therefore recommended that all bird mortalities are recorded during the operational phase of the project. The site should be inspected on a regular basis, for example during routine maintenance, and any bird mortalities recorded, including probable cause of death. The results must be reported to BirdLife SA				
POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-6*	*1*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		

SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-6***	***very low negative***		
CONFIDENCE LEVEL				
High				

Pollution and contamination of the environment

During operations, release of grey water into the environment can cause contamination by detergents. Hydrocarbons and other pollutants from the motorsport raceway can be washed off the hardened surfaces into the soil and downstream watercourses and wetlands.

Grey water from cleaning solar panels has the potential to contaminate soils and ground water and be washed into the watercourses during high rainfall events. This includes biodegradable detergents used for cleaning the panels, which can accumulate in the soil and be washed into the nearby watercourses before they break down. Biodegradable detergents can alter the balance of freshwater ecosystems as they promote bacterial growth and lower oxygen levels.

PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Pollution and contamination of the environment*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-42***	***moderate negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee operational phase activities at a minimum every 6 months for the first 2 years and then yearly for 5 years thereafter				
A formal stormwater management plan must be incorporated into the development design for each component				
Dirty water from the raceway must be treated and cleaned (e.g. solids and hydrocarbons removed) before being released into the environment				
If possible, panels should be cleaned using water that is clear of detergents only (e.g. potable water or borehole water). The use of grey water should be avoided. Should the need arise to clean the panels with detergents, then biodegradable				

detergents are preferred. Care must be taken not to allow the detergents to accumulate in the soil. Detergents must not be used in the rainy season when they can be washed into the downstream watercourses				
All maintenance vehicles must be checked for leaks and serviced on a regular basis				
Any spillage must be dealt with rapidly and in the most appropriate manner				
Dumping of solid waste in natural areas, including cigarette butts and litter by operational staff must be prohibited				
Appropriate solid waste disposal and ablution facilities must be provided for operational staff and visitors				
POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-12*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-24***	***low negative***		
CONFIDENCE LEVEL				
Medium				

7.3.2. INDIRECT IMPACTS

CONSTRUCTION PHASE

Disturbance to and displacement of birds

Construction activities have the potential to cause disturbance to resident bird species inhabiting the surrounding habitats through noise, vibrations, and light (if construction continues after dark). This will disturb the birds utilising the surrounding natural areas and could result in a localised decrease in biodiversity as species move away from the disturbance. The removal of habitat on the site will also cause birds to disperse into the surrounding natural areas. In addition, the presence of construction site may result in negative interactions with avifauna. These may be associated with construction workers such as hunting, as well as possible collisions of larger ground feeding avifauna with construction vehicles.

PROJECT PHASE	*Construction phase*			
DIRECT IMPACT	*Disturbance to and displacement of birds*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-30***	***low negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee all construction activities				
Construction should commence in the winter months (preferably between May and September) to minimise the impacts on the breeding activities of avifauna				
No bird or wild animal may under any circumstance be handled, removed, or be interfered with by construction workers				
No birds or wild animal may under any circumstance be hunted, snared, captured, injured, or killed. This includes animals perceived to be vermin				
To prevent possible collisions with birds (especially gamebirds such as guineafowl), drivers of construction vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered to				
Lighting during construction should be avoided as far as possible. Where required, lighting must not include those that fall within the white spectrum or emit ultra-violet light such as high-pressure sodium or mercury lamps. Light that is emitted at one wavelength, contains no ultraviolet (UV) light, and has a low attraction to insects, such as low-pressure sodium lamps, is preferred				
If lighting is necessary, upward lighting must be avoided to minimise light pollution. Light can be restricted by fitting shields that direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light				
POST-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-4*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-8***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

Spread of invasive alien plant species

During construction, the removal of vegetation and disturbance to the soil will increase the likelihood of invasion by alien plant species. Alien species establish easily and quickly on bare soil by colonisation or from seeds existing in the seed bank of the soil. Infestation by alien and invasive species will lead to degradation of the surrounding natural habitat and will increase the potential of spread into the greater landscape. In addition, the vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds.

PROJECT PHASE	*Construction phase*			
DIRECT IMPACT	*Spread of invasive alien plant species*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-30***	***low negative***		
PROPOSED MITIGATION MEASURES				
Where vegetation clearing takes place, topsoil must be retained and used to rehabilitate underneath the solar arrays and other cleared areas, and for landscaping. Only indigenous plants found in the area must be used for rehabilitation and landscaping				
Only clear vegetation where absolutely necessary and retain as much of the existing vegetation as possible under the solar panels				
A site-specific and region-specific invasive alien plant species management and monitoring plan must be written by a suitably qualified professional and implemented during the construction phase and operational phase				
A specialist contractor must be appointed to clear invasive alien plants that may establish in areas disturbed by construction. All alien plant seedlings and saplings must be removed as they become evident. Alien vegetation must be disposed of at the municipal waste dump, and not dumped on or off the site				
All construction vehicles and equipment must be free of plant material before entering the site				
POST-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short Term*	*-8*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-16***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

OPERATIONAL PHASE

Disturbance to and displacement of avifauna

Noise and vibrations from the motorsport arena will disturb species inhabiting the surrounding natural areas, although quite limited. Lights during the operational phase will result in an increase in artificial lighting. This will disturb the avifauna utilising the surrounding natural areas, especially nocturnal species, and could result in a localised decrease in biodiversity as avifaunal species move away from the disturbance.

PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Disturbance to and displacement of birds*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-30***	***low negative***		
PROPOSED MITIGATION MEASURES				
Lighting must not include those that fall within the white spectrum or emit ultra-violet light such as high-pressure sodium or mercury lamps. Light that is emitted at one wavelength, contains no ultraviolet (UV) light, and has a low attraction to insects, such as low-pressure sodium lamps, is preferred				
Upward lighting must be avoided as far as possible to minimise light pollution. Light can be restricted by fitting shields that direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light				
POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-16***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

7.3.3. CUMULATIVE IMPACTS

Environmental degradation and disturbance to avifauna

The study area is situated within the industrial precinct and is relatively fragmented by the adjacent industrial and agricultural land uses. The proposed development will however cause additional disturbance to the landscape (mainly light and noise) and could result in pollution of the surrounding environment if mitigation measures aren't put in place. The presence of the development will add cumulatively to existing pressures in the landscape caused by industrial and agricultural activities. This will potentially increase the levels of habitat degradation, cause habitat fragmentation, and disturbance to avifauna. While the site itself is of low conservation importance and functional integrity, bird SCC such as Blue Crane *Grus paradisea* are known to occur in the surrounding areas and utilise modified habitats such as fields and pastures.

PROJECT PHASE	*Construction and Operational Phases*			
DIRECT IMPACT	*Environmental degradation*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-42***	***moderate negative***		
PROPOSED MITIGATION MEASURES				
All mitigation measures prescribed for the impacts must be strictly adhered to				
Construction should commence in the winter months (preferably between May and September) to minimise the impacts on the breeding activities of avifauna				
The proposed conservation area on the eastern side is supported and must be implemented to ensure impacts are minimised				
Lighting must not include those that fall within the white spectrum or emit ultra-violet light such as high-pressure sodium or mercury lamps. Light that is emitted at one wavelength, contains no ultraviolet (UV) light, and has a low attraction to insects, such as low-pressure sodium lamps, is preferred				
Upward lighting must be avoided to minimise light pollution. Light can be restricted by fitting shields that direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light				
Only clear vegetation where absolutely necessary and retain as much of the existing vegetation as possible under the solar panels				
Where vegetation clearing takes place, topsoil must be retained and used to rehabilitate underneath the solar arrays and other cleared areas, and for landscaping. Only indigenous plants found in the area must be used for rehabilitation and landscaping				
A site-specific and region-specific invasive alien plant species management and monitoring plan must be written by a suitably qualified professional and implemented during the construction phase and operational phase				

The cumulative effect of the impact of potential collision with solar panels by birds is not well documented and results from research and monitoring is required to assess the efficacy of mitigation measures. It is therefore recommended that all bird mortalities are recorded during the operational phase of the project. The site should be inspected on a regular basis, for example during routine maintenance, and any bird mortalities recorded, including probable cause of death. The results should be reported to BirdLife SA				
If collisions become a problem, bird diverters / visual deterrents that can be installed around the solar tables to break up the continuity and deter birds from perceiving the panels to be open water must be investigated / researched using the latest available information from the global solar industry				
POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-12*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-24***	***low negative***		
CONFIDENCE LEVEL				
Medium				

7.4. SUMMARY OF IMPACTS AND KEY RECOMMENDATIONS

The perceived impacts for the installation of the proposed development begin at low negative without mitigation for the construction phase and drop to very low negative once mitigation measures have been applied (**Table 11**). The most significant construction phase impact is the removal of habitat and the resulting displacement of terrestrial bird species. The perceived impacts for the operational phase begin at moderate and low negative without mitigation and drop to low and very low negative once mitigation measures have been applied (**Table 12**). The most significant operational phase impact is the potential for pollution of the surrounding natural habitats, as well as light and noise. There is also the potential for the cumulative impact of environmental degradation in the landscape should mitigation measures not be appropriately implemented (**Table 13**).

Table 11: Summary of significance of possible impacts arising from the construction phase of the proposed development

Possible Impact	Significance Rating	
	Pre-mitigation	Post-mitigation
Destruction of avifaunal habitat	**Low negative 36**	**Very Low negative 18**
Pollution and contamination of the environment	**Low negative 30**	**Very Low negative 16**
Disturbance to and displacement of birds	**Low negative 30**	**Very Low negative 8**
Spread of invasive alien plants	**Low negative 30**	**Very Low negative 16**

Table 12: Summary of significance of possible impacts arising from the operational phase of the proposed development

Possible Impact	Significance Rating	
	Pre-mitigation	Post-mitigation
Collision of birds with solar panels	Low negative 24	Very Low negative 6
Pollution and contamination of the environment	Moderate negative 42	Low negative 24
Disturbance to and displacement of birds	Low negative 30	Very Low negative 16

Table 13: Summary of cumulative impact significance

Possible Impact	Significance Rating	
	Pre-mitigation	Post-mitigation
Increased disturbance to natural areas and environmental degradation in the region causing reduction in habitat for SCC	Moderate negative 42	Low negative 24

The following recommendations are key to mitigating the impacts of the proposed project from an avifaunal perspective, and must be included in the Environmental Management Programme (EMPr):

- The proposed conservation area on the eastern side is supported and will help alleviate the cumulative impacts. This must be implemented to ensure impacts are minimised.
- Vegetation clearing for construction should commence in the winter months (preferably between May and September) to minimise the impacts on the breeding activities of avifauna.
- Only clear vegetation where absolutely necessary and retain as much of the existing vegetation as possible under the solar panels.
- Where vegetation clearing takes place, topsoil must be retained and used to rehabilitate underneath the solar arrays and other cleared areas, and for landscaping. Only indigenous plants found in the area must be used for rehabilitation and landscaping.
- A site-specific and region-specific invasive alien plant species management and monitoring plan must be written by a suitably qualified professional and implemented during the construction and operational phases.
- Appropriate stormwater management must be implemented during construction and a formal stormwater management plan must be designed for each of the development components.
- Dirty water from the raceway must be treated and cleaned (e.g. solids and hydrocarbons removed) before being released into the environment.
- Lighting during construction and operations should not include that which falls within the white spectrum or emit ultra-violet light such as high-pressure sodium or mercury lamps. Light that is emitted at one wavelength, contains no ultraviolet (UV) light, and has a low attraction to insects, such as low-pressure sodium lamps, is preferred.
- Upward lighting should be avoided to minimise light pollution. Light can be restricted by fitting shields that direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light.
- The cumulative effect of the impact of potential collision with solar panels by birds is not well

documented and results from research and monitoring is required to assess the efficacy of mitigation measures. It is therefore recommended that all bird mortalities are recorded during the operational phase of the project. The site should be inspected on a regular basis, for example during routine maintenance, and any bird mortalities recorded, including probable cause of death. The results should be reported to BirdLife SA.

- If collisions become a problem, bird diverters / visual deterrents that can be installed around the solar tables to break up the continuity and deter birds from perceiving the panels to be open water must be investigated / researched using the latest available information from the global solar industry.

8. CONCLUSION AND IMPACT STATEMENT

The site is largely in a transformed state, with most of the site modified by farming activities since at least the 1950s. The western portion of the site is currently used for agricultural purposes, while the central and eastern portions are comprised of secondary vegetation that has established since clearing for fields, roads and other past human activities. The most important habitat for avifauna occurring on the site is the establishing thicket-like vegetation in the eastern portion of the site and the small drainage line in the south-eastern section, which were evaluated to be of medium ecological importance. These were the most diverse and near to natural habitat for avifauna on the site. The conservation zone proposed for this area is therefore supported. The secondary grassy vegetation and the fields and pastures on the remainder of the site were evaluated to be of low ecological importance. The sensitivity rating identified by the screening tool of **Low** for the Avian theme is therefore confirmed, while the sensitivity rating of **High** for the Animal Species theme is not appropriate and can be dropped to **Low** for most of the site and **Medium** for the eastern section.

During the field survey, 37 species of birds were recorded in the study area and immediate surroundings. Bird species observed in the study area included mainly generalist species and only a few typical of the thicket / fynbos vegetation type. No SSC were recorded on the site during the field survey, however a small group of Blue Crane *Grus paradisea* was recorded in the field adjacent to the site on the south side. While the site itself does not provide important habitat for the species, it is likely to move through the area for foraging purposes from time to time. The six bird SCC identified by the screening tool as potentially occurring in the study area, are not likely to depend on the site for foraging or breeding purposes. Most of these species are either wide-ranging and may cross the study area at times, or have specific habitat requirements, which are not provided by the proposed development site.

The site is largely in a modified state and impacts potentially imposed by the proposed development are perceived to be mostly of low significance. The most significant construction phase impact will be the removal of habitat and the resulting displacement of terrestrial bird species. The most significant operational phase impact will be the potential for pollution of the surrounding natural habitats, as well as the cumulative impact of increased light and noise pollution, as well as environmental degradation in the landscape.

From an avifaunal perspective, the perceived direct, indirect, and cumulative impacts can be mitigated to a low and very low significance. It is the opinion of the specialist that the proposed developments may be authorised as long as mitigation measures are incorporated into the EMPr and are strictly adhered to.

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10. APPENDICES

APPENDIX A: ABRIDGED CV OF THE SPECIALIST

Name and Surname	:	Robyn Phillips
Date of Birth	:	28 08 1975
Company Name	:	Cossypha Ecological
Field of Expertise	:	Terrestrial Ecologist and Avifaunal Specialist
SACNASP Registration	:	*Pr.Sci.Nat.* 400401/12 (Zoological and Ecological Sciences)
Highest Qualification	:	MSc (Zoology) *cum laude*
Years of Experience	:	24
Contact Number	:	084 695 1648
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The first half of my professional career was spent working in ecological research at the University of KwaZulu-Natal. Since starting in consulting in 2011, I have been involved in many projects requiring biodiversity surveys and ecological assessments as part of the legislated requirements for the Environmental Impact Assessment (EIA) process. These studies Include field assessment of habitat, species occurrence (especially those of conservation concern), assessment of ecological importance and sensitivity of floral and faunal communities and habitat, as well as assessment of impacts. Tasks also include making recommendations and prescribing mitigation measures after applying the mitigation hierarchy, aimed at minimising impacts.

Following is a selection of similar projects undertaken:

- Terrestrial Biodiversity and Animal Species Assessments for the proposed Kwartel Solar PV Cluster Development near Legkraal north of Polokwane, Limpopo Province (ABO Energy South Africa (Pty) Ltd) – 2024 to present.
- Terrestrial Biodiversity and Animal Species Assessments for the proposed Otter Solar PV Cluster Development to Mercury MTS Grid Connection near Orkney, North West Province (ABO Energy South Africa (Pty) Ltd) – 2023 to 2024.
- Terrestrial Biodiversity and Animal Species Assessments for the proposed Otter Solar PV Cluster Development Grid Connection with MTS and LiLo near Orkney, North West Province (ABO Energy South Africa (Pty) Ltd) – 2023 to 2024.
- Avifaunal Screening Assessment for the Proposed ABO Ndau 3 Solar PV Facility near Polokwane, Limpopo Province (Praxos 373) – 2024.
- Avifaunal Screening Assessment for the Proposed ABO Tau Solar PV Facility near Polokwane, Limpopo Province (Praxos 373) – 2024.

- Avifaunal Impact Assessments for the proposed Kwena Solar PV Cluster Development near Groblersdal, Limpopo Province (ABO Energy South Africa (Pty) Ltd) – 2023 to present.
- Avifaunal Impact Assessments for the proposed Bateleur Solar PV Cluster Development between Mopane and Musina, Limpopo Province (ABO Energy South Africa (Pty) Ltd) – 2023 to present.
- Avifaunal Impact Assessments for the proposed ZCC N3 Solar PV Developments along the N3 from Ashburton in KwaZulu-Natal to Heidelberg in Gauteng (EnviroAfrica) – 2023 to present.
- Terrestrial Biodiversity and Animal Species Assessments for the proposed Otter Solar PV Cluster Development near Orkney, North West Province (ABO Energy South Africa (Pty) Ltd) – 2023 to 2024.
- Terrestrial Biodiversity and Animal Species Compliance Statement for the Proposed Development of a 9 MW Photovoltaic Solar Plant on Various Property Alternatives in George, Western Cape (Sharples Environmental Services) – 2023.
- Terrestrial Biodiversity and Faunal Screening Assessment for the proposed Springhaas 2 Solar Cluster Development near Dealesville, Free State (GIBB Environmental) – 2023.
- Avifaunal Impact Assessments for the proposed Nyala Solar PV Developments near Northam, Limpopo Province (PRAXOS 373) – 2022 to present.
- Avifaunal Impact Assessments for the proposed Ndau Solar PV Developments near Polokwane, Limpopo Province (PRAXOS 373) – 2022 to 2023.
- Avifaunal Impact Assessment for the proposed Harvard 1 & 2 Solar PV Plants and Grid Connection, Bloemfontein, Free State (EnviroAfrica) – 2021 to 2023.
- Avifaunal Screening Assessment for Proposed Solar PV Facilities and Associated Powerlines near Northam in the Waterberg District, Limpopo Province (Praxos 373) – 2022.
- Avifaunal Screening Assessment for Proposed Solar PV Facilities and Associated Powerlines near Polokwane in the Capricorn District, Limpopo Province (Praxos 373) – 2022.
- Terrestrial Biodiversity and Faunal Assessment for the proposed Springhaas 1 Solar Cluster Development and Grid Connection near Dealesville, Free State (GIBB Environmental) – 2021 to 2023.
- Avifaunal Impact Assessment, Terrestrial Fauna Compliance Statement, and Terrestrial Biodiversity Impact Assessment for the proposed Oceana 10 MW Solar PV Facility near St Helena Bay, Western Cape (SRK) – 2021 to 2022.
- Terrestrial Biodiversity (including fauna and flora) and Avifaunal Impact Assessment for the Waterkloof Solar IPP Programme, North West (GIBB Environmental) – 2020 to 2022.
- Terrestrial Biodiversity Assessment for the Askham Solar Energy Facility, Northern Cape (GIBB Environmental) – 2018 to 2019.
- Terrestrial Faunal Assessment for the Proposed Mareetsane Batho-Batho Solar Farm and associated powerline, North West (Kgatelopele Private Equity & Venture Capital) – 2013.
- Terrestrial Faunal Assessments for various solar farms in the Northern Cape (Strategic Environmental Focus) – 2011 to 2012.