Proposed Renewstable© Bokamoso 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

July 2024

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© Bokamoso renewable power plant near the Majuba Power Station 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 486 ha has been earmarked for the proposed Renewstable© Bokamoso project, which will provide between 12 MW and 55 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.

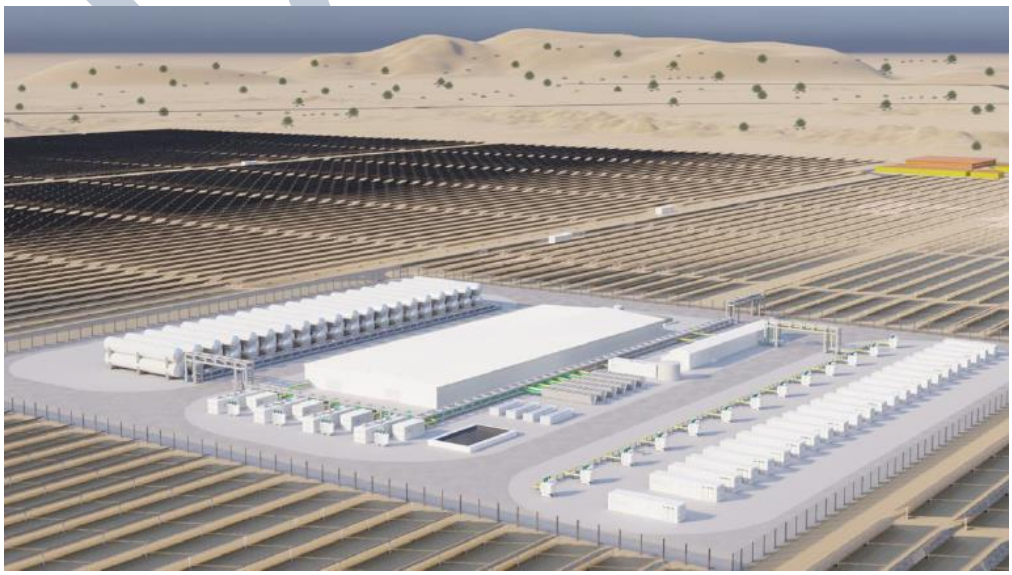


Figure 1: Example of a hydrogen power plant with solar PV arrays

1.2. LOCATION

The Renewstable© Bokamoso project area is located approximately 2.3 km to the north-east of the Majuba Power Station and ~7 km south-west 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 ~486 ha in extent and occurs on a portion of the Farm Rietfontein 66-HS Ptn 4, and Rietfontein 66-HS Ptn 5. The site falls within Quarter Degree Grid Cell (QDGC) 2729BB and lies between 27°03'28.06" and 27°05'03.30" south and 29°47'51.16" and 29°50'06.10" east. The study area is gently undulating with a range in altitude from around 1 697 to 1 726 m above mean sea level (a.m.s.l).

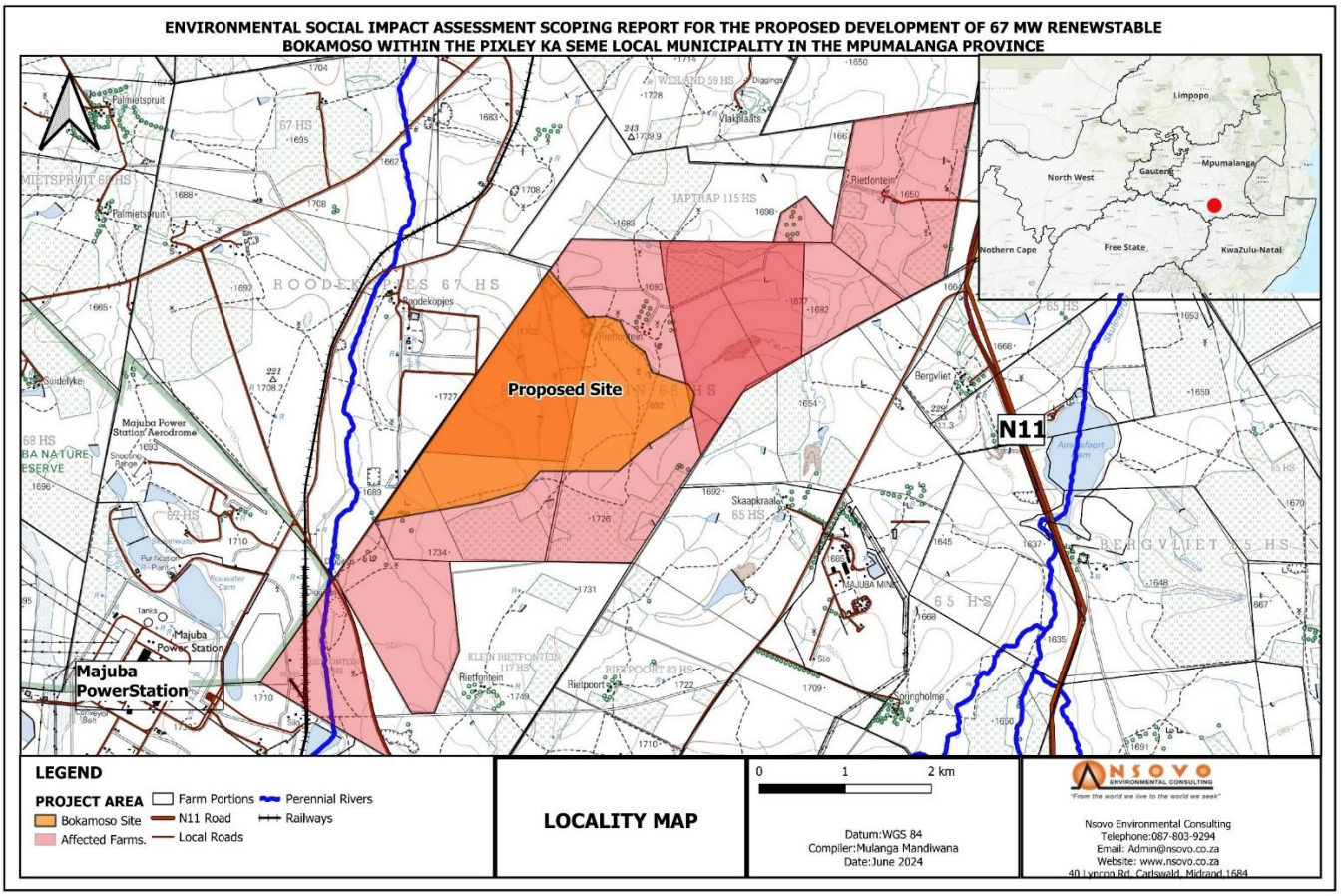


Figure 2: Location of the Bokamoso study area

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 **Low** for the Avian theme, but **High** for Aves under the Animal Species theme (see **Figure 3**) due to the potential occurrence of the the following bird Species of Conservation Concern (SCC) within the study area:

- High: *Circus ranivorus* African Marsh Harrier (Endangered (EN))
- High: *Spizocorys fringillaris* Botha's Lark (EN)
- High: *Sagittarius serpentarius* Secretarybird (Vulnerable (VU))
- High: *Geronticus calvus* Southern Bald Ibis (VU)

- Medium: *Eupodotis senegalensis* White-bellied Bustard (VU)
- Medium: *Sagittarius serpentarius* Secretarybird (VU)
- Medium: *Tyto Capensis* African Grass Owl (VU)
- Medium: *Circus ranivorus* African Marsh Harrier (EN)
- Medium: *Spizocorys fringillaris* Botha's Lark (EN)
- Medium: *Neotis denhami* Denham's Bustard (VU)
- Medium: *Balearica regulorum* Grey Crowned Crane (EN)
- Medium: *Geronticus calvus* Southern Bald Ibis (VU)

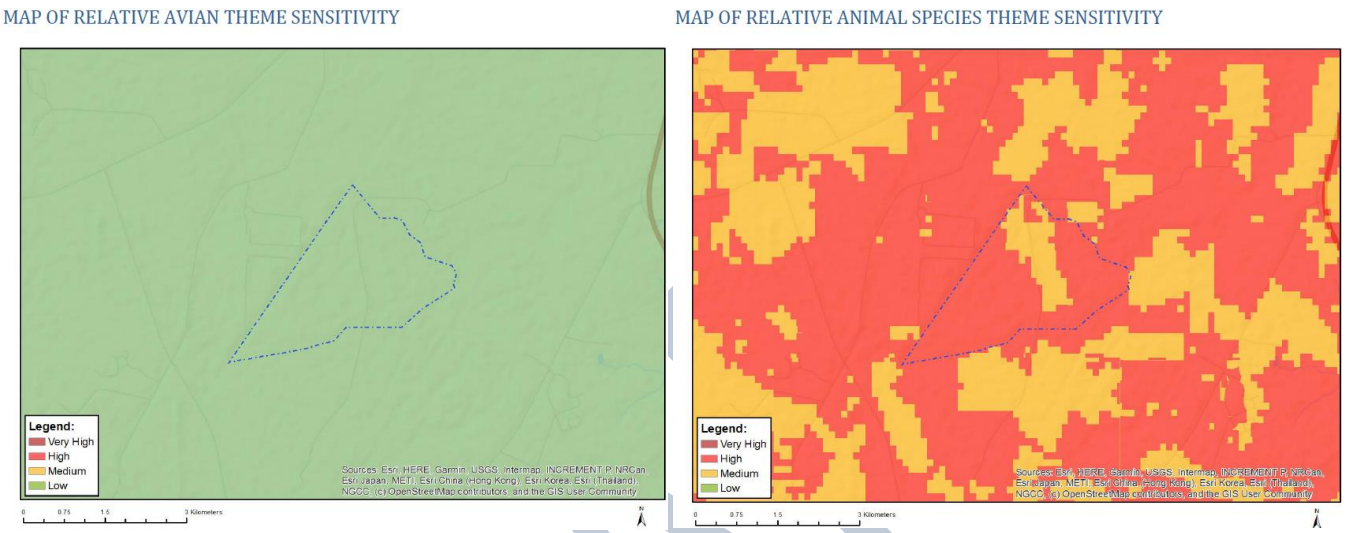


Figure 3: DFFE Screening Tool map of relative sensitivity for the Avian theme (left) and Animal Species theme (right)

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).

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. The SSV

conducted for this study confirmed both the Animal Species theme and the Avian theme to be of **High** sensitivity due to the presence of bird SCC as well as a large expanse of suitable grassland habitat for these species in the study area. **Refer to further information provided in the sections that follow and the SSV in Section 5.**

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).

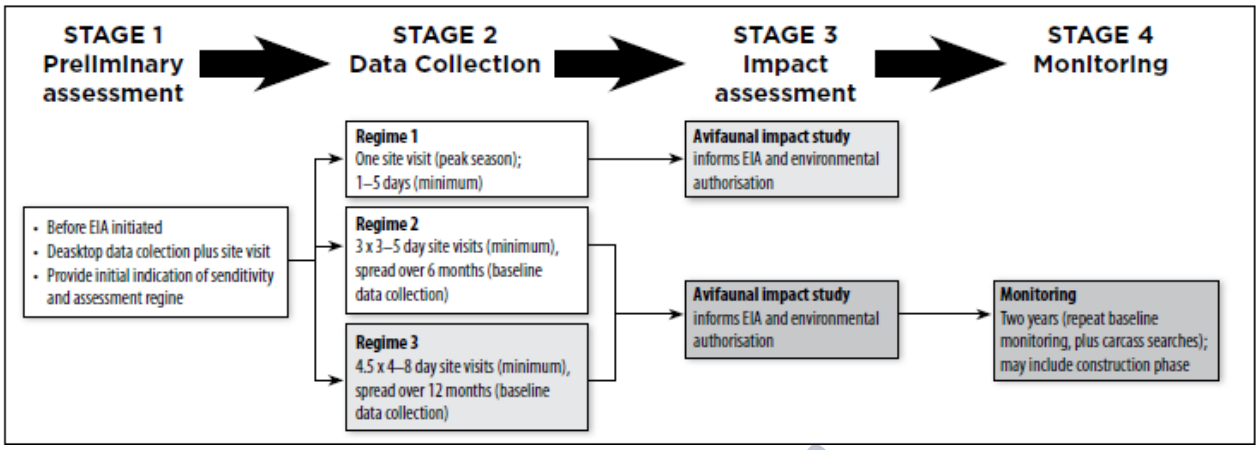
According to Jenkins *et al.* (2017), an avifaunal impact assessment for Solar Energy Facilities (SEFs) must follow a tiered process that follows pre-determined stages depending on the conditions of the site:

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 ~486 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. DESCRIPTION OF THE 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 Bokamoso study area is rural in nature occurring in farmland used mostly for cattle grazing and cultivation. The site is comprised mostly of natural open grassland vegetation interspersed with natural drainage lines, small farm dams, a few cultivated fields, and scattered clumps of alien trees. The natural grassland vegetation on the site forms part of a relatively continuous expanse of open grassland found in the surrounding areas (**Figure 5**). The site itself is largely in a natural state, with cultivated fields occurring in the south-eastern portion. The surrounding areas comprise privately owned farmland with natural open grassland, scattered with cultivated fields, natural drainage lines, and small farm dams. The natural grassland vegetation on the site is relatively undisturbed and according to historical aerial imagery (from ~1957 (**Figure 4**) to today), has not been

modified by ploughing in the last ~67 years, and has likely only been used for grazing. The Majuba Power Station occurs ~2 km to the south-west. A tar road and a railway line leading to the Majuba Power Station occurs approximately 800 m to the west / south-west of the site, and the N11 highway occurs ~5 km on the east side.

Figure 4: Historical aerial image of the study area from 1957

According to the Mpumalanga Biodiversity Sector Plan (MTPA, 2019), the majority of the study area is comprised of Critical Biodiversity Area (CBA) Irreplaceable mostly associated with the natural grassland vegetation, with the extreme western corner comprising "Other Natural Area". The Majuba Nature Reserve occurs ~0.7 km to the south-west of the Bokamoso site and the Afrikan Farms Protected Environment occurs ~23 km to the east. The site falls between two Important Bird Areas (IBAs), the Grasslands IBA (ZA016) occurs ~2.4 km to the south and ~10.4 km to the east, while the Amersfoort-Bethal-Carolina IBA (ZA014) occurs ~7 km to the north 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**).

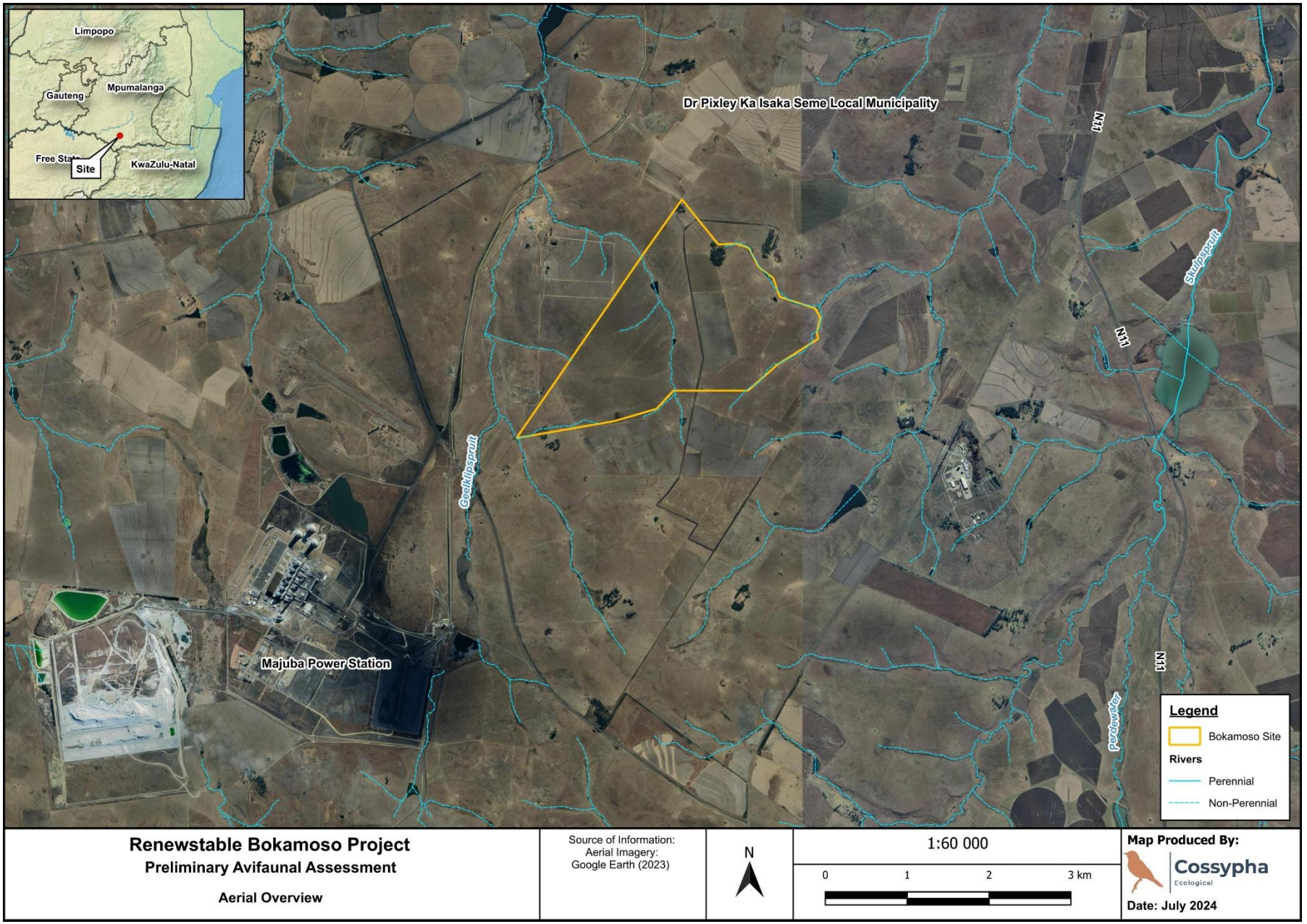


Figure 5: Aerial overview of the Bokamoso study area and surrounds

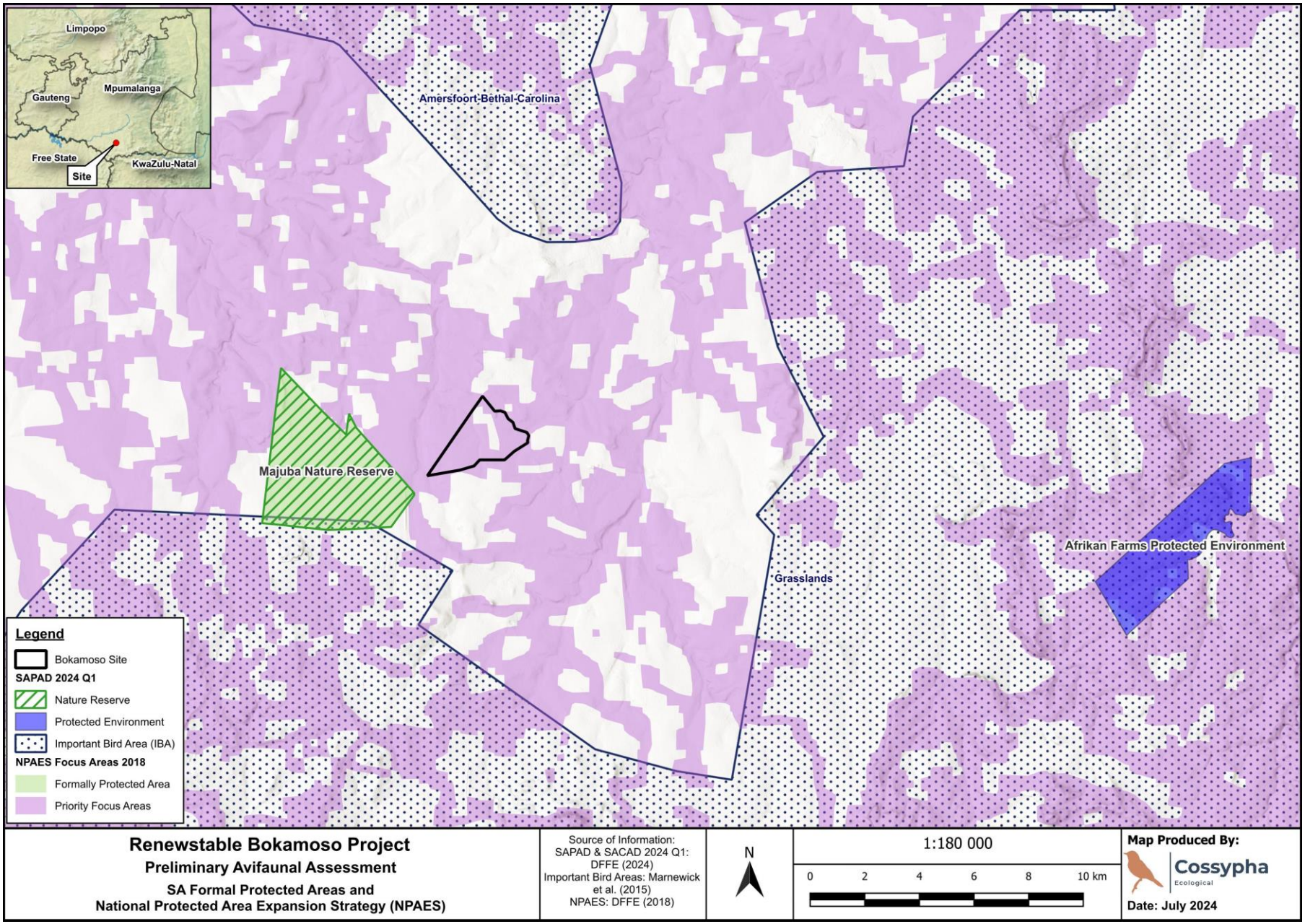


Figure 6: The Bokamoso study area in relation to national Protected Areas

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. This demonstrates that the available habitats within the study area 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. According to SABAP2 data, 134 bird species have been recorded in the pentads in which the study area falls (pentads 2700_2945 and 2705_2945). This includes 12 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) and 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 the pentads, 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 2** in **Section 4.3.3** for species recorded in the study area.

Table 1: Avifaunal priority species occurring within pentads 2700_2945 and 2705_2945 including Reporting Rate (RR)

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Common Quail	*Coturnix coturnix*	Gamebird	LC / LC	100
African Wattled Lapwing	*Vanellus senegallus*	Gamebird	LC / LC	100
Hadada Ibis	*Bostrychia hagedash*	Gamebird	LC / LC	100
Southern Masked Weaver	*Ploceus velatus*	Gregarious	LC / LC	100
Southern Red Bishop	*Euplectes orix*	Gregarious	LC / LC	100
Long-tailed Widowbird	*Euplectes progne*	Gregarious	LC / LC	90
Helmeted Guineafowl	*Numida meleagris*	Gamebird	LC / LC	87.5
Amur Falcon	*Falco amurensis*	Raptor	LC / LC	87.5
African Darter	*Anhinga rufa*	Waterfowl	LC / LC	87.5
Black-headed Heron	*Ardea melanocephala*	Gamebird	LC / LC	87.5
Western Cattle Egret	*Bubulcus ibis*	Gamebird	LC / LC	87.5
Cape Sparrow	*Passer melanurus*	Gregarious	LC / LC	87.5
Southern Grey-headed Sparrow	*Passer diffusus*	Gregarious	LC / LC	87.5
African Snipe	*Gallinago nigripennis*	Waterfowl	LC / LC	75
Common Greenshank	*Tringa nebularia*	Waterfowl	LC / LC	75
Blacksmith Lapwing	*Vanellus armatus*	Waterfowl	LC / LC	75
Reed Cormorant	*Microcarbo africanus*	Waterfowl	LC / LC	75
Brown-throated Martin	*Riparia paludicola*	Gregarious	LC / LC	75

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
Cape White-eye	*Zosterops virens*	Gregarious	LC / LC	75
Quailfinch	*Ortygospiza atricollis*	Gregarious	LC / LC	75
Red-knobbed Coot	*Fulica cristata*	Waterfowl	LC / LC	70
Swainson's Spurfowl	*Pternistis swainsonii*	Gamebird	LC / LC	62.5
Yellow-billed Duck	*Anas undulata*	Waterfowl	LC / LC	62.5
Blue Korhaan	*Eupodotis caerulescens*	SCC	LC / NT	62.5
Crowned Lapwing	*Vanellus coronatus*	Gamebird	LC / LC	62.5
Common Buzzard	*Buteo buteo*	Raptor	LC / LC	62.5
African Sacred Ibis	*Threskiornis aethiopicus*	Waterfowl	LC / LC	62.5
Barn Swallow	*Hirundo rustica*	Gregarious	LC / LC	62.5
South African Cliff Swallow	*Petrochelidon spilodera*	Gregarious	LC / LC	62.5
Fan-tailed Widowbird	*Euplectes axillaris*	Gregarious	LC / LC	62.5
Little Grebe	*Tachybaptus ruficollis*	Waterfowl	LC / LC	60
Yellow-crowned Bishop	*Euplectes afer*	Gregarious	LC / LC	60
Egyptian Goose	*Alopochen aegyptiaca*	Waterfowl	LC / LC	50
Spur-winged Goose	*Plectropterus gambensis*	Waterfowl	LC / LC	50
White-rumped Swift	*Apus caffer*	Gregarious	LC / LC	50
Black Stork	*Ciconia nigra*	SCC	VU / LC	50
Pied Starling	*Lamprotornis bicolor*	Gregarious	LC / LC	50
White-throated Swallow	*Hirundo albigularis*	Gregarious	LC / LC	50
Greater Striped Swallow	*Cecropis cucullata*	Gregarious	LC / LC	50
Cape Weaver	*Ploceus capensis*	Gregarious	LC / LC	50
Red-billed Quelea	*Quelea quelea*	Gregarious	LC / LC	50
Common Waxbill	*Estrilda astrild*	Gregarious	LC / LC	50
Cape Canary	*Serinus canicollis*	Gregarious	LC / LC	50
Black-throated Canary	*Crithagra atrogularis*	Gregarious	LC / LC	50
South African Shelduck	*Tadorna cana*	Waterfowl	LC / LC	40
Grey-winged Francolin	*Scleroptila afra*	Gamebird	LC / LC	37.5
Cape Shoveler	*Spatula smithii*	Waterfowl	LC / LC	37.5
Spotted Thick-knee	*Burhinus capensis*	Gamebird	LC / LC	37.5
Banded Martin	*Riparia cincta*	Gregarious	LC / LC	37.5
Pin-tailed Whydah	*Vidua macroura*	Gregarious	LC / LC	37.5
Jackal Buzzard	*Buteo rufofuscus*	Raptor	LC / LC	30
Secretarybird	*Sagittarius serpentarius*	SCC	VU / EN	30
Hamerkop	*Scopus umbretta*	Waterfowl	LC / LC	30
Blue Crane	*Grus paradisea*	SCC	NT / VU	25
Common Moorhen	*Gallinula chloropus*	Waterfowl	LC / LC	25
Black-winged Kite	*Elanus caeruleus*	Raptor	LC / LC	25
African Marsh Harrier	*Circus ranivorus*	SCC	EN / LC	25
Glossy Ibis	*Plegadis falcinellus*	Waterfowl	LC / LC	25
Southern Bald Ibis	*Geronticus calvus*	SCC	VU / VU	25
White Stork	*Ciconia ciconia*	Gamebird	LC / LC	25
Red-billed Teal	*Anas erythrorhyncha*	Waterfowl	LC / LC	20
Speckled Mousebird	*Colius striatus*	Gregarious	LC / LC	20
Lanner Falcon	*Falco biarmicus*	SCC	VU / LC	20

Common Name	Scientific Name	Priority Species	Threat Status (RSA / IUCN)	SABAP2 RR (%)
White-breasted Cormorant	*Phalacrocorax lucidus*	Waterfowl	LC / LC	20
Grey Heron	*Ardea cinerea*	Waterfowl	LC / LC	20
Rock Martin	*Ptyonoprogne fuligula*	Gregarious	LC / LC	20
African Black Duck	*Anas sparsa*	Waterfowl	LC / LC	12.5
European Roller	*Coracias garrulus*	SCC	NT / LC	12.5
Marsh Owl	*Asio capensis*	Raptor	LC / LC	12.5
Wood Sandpiper	*Tringa glareola*	Waterfowl	LC / LC	12.5
Intermediate Egret	*Ardea intermedia*	Waterfowl	LC / LC	12.5
African Spoonbill	*Platalea alba*	Waterfowl	LC / LC	12.5
Botha's Lark	*Spizocorys fringillaris*	SCC	EN / EN	12.5
Village Weaver	*Ploceus cucullatus*	Gregarious	LC / LC	12.5
Maccoa Duck	*Oxyura maccoa*	SCC	NT / EN	10
Southern Pochard	*Netta erythrophthalma*	Waterfowl	LC / LC	10
Little Swift	*Apus affinis*	Gregarious	LC / LC	10
Spotted Eagle-Owl	*Bubo africanus*	Raptor	LC / LC	10
Grey Crowned Crane	*Balearica regulorum*	SCC	EN / EN	10
Ruff	*Calidris pugnax*	Waterfowl	LC / LC	10
Pied Avocet	*Recurvirostra avosetta*	Waterfowl	LC / LC	10
Martial Eagle	*Polemaetus bellicosus*	SCC	EN / EN	10
Lesser Kestrel	*Falco naumanni*	Raptor	LC / LC	10
Rock Kestrel	*Falco rupicolus*	Raptor	LC / LC	10
Great Crested Grebe	*Podiceps cristatus*	Waterfowl	LC / LC	10
Little Egret	*Egretta garzetta*	Waterfowl	LC / LC	10
Goliath Heron	*Ardea goliath*	Waterfowl	LC / LC	10
Orange-breasted Waxbill	*Amandava subflava*	Gregarious	LC / LC	10
Yellow Canary	*Crithagra flaviventris*	Gregarious	LC / LC	10
Golden-breasted Bunting	*Emberiza flaviventris*	Gregarious	LC / LC	10
Whiskered Tern	*Chlidonias hybrida*	Waterfowl	LC / LC	0
Montagu's Harrier	*Circus pygargus*	Raptor	LC / LC	0

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

4. FIELD RESULTS

4.1. SITE DESCRIPTION

The Bokamoso site is comprised primarily of natural open grassland (~71%) used for grazing cattle and is bordered on the eastern side by a natural drainage line with a few small farm dams. Another natural drainage line flows through the central portion of the site in a northerly direction and one along the southern border of the site in a westerly direction and joins a tributary of the Geelklipspruit River in the south-western corner. A small rocky ridge occurs in the western corner of the site, where the remains of an old settlement is also evident. The grassland around the old structures is relatively disturbed and a few stands of alien *Eucalyptus* trees occur around the old walls. Secondary grassland on recovering old fields apparently associated with the old farmstead occur in the southwestern corner of the site. This small farm appears to have been active in the late 1950s according to historical aerial imagery. Some old fields that are in a state of recovery comprising secondary grassland occur in the northern section, and a relatively large, cultivated field is situated roughly in the centre of the site (**Figure 7**).

Natural open grassland (top left); natural drainage line with small farm dams on the eastern boundary (top right); rocky ridge in the western portion (middle left); stand of alien trees around old farm walls in the western portion (middle right); secondary grassland on old fields in the south-western corner (bottom left); and cultivated fields in the south-eastern corner of the study area (bottom right)

4.2. AVIFAUNAL HABITATS IN THE STUDY AREA AND SURROUNDS

The study area and surroundings are comprised of natural open grassland habitat and farmland, interspersed with natural watercourses with small farm dams, that collectively create an ecosystem that supports many avifaunal species typical of the grassland biome. The most important habitat for avifauna occurring in the Bokamoso study area is the natural open grassland vegetation, as well as the small farm dams occurring along the north-eastern boundary. The extensive open grassland vegetation on the site and in the surrounding areas supports most of the terrestrial species found in the region, including priority species such as gamebirds, raptors,

cranes, ibises, and smaller gregarious species. The many watercourses, farm dams, and wetlands provide important habitat for waterfowl and other wetland associated species such as ducks, geese, herons, and flamingos, while the wet areas provide surface water for drinking for all fauna. Another key habitat in the study area is the rocky ridge occurring in the western corner, which creates habitat heterogeneity within the landscape facilitating species diversity. Rocky areas provide a greater diversity of potential niches for plants and animals as a result of the microclimatic conditions they offer (Burnett *et al*., 1998), therefore creating unique feeding opportunities in the landscape. Rocks also provide perching and display opportunities for many birds.

Expanse of natural open grassland and small farm dam with flamingos

Natural drainage line and wetland with Long-tailed Widowbirds

Rocky ridge providing habitat heterogeneity in the western portion

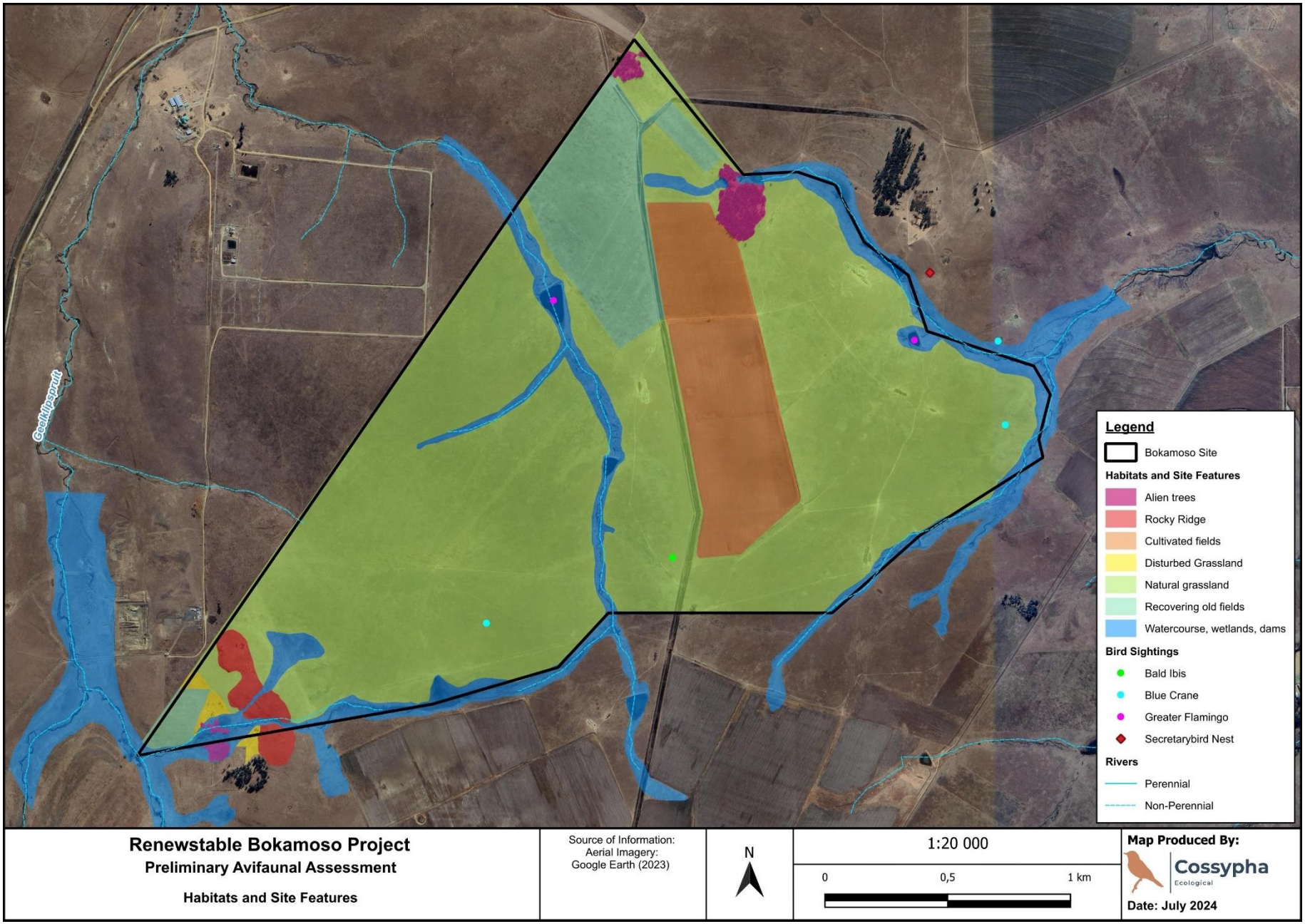


Figure 7: Habitat features of the Bokamoso study area

4.3. BIRD SPECIES OCCURRENCE IN THE STUDY AREA

4.3.1. BIRD OBSERVATIONS

During the preliminary field survey, 55 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 2** 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. Birds recorded at the dams and wetlands included geese, ducks, herons, widowbirds, lapwings, and flamingos.

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 global level (IUCN, 2024) and/or species Protected at a national level (DFFE, 2023). SSC recorded during the preliminary site survey in the study area and surrounds are highlighted in red in **Table 2** below. These include Blue Crane *Grus paradisea* (NT / VU), Greater Flamingo *Phoenicopterus roseus* (NT / LC), and Southern Bald Ibis *Geronticus calvus* (VU / VU). In addition, a nest of a Secretarybird *Sagittarius serpentarius* (VU / EN), in which the birds apparently successfully bred this past year, was recorded ~90 m outside of the eastern boundary of the site (see **Figure 7**).

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 species and waterfowl such as ducks, geese, flamingos, ibises, and cranes; raptors such as kites, buzzards, and Secretarybirds; and gregarious species such as sparrows, starlings, swallows, bishops, and widowbirds. These and other priority species recorded in the study area and surrounds are listed in **Table 2** along with their national and global conservation status.

Table 2: Species recorded in the study area and surroundings listed in taxonomic order. SCC are highlighted 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
Lybius torquatus	Black-collared Barbet	LC	LC	
Ceryle rudis	Pied Kingfisher	LC	LC	
Columba livia	Rock Dove	LC	LC	
Columba guinea	Speckled Pigeon	LC	LC	
Streptopelia capicola	Ring-necked Dove	LC	LC	
Grus paradisea	Blue Crane	NT	VU	SCC
Gallinula chloropus	Common Moorhen	LC	LC	Waterfowl
Burhinus capensis	Spotted Thick-knee	LC	LC	Gamebird
Himantopus himantopus	Black-winged Stilt	LC	LC	Waterfowl

Scientific Name	Common Name	National Status	Global Status	Priority Species
Vanellus armatus	Blacksmith Lapwing	LC	LC	Waterfowl
Vanellus senegallus	African Wattled Lapwing	LC	LC	Gamebird
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
Lanius collaris	Southern Fiscal	LC	LC	
Corvus capensis	Cape Crow	LC	LC	
Telophorus zeylonus	Bokmakierie	LC	LC	
Cossypha caffra	Cape Robin-Chat	LC	LC	
Saxicola torquatus	African Stonechat	LC	LC	
Myrmecocichla formicivora	Ant-eating Chat	LC	LC	
Lamprotornis bicolor	Pied Starling	LC	LC	Gregarious
Hirundo rustica	Barn Swallow	LC	LC	Gregarious
Cecropis cucullata	Greater Striped Swallow	LC	LC	Gregarious
Petrochelidon spilodera	South African Cliff Swallow	LC	LC	Gregarious
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	
Acrocephalus gracilirostris	Lesser Swamp Warbler	LC	LC	
Calandrella cinerea	Red-capped Lark	LC	LC	
Passer melanurus	Cape Sparrow	LC	LC	Gregarious
Motacilla capensis	Cape Wagtail	LC	LC	
Macronyx capensis	Cape Longclaw	LC	LC	
Anthus cinnamomeus	African Pipit	LC	LC	
Ploceus velatus	Southern Masked Weaver	LC	LC	Gregarious
Euplectes orix	Southern Red Bishop	LC	LC	Gregarious
Euplectes progne	Long-tailed Widowbird	LC	LC	Gregarious
Estrilda astrild	Common Waxbill	LC	LC	Gregarious
Vidua macroura	Pin-tailed Whydah	LC	LC	Gregarious

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

Top to bottom: Blue Crane, Southern Bald Ibis, and Greater Flamingo recorded in the study area

4.4. KEY HABITATS AND PRELIMINARY SITE SENSITIVITY

The extensive open grassland vegetation in the study area and surroundings, 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 relatively undisturbed and according to historical aerial imagery (from ~1957 to today), has not been modified by ploughing in the last ~67 years, and has likely only been used for grazing. These habitats have been rated as highly sensitivity due to the natural extent and intactness (high functional integrity), as well as the support of SCC (conservation value). The rocky ridge in the western portion is also rated as highly sensitive as this area provides habitat heterogeneity facilitating higher biodiversity and provides specialised habitat in the landscape. The recovering old fields with secondary grassland are rated as being of medium sensitivity, while the modified and highly disturbed areas such as stands of alien trees and cultivated fields have been rated as having low and very low sensitivity respectively (**Figure 8**).

The relatively undisturbed areas should be avoided by the proposed development. The natural grassland should be avoided as far as possible, while the drainage lines and wetland areas must be avoided by the buffer specified by the wetland and/or aquatic specialists. From a species perspective, the Secretarybird nest, which occurs just outside the site on the east side must be avoided by the proposed development and associated infrastructure by a suitable buffer. A preliminary buffer of 1 km has been applied to the nest following preliminary consultation with the relevant authorities (EWT Birds of Prey Programme and BirdLife SA). This will need to be investigated further during the follow-up seasonal monitoring and in the Avifaunal Impact Assessment to follow. In addition, according to BirdLife SA, large, contiguous habitat for Secretarybirds that has high functional integrity (i.e. habitat remnants of 100 ha or more) should be avoided by development (BirdLife SA, 2022).

Tree with Secretarybird nest just outside the study area

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) summarised in **Table 3**.

Table 3: Summary of sensitivity categories

Site Feature	Description and Recommendation	Sensitivity Rating
Natural open grassland	Natural grassland provides the main habitat for the avifauna, including SCC, found in the area, especially Secretarybird. Large, contiguous patches of grassland (>= 100 ha) should be avoided. 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.	**High**
Watercourses / drainage lines / wetlands / farm dams	Water courses / drainage lines and natural wetlands or small farm dams provide important aquatic habitat for waterfowl and other priority species. These features must be avoided by the development by the buffer specified by the wetland / aquatic specialist/s.	**High**
Rocky ridge	Rocky ridges and outcrops are areas of high biodiversity and provide specialist habitat in the landscape. 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.	**High**
Secretarybird Nest	A preliminary buffer of 1 km has been applied to the nest following preliminary consultation with the relevant authorities (**Figure 8**). This buffer may be revised following further investigation.	**High**
Old Fields / Secondary Grassland	Recovering old fields with secondary grassland provides secondary habitat for avifauna. Minimisation and restoration mitigation applies – development activities of medium impact followed by appropriate restoration activities.	**Medium**
Modified and disturbed areas – stands of alien trees	Areas that have been modified by alien trees. Little to no natural vegetation occurs in these areas. These areas do not need to be avoided by the development, unless a nest of a priority species is recorded in the follow-up surveys during the pre-construction monitoring.	**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 Renewstable© Bokamoso study area is comprised of approximately 347 ha of natural open grassland vegetation that forms a large continuous expanse with the surrounding areas, which represents the most important habitat for birds in the landscape, including many SCC, and is rated as **highly sensitive**. Other key habitats in the study area that are considered highly sensitive include drainage lines, wetlands, farm dams, and the rocky ridge in the western corner. As such, the nature of the landscape supports SCC such as Blue Crane, Greater Flamingo, Secretarybird, and Southern Bald Ibis. For the **Animal Species theme**, the sensitivity rating identified by the screening tool of **High** for Aves corresponds with the large expanse of natural grassland habitat and freshwater ecosystems in the study area and is therefore appropriate. The sensitivity rating for the **Avian theme** will therefore also be **High** and not Low as identified by the screening tool. A number of bird SSC were recorded in the study area and surroundings during the preliminary field surveys. This includes two species listed by the Screening Tool Report, Southern Bald Ibis *Geronticus calvus* (VU) and Secretarybird *Sagittarius serpentarius* (VU). Therefore, once the development footprint has been finalised, a full 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.

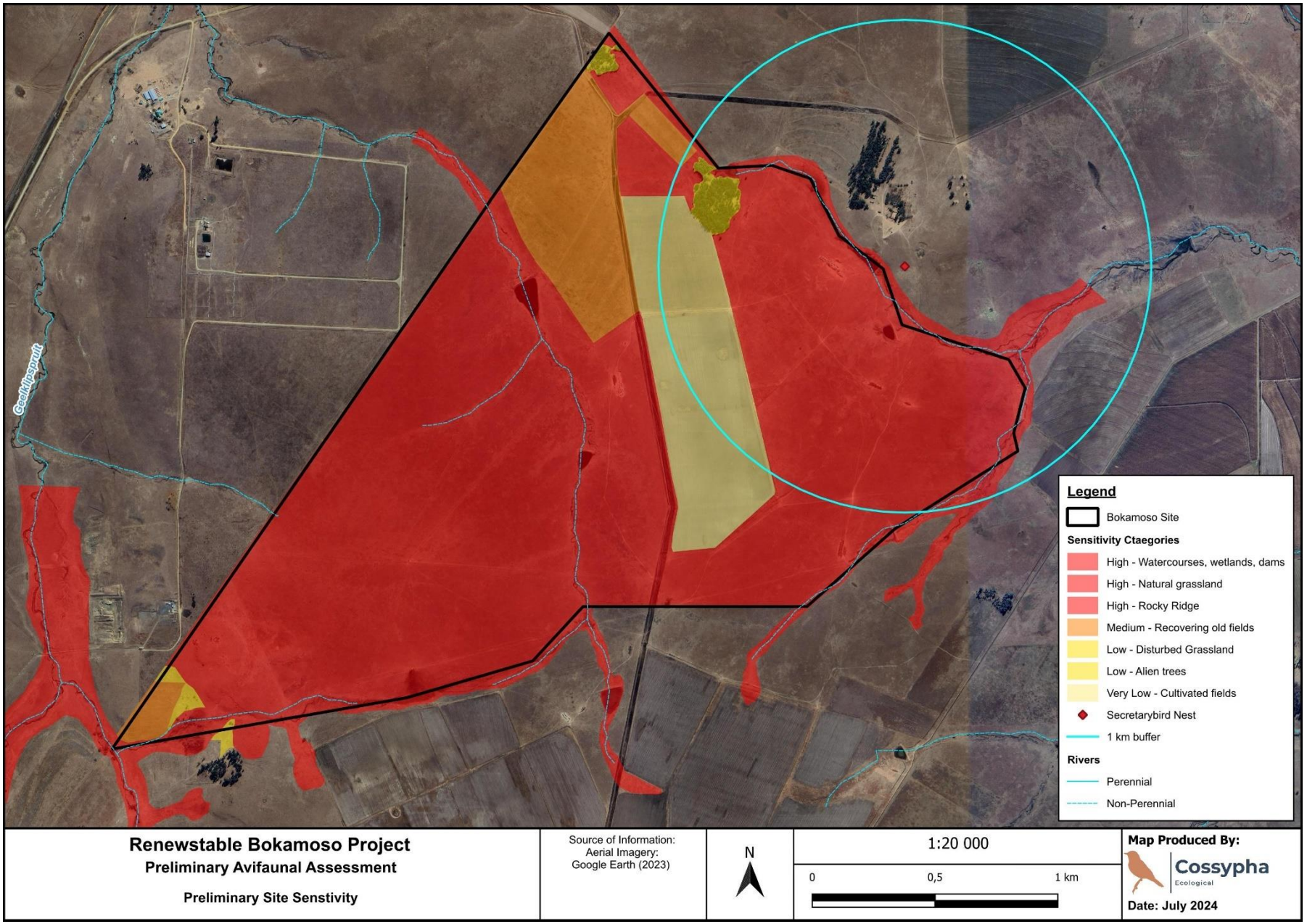


Figure 8: Preliminary avifaunal habitat sensitivity of the Bokamoso study area

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 4**. The installation of the proposed Renewstable© Bokamoso project and ancillary infrastructure will require clearance of a large area 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 many species including gregarious species and larger terrestrial species such as Blue Crane, as well as disturbance to the rocky ridge, farm dams, and the Secretarybird nest. Impacts on highly sensitive habitats can only be avoided by the project layout avoiding these areas. As such a preliminary buffer of 1 km has been applied to the Secretarybird nest. Other possible direct impacts include possible collisions 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 4: 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 including SCC, 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	Clearing of site and construction activities;	Site and immediate surroundings; Small	Construction and Operation	Indirect

Possible Impact	Source of Impact	Area and Species to be Affected	Development Phase	Nature of Impact
bird species	Operational and maintenance activities; attraction of novel species	terrestrial species; Ground-dwelling gamebirds; SCC such as cranes and Secretarybirds		
Habitat fragmentation	Clearing vegetation and installation of solar panels, roads, and buildings	Study area	Operation	Indirect
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

The Renewstable© Bokamoso study area 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 BirdLife SA guidance notes on minimising the impacts of infrastructure development on Secretarybirds *Sagittarius serpentarius* (BirdLife SA, 2022) states that large, contiguous patches of grassland (>= 100 ha) should be avoided. In addition, a recently used Secretarybird nest was recorded just outside the site, to which a preliminary development buffer of 1 km has been applied. It is therefore recommended that the proposed development layout avoid the eastern half of the study area that encompasses the 1 km buffer as well as at least 100 ha of intact natural grassland habitat.

Once the development layout has been finalised, it is therefore 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 5**). For the Bokamoso site, with the current layout, assessment **Regime 3** would be applicable (see **large** solar facilities >150 ha / >50 MW) with sampling over **four** seasons within 12 months, due to the majority of the site being highly sensitive. At least one survey must fall 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 for each season:

- Abundance estimates for small terrestrial birds through point count or walked linear transect surveys.
- Counts for large terrestrial birds and raptors in the study area and surrounds, 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 should be surveyed and checked on each survey to confirm occupancy. Any evidence of breeding activity and/or its outcomes must be recorded.
- Surveys of existing nearby power lines for signs of bird collisions and electrocutions.
- Details of any incidental sightings of priority species.

Table 5: 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, as well as rocky ledges, must be avoided, including the buffer recommended by the aquatic and/or wetland specialist/s.
- A preliminary buffer of 1 km has been applied to the Secretarybird nest. It is important that the infrastructure remain out of the buffer to avoid disturbance to potentially breeding birds, especially during the construction phase.
- Considering the preliminary site sensitivity being high, and based on the current layout, it is advisable that assessment **Regime 3** covering **four seasons** of surveys be followed for the pre-construction monitoring.

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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
Email	:	robyn@cossypha.co.za

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.