Mobile: Sam - 072 437 1742
Mobile: Luke - 083 784 1997
Email: info@enviro-insight.co.za
Website: www.enviro-insight.co.za

Avifauna Scoping Report for the proposed Bonsmara Solar Photovoltaic (PV) Facility near Kroonstad, Free State Province, South Africa

October 2022

APPLICANT:

Bonsmara Solar PV (RF) (Pty) Ltd

EAP:

SiVEST Environmental

SPECIALIST:

Enviro-Insight CC

Sam Laurence (*Pr. Sci. Nat.*)

sam@enviro-insight.co.za

Specialist Declaration

I, Sam Laurence *Pr. Sci. Nat.,* declare that the work presented in this report is our own and has not been influenced in any way by the developer or the EAP. At no point has the developer asked us as specialists to manipulate the results in order to make it more favourable for the proposed development. We consider ourselves bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP) and the EIA Regulations (2014, as amended). We have the necessary qualifications and expertise (*Pr. Sci. Nat. Zoological Science)* in conducting this specialist report.

Sam Laurence Pr. Sci. Nat

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GLOSSARY

Critical Biodiversity Area (CBA)	An area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.
Cumulative impact	Impacts on a species, ecosystem or resource as a result of the sum of actions in the past, present and foreseeable future, from multiple renewable energy projects or a renewable energy project in combination with other developments.
Ecological Support Area (ESA)	The ESA are supporting zones or areas which must be safeguarded as they are needed to prevent degradation of Critical Biodiversity Areas and formal Protected Areas.
Endemic	A species that is naturally restricted to a particular, well-defined region. This is not the same as the medical definition, which is 'occurring naturally in a region.
Environmental Impact Assessment (EIA)	The process of identifying environmental impacts due to activities and assessing and reporting these impacts
IBA	Important Bird and Biodiversity Area. Part of a global network of sites that are critical for the long-term viability of bird populations. Now known as Important Bird and Biodiversity Areas.
IUCN Red Listed Categories and Criteria	International Union for Conservation of Nature.
Preconstruction Phase	The period prior to the construction of a solar energy facility
Priority species	Threatened or rare birds (in particular those unique to the region and especially those which are possibly susceptible to solar energy impacts), which occur in the given development area at relatively high densities or have high levels of activity in the area. These species should be the primary (but not the sole) focus of all subsequent monitoring and assessment.
SABAP	The Southern African Bird Atlas Project. A project in which data on bird distribution and relative abundance are collected by volunteers. There have been two SABAP projects; i.e. SABAP1 (completed

	in 1991) and SABAP2 (started in 2007 and on-going). See http://sabap2.adu.org.za for more information.
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute

1 INTRODUCTION AND PROJECT BACKGROUND

Bonsmara Solar PV (RF) (Pty) Ltd('the Applicant') is proposing to develop the 100 MW Bonsmara Photovoltaic (PV) Solar Energy Facility (SEF), BESS and grid connection infrastructure on a site approximately 12km south-east from the town of Kroonstad in the Free State Province.

Enviro-Insight CC was appointed to undertake the requisite avifauna assessment associated with the proposed Bonsmara SEF. The aim of this report is to undertake a desktop analysis and compile a high-level Scoping Report (Plan of Study), which includes a reconnaissance study.

1.1 STUDY AREA

The study area of approximately 980 ha is located on Portion 0 and Portion 1 of Farm Scheveningen 636 located in the Moqhaka Local Municipality, in the Fezile Dabi District Municipality (Figure 1).

1.2 PROJECT DESCRIPTION

The facility will compromise of several arrays of PV panels and associated infrastructure that includes BESS and will have a contracted capacity of 100MW. The Solar PV facility will connect to the grid via a 2km 132kv powerline from the on-site substation to the Kroonstad Switching Station.

Preliminary technical details of the respective Solar Farm are included below:

- PV modules and mounting structures (monofacial or bifacial) with fixed, single or double axis tracking mounting structures;
- Associated stormwater management infrastructure;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 6 m wide);
- Auxiliary buildings (offices, parking, etc.);
- Ablution facilities and associated infrastructure;
- Temporary laydown area during the construction phase for the construction camp and laydown area (which will be a permanent laydown area for the BESS during the operational phase);
- Infrastructure including offices, operational control centre, operation and maintenance area, ablution facilities etc;
- On-site 33 kV/132kV on-site substation (facility substation);
- Grid connection infrastructure including medium-voltage cabling between the project components and the facility substation (underground cabling will be used where practical (up to 33kV);
- Perimeter fencing; and,
- Rainwater and/or groundwater storage tanks and associated water transfer infrastructure.

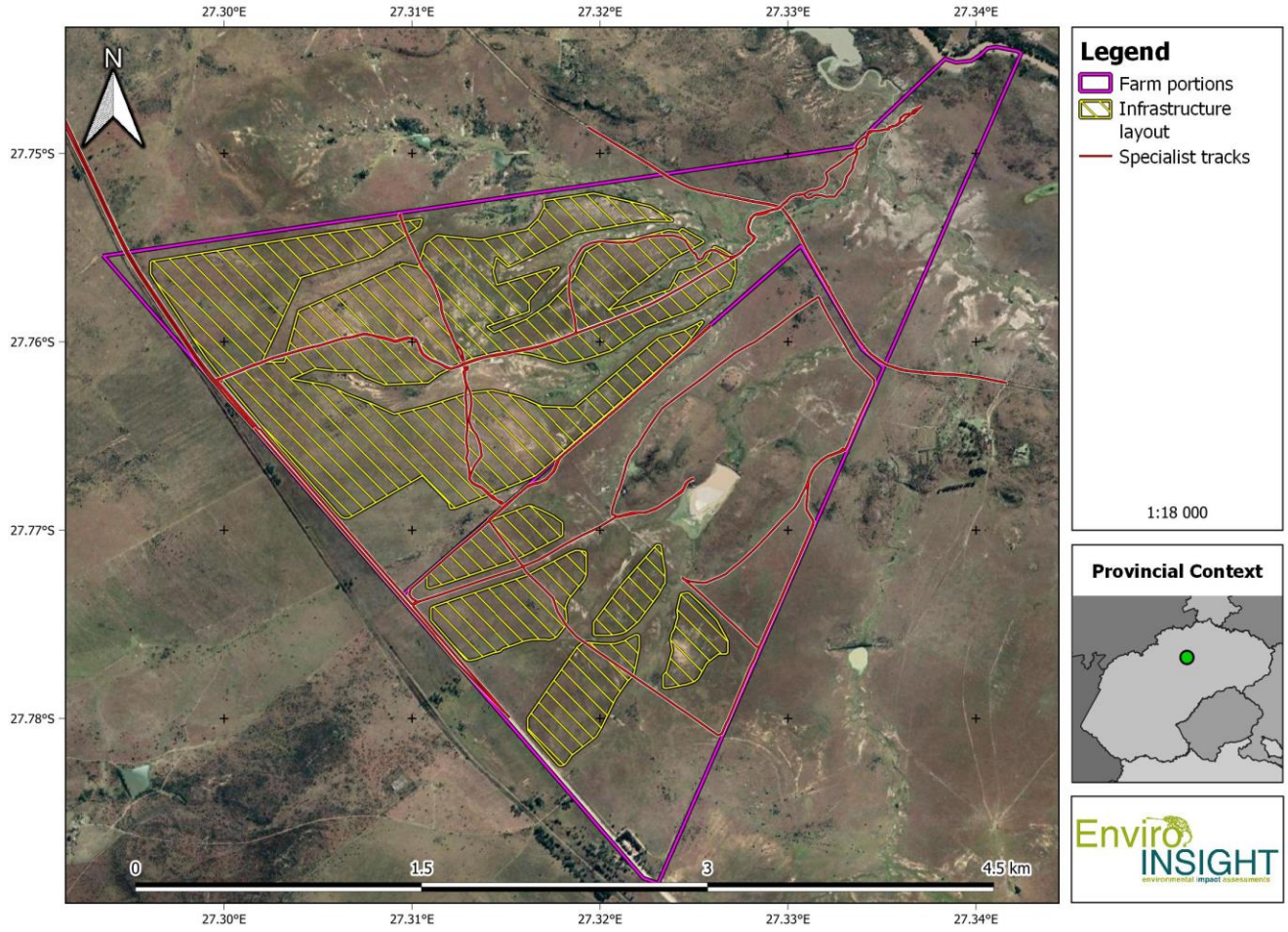

Figure 1: Locality map of the proposed study area.

1.3 OBJECTIVES

The principal aim of the avifaunal assessment will be to determine how this development (and its separate elements) will impact on the terrestrial ecological integrity of the area (as it pertains to avifauna) and if necessary, demarcate appropriate ecological buffers around sensitive communities or receptors. Draft monitoring plans will be included if necessary.

The main objectives are as follows:

- Provide quantitative information on the abundance, distribution, and risk to key avifaunal species or groups of species and serve to inform and improve mitigation measures.
- Determine how this development (and its separate elements) will impact on avifauna, particularly relating to habitat loss/fragmentation, alteration of habitat quality, species assemblage changes, microclimate disturbance and reduced connectivity between populations in some species.
- Include a corridor analysis for the migration of avifauna across the landscape, taking the cumulative impact of the Project with other proposed and/ or existing regional facilities (phases) into account.

- Identify actual and potential species of conservation concern/importance (protected – NEMBA, endemic, threatened or identified as Priority classified as per the recommendations from Jenkins *et. Al.* 2017)). GPS the position of all sensitive receptors (protected, endemic and/or red data species) - the co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection. Alternatively, exact timed records of all species observed within the prescribed transects (Driving, Walking and Random) will suffice in order to model required densities.
- Demarcate appropriate ecological buffers around sensitive communities or receptors.
- Compile a search and rescue plan for relevant species to be adopted prior to construction (if required).
- Identify and quantify the perceived impacts and propose mitigations to be included in the Environmental Management Programme (EMPr). The potential impacts and recommended mitigations must be identified for the planning and design, pre-construction, construction, and post-construction (e.g., monitoring rehabilitation of the construction site) only.
- The impacts must be assessed and evaluated according to the EIA Regulations, 2014 as amended (https://cer.org.za/wp-content/uploads/1999/01/EIA-Regulations.pdf) or the Impact Assessment Criteria and Matrix to be supplied by the client.
- Undertake a cumulative impact assessment for the Project. Then, in addition to the development site, also take into consideration other similar or proposed facilities within a 30 km radius of the proposed development site. Information on the location of renewable energy developments can be accessed from https://egis.environment.gov.za/renewable_energy.
- Draft the basic elements of a Monitoring Program.

1.4 AVIFAUNA SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

- Perform the Avifaunal Specialist Assessment according to the criteria provided by the Terrestrial Animal Species protocol published on 30 October 2020 in Government Gazette No. 43855.
- Write up the findings of the specialist assessment in an Avifaunal Specialist Assessment Report that contains the minimum report content requirements prescribed in the same protocol, and the applicable guidelines for solar developments (Jenkins *et. Al.* 2017).
- According to Regulation 13(1)(b) and 13(1)(e) read together with Regulation 18 of the amended EIA Regulations, 2014, Specialists must have knowledge of any guidelines that have relevance to the proposed activity and have regard to the need for and desirability of the undertaking of the proposed activity. BirdLife SA's Best Practice Guidelines on Birds and Solar Energy (Jenkins et al., 2017) was consulted when compiling the Plan of Study.
- Ensure that the avifauna assessment and reporting meet all the requirements of the relevant protocol.

1.5 STUDY LIMITATIONS

- It is assumed that all third-party information acquired is correct (e.g. GIS data and scope of work); and
- Owing to extremely dry, early spring conditions occurring during the reconnaissance site visit in September 2022, bird

activity was at its lowest.

2 LEGISLATIVE FRAMEWORK

2.1 NATIONAL ENVIRONMENTAL SCREENING TOOL AND ENVIRONMENTAL THEME PROTOCOLS

2.1.1 Screening Report

The Minister of Environment, Forestry and Fisheries, gave notice that the submission of a report generated from the national web-based environmental screening tool[1], as contemplated in Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, will be compulsory from 4 October 2019 when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the Environmental Impact Assessment Regulations, 2014.

In addition, a set of protocols that an applicant needs to adhere to in the Environmental Authorisation (EA) process were developed and on 20 March 2020 the Minister of Forestry, Fisheries and the Environment gazetted the Protocols for national implementation purposes. The gazette '*Procedures to be followed for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the National Environmental Management Act (1998) when Applying for Environmental Authorisation*', has protocols that have been developed for environmental themes which include agriculture, avifauna, biodiversity (Terrestrial and Aquatic Biodiversity), noise, defence and civil aviation.

The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring EA. The higher the sensitivity rating of the features on the proposed site as identified by the screening tool report, the more rigorous the assessment and reporting requirements.

Based on the generated screening report, the relative animal species theme was mixed between medium and low sensitivity. For the project footprint and supporting infrastructure, the avifauna theme was indicated as "low" sensitivity, due to no probability of Red Listed species occurring (Figure 2, **Error! Reference source not found.**).

[1] https://screening.environment.gov.za/screeningtool/#/pages/welcome

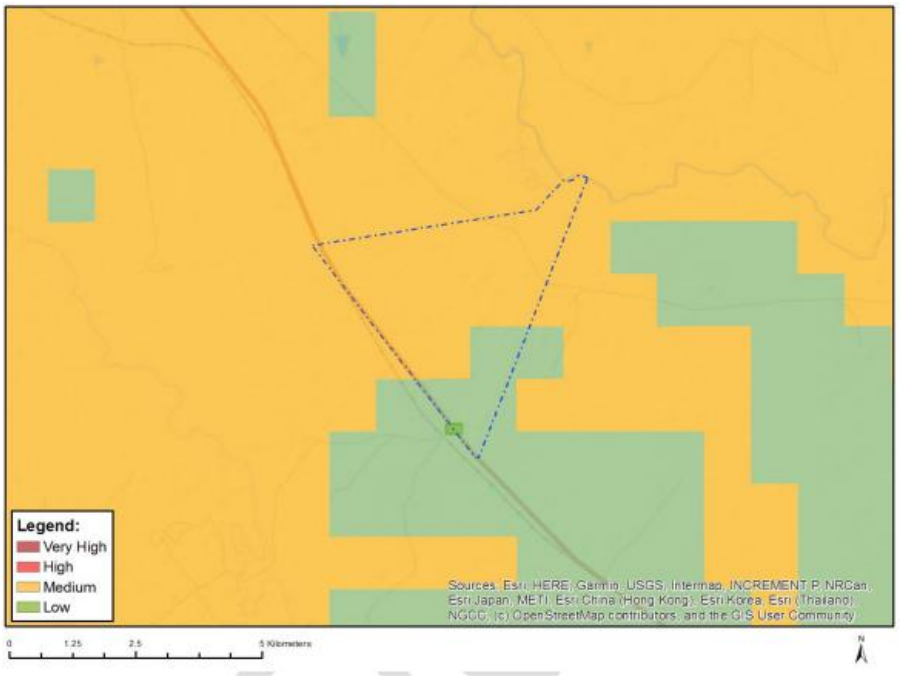

Figure 2: Screening Tool map of relative animal species theme sensitivity for the Project Footprint.

Figure 3: Screening Tool map of relative animal species theme sensitivity for the connecting powerline.

2.2 RENEWABLE ENERGY DEVELOPMENT ZONE

On 17 February 2016, Cabinet approved the Renewable Energy Development Zones (REDZs) for large scale wind and solar photovoltaic development and associated Strategic Transmission Corridors (STC) which support areas where long term electricity grid will be developed.

The procedure to be followed in applying for EA for a large-scale project in a REDZ or in a Power Corridor was formally gazetted on 16 February 2018 in GN113 and GN114. On 17 July 2020, Minister Barbara Dallas Creecy, published Government Gazette 43528, Notice 786 for consultation with the intention to identify three additional Renewable Energy Development Zones to the eight Renewable Energy Development Zones published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018. REDZs are also aligned with the powerline corridors that were identified in the Electricity Grid Infrastructure SEA completed in 2016 and gazetted as powerline corridors in February 2018. In this way, the combination of the REDZs and power corridors provides strategic guidance to Eskom on where to prioritise investment in grid infrastructure.

New renewable energy projects located within one of the 11 REDZ areas, and new electricity grid expansion within the 5 Strategic Transmission Corridors are subject to a Basic Assessment and not a full EIA process, as well as a shortened timeframe of 147 days (90-day BA process and 57 decision-making process).

The proposed Bonsmara SEF is not located in a REDZ which ensures that the study must fulfil a Scoping & EIA process.

2.3 BIRDS AND SOLAR ENERGY BEST-PRACTICE GUIDELINES (2017)

The "*Best-Practice Guidelines for assessing and monitoring the impact of solar energy facilities on birds in southern Africa*" (Jenkins *et al*., 2017) are followed in order to fulfil the outlined requirements.

As per Appendix 2 - *Minimum requirements for avifaunal impact assessment*, an avifaunal impact assessment for a SEF should follow a two-tier process (of which this report services the Tier 1 component):

Tier 1

1. **Scoping report**- process to identify issues that are likely to be important in the impact assessment process and to define the scope of work required in the assessment (e.g. timing, spatial extent and data collection methodologies). Largely based on desktop analysis of available data, but preferably also informed by a brief site visit.
2. **Preliminary assessment** – This is part of the planning for the EIA application, giving an overview on the biological context, likely impacts and potential red flags to the development, identifying alternatives and determining the appropriate assessment regime.

Tier 2

3. **In-depth Study** – Could 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.
4. **Impact assessment** - Informed by the data collected during the preliminary assessment.

3 METHODS

3.1 GIS

Existing data layers were incorporated into a GIS to establish how the proposed SEF layout and associated activities interact with important terrestrial entities. Emphasis was placed on the following spatial datasets:

- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- Important Bird and Protected Areas (Marnewick *et al*., 2015);
- South African Protected Areas Database (SAPAD); and
- GIS layers of proposed layout provided by the client.

All mapping was performed using open-source GIS software (QGIS[2]).

3.2 DESKTOP AND LITERATURE SURVEY

A desktop survey is conducted to consider the best information available, in order to provide a better evaluation of all conditions present within the study area. An initial literature review was undertaken to assess which bird species could potentially occur in the vicinity of the Bonsmara SEF using data from the second South African Bird Atlas Project (SABAP 2[3]; [SABAP2, 2020]). SABAP 2 records were developed based on records per pentad (i.e., 5' X 5'). A list of species potentially occurring was developed from SABAP 2 data for the pentads within which the study area falls (2735_2710, 2735_2715 2735_2720, 2735_2725, 2740_2710, 2740_2715 2740_2720, 2740_2725, 2745_2710, 2745_2715, 2745_2720, 2745_2725, 2750_2715 2750_2720 and 2750_2725 (Figure 4). The expected species list is therefore based on an area much larger than the actual study area and was therefore subsequently refined. This approach was adopted to ensure that all species potentially occurring within the study area, whether resident, nomadic, or migratory, are identified.

Species were considered sensitive based on their abundance, flight characteristics, ecological role, population trend and conservation status.

The following main literature sources have been consulted for the avifauna study:

- The existing avifaunal impact assessments for the area (Simon Todd Consulting, 2017);
- Information relating to avifauna species of conservation concern (SCC) was obtained from Taylor *et al.* (2015) and the IUCN Red List of threatened species (IUCN, 2022);
- del Hoyo *et al.* (1992) and Hockey *et al.* (2005) were consulted for general information on the life history attributes of relevant bird species;
- Distributional data was sourced from the Southern Africa Bird Atlas Project (SABAP 2, 2021), del Hoyo *et al.* (1992) and Sinclair & Ryan (2010);

[2] http://qgis.osgeo.org/en/site/
[3] http://sabap2.birdmap.africa/

- INaturalist and Virtual Museum (ADU) was used to source the distribution bird data in the area; and
- Nomenclature and taxonomy followed the IOC World Bird Names unless otherwise specified (see www.worldbirdnames.org; Gill & Donsker, 2012).

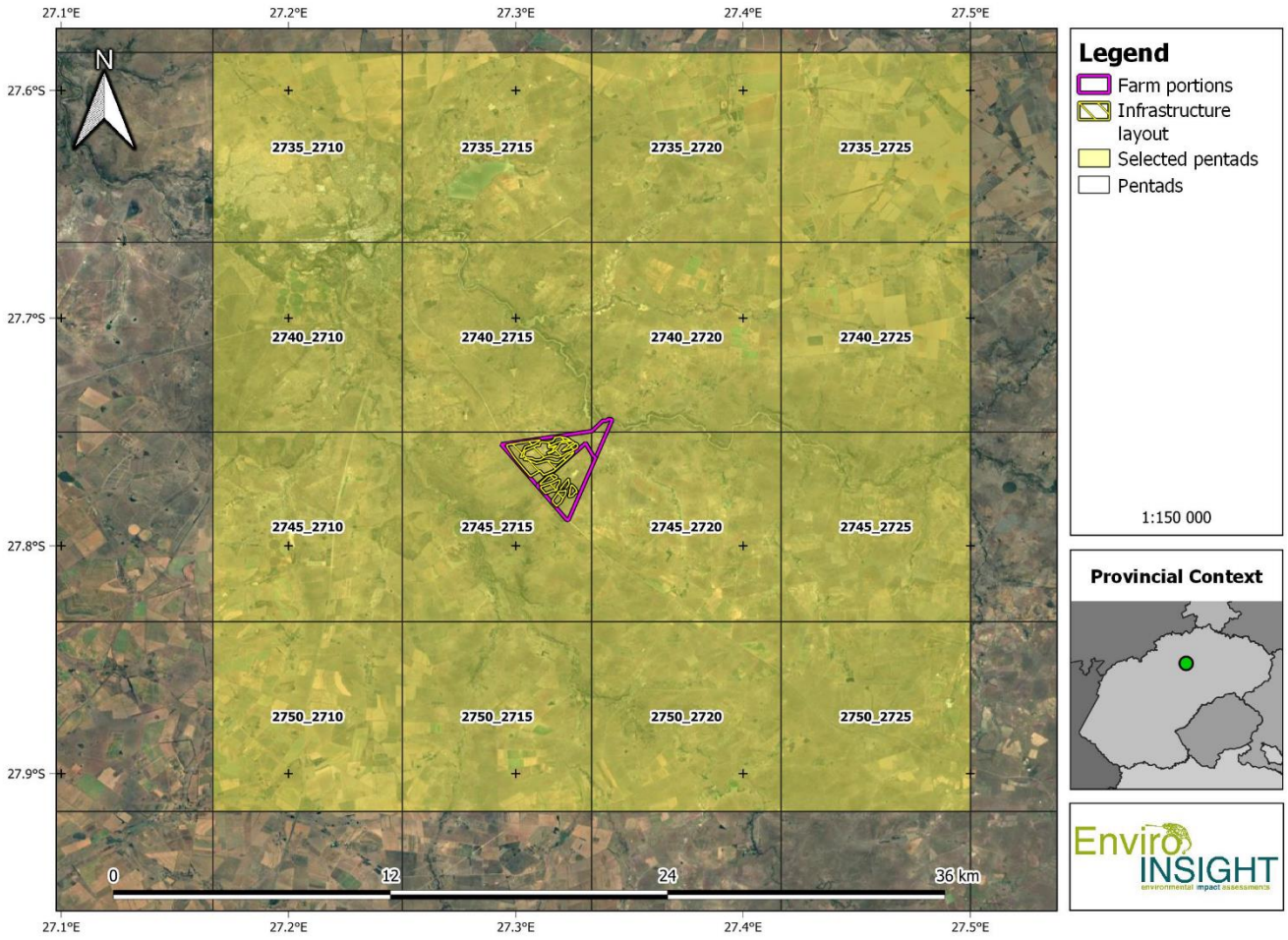

Figure 4: The proposed Bonsmara SEF in relation to the SABAP2 pentads.

3.3 PRECONSTRUCTION BIRD MONITORING SURVEY DESIGN

The proposed study area is classified as a Regime 2 based on the size of the study area (>150 ha), medium avifaunal sensitivity and type of technology that will be used for the proposed project. The avifaunal sensitivity was determined based on the number of priority species occurring, or potentially present, within or around the study area, the regional or globally threat status of these species, avifaunal habitat found in the area, population of priority species, bird movement corridor and Important Bird and Biodiversity Area.

The duration, in terms of data collection, for this study will be a minimum of 2 surveys (of which one must be in the peak season)

of 3 days. This complies with the requirements of the Best Practice Guidelines available at the time (Jenkins *et al*., 2017). It is important to take note that this period may be extended should there be a high risk of impact on the priority bird species observed in or around the study area, such as active nests.

The first site visit included the site verification as well as the first survey, which was the dry-season survey conducted to identify site characteristic found within the study area such as habitats, important bird species and site sensitivities including sensitive habitats with their associated sensitive bird species and observation of nests of sensitive bird species. The site visit was conducted in September 2022, during sub-optimal conditions where the area receives the least rainfall. During the site visit, sampling was done by means of walking and driving transects in and around the study area. Waterbodies in- and outside of the study area were identified and observed whilst powerlines and pylons were scanned for any possible nests from sensitive bird species.

The site visits that will be conducted during the wet season, will form part of the data sampling methods used as per the Best Practice Guidelines (Jenkins et al., 2017). Walking transects (WT) and driving transects (DT) were determined after the first day of the site visit (Table 1). Additional methods that will commence during the first site visit includes nesting sites and Coordinated Waterbird Counts, (CWAC).

Table 1: Avifauna monitoring sampling period for Bonsmara SEF and Control Site.

Date	Season	Methodology applied*
September 2022 (late dry season) – site verification and first survey	Early Spring	WT, DT, NE, WB
Scheduled for January 2023 (date to be confirmed based on good rains)	Summer	WT, DT, NE, WB

*** WT – Walked transects; DT – Drive transects; NE – Nest searches, inspection, and monitoring; WB – Water body inspections.**

3.3.1 Walking Transects and Fixed-Point Counts

These methods are utilised to monitor small bird species within the major habitat types within a study area. Based on the variety of habitat types, transects and sample points will be positioned at varying distances away from the proposed solar farm in order to maximize the comparative value of the data which will be compared with the surveys from the post-construction phase results.

Linear transects are determined based upon habitat characteristics and are approximately 500 m each, conducted to characterize the passerine and small bird communities and end with a fixed sample point. These transects were representative of the biotopes present within the study area. The survey locations were selected based on the representation of the different habitats covering the proposed study area, in proportion to their availability. All of them will be positioned at varying distances from the central development area (Jenkins *et al*., 2017). Each linear transect was and will be conducted by one expert bird observer at a time (more than one observer for all transects will be used), who records all bird contacts (both seen and heard) by walking slowly along the predetermined transect. Observations are made on both the left and right side of the predetermined

transect and 360 degrees at the final fixed sample point. As a guideline. birds will be only recorded (seen or heard) within an estimated fixed maximum width of 200 m on either side of the transect line. The same transects are to be repeated in the summer wet season. Surveys commence mostly after sunrise and are performed throughout the day to account for temporal variation in activity. As a general rule, transects are not to be walked in adverse conditions, such as heavy rain, strong winds or thick mist.

3.3.2 Driven Transects

Large terrestrial birds (e.g. cranes, bustards, storks, and most raptors) cannot be adequately surveyed using walked transects. Populations of such birds should be estimated on each visit to the project area by means of road counts (vehicle-based sampling; best applied for relatively large, proposed SEFs, especially those with good networks of roads and tracks).

Road counts of large terrestrial birds and raptors require that one or a few driven transects be executed (depending on site size, terrain and infrastructure), comprising one or a number of set routes, limited by the existing roadways but as far as possible directed to include a representative cross section of habitats within the project area of influence.

These transects will be driven at a constant and slow speed (± 20km/h), and all sightings of large terrestrial birds and raptors are recorded in terms of the same data-capture protocols used for walked transects (above), and in general compliance with the road-count protocols described for large terrestrial species (Young et al., 2003) and raptors (Malan, 2009).

One observer travels slowly in a vehicle recording all species on both sides of the drive transect. The observer stops at regular intervals (every 300 m) to scan the environment with binoculars. The number, distance and locations of each driving transects were be determined during the first site visit in early Spring. The driving and walking transects are shown as Figure 5.

3.3.3 Nesting sites

Any habitats within the broader impact zone of the proposed SEF, or an equivalent area around the site, deemed likely to support nest sites of key raptor and other species of conservation concern, including power lines, stands of large trees, marshes and drainage lines, were searched for and surveyed. All potential breeding sites, once identified fully, will be mapped, and checked during each survey to confirm occupancy, and all evidence of breeding and the outcomes of such activity, where possible, will be recorded.

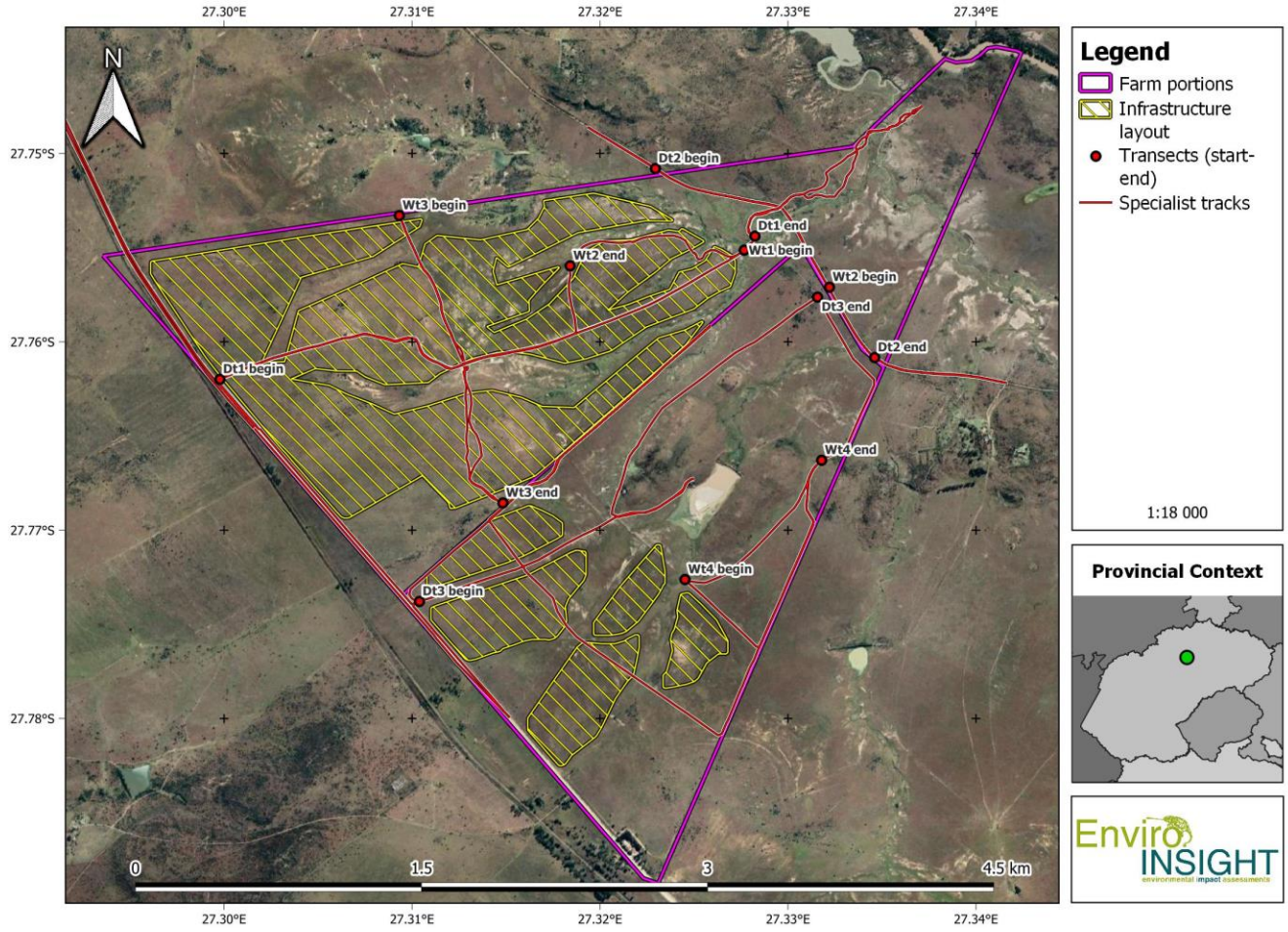

Figure 5: The Driving and Walking Transects identified for the project footprint

3.3.4 Waterbodies

Prior to the initiation of the preconstruction monitoring campaign, the main water bodies (including wetlands) present within the study area were identified during the site visit in September 2022 and will be mapped on a Geographical Information System (GIS) by using 1:50 000 topographic maps and aerial photos. All identified water bodies must continue to be surveyed to determine their level of utilisation by water birds. The summer survey will supplement the early Spring water body bird count.

Water birds, including potential roosting sites, are recorded by the observers during all the surveys. The observers are aided by a pair of binoculars and a spotting scope. Additional sites will be added to the monitoring programme, as and when they are discovered.

3.3.5 Incidental Observations

All other sightings of priority species (and particularly those suggestive of breeding or important feeding or roosting sites or flight paths) on the SEF and control site as well as within the broader study area are recorded, along with additional relevant

information such as habitat type, abundance, habit and weather data. These observations will be used as complementary data to characterise the bird community and its utilisation of the site, as recommended by the Best Practice Guidelines (Jenkins *et al*., 2017).

3.4 SPECIES OF CONSERVATION CONCERN

The Red List of threatened species generated by the IUCN (http://www.iucnredlist.org/) provided the global conservation status of avifauna. However, Taylor *et al*. (2015) produced a regional conservation status assessment following the IUCN criteria which was used for this assessment. The first three categories i.e. Critically Endangered, Endangered and Vulnerable, are collectively called 'threatened' species.

The conservation status categories defined by the IUCN, which are considered here to represent species of conservation concern (SCC), are defined as follows:

- **Critically Endangered (CR)** - Critically Endangered refers to species facing immediate threat of extinction in the wild.
- **Endangered (EN)** - Endangered species are those facing a very high risk of extinction in the wild within the foreseeable future.
- **Vulnerable (VU)** - Vulnerable species are those facing a high risk of extinction in the wild in the medium-term.
- **Near Threatened (NT)** - any indigenous species which does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. NEMBA also deals with endangered, threatened and otherwise controlled species, under the Threatened or Protected Species Regulations (ToPS). A ToPS permit is required for any activities involving the removal or destruction of any ToPS-listed species.

Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Priority species: any species which is qualifies as high risk to impacts from solar facilities as suggested by Jenkins *et. al.*

4 RESULTS

4.1 REGIONAL CONTEXT

The study area is located in the Grassland Biome and falls within the Central Free State Grassland vegetation type (Mucina & Rutherford, 2006 – as amended), listed as Vulnerable (Table 2; Figure 6).

Table 2: Attributes of the Central Free State Grassland vegetation type (Mucina & Rutherford, 2006, as amended).

Name of vegetation type	Central Free State Grassland
Code as used in the Book	GH6
Conservation Target (percent of area) from NSBA	24%
Protected (percent of area) from NSBA	0.8%
Remaining (percent of area) from NSBA	76.5%
Description of conservation status from NSBA	Vulnerable
Description of the Protection Status from NSBA	Hardly protected
Area (km^2) of the full extent of the Vegetation Type	15982.26
Name of the Biome	Grassland
Name of Bioregion	Dry Highveld Grassland Bioregion

Figure 6: The proposed Bonsmara SEF in relation to regional vegetation types.

4.2 DESCRIPTION OF THE MAJOR BIRD HABITATS

The overall habitat delineation as expressed below in Figure 7 is more complex than the habitats described below. However, for the purposes of avifaunal monitoring, the monitoring can be confined to the below-described habitat types which will encompass all delineated habitats below.

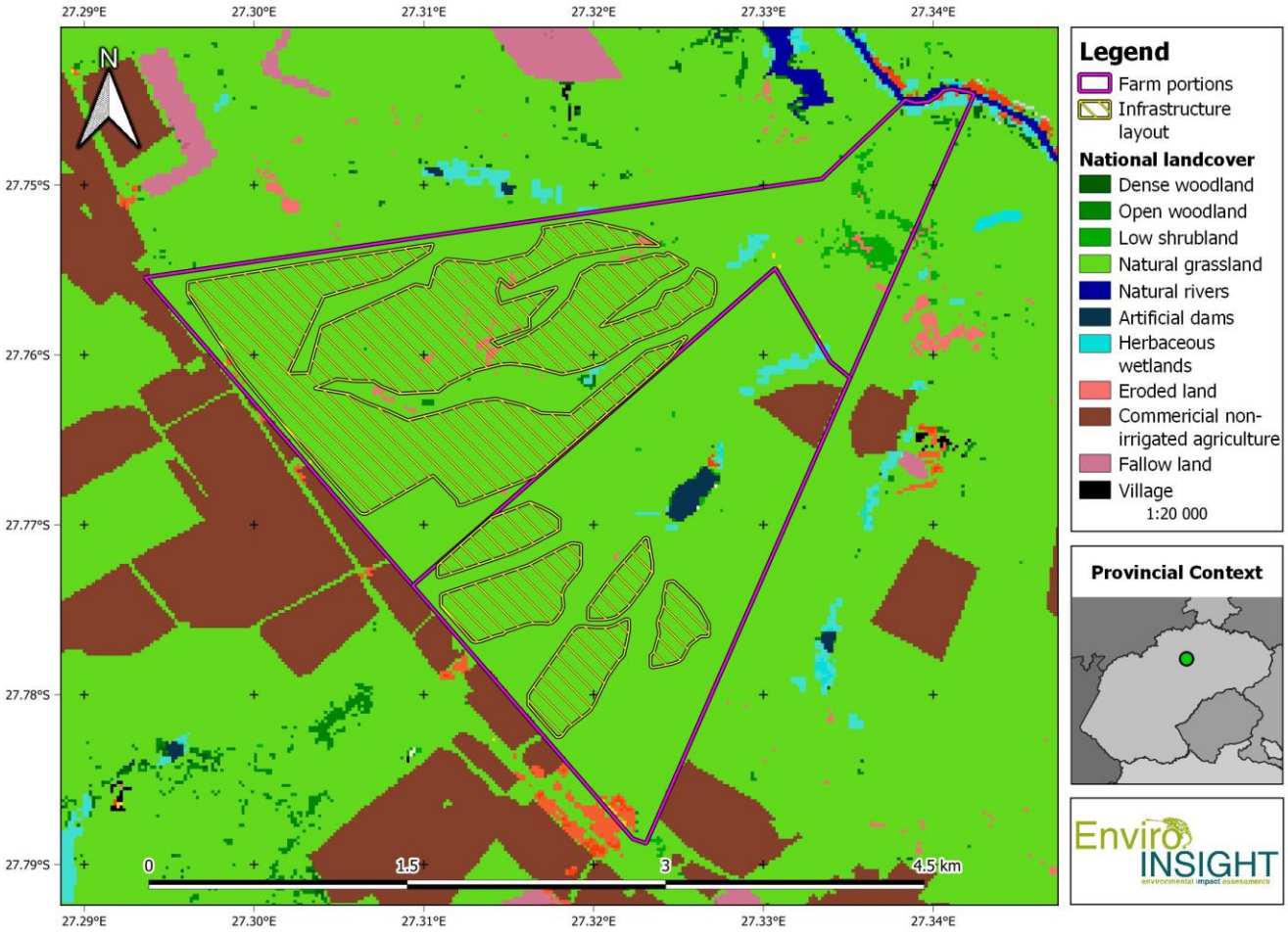

Figure 7: Habitat Delineation of the Project Footprint.

4.2.1 Open Grassland interspersed with Woodland

The open grassland supports a mix of grassland, wetland and drought-tolerant grass species such as *Themeda triandra, Sporobolus sp., Setaria sp., Cynodon sp., Aristida sp.*, *Eragrostis sp.*, *Digitaria sp.*, and *Heteropogon sp.* with various trees such as *Grewia sp., Ziziphus sp., Searsia sp., Grewia sp.,* and *Senegalia sp.* interspersing the grassland habitats in low densities. The vegetation type is the most dominant type for the proposed project. Due to the vegetation type being the only habitat for the

proposed study area, it is of medium sensitivity. This type of vegetation also supports many priority avifauna species expected within the study area such as large terrestrial bird species (Northern Black Korhaan), raptor species such as Black-winged Kite, Pale Chanting Goshawk and Black-chested Snake Eagle as well as the highest likelihood for Secretarybird.

Figure 8: Open Grassland.

4.2.2 Isolated small Rocky ridges "koppies"

The small rocky ridges found in and around the study area, differs in size and height but do not form extensive ridge systems and often form near isolated small "Koppies" as is typical of the habitat type (Mucina and Rutherford 2006). There are some relatively higher undulations to the south of the proposed project footprint. Although, no nests were found within the "koppies", this vegetation type is of high sensitivity it supports great habitat for different fauna and flora species found within the study area. These areas also support scattered large thorn bushes which could be ideal nesting habitat for raptors species such as Secretarybird. Although, no nests where found, it is important to protect these areas.

Figure 9: Rocky ridges "koppies"

4.2.3 Waterbodies

All the waterbodies found within the study area are man-made and mostly fills up after heavy rains. The main artificial waterbody impoundment situated within the study area is relatively large and has wisely been buffered from the infrastructure footprint. The smaller dams and water holes observed within the study area, did not support any waterbirds although large densities of small birds such as swifts congregated around some habitats still containing water from the excellent rains in 2022. Congregations around these habitats were primarily due to nesting habitat and a lack of standing water throughout the region during the survey period (providing a localised attractant). All waterbodies will be observed during the wet season as well, so that the bird activity can be compared to the initial survey.

Figure 10: Artificial Waterbodies.

4.2.4 Drainage lines

The drainage lines throughout the PAOI were primarily herbaceous and dry with some structural differences to the surrounding Open Grasslands. It is anticipated that these habitats will provide significantly different survey results during the wet season and the potential for priority species being present is considered to be high. Occasionally and in some localised locations, standing water still persisted within these habitats.

Figure 11: Drainage lines with standing water

Figure 12: Herbaceous Drainage lines

4.3 CRITICAL BIODIVERSITY AREAS (CBA'S) OF THE FREE STATE

Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- Critical biodiversity areas (CBA's) are areas of the landscape that need to be maintained in a natural or near- natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a population or habitat). All FEPA prioritised wetlands and rivers have minimum category of CBA 1, while all FEPA prioritised wetland clusters have minimum category of CBA 2.
- Ecological support areas (ESA's) are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or delivery ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resources use in this specific ESA is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity). All natural non-FEPA wetlands and larger rivers have minimum category of ESA.

A map of the study in relation to the 2016 Free State CBA's is presented in Figure 13, indicating that the study area is located mainly in ESA1 with a small portion in Other natural areas. This was supported by the field verification although this does not discount the habitats of higher sensitivity such as the Drainage Lines and Waterbodies.

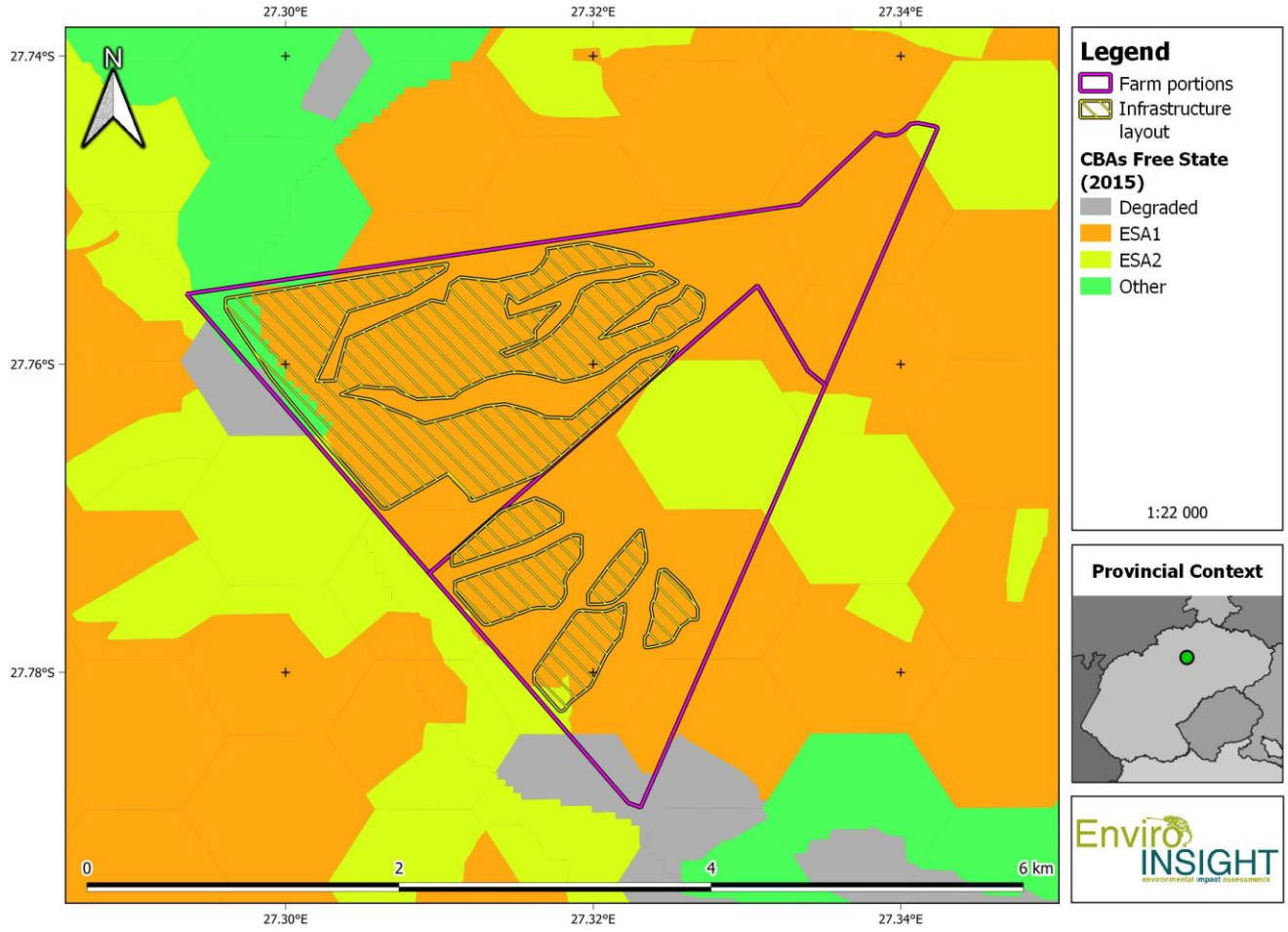

Figure 13: Study Area's CBA's Map.

4.4 PROTECTED AREAS AND IMPORTANT BIRD AND BIODIVERSITY AREAS

The proposed solar farm does not occur within an area of influence of any Important Bird and Biodiversity Area (IBA) with both the Willem Pretorius and Rooiberge Riemland reserves being situated more than 50 km and 75 km away respectively (Figure 14).

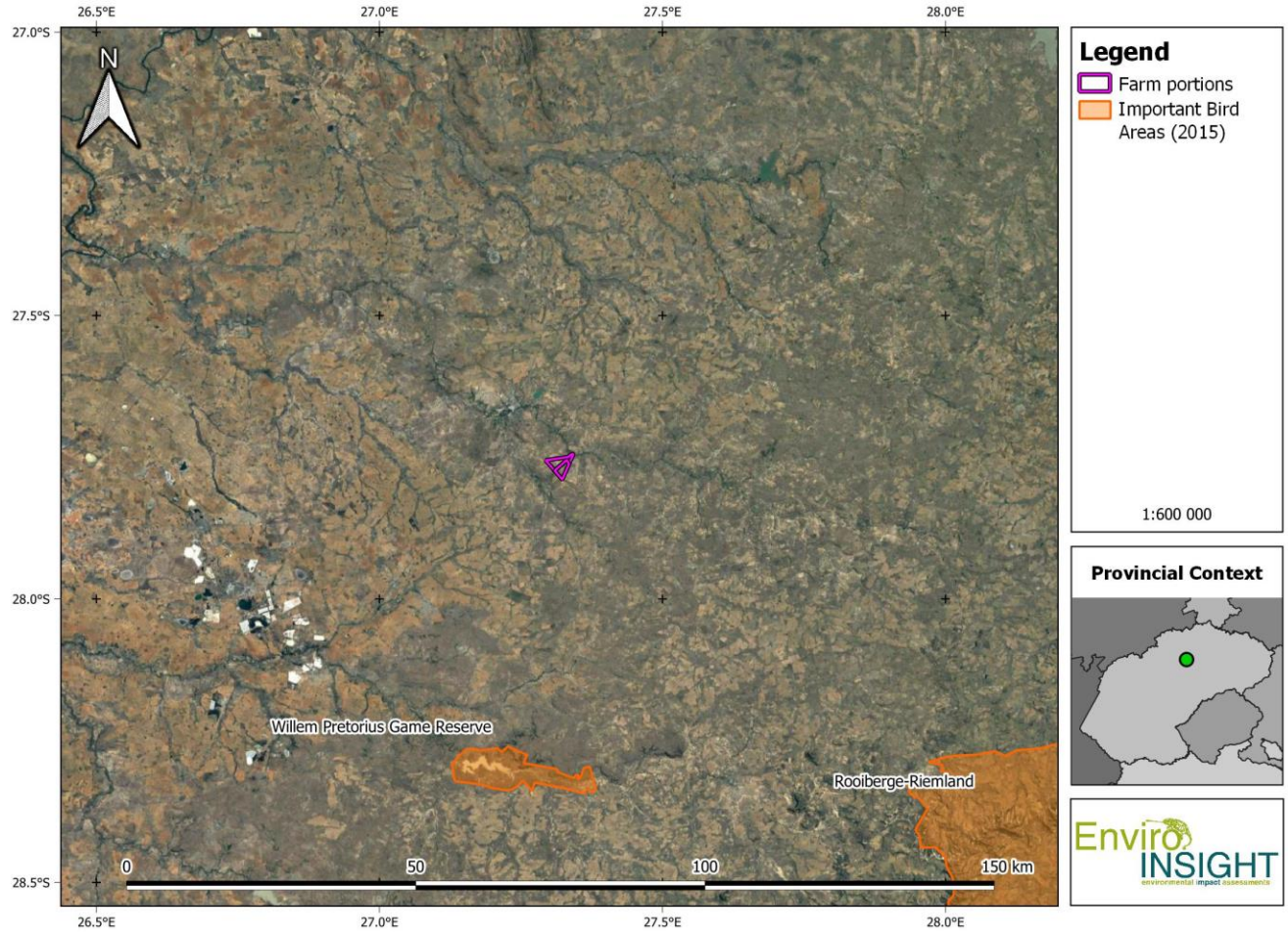

Figure 14: Important Bird Areas in the region.

4.5 EXPECTED AND OBSERVED AVIFAUNA

4.5.1 Total species composition and abundance

A relatively high diversity of 161 bird species for the area have been recorded within the 16 SABAP pentads in which the study area is situated. A total of 216 bird species was recorded in the greater area (16 pentads), as shown in APPENDIX 1: Expected & Observed Avifauna Species List. During the September 2022 site visit, a total of 79 species were recorded.

4.5.2 Sensitive avifauna species list

A list of expected priority species in the project area is provided in Table 3. A total of 55 priority species are expected to occur within and surrounding the study area, of which seven (7) species are listed as regionally/globally threatened and near-threatened species.

The priority species list in Table 3 includes the following data:

- Threatened and Near-Threatened species recorded as per the SABAP pentad data; and
- Priority species with a medium or higher probability of occurrence.

Consequently, every effort will be taken to capture all aspects of priority species observed within the field survey to allow for careful evaluation of potential impacts and application of suitable mitigation measures to reduce these impacts where possible.

Table 3: Priority avifauna species list expected and observed in the study area.

Common Name	Scientific Name	Red Data Reg/Global	Priority Species
Abdim's Stork	*Ciconia abdimii*	LC	x
*African Darter	*Anhinga rufa*	LC	x
*African Fish Eagle	*Haliaeetus vocifer*	LC	x
African Harrier-Hawk	*Polyboroides typus*	LC	x
African Snipe	*Gallinago nigripennis*	LC	x
African Spoonbill	*Platalea alba*	LC	x
Amur Falcon	*Falco amurensis*	LC	x
Black Sparrowhawk	*Accipiter melanoleucus*	LC	x
*Black-winged Kite	*Elanus caeruleus*	LC	x
Black-winged Stilt	*Himantopus himantopus*	LC	x
Blue Korhaan	*Eupodotis caerulescens*	LC / NT	x
Burchell's Coucal	*Centropus burchellii*	LC	x
Cape Shoveler	*Spatula smithii*	LC	x
Caspian Tern	*Hydroprogne caspia*	NT / LC	x
Common Buzzard	*Buteo buteo*	LC	x
Common Greenshank	*Tringa nebularia*	LC	x
*Egyptian Goose	*Alopochen aegyptiaca*	LC	x
European Honey-buzzard	*Pernis apivorus*	LC	x
Fulvous Whistling Duck	*Dendrocygna bicolor*	LC	x
Gabar Goshawk	*Micronisus gabar*	LC	x
Glossy Ibis	*Plegadis falcinellus*	LC	x
Goliath Heron	*Ardea goliath*	LC	x
Great Crested Grebe	*Podiceps cristatus*	LC	x
Greater Flamingo	*Phoenicopterus roseus*	NT / LC	x
Greater Kestrel	*Falco rupicoloides*	LC	x
Lanner Falcon	*Falco biarmicus*	VU / LC	x
Lesser Flamingo	*Phoeniconaias minor*	NT / NT	x
Little Grebe	*Tachybaptus ruficollis*	LC	x
Maccoa Duck	*Oxyura maccoa*	LC	x

Marsh Owl	*Asio capensis*	LC	x
Marsh Sandpiper	*Tringa stagnatilis*	LC	x
Martial Eagle	*Polemaetus bellicosus*	EN / EN	x
*Northern Black Korhaan	*Afrotis afraoides*	LC	x
Pale Chanting Goshawk	*Melierax canorus*	LC	x
Pied Avocet	*Recurvirostra avosetta*	LC	x
Red-billed Teal	*Anas erythrorhyncha*	LC	x
Red-footed Falcon	*Falco vespertinus*	LC	x
*Reed Cormorant	*Microcarbo africanus*	LC	x
Ruff	*Calidris pugnax*	LC	x
Secretarybird	*Sagittarius serpentarius*	VU / EN	x
South African Shelduck	*Tadorna cana*	LC	x
Southern Pochard	*Netta erythrophthalma*	LC	x
Spur-winged Goose	*Plectropterus gambensis*	LC	x
Squacco Heron	*Ardeola ralloides*	LC	x
Western Barn Owl	*Tyto alba*	LC	x
*Western Cattle Egret	*Bubulcus ibis*	LC	x
Whiskered Tern	*Chlidonias hybrida*	LC	x
White Stork	*Ciconia ciconia*	LC	x
White-backed Duck	*Thalassornis leuconotus*	LC	x
White-breasted Cormorant	*Phalacrocorax lucidus*	LC	x
White-faced Whistling Duck	*Dendrocygna viduata*	LC	x
White-winged Tern	*Chlidonias leucopterus*	LC	x
Wood Sandpiper	*Tringa glareola*	LC	x
*Yellow-billed Duck	*Anas undulata*	LC	x
		7	55

* These species were observed and recorded to date on the first survey and are expected from SABAP1 or SABAP2.

5 IMPACT ASSESSMENT

5.1 BACKGROUND TO INTERACTIONS BETWEEN SOLAR ENERGY FACILITIES, POWER LINES AND BIRDS

The effects of a solar farm on birds are highly variable and depend on a wide range of factors including the design and specification of the development, the topography of the surrounding land, the habitats affected and the number and species of birds present.

Typical potential impacts include (but are not necessarily limited to):

- Habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance). Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its

requirements.

- Collision and electrocution with above-ground power transmission lines (to be assessed in separate application). In some cases, collision can be associated with combustion (streamers) from polarised light pollution and waterbird species mistaking large PV panels areas as wetlands or other waterbodies, a case known as the "lake effect" (as per Jenkins *et al*. 2017). The mitigation of these impacts will be addressed in the final EIA report with operational phase monitoring to be designed in the EMPr.
- Disturbance due to noise such as, machinery movements and maintenance operations during the construction and operational phase of the proposed PV solar farm.
- The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as perches, nest and shade opportunities
- Chemical pollution: Chemicals being used to keep the PV panels clean from dust (suppressants) etc.

New mitigation measures range from simple (e.g., buffering of habitats) to complex (retrofitting of panels to avoid Lake Effect Impacts). However, by far the best mitigation option remains the first step of the mitigation hierarchy which is "avoidance". Consequently, all attempts will be made to avoid potential impacts arising from the proposed development through the application of necessary buffers for sensitive areas, where placement of panel infrastructure may not occur. Additional remaining impacts will be minimised through the application of known and previously tested mitigation measures.

Potential mitigation measures:

- Impacts associated with the loss of bird foraging habitat due to construction activity cannot be mitigated in relation to the majority of the habitats but can be mitigated by avoiding avifaunal specific highly sensitive areas and their associated buffers;
- impact can be mitigated by timing construction in order to avoid breeding periods of species;
- Set-back areas or buffer zones are allocated to sensitive or important habitat features to alleviate the effect of foraging and nesting/ roosting habitat in particular;
- Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. It is likely that most of the avifaunal populations will be largely displaced from the majority of the project infrastructure, although significant risks are associated with the likelihood of project vehicles flushing birds into fencing infrastructure as well as collisions of large bodied species with powerlines;
- All powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds while all fences must be set back from every service road in order to allow for vulnerable species such as cranes and korhaans to obtain adequate height after being flushed by vehicle traffic;
- Migratory pathways of birds cannot be changed and the resulting impacts are unavoidable. However, severity of the impacts can be reduced with appropriate mitigation measures;
- all habitat attractants should be eliminated so that avifaunal populations will not embed themselves within the infrastructure over time. This includes bird diverters, perch deterrents and the application of Non-polarising white tape

can be used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies;

- The application of strict chemical control protocols which are not detrimental to avifauna.

6 PRELIMINARY SENSITIVITY

The study area mostly consists of Open Grassland with some drainage line habitats found in parts of the proposed project footprint. The Grassland (including woodland permeations) and Koppie vegetation provides potential nesting habitat for bird species such as small Raptors, Larks, Pipits, Cisticola's and korhaan and possibly including hunting/foraging habitat for species such as Lanner Falcon, Secretary bird and other larger raptors. The woodland and ridge areas found within the PAOI consist of succulents and some large thorn bushes which might provide possible nesting and foraging habitat for species such as Chats and Prinia's, including sensitivity species such as the Secretarybird.

The site visit in September 2022 took place during the late dry season, which means the habitat conditions were at their least optimal. When conditions are sub-optimal, avifaunal assemblages will carry out small scale migrations to more ecologically productive habitats (such as permanent water courses) and return after the post rain green flush. Even the large artificial impoundment showed almost no significant bird activity, with expected species such as ducks, geese, stilts, stints, and plovers all but absent. However, it is anticipated that within the drainage lines and impoundment areas, migratory patterns during summer and higher rainfall will provide optimal foraging habitat for sensitive species with a possibility to occur on site such as Bustards, Storks, Waders, and a plethora of other priority species. Accordingly, all watercourses are mapped as preliminarily sensitive and buffered at 50 metres with side of the edge of the habitat delineation (Figure 15).

There is an existing substation running along the southern border of the southern section of the study area. The associated powerline did not have any signs of priority bird species nests but could lead to possible nesting in the future for species such as Martial Eagle. The species abundance would be at its highest during and after the rainy season, as food resources increase more birds will fly in, including water associated bird species which will mostly be found at the larger dam north of the powerline study area.

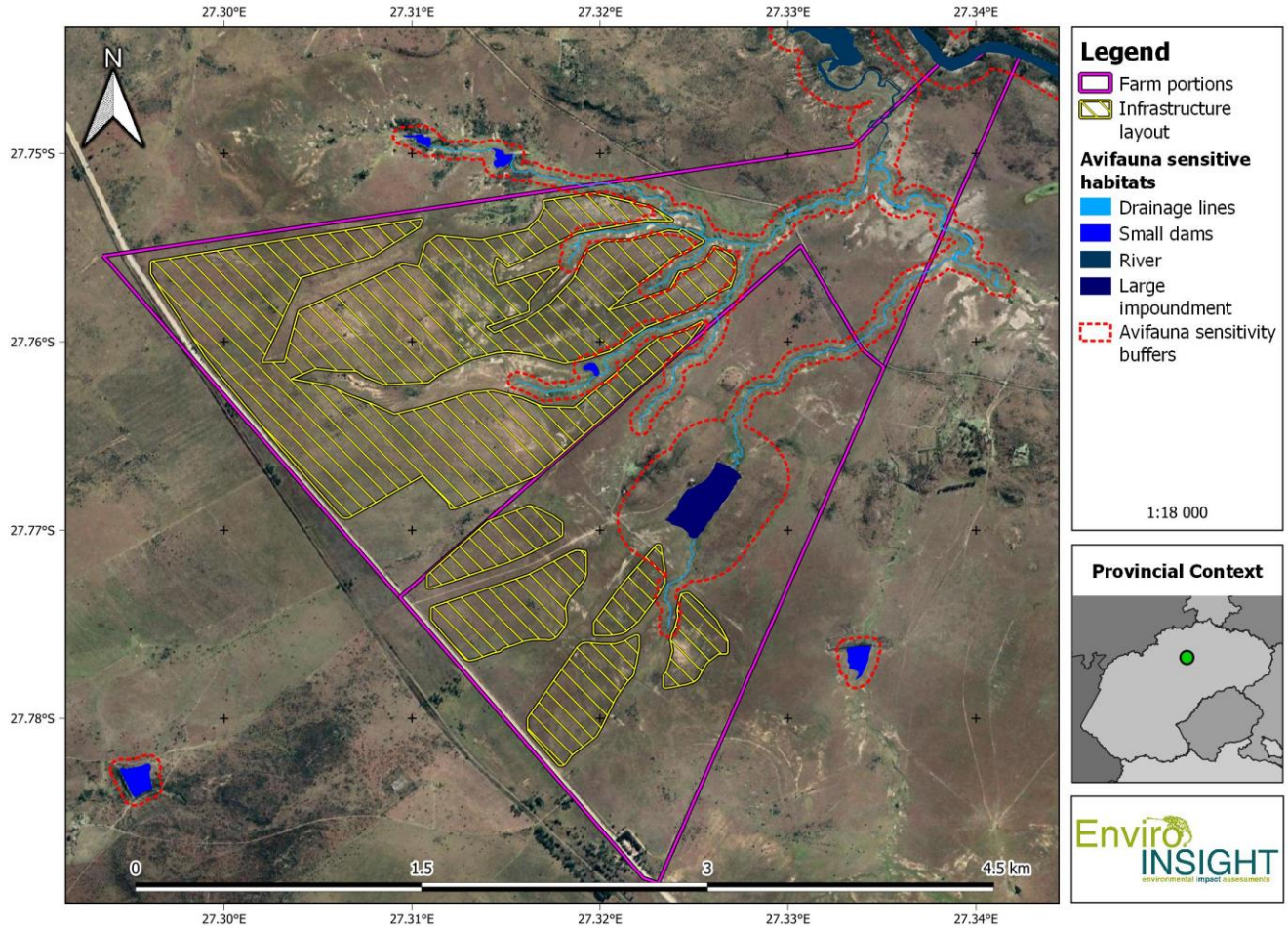

Figure 15: Preliminary avifauna sensitivity map.

7 CONCLUSIONS

The study area is situated within the Central Free State Grassland vegetation type. The study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes, bustards and Red-Listed korhaans and large raptor species in sufficiently large densities or within breeding habitat that may be considered highly significant. However, given the size of the area, the proximity to a very large wetland impoundment and the large amount of herbaceous drainage line habitat within the project footprint, final conclusions must be subject to wet season verification under a Regime 2 survey. Thus, in in order to confirm that the study area is of low sensitivity in terms of conservation of these type of bird species. A January 2023 survey is recommended as per the aforementioned methods.

The CBAs of the Free State designated that majority of the site falls within an ESA1. Avoidance mitigation could be applied wherever possible to project infrastructure design and limit the amount of habitat impacted.

The study area is classified as a Regime 2 assessment (Jenkins *et al.* 2017). Even though it is not within a REDZ and will require a full S&EIA, the methods will follow the appropriate sampling method, which consists of 2-3 surveys of 3-5 days each over a 6-month period. Samling methods to be used will include walking and driving transects, bird species abundance at waterbodies and monitoring of new and previously observed nests on existing and constructed pylons.

A total of fifty-five (55) priority species has the possibility of occurring within and around the study area, although only seven Red Listed species have been identified and all are of moderate likelihood to occur within the project footprint and most will be irregular foraging visitors and not resident. Once again, this is subject to a follow up wet season verification.

The proposed solar project has the potential to be of low to medium sensitivity from an avifaunal point of view. Some of the priority bird species are not habitat bound to the area for nesting and/or foraging purposes and is therefore important to focus on the some of the most significant cumulative impacts for the proposed solar project. Possible primary impacts of the proposed study area on avifauna include:

1. Potential habitat loss through the establishment of solar panel infrastructure.
2. The inclusion of crops as part of a Agrivoltaic system might attract more avifauna species to the area.
3. Collision with solar panel infrastructure is possible albeit less likely than secondary collision risk.
4. Secondary collision risks are represented by supporting powerline infrastructure which are connected to solar panel infrastructure.

The study area is not surrounded with existing renewable energy developments, both wind and solar developments, although a number are proposed which could have the possibility of cumulative impacts at the proposed site. Sensitive bird species found within the study area include Secretarybird and Lanner Falcon.

Consequently, every effort will be taken to capture all aspects of priority species observed within the field survey to allow for careful evaluation of potential impacts and application of suitable mitigation measures to reduce these impacts where possible.

8 REFERENCES

Del Hoyo, J., Elliott, A. AND Sargatal, J. 1992. Handbook of the birds of the world. 1992 – 2011 editions, Lynx Editions, Barcelona.

Gill, F. & Donsker, D. (Eds). 2019. IOC World Bird List (v9.2). doi: 10.14344/IOC.ML.9.2.

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V., & Brown, C.J. (eds). (1997) *The Atlas of Southern African Birds*. BirdLife South Africa, Johannesburg.

Hockey P., Dean, W., Ryan, P., Maree S. & Brickman, B. (2005). *Roberts - Birds of Southern Africa* 7th ed. Trustees of the John Voelcker Bird Book Fun/ Africa Geographic Books. 1296 p.

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

Jenkins, A.R., Ralston-Paton, S. and Smit-Robinson, H.A. (2017). Birds & Solar Energy. Best Practice Guidelines: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.

Malan, G. (2009) *Raptor Survey and Monitoring – a Field Guide for African Birds of Prey*. Briza Publications, Pretoria, South Africa.

Marnewick, M., Retief, E., Theron, N., Wright, D., & Anderson, T. (2015). Important Bird and Biodiversity Areas of South Africa. BirdLife South Africa. Johannesburg.

Mucina, L. & Rutherford, M.C. (eds). (2006, as amended). *The Vegetation of South Africa, Lesotho and Swaziland*. South African National Biodiversity Institute, Pretoria.

SABAP2 (South African Bird Atlas Project). Visited February 2022. http://vmus.adu.org.za/

South African National Biodiversity Institute. (2018) Beta Vegetation Map of South Africa, Lesotho and Swaziland (File Geodatabase) [File geodatabase] 2018. Available from the Biodiversity GIS website (http://bgis.sanbi.org/SpatialDataset/Detail/670).

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

9 APPENDIX

9.1 APPENDIX 1: EXPECTED & OBSERVED AVIFAUNA SPECIES LIST

Avifauna recorded by SABAP1 and SABAP2 for the sixteen pentads, which includes the study area and surrounding area, is situated (see Figure 4).

Table 4: Avifauna species expected (medium probability and higher) in the study area.

Common Name	Scientific Name	Recorded
Abdim's Stork	*Ciconia abdimii*	
Acacia Pied Barbet	*Tricholaema leucomelas*	x
African Black Swift	*Apus barbatus*	
African Darter	*Anhinga rufa*	x
African Fish Eagle	*Haliaeetus vocifer*	x
African Harrier-Hawk	*Polyboroides typus*	
African Hoopoe	*Upupa africana*	x
African Openbill	*Anastomus lamelligerus*	
African Palm Swift	*Cypsiurus parvus*	x
African Paradise Flycatcher	*Terpsiphone viridis*	
African Pipit	*Anthus cinnamomeus*	x
African Red-eyed Bulbul	*Pycnonotus nigricans*	x
African Reed Warbler	*Acrocephalus baeticatus*	x
African Sacred Ibis	*Threskiornis aethiopicus*	x
African Snipe	*Gallinago nigripennis*	
African Spoonbill	*Platalea alba*	
African Stonechat	*Saxicola torquatus*	x
African Wattled Lapwing	*Vanellus senegallus*	x
Amethyst Sunbird	*Chalcomitra amethystina*	x
Amur Falcon	*Falco amurensis*	
Ant-eating Chat	*Myrmecocichla formicivora*	x
Ashy Tit	*Melaniparus cinerascens*	
Barn Swallow	*Hirundo rustica*	
Black Sparrowhawk	*Accipiter melanoleucus*	
Black-chested Prinia	*Prinia flavicans*	x
Black-collared Barbet	*Lybius torquatus*	x
Black-crowned Night Heron	*Nycticorax nycticorax*	
Black-faced Waxbill	*Brunhilda erythronotos*	x
Black-headed Heron	*Ardea melanocephala*	
Blacksmith Lapwing	*Vanellus armatus*	x

Black-throated Canary	*Crithagra atrogularis*	
Black-winged Kite	*Elanus caeruleus*	x
Black-winged Stilt	*Himantopus himantopus*	
Blue Korhaan	*Eupodotis caerulescens*	x
Blue Waxbill	*Uraeginthus angolensis*	x
Bokmakierie	*Telophorus zeylonus*	
Brown-crowned Tchagra	*Tchagra australis*	
Brown-hooded Kingfisher	*Halcyon albiventris*	
Brown-throated Martin	*Riparia paludicola*	
Buffy Pipit	*Anthus vaalensis*	
Burchell's Coucal	*Centropus burchellii*	x
Cape Bunting	*Emberiza capensis*	x
Cape Longclaw	*Macronyx capensis*	
Cape Penduline Tit	*Anthoscopus minutus*	
Cape Robin-Chat	*Cossypha caffra*	
Cape Shoveler	*Spatula smithii*	x
Cape Sparrow	*Passer melanurus*	x
Cape Starling	*Lamprotornis nitens*	x
Cape Turtle Dove	*Streptopelia capicola*	x
Cape Wagtail	*Motacilla capensis*	x
Cape Weaver	*Ploceus capensis*	
Cape White-eye	*Zosterops virens*	
Capped Wheatear	*Oenanthe pileata*	
Cardinal Woodpecker	*Dendropicos fuscescens*	
Caspian Tern	*Hydroprogne caspia*	x
Chestnut-backed Sparrow-Lark	*Eremopterix leucotis*	
Chestnut-vented Warbler	*Curruca subcoerulea*	
Cinnamon-breasted Bunting	*Emberiza tahapisi*	x
Cloud Cisticola	*Cisticola textrix*	
Common Buttonquail	*Turnix sylvaticus*	
Common Buzzard	*Buteo buteo*	
Common Greenshank	*Tringa nebularia*	
Common House Martin	*Delichon urbicum*	
Common Moorhen	*Gallinula chloropus*	
Common Myna	*Acridotheres tristis*	x
Common Ostrich	*Struthio camelus*	
Common Quail	*Coturnix coturnix*	
Common Ringed Plover	*Charadrius hiaticula*	
Common Sandpiper	*Actitis hypoleucos*	
Common Scimitarbill	*Rhinopomastus cyanomelas*	

Common Starling	*Sturnus vulgaris*	
Common Swift	*Apus apus*	x
Common Waxbill	*Estrilda astrild*	
Crested Barbet	*Trachyphonus vaillantii*	x
Crimson-breasted Shrike	*Laniarius atrococcineus*	
Crowned Lapwing	*Vanellus coronatus*	x
Desert Cisticola	*Cisticola aridulus*	
Diederik Cuckoo	*Chrysococcyx caprius*	
Double-banded Courser	*Rhinoptilus africanus*	x
Eastern Clapper Lark	*Mirafra fasciolata*	
Egyptian Goose	*Alopochen aegyptiaca*	x
European Bee-eater	*Merops apiaster*	
European Honey-buzzard	*Pernis apivorus*	
Fairy Flycatcher	*Stenostira scita*	
Familiar Chat	*Oenanthe familiaris*	x
Fiscal Flycatcher	*Melaenornis silens*	
Fulvous Whistling Duck	*Dendrocygna bicolor*	x
Gabar Goshawk	*Micronisus gabar*	
Giant Kingfisher	*Megaceryle maxima*	
Glossy Ibis	*Plegadis falcinellus*	
Goliath Heron	*Ardea goliath*	
Great Crested Grebe	*Podiceps cristatus*	
Greater Flamingo	*Phoenicopterus roseus*	x
Greater Honeyguide	*Indicator indicator*	
Greater Kestrel	*Falco rupicoloides*	
Greater Striped Swallow	*Cecropis cucullata*	
Green Wood Hoopoe	*Phoeniculus purpureus*	
Green-winged Pytilia	*Pytilia melba*	
Grey Heron	*Ardea cinerea*	x
Hadada Ibis	*Bostrychia hagedash*	
Hamerkop	*Scopus umbretta*	x
Helmeted Guineafowl	*Numida meleagris*	x
Horus Swift	*Apus horus*	
House Sparrow	*Passer domesticus*	x
Icterine Warbler	*Hippolais icterina*	
Jameson's Firefinch	*Lagonosticta rhodopareia*	
Kalahari Scrub Robin	*Cercotrichas paena*	x
Karoo Scrub Robin	*Cercotrichas coryphoeus*	
Karoo Thrush	*Turdus smithi*	
Kittlitz's Plover	*Charadrius pecuarius*	x

Lanner Falcon	*Falco biarmicus*	x
Laughing Dove	*Spilopelia senegalensis*	
Lesser Flamingo	*Phoeniconaias minor*	x
Lesser Grey Shrike	*Lanius minor*	
Lesser Honeyguide	*Indicator minor*	
Lesser Kestrel	*Falco naumanni*	
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	
Levaillant's Cisticola	*Cisticola tinniens*	x
Little Bee-eater	*Merops pusillus*	x
Little Egret	*Egretta garzetta*	
Little Grebe	*Tachybaptus ruficollis*	x
Little Swift	*Apus affinis*	
Long-billed Crombec	*Sylvietta rufescens*	
Long-tailed Paradise Whydah	*Vidua paradisaea*	
Long-tailed Widowbird	*Euplectes progne*	
Maccoa Duck	*Oxyura maccoa*	x
Malachite Kingfisher	*Corythornis cristatus*	
Marsh Owl	*Asio capensis*	
Marsh Sandpiper	*Tringa stagnatilis*	
Martial Eagle	*Polemaetus bellicosus*	x
Melodious Lark	*Mirafra cheniana*	x
Mountain Wheatear	*Myrmecocichla monticola*	
Namaqua Dove	*Oena capensis*	x
Namaqua Sandgrouse	*Pterocles namaqua*	
Natal Spurfowl	*Pternistis natalensis*	x
Neddicky	*Cisticola fulvicapilla*	
Northern Black Korhaan	*Afrotis afraoides*	x
Orange River Francolin	*Scleroptila gutturalis*	
Orange River White-eye	*Zosterops pallidus*	
Pale Chanting Goshawk	*Melierax canorus*	
Pearl-breasted Swallow	*Hirundo dimidiata*	
Pied Avocet	*Recurvirostra avosetta*	
Pied Crow	*Corvus albus*	x
Pied Kingfisher	*Ceryle rudis*	
Pied Starling	*Lamprotornis bicolor*	
Pink-billed Lark	*Spizocorys conirostris*	
Pin-tailed Whydah	*Vidua macroura*	
Pririt Batis	*Batis pririt*	
Purple Heron	*Ardea purpurea*	
Quailfinch	*Ortygospiza atricollis*	

Red-backed Shrike	*Lanius collurio*	x
Red-billed Firefinch	*Lagonosticta senegala*	
Red-billed Quelea	*Quelea quelea*	
Red-billed Teal	*Anas erythrorhyncha*	x
Red-breasted Swallow	*Cecropis semirufa*	
Red-capped Lark	*Calandrella cinerea*	
Red-chested Cuckoo	*Cuculus solitarius*	
Red-eyed Dove	*Streptopelia semitorquata*	x
Red-faced Mousebird	*Urocolius indicus*	x
Red-footed Falcon	*Falco vespertinus*	x
Red-headed Finch	*Amadina erythrocephala*	
Red-knobbed Coot	*Fulica cristata*	
Red-throated Wryneck	*Jynx ruficollis*	
Red-winged Starling	*Onychognathus morio*	
Reed Cormorant	*Microcarbo africanus*	x
Rock Dove	*Columba livia*	x
Rock Martin	*Ptyonoprogne fuligula*	
Ruff	*Calidris pugnax*	
Rufous-naped Lark	*Mirafra africana*	x
Sabota Lark	*Calendulauda sabota*	
Scaly-feathered Weaver	*Sporopipes squamifrons*	
Secretarybird	*Sagittarius serpentarius*	
South African Cliff Swallow	*Petrochelidon spilodera*	
South African Shelduck	*Tadorna cana*	
Southern Fiscal	*Lanius collaris*	x
Southern Grey-headed Sparrow	*Passer diffusus*	
Southern Masked Weaver	*Ploceus velatus*	x
Southern Pochard	*Netta erythrophthalma*	x
Southern Red Bishop	*Euplectes orix*	x
Speckled Mousebird	*Colius striatus*	x
Speckled Pigeon	*Columba guinea*	x
Spike-heeled Lark	*Chersomanes albofasciata*	
Spotted Eagle-Owl	*Bubo africanus*	
Spotted Flycatcher	*Muscicapa striata*	
Spotted Thick-knee	*Burhinus capensis*	x
Spur-winged Goose	*Plectropterus gambensis*	x
Squacco Heron	*Ardeola ralloides*	
Swainson's Spurfowl	*Pternistis swainsonii*	x
Swallow-tailed Bee-eater	*Merops hirundineus*	
Three-banded Plover	*Charadrius tricollaris*	

Village Indigobird	*Vidua chalybeata*	
Violet-eared Waxbill	*Granatina granatina*	x
Wattled Starling	*Creatophora cinerea*	
Western Barn Owl	*Tyto alba*	
Western Cattle Egret	*Bubulcus ibis*	x
Whiskered Tern	*Chlidonias hybrida*	
White Stork	*Ciconia ciconia*	
White-backed Duck	*Thalassornis leuconotus*	
White-backed Mousebird	*Colius colius*	
White-bellied Sunbird	*Cinnyris talatala*	
White-breasted Cormorant	*Phalacrocorax lucidus*	x
White-browed Sparrow-Weaver	*Plocepasser mahali*	
White-faced Whistling Duck	*Dendrocygna viduata*	
White-fronted Bee-eater	*Merops bullockoides*	
White-rumped Swift	*Apus caffer*	x
White-throated Swallow	*Hirundo albigularis*	
White-winged Tern	*Chlidonias leucopterus*	
White-winged Widowbird	*Euplectes albonotatus*	
Willow Warbler	*Phylloscopus trochilus*	
Wing-snapping Cisticola	*Cisticola ayresii*	
Wood Sandpiper	*Tringa glareola*	
Yellow Canary	*Crithagra flaviventris*	
Yellow-bellied Eremomela	*Eremomela icteropygialis*	
Yellow-billed Duck	*Anas undulata*	x
Yellow-crowned Bishop	*Euplectes afer*	
Zitting Cisticola	*Cisticola juncidis*	x
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