Proposed Renewstable© Ntokozo Renewable Power Plant and Associated Infrastructure near the Majuba Power Station, Mpumalanga Province

Preliminary Avifaunal Assessment & Site Sensitivity Verification

Compiled for

NSOVO ENVIRONMENTAL CONSULTING

By

Cossypha Ecological

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REPORT PRODUCTION

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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.

July 2024

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Robyn Phillips *Pr.Sci.Nat.*
Terrestrial Ecologist
SACNASP Reg. No. 400401/12

Date

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ABBREVIATIONS

BA	Basic Assessment
BESS	Battery Energy Storage System
BIRP	Birds in Reserves Project
CAR	Co-ordinated Avifaunal Road Counts
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
EN	Endangered
EWT	Endangered Wildlife Trust
GBIF	Global Biodiversity Information Facility
GN	General Notice
IUCN	International Union for Conservation of Nature
kV	Kilovolts
LC	Least Concern
MW	Megawatt
NEMA	National Environmental Management Act 107 of 1998
NT	Near Threatened
PV	Photovoltaic
QDGC	Quarter Degree Grid Cell
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEF	Solar Energy Facility
SPC	Special Purpose Company
VU	Vulnerable

1. INTRODUCTION AND PROJECT DESCRIPTION

Hydrogene de France (HDF), under its Special Purpose Company (SPC) Renewstable© Mpumalanga (Pty) Ltd, proposes to develop the Renewstable© Ntokozo renewable power plant near Amersfoort in Mpumalanga. The project is part of a cluster of similar developments, which are high-capacity renewable power plants based on hydrogen energy storage technology. Nsovo Environmental Consulting (Pty) Ltd was appointed to undertake an Environmental Impact Assessment (EIA) 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 project. Cossypha Ecological was appointed to conduct an Avifaunal Impact Assessment for the proposed development to inform the EIA process.

1.1. PROJECT DESCRIPTION

A development area of approximately 132 ha has been earmarked for the proposed Renewstable© Ntokozo project, which will provide between 6 MW and 25 MW of electricity services to the country daily over a period of at least 25 years from the commissioning of the plant. The cluster of plants are scheduled to be commissioned in 2027 and will contribute to the greening of the local power grid and enhance the territory's energy independence.

The Renewstable® power plants convert the electricity from a photovoltaic (PV) solar park into hydrogen through an electrolyser system, then stores this hydrogen in compressed gas form, and restitutes the electricity to the grid through a fuel cell system when the PV park no longer produces enough energy. Hydrogen technologies rely on the electrochemical properties of water by decomposing and then recomposing a water molecule (H_2O) using electrical energy, without emitting greenhouse gases. Therefore, the system does not generate any harmful atmospheric emissions, only oxygen, with traces of water as vapor, hydrogen, and nitrogen during the maintenance phase. The site would also include battery power storage to maximise plant performance and improve customer service. A Battery Energy Storage System (BESS) provides the end-of-the-day peak power and, in combination with the hydrogen storage, ensures the stability of the electricity service. In the Renewstable® Power Plant BESS is complementary to hydrogen being used as short-term energy storage and for power regulation. There are many technologies on the BESS market, but the current leading technology and more suitable for Renewstable® currently is the Lithium-Ion (Li-Ion) BESS.

Figure 1: Example of a hydrogen power plant with solar PV arrays

1.2. LOCATION

The Renewstable© Ntokozo project area is located approximately 16.5 km to the north-east of the Majuba Power Station and ~6.3 km south-east of the town of Amersfoort within the Dr Pixley Ka Isaka Seme Local Municipality in the Gert Sibande District of Mpumalanga Province (**Figure 2**). The study area is 132 ha in extent and occurs on Portion 10 of the Farm Schurvepoort 63-HS. The site falls within Quarter Degree Grid Cell (QDGC) 2729BB and lies between 27°02'05.57" and 27°03'03.35" south and 29°56'17.75" and 29°56'54.29" east. The study area is mostly flat but gently undulating in the southern portion with a range in altitude from around 1 654 to 1 673 m above mean sea level (a.m.s.l).

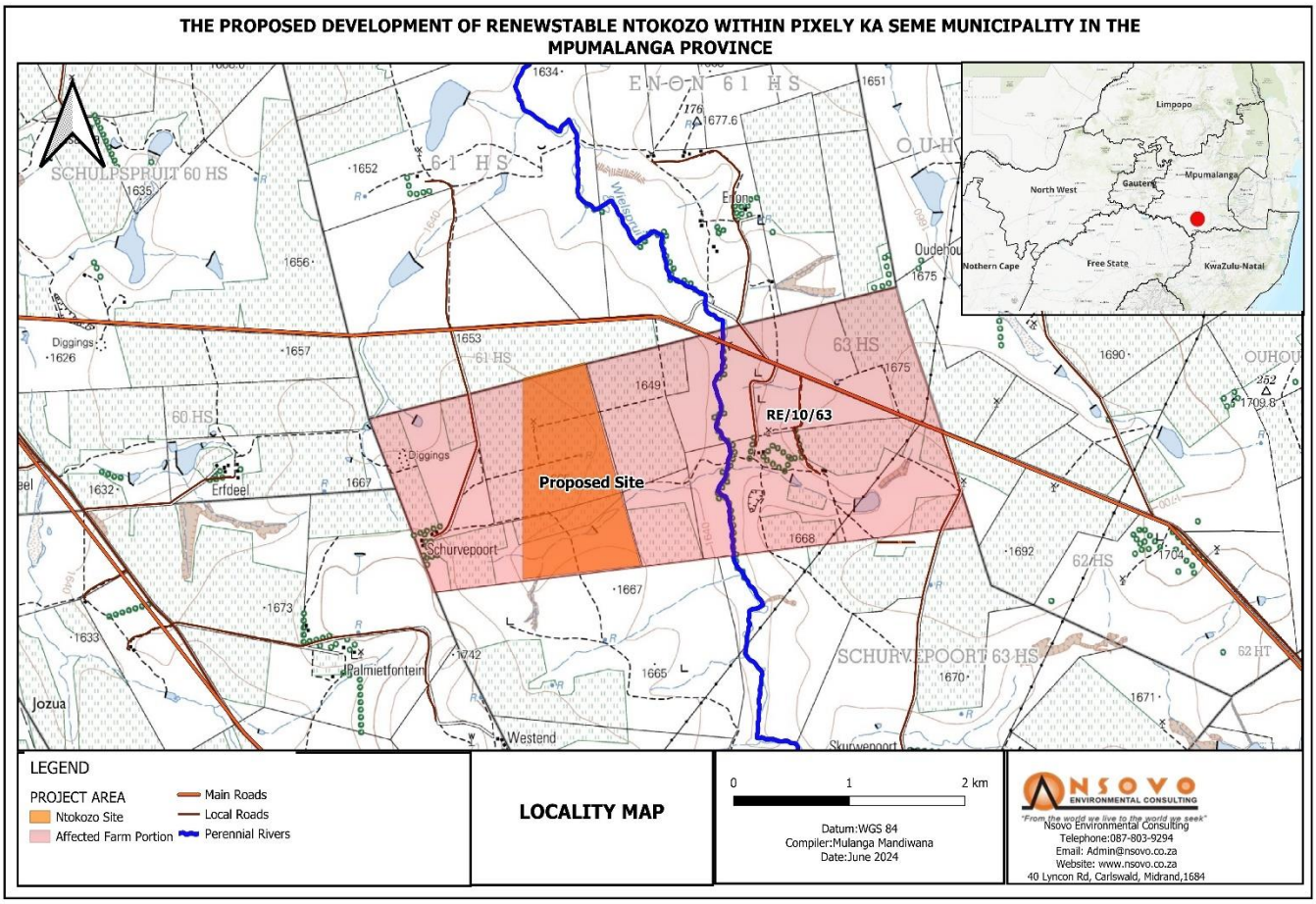


Figure 2: Location of the Ntokozo study area

1.3. REPORTING REQUIREMENTS

An environmental site sensitivity report was generated for the project on the 26th of June 2024 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 **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: *Balearica regulorum* Grey Crowned Crane (EN)
- High: *Sagittarius serpentarius* Secretarybird (Vulnerable (VU))
- High: *Geronticus calvus* Southern Bald Ibis (VU)

- Medium: *Eupodotis senegalensis* White-bellied Bustard (VU)
- Medium: *Tyto Capensis* African Grass Owl (VU)
- Medium: *Spizocorys fringillaris* Botha's Lark (EN)
- Medium: *Neotis denhami* Denham's Bustard (VU)

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

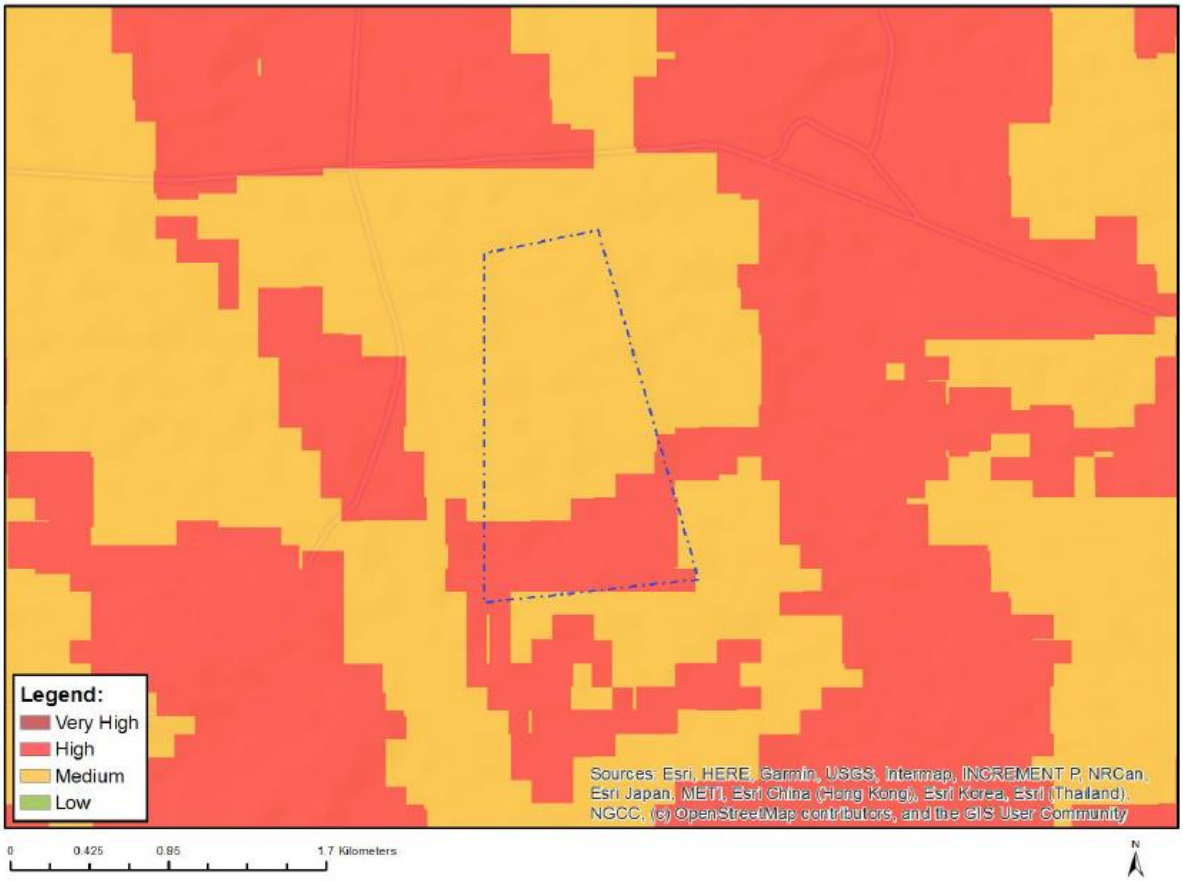


Figure 3: DFFE Screening Tool map of relative sensitivity for the Animal Species theme

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).

According to the above mentioned gazetted protocols, prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site identified by the screening tool must be confirmed by undertaking a Site Sensitivity Verification (SSV). The purpose of the SSV is to confirm the actual use of the land on the ground versus that which has been identified by the screening tool. The SSV must confirm or refute the need to employ the various specialists as identified in the screening report. **This Report covers Stage 1 of the methodology prescribed by the Best Practice Guidelines (Jenkins *et al.*, 2017) and entails the Preliminary Avifaunal Assessment as well as the SSV of the DFFE Environmental Screening Report outcomes.**

1.4. TERMS OF REFERENCE

The Terms of Reference for this report were to:

- Undertake a preliminary field survey of the study area to identify and map areas of opportunity and constraint within the property to inform the layout.
- Compile a photographic record of the characteristics of the study area, including major habitats and sensitive areas.
- Provide a verification of the site sensitivities identified by the DFFE screening tool (SSV Report).
- Compile a Preliminary Avifaunal Assessment Report that provides an overview of the ecological context, likely impacts, and potential red flags to development, from an avifaunal perspective, covering **Stage 1** of the methodology prescribed by the Guidelines (Jenkins *et al.*, 2017); and
- Provide maps and shapefiles based on the preliminary findings.

2. 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).

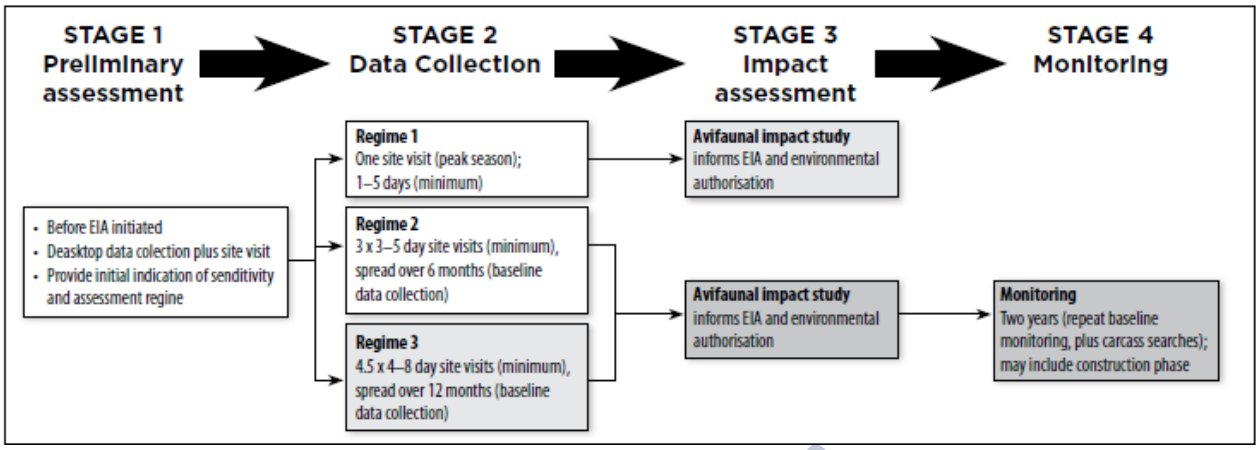
According to Jenkins *et al.* (2017), an avifaunal impact assessment for Solar Energy Facilities (SEFs) must follow a tiered process that follows pre-determined stages depending on the conditions of the site:

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).



This document reports information and results for stage 1.

2.1. STAGE 1: PRELIMINARY ASSESSMENT

According to Jenkins *et al.* (2017) the preliminary assessment should yield a preliminary avifaunal assessment report, which describes the relative sensitivity of the study area, highlights any red flags to development, and determines whether additional baseline data collection is necessary to fully inform the Avifaunal Impact Assessment Report. The preliminary assessment is based on desk-top review and a site survey conducted over the study area in the summer season from the from the 14th to the 16th of November 2023. The findings are incorporated into a report aimed to characterise the study area in terms of habitats present, the overall site sensitivity, and delineate areas that are potentially highly sensitive and no-go areas that may need to be avoided by the development. The sensitivity analysis follows the methodology prescribed in the Species Environmental Assessment Guideline (SANBI, 2020). Preliminary assessment of impacts and general recommendations are also provided.

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, 2022) 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.

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.

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.

2.2. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations pertain to this report:

- Habitat boundaries usually consist of subtle transitional zones or ecotones, which cannot be captured as distinct lines. Boundaries of habitat types are therefore approximately defined.
- Habitat types are defined and mapped in the context of use by birds and not in terms of botanical species associations. Similarly, the riparian habitat associated with rivers, wetlands, and dams are defined in terms of broad habitat use by birds and do not denote the boundaries of wetlands and watercourses.
- The preliminary assessment was conducted over the entire ~132 ha study area to get an overview of habitats, landscape features, and sensitivities. While it's unlikely, any of the habitat delineations are subject to change if new sensitivities come to light following the more detailed seasonal assessments.

3. DESKTOP ASSESSMENT RESULTS

3.1. STUDY AREA

The study area lies in the eastern highveld parts of the country, within the Grassland Biome and the Mesic Highveld Grassland Bioregion (Rutherford and Westfall, 1994; Mucina and Rutherford, 2006), which is characterised by cold dry winters and mild summers. Rain falls mostly in summer with a Mean Annual Precipitation (MAP) of 694 mm. The highest rainfall occurs in January and the lowest falls in June / July. Maximum temperatures reach around 27°C in summer and minimum temperatures drop to around 8°C in winter. Incidence of frost is very high (Mucina and Rutherford, 2006).

According to SANBI (2018) the study area is situated within the Amersfoort Highveld Clay Grassland vegetation type, which is endemic to South Africa and occurs in KwaZulu-Natal and Mpumalanga Provinces. Amersfoort Highveld Clay Grassland consists of undulating grassland plains, with scattered patches of dolerite outcrops. The grassland is characteristically short and closed, dominated by *Themeda triandra* and is often severely grazed (Mucina and Rutherford, 2006; SANBI, 2021). Amersfoort Highveld Clay Grassland is classified as Least Concern, with a target of 27%, only 3.6% is statutorily conserved, with around 45% transformed mainly for agriculture (Mucina and Rutherford, 2006; SANBI, 2021; DFFE, 2022).

The landscape of the Ntokozo study area is rural in nature occurring in farmland used mostly for cultivation and cattle grazing. The site is an active farm comprised mostly of cultivated fields (approximately 71%) with a strip of natural grassland vegetation in the southern portion of the site, which is used for grazing. The site is largely in a transformed state, with most areas modified by farming activities, which has been this way since at least 1964 according to available historical aerial imagery (**Figure 4**). The strip of natural grassland in the southern portion of the site however does not appear to have been ploughed in the past. The surrounding areas comprise privately owned farmland comprised mostly of cultivated fields with patches of natural grassland with natural drainage

lines and small farm dams scattered in between. The Majuba Power Station occurs ~16.5 km to the south-west. A dirt road occurs ~350 m to the north and the N11 highway occurs ~6.5 km to the west (**Figure 5**).

Figure 4: Historical aerial image of the study area from 1964

According to the Mpumalanga Biodiversity Sector Plan (MTPA, 2019), the majority of the site (mostly cultivated fields) is classified as "Heavily Modified". The southern section, which incorporates a natural drainage line and the natural grassland to the south is classified as Critical Biodiversity Area (CBA) Irreplaceable.

The Majuba Nature Reserve occurs ~15.5 km to the south-west of the Ntokozo site and the Afrikan Farms Protected Environment occurs ~12.2 km to the south-east. The site just falls within the boundary of the Grasslands Important Bird Area (IBA) (IBA number ZA016), while the Amersfoort-Bethal-Carolina IBA (ZA014) occurs ~8 km to the north-west of the site. In addition, most of the remaining natural grassland on the site and in the surrounding areas is flagged as Protected Area Expansion Priority Areas (**Figure 6**).

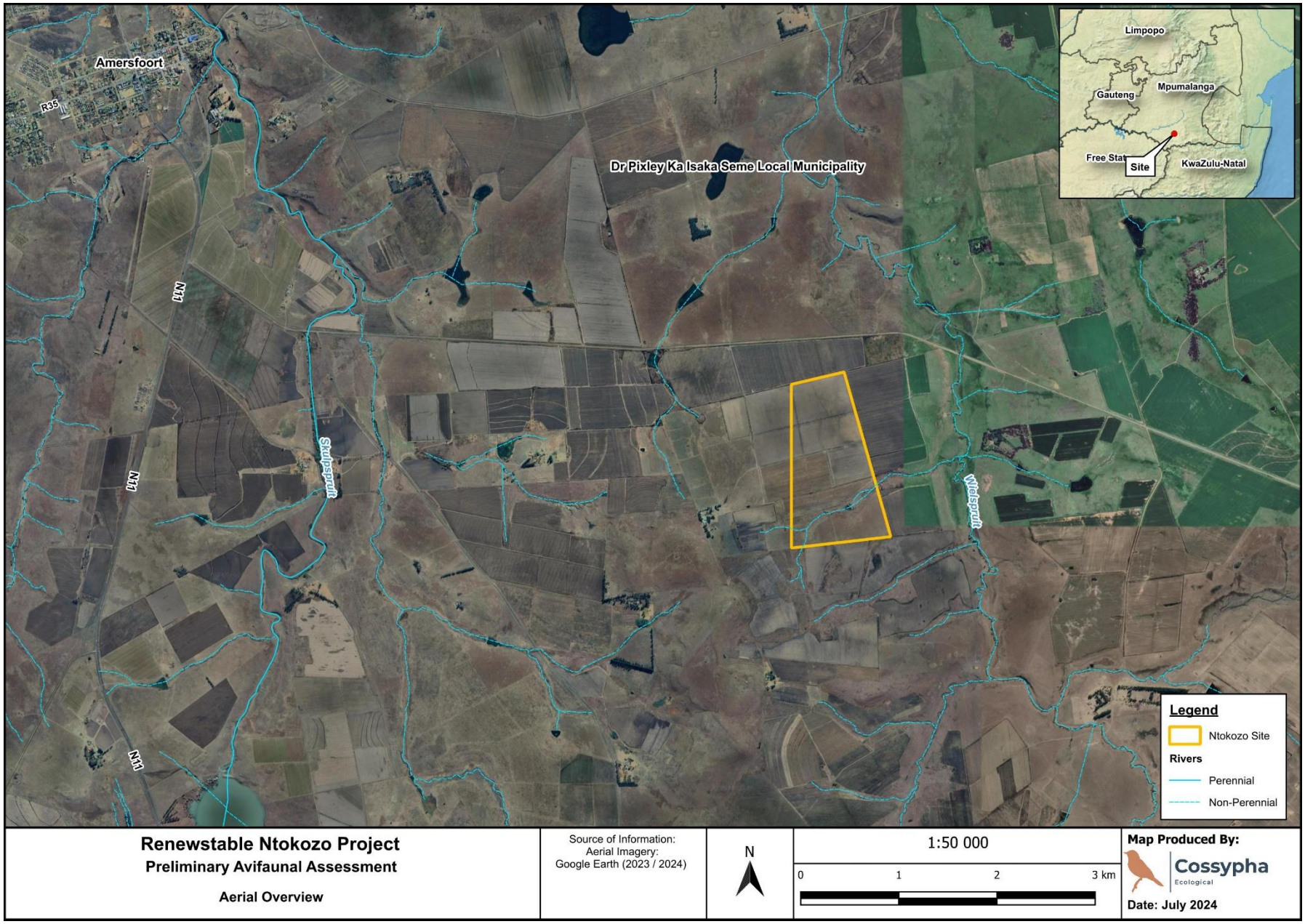


Figure 5: Aerial overview of the Ntokozo study area and surrounds

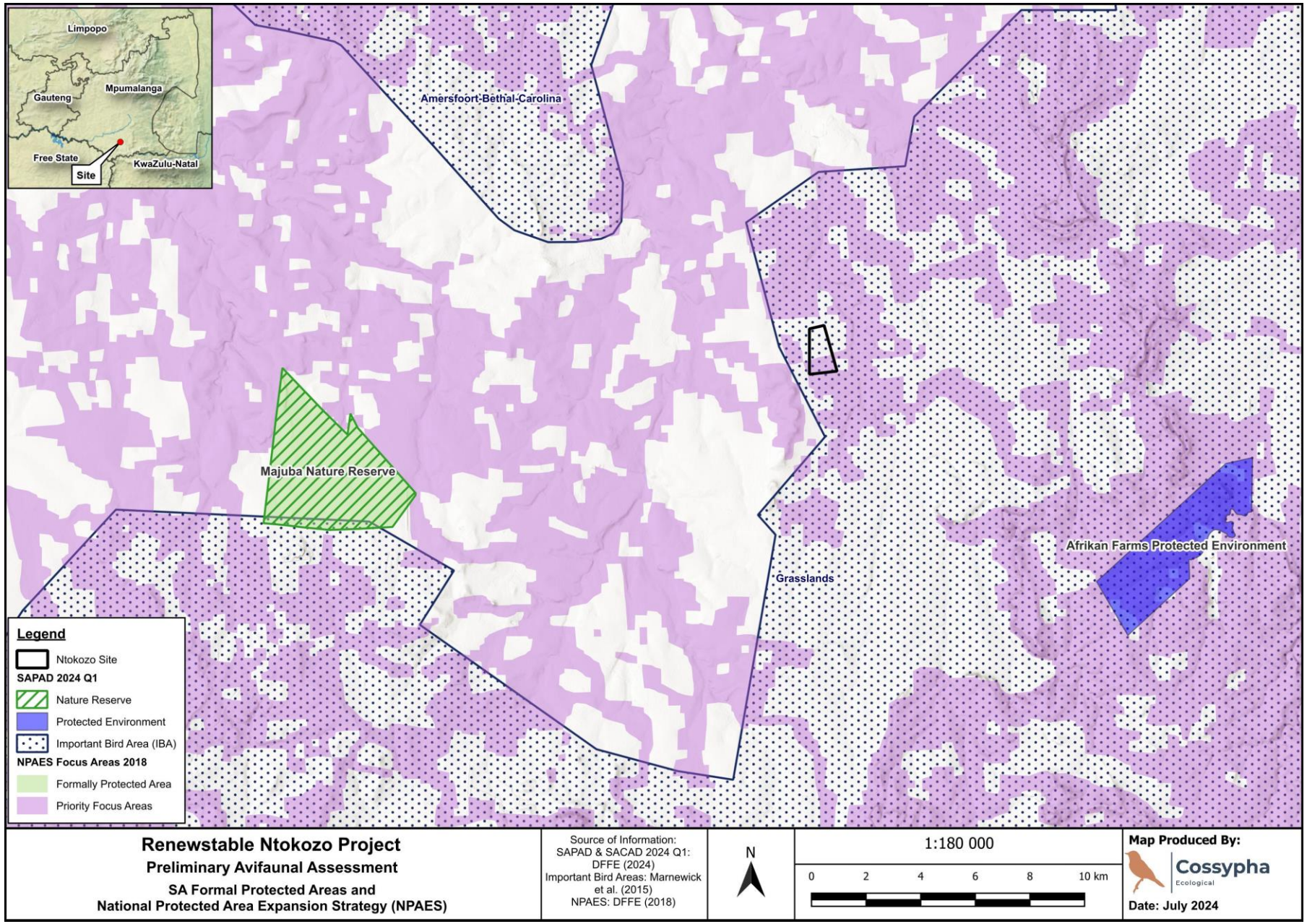


Figure 6: The Ntokozo study area in relation to national Protected Areas

3.2. DISTRIBUTION OF AVIFAUNA IN THE STUDY AREA

The region is relatively high in avifaunal diversity with around 308 bird species known to occur within the QDGC (an atlas area of 15' × 15' – roughly 24 × 27 km) that the study area falls within (2729BB), according to the distribution maps in Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011). Approximately 87% of the total species in the QDGCs are associated with grassland habitat, farmlands, and inland water habitats, which is the character of the study area and surroundings. While most of the natural habitat on the site has been modified, this demonstrates that the available habitats within the surrounding areas are able to support the majority of bird 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. 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. To date, 98 bird species have been recorded in the pentad in which the study area falls (pentad 2700_2955) according to SABAP2 data (from 25 cards submitted). This includes eight species of conservation concern (SCC) (see species highlighted in **Table 1**).

Priority species in terms of sensitivity to solar PV development impacts include any Red List (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 1** lists priority species that have been recorded within pentad 2700_2955 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 **Table 3** in **Section 4.3.3** for species recorded in the study area.

Table 1: Avifaunal priority species occurring within pentad 2700_2955 including Reporting Rate (RR)

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Red-knobbed Coot	*Fulica cristata*	Waterfowl	LC / LC	100
Yellow-billed Duck	*Anas undulata*	Waterfowl	LC / LC	100
Spur-winged Goose	*Plectropterus gambensis*	Waterfowl	LC / LC	100
Black-headed Heron	*Ardea melanocephala*	Gamebird	LC / LC	100
Hadada Ibis	*Bostrychia hagedash*	Gamebird	LC / LC	100
South African Cliff Swallow	*Petrochelidon spilodera*	Gregarious	LC / LC	100
Southern Masked Weaver	*Ploceus velatus*	Gregarious	LC / LC	100
Long-tailed Widowbird	*Euplectes progne*	Gregarious	LC / LC	100
Reed Cormorant	*Microcarbo africanus*	Waterfowl	LC / LC	75
Western Cattle Egret	*Bubulcus ibis*	Waterfowl	LC / LC	75
Amur Falcon	*Falco amurensis*	Raptor	LC / LC	75
Grey Heron	*Ardea cinerea*	Waterfowl	LC / LC	75
Common Quail	*Coturnix coturnix*	Gamebird	LC / LC	75
Cape Sparrow	*Passer melanurus*	Gregarious	LC / LC	75
Southern Grey-headed Sparrow	*Passer diffusus*	Gregarious	LC / LC	75
Swainson's Spurfowl	*Pternistis swainsonii*	Gamebird	LC / LC	75
Greater Striped Swallow	*Cecropis cucullata*	Gregarious	LC / LC	75

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
White-rumped Swift	*Apus caffer*	Gregarious	LC / LC	75
Pin-tailed Whydah	*Vidua macroura*	Gregarious	LC / LC	75
Fan-tailed Widowbird	*Euplectes axillaris*	Gregarious	LC / LC	75
Hamerkop	*Scopus umbretta*	Waterfowl	LC / LC	50
Secretarybird	*Sagittarius serpentarius*	SCC	VU / EN	50
Southern Red Bishop	*Euplectes orix*	Gregarious	LC / LC	50
Yellow-crowned Bishop	*Euplectes afer*	Gregarious	LC / LC	50
White-breasted Cormorant	*Phalacrocorax lucidus*	Waterfowl	LC / LC	50
Egyptian Goose	*Alopochen aegyptiaca*	Waterfowl	LC / LC	50
Helmeted Guineafowl	*Numida meleagris*	Gamebird	LC / LC	50
African Sacred Ibis	*Threskiornis aethiopicus*	Waterfowl	LC / LC	50
Glossy Ibis	*Plegadis falcinellus*	Waterfowl	LC / LC	50
Greater Kestrel	*Falco rupicoloides*	Raptor	LC / LC	50
Black-winged Kite	*Elanus caeruleus*	Raptor	LC / LC	50
Red-billed Quelea	*Quelea quelea*	Gregarious	LC / LC	50
South African Shelduck	*Tadorna cana*	Waterfowl	LC / LC	50
Cape Shoveler	*Spatula smithii*	Waterfowl	LC / LC	50
African Spoonbill	*Platalea alba*	Waterfowl	LC / LC	50
Red-billed Teal	*Anas erythrorhyncha*	Waterfowl	LC / LC	50
Common Waxbill	*Estrilda astrild*	Gregarious	LC / LC	50
Quailfinch	*Ortygospiza atricollis*	Gregarious	LC / LC	25
Yellow Bishop	*Euplectes capensis*	Gregarious	LC / LC	25
Common Buzzard	*Buteo buteo*	Raptor	LC / LC	25
Blue Crane	*Grus paradisea*	SCC	NT / VU	25
Grey Crowned Crane	*Balearica regulorum*	SCC	EN / EN	25
Little Grebe	*Tachybaptus ruficollis*	Waterfowl	LC / LC	25
Blue Korhaan	*Eupodotis caerulescens*	SCC	LC / NT	25
Rock Martin	*Ptyonoprogne fuligula*	Gregarious	LC / LC	25
Marsh Owl	*Asio capensis*	Raptor	LC / LC	25
Black-winged Pratincole	*Glareola nordmanni*	SCC	NT / NT	25
Barn Swallow	*Hirundo rustica*	Gregarious	LC / LC	25
Horus Swift	*Apus horus*	Gregarious	LC / LC	25
Little Swift	*Apus affinis*	Gregarious	LC / LC	25
Cape Weaver	*Ploceus capensis*	Gregarious	LC / LC	25
Red-collared Widowbird	*Euplectes ardens*	Gregarious	LC / LC	25
Black-bellied Bustard	*Lissotis melanogaster*	Gamebird	LC / LC	0
Jackal Buzzard	*Buteo rufofuscus*	Raptor	LC / LC	0
African Black Duck	*Anas sparsa*	Waterfowl	LC / LC	0
Great Egret	*Ardea alba*	Waterfowl	LC / LC	0
Lanner Falcon	*Falco biarmicus*	SCC	VU / LC	0
Greater Flamingo	*Phoenicopterus roseus*	SCC	NT / LC	0
Southern Bald Ibis	*Geronticus calvus*	SCC	VU / VU	0
White-winged Widowbird	*Euplectes albonotatus*	Gregarious	LC / LC	0

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

4. FIELD RESULTS

4.1. SITE DESCRIPTION

The Ntokozo site is largely in a transformed state, with most areas modified by farming activities. The site is comprised mostly of cultivated fields (approximately 71%) with a patch of natural open grassland vegetation occurring in the south-eastern corner of the site. Natural grassland makes up ~17.3% of the site. A few rocky patches occur in the natural grassland in the south-eastern corner. A natural drainage line with a few small farm dams flows through the southern portion of the site (**Figure 7**).

Cultivated fields make up the majority of the site

Patch of natural open grassland with a few rocky patches in the south-eastern portion of the site

Natural drainage line with a small farm dam occurring in the southern portion of the site

4.2. AVIFAUNAL HABITATS IN THE STUDY AREA AND SURROUNDS

The study area and surroundings are comprised of farmland with patches of natural open grassland habitat, interspersed with natural watercourses and wetlands with small farm dams, and supports many avifaunal species typical of the grassland biome. The natural open grassland vegetation in the surrounding landscape supports most of the terrestrial species found in the region, including priority species such as gamebirds, raptors, and gregarious passerines. The many watercourses, farm dams, and wetlands provide important habitat for waterfowl and other wetland associated species, while the wet areas provide surface water for drinking for all fauna.

The Ntokozo site itself is largely in a transformed state, with most areas modified by farming activities. The most important habitat for avifauna occurring on the site is the natural open grassland vegetation, as well as the natural drainage line and small farm dam. The natural open grassland vegetation on the site is however limited and is relatively fragmented by the surrounding farming practices (mostly cultivated fields). It is therefore unlikely that this habitat supports any significant populations of grassland species.

Natural open grassland occurring on the Ntokozo site

Natural drainage line and wetlands in the southern portion of the site

Figure 7: Habitat features of the Ntokozo study area

4.3. BIRD SPECIES OCCURRENCE IN THE STUDY AREA

4.3.1. BIRD OBSERVATIONS

During the preliminary field survey, 36 species of birds were recorded in the study area and 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) and global (IUCN Red List of Threatened Species, 2023) conservation status. Bird species observed in the study area included mainly species typical of the grassland biome such as cisticolas, larks, longclaws, swallows, chats, and pipits.

Table 2: Species recorded in the study area and surroundings listed in taxonomic order

Scientific Name	Common Name	National Status	Global Status
Pternistis swainsonii	Swainson's Spurfowl	LC	LC
Coturnix coturnix	Common Quail	LC	LC
Numida meleagris	Helmeted Guineafowl	LC	LC
Alopochen aegyptiaca	Egyptian Goose	LC	LC
Columba livia	Rock Dove	LC	LC
Columba guinea	Speckled Pigeon	LC	LC
Streptopelia capicola	Ring-necked Dove	LC	LC
Vanellus armatus	Blacksmith Lapwing	LC	LC
Elanus caeruleus	Black-winged Kite	LC	LC
Buteo buteo	Common Buzzard	LC	LC
Falco rupicoloides	Greater Kestrel	LC	LC
Ardea melanocephala	Black-headed Heron	LC	LC
Bubulcus ibis	Western Cattle Egret	LC	LC
Bostrychia hagedash	Hadada Ibis	LC	LC
Lanius collaris	Southern Fiscal	LC	LC
Corvus capensis	Cape Crow	LC	LC
Saxicola torquatus	African Stonechat	LC	LC
Myrmecocichla formicivora	Ant-eating Chat	LC	LC
Lamprotornis bicolor	Pied Starling	LC	LC
Hirundo rustica	Barn Swallow	LC	LC
Petrochelidon spilodera	South African Cliff Swallow	LC	LC
Cisticola tinniens	Levaillant's Cisticola	LC	LC
Cisticola juncidis	Zitting Cisticola	LC	LC
Cisticola textrix	Cloud Cisticola	LC	LC
Cisticola cinnamomeus	Pale-crowned Cisticola	LC	LC
Cisticola ayresii	Wing-snapping Cisticola	LC	LC
Calandrella cinerea	Red-capped Lark	LC	LC
Passer domesticus	House Sparrow	LC	LC
Passer melanurus	Cape Sparrow	LC	LC
Macronyx capensis	Cape Longclaw	LC	LC
Anthus cinnamomeus	African Pipit	LC	LC
Ploceus velatus	Southern Masked Weaver	LC	LC
Quelea quelea	Red-billed Quelea	LC	LC
Euplectes orix	Southern Red Bishop	LC	LC
Euplectes progne	Long-tailed Widowbird	LC	LC
Vidua macroura	Pin-tailed Whydah	LC	LC

LC = Least Concern

4.3.2. BIRDS OF CONSERVATION CONCERN

Species of conservation concern (SCC) are those with a Red List status higher than Least Concern at a national level (Taylor *et al*., 2015) and a global level (IUCN, 2023) and/or species Protected at a national level (DFFE, 2023). No SSC were recorded in the study area during the preliminary site survey, however SCC such as Blue Crane *Grus paradisea* (NT / VU), Secretarybird *Sagittarius serpentarius* (VU / EN), Greater Flamingo *Phoenicopterus roseus* (NT / LC), and Southern Bald Ibis *Geronticus calvus* (VU / VU) are known to occur in the area. Such species were recorded within a ~15 km radius of the Ntokozo site during the preliminary field survey.

4.3.3. PRIORITY SPECIES

Preliminary assessment of species recorded in and around the study area show that there are some bird species that may be susceptible to the impacts of solar PV development occurring in the study area and surrounds. These include a few SCC as well as large-bodied, ground-welling gamebirds such as 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. These and other priority species recorded in the study area and greater surrounding areas (up to ~15 km) are listed in **Table 3** along with their national and global conservation status, and the type of species.

Table 3: Priority species recorded in the study area and greater surroundings listed in taxonomic order. Species recorded on the site are highlighted, and SCC are in red

Scientific Name	Common Name	National Status	Global Status	Priority Species
Pternistis swainsonii	Swainson's Spurfowl	LC	LC	Gamebird
Coturnix coturnix	Common Quail	LC	LC	Gamebird
Numida meleagris	Helmeted Guineafowl	LC	LC	Gamebird
Alopochen aegyptiaca	Egyptian Goose	LC	LC	Waterfowl
Plectropterus gambensis	Spur-winged Goose	LC	LC	Waterfowl
Anas undulata	Yellow-billed Duck	LC	LC	Waterfowl
Grus paradisea	Blue Crane	NT	VU	SCC
Vanellus armatus	Blacksmith Lapwing	LC	LC	Waterfowl
Elanus caeruleus	Black-winged Kite	LC	LC	Raptor
Buteo buteo	Common Buzzard	LC	LC	Raptor
Sagittarius serpentarius	Secretarybird	VU	EN	SCC
Falco rupicoloides	Greater Kestrel	LC	LC	Raptor
Microcarbo africanus	Reed Cormorant	LC	LC	Waterfowl
Ardea melanocephala	Black-headed Heron	LC	LC	Gamebird
Bubulcus ibis	Western Cattle Egret	LC	LC	Gamebird
Phoenicopterus roseus	Greater Flamingo	NT	LC	SCC
Plegadis falcinellus	Glossy Ibis	LC	LC	Waterfowl
Bostrychia hagedash	Hadada Ibis	LC	LC	Gamebird
Geronticus calvus	Southern Bald Ibis	VU	VU	SCC
Threskiornis aethiopicus	African Sacred Ibis	LC	LC	Gamebird
Hirundo rustica	Barn Swallow	LC	LC	Gregarious
Petrochelidon spilodera	South African Cliff Swallow	LC	LC	Gregarious
Ploceus velatus	Southern Masked Weaver	LC	LC	Gregarious
Quelea quelea	Red-billed Quelea	LC	LC	Gregarious
Euplectes orix	Southern Red Bishop	LC	LC	Gregarious
Euplectes progne	Long-tailed Widowbird	LC	LC	Gregarious
Vidua macroura	Pin-tailed Whydah	LC	LC	Gregarious

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

4.4. KEY HABITATS AND PRELIMINARY SITE SENSITIVITY

The patches of natural open grassland vegetation in the surrounding areas, with the natural drainage lines, wetlands, and dams, provide the main habitats that support the avifaunal species found in the region, including priority species such as cranes, Secretarybirds, ibises, flamingos, raptors, and gregarious species. The natural grassland vegetation on the site is however limited and fragmented by farming practices, and it is unlikely that this habitat supports any significant populations of grassland species. This habitat on the site has a medium sensitivity rating, while the natural drainage line, wetlands, and dam is rated as highly sensitive. The grassland that is disturbed regularly by farming activities on the site has a low sensitivity rating. The modified and highly disturbed areas such as cultivated fields are of very low sensitivity (**Figure 8**).

The natural drainage line, wetlands, and dams must be avoided by the buffer specified by the wetland and/or aquatic specialists. The relatively undisturbed patch of grassland in the south-eastern corner of the site, where a few rocky patches occur, should be avoided by the proposed development if possible. This would provide habitat buffer around the drainage line and continue to provide some natural habitat to the bird species occurring on the site and in the surrounding areas. Refer to **Figure 8** for the preliminary assessment of sensitivity for the site features represented in **Figure 7** with recommendations following the Species Environmental Assessment Guideline (SANBI, 2020) and summarised in **Table 4** below.

Table 4: Summary of sensitivity categories

Site Feature	Description and Recommendation	Sensitivity Rating
Watercourses / drainage lines / wetlands / farm dams	Water courses / drainage lines and natural wetlands or small farm dams provide important aquatic habitat for waterfowl. • Must be avoided by the development by the buffer specified by the wetland / aquatic specialist/s.	**High**
Natural open grassland	Natural open grassland provides the main habitat for avifauna, including SCC, found in the area, however the natural grassland on the site is limited and fragmented. • Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. • Minimisation mitigation could be achieved by avoiding a portion of the natural grassland in the south-eastern corner.	**Medium**
Disturbed grassland	Grassland that is disturbed regularly by farming activities. These areas do not need to be avoided by the development.	**Low**
Modified and disturbed areas – cultivated fields	Areas that have been modified by cultivation. No natural vegetation occurs in these areas. These areas do not need to be avoided by the development.	**Very Low**

5. SITE SENSITIVITY VERIFICATION

The study area is mostly comprised of cultivated fields that are considered to be of **Low** sensitivity. The natural grassland on the site has a medium sensitivity rating, while the natural drainage line and wetlands are rated as highly sensitive. For the Animal Species theme, the sensitivity rating identified by the screening tool of **High** for Aves is not appropriate and can be dropped to **Low** for most of the site and **Medium** for the southern section. A number of priority species including SSC are known to occur in the region, therefore, once the development footprint has been finalised, an assessment of potential impacts that the proposed development may impose on avifauna, should be conducted following the Species Environmental Assessment Guidelines (SANBI, 2020) in accordance with the *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.

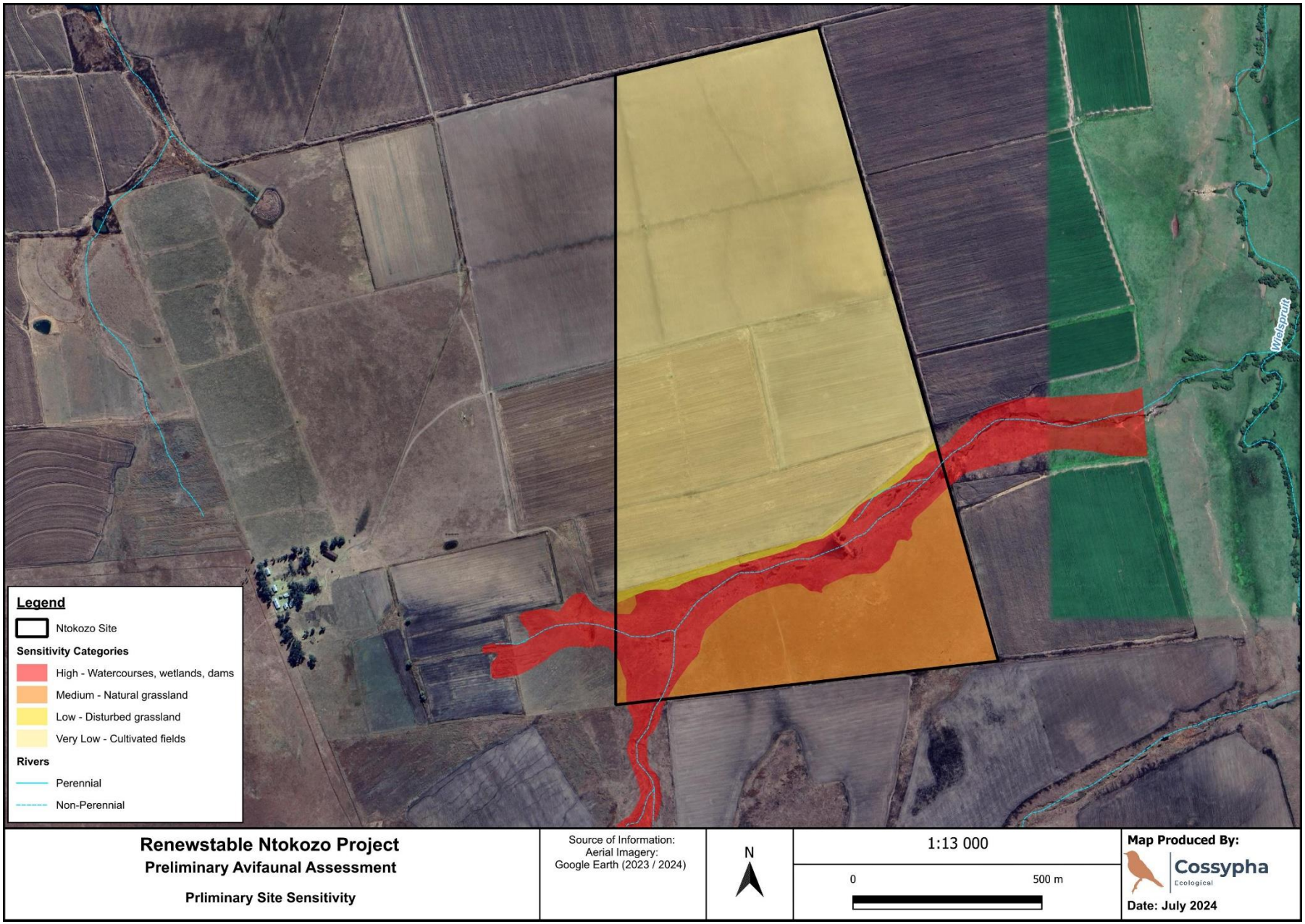


Figure 8: Preliminary avifaunal habitat sensitivity of the Ntokozo study area

6. PRELIMINARY IMPACTS

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. These include, habitat destruction, fragmentation, threat of collision, and electrocution (Jenkins *et al.*, 2017).

Possible impacts on avifauna during the construction and operational phases and their sources associated with the proposed development are provided in **Table 5**. The installation of the proposed Renewstable© Ntokozo project and ancillary infrastructure will require clearance of natural grassland vegetation during the construction phase. The majority of the site will be comprised of solar PV arrays during the operational phase. The main impact relating to avifauna will therefore be loss of natural habitat, the displacement of species including gregarious species. 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 5: Possible impacts arising from the proposed development

Possible Impact	Source of Impact	Area and Species to be Affected	Development Phase	Nature of Impact
Loss of vegetation and avifaunal habitat	Clearing vegetation for installation of infrastructure including solar panels, roads, and buildings	Natural open grassland; Terrestrial grassland species; large-bodied, ground-dwelling gamebirds, raptors	Construction	Direct
Collision of avifauna with reflective surfaces of solar panels leading to injury or death	Solar panels perceived to be water body by avifauna	Solar PV development site; Gamebirds, waterfowl; raptors; SCC such as cranes and Secretarybirds	Operation	Direct
Collision and/or electrocution of avifauna with associated power lines	Power lines	Power line route; Gamebirds, waterfowl; raptors; SCC such as cranes and Secretarybirds	Operation	Direct
Contamination of the environment by hazardous materials	Cleaning of solar panels during operation	Solar PV development site; All species	Construction and Operation	Indirect
Spread of invasive alien plant species	Disturbance to soil and clearing of vegetation	Study area and surroundings	Construction	Indirect
Disturbance and displacement of resident bird species	Clearing of site and construction activities; Operational and maintenance activities;	Site and immediate surroundings; Small terrestrial species	Construction and Operation	Indirect

Possible Impact	Source of Impact	Area and Species to be Affected	Development Phase	Nature of Impact
	attraction of novel species			
Increased human disturbance; Gradual environmental degradation	• Disturbance to the study area, adding to existing pressures in the landscape • Adding to cumulative pressures in the landscape caused by other approved or proposed renewable energy projects	Study area and surrounding natural areas	Operation	Cumulative

7. PRE-CONSTRUCTION MONITORING REQUIREMENTS

Key habitat in the region of the study area is natural open grassland vegetation that forms any large continuous expanse with the surrounding areas and represents the most important habitat for birds in the landscape, including many SCC and other priority species. Other key habitats include drainage lines, rivers, and streams, wetlands, and farm dams. As such, the broader landscape supports many priority species (bird species that may be susceptible to the impacts of solar PV development), including SCC such as Blue Crane, Greater Flamingo, Secretarybird, and Southern Bald Ibis. The Renewstable© Ntokozo site however comprises limited natural grassland (~22.9 ha) that does not form part of a contiguous extent (i.e. it has limited connectivity). There are however terrestrial species that occur on the site and priority species that are present in the landscape.

Due to the nature of the landscape and the potential impacts to priority species, it will be important to conduct pre-construction monitoring according to the Best Practice Guidelines for Birds and Solar Energy (Jenkins *et al.*, 2017) for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. This will take the avifaunal assessment to **Stage 2 – Data Collection**, which includes 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. The duration and scope of data collection is guided by the size of the proposed development as well as the results of the preliminary assessment, which verifies the sensitivity of avifauna potentially affected by the proposed development (see **Table 6**). For the Ntokozo site, assessment **Regime 1** would be the minimum requirement (see **medium** solar facilities 30-150 ha / 10-50 MW) with sampling conducted within the peak (summer) season.

Based on the key habitats observed in the study area and surrounds, the following sampling would need to be incorporated into the data collection:

- Counts for large terrestrial birds and raptors in the surrounding areas, through driven road transects and vantage point monitoring.
- Observations of flight behaviour of priority species flying over or near the proposed development area and associated risk of collision.
- Counts of bird numbers at focal wetlands such as the farm dams and local movements between waterbodies.
- Searches for nest sites of large terrestrial species and any habitats likely to support nest sites of key raptors and other priority species. Any evidence of breeding activity and/or its outcomes must be recorded.

- Exist Surveys of existing nearby power lines for signs of bird collisions and electrocutions.
- Details of any incidental sightings of priority species.

Table 6: 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

8. RECOMMENDATIONS

The following recommendations are intended to guide the positioning of the proposed infrastructure and layout:

- All natural drainage lines, wetlands, and dams must be avoided, including the buffer recommended by the aquatic and/or wetland specialist/s.
- If possible, the natural grassland habitat in the south-eastern corner should be avoided. This would contribute to minimisation of impacts for natural grassland on the site. If not possible, then strict mitigation and restoration actions would apply.
- More information will need to be obtained through pre-construction monitoring. It is advisable that assessment **Regime 1** be followed with one peak season of monitoring included.

9. REFERENCES

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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	:	23
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:

- Avifaunal Impact Assessments for the proposed Bateleur Solar PV Cluster Development between Mopane and Musina, Limpopo Province (ABO Wind) – 2023 to present.
- Avifaunal Impact Assessments for the proposed Kwena Solar PV Cluster Development near Groblersdal, Limpopo Province (ABO Wind) – 2023 to present.
- Avifaunal Impact Assessments for the proposed ZCC N3 Solar PV Developments along the N3 from Ashburton to Heidelberg (EnviroAfrica) – 2023 to present.
- 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 present.
- Avifaunal Impact Assessment for the proposed Harvard 1 & 2 Solar PV Plants and Grid Connection, Bloemfontein, Free State (EnviroAfrica) – 2021 to 2023.
- Terrestrial Biodiversity and Faunal Assessment for the proposed Springhaas 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 2021.
- Avifaunal Assessment for the Proposed Development of a Battery Energy Storage System (BESS) and Associated Infrastructure at the Cuprum Substation located at Copperton, near the town of Prieska, Northern Cape Province (AECOM) – 2021.
- Terrestrial Biodiversity Assessment (including flora, fauna, and avifauna) for the Askham Solar Energy Facility, Northern Cape (Komani San) – 2018 to 2019.
- Faunal and Avifaunal Assessments for various solar farms in the Northern Cape (SEF) – 2011 to 2012.