

AVIFAUNAL IMPACT ASSESSMENT (PHASE 2)

PROPOSED PHASE 2 GILIMBERG SPV 2, 200MW
CLUSTER SOLAR PV FACILITY AND ASSOCIATED
INFRASTRUCTURE IN WATERBERG
(MOGALAKWENA LOCAL MUNICIPALITY) AND
CAPRICORN DISTRICT (POLOKWANE LOCAL
MUNICIPALITY), LIMPOPO PROVINCE



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1. Report Control

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Aspect Investigated	Specialist Name	Qualifications & SACNASP Registration Number	Dates of Assessment
Avifaunal	Rachuene, Tselane Rebotile	Honours Degree in Environmental Monitoring and Modelling, and Advance Dip. Nat. Conservation. <i>SACNASP: 154249</i>	12 – 16 March 2026
Avifaunal	Molokomme, Prince Sello	Master of Science in Zoology and 2 x BSc Zoology (Limpopo University). <i>SACNASP: 156974</i>	12 – 16 March 2026

2. EXECUTIVE SUMMARY

Abantu Environmental Services appointed Sediba Sa Metse (Pty) Ltd to undertake an Avifaunal Impact Assessment for the scoping and Environmental Impact Assessment (EIA) process for a proposed Phase 2 GILIMBERG SPV 2, 200MW Cluster solar PV Facility and Associated Infrastructure, including its 2km overhead connecting line to Boruto Eskom substation, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province. The proposed 305ha site is located approximately 30km north of Mokopane, outside Sekuruwe village, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province. The proposed development of a solar facility, by its nature, has a direct impact on birds. A screening site visit and pre-construction bird monitoring site visits were conducted on-site.

Supported by the preliminary desktop study with consultation of third-party sources (e.g., iNaturalist, SABAP2, and SANBI), the pre-construction assessment to ascertain the status of the birdlife of the area, between 12 and 16 March 2026. The assessment is mainly guided by the “*Best Practices Guidelines: Birds & Solar Energy*, by A.R. Jenkins, *et.al.*, 2017,” and NEMA No. 107 of 1998, NEMBA, the National Water Act (NWA), and Environmental Impact Assessment Regulations, 2014 (Amendment G. 49028, No.3717 of July 2023 and G. 43855, No. 1150 of October 2020) as in NEMA Sections 24(5)(a) and (h) and 44. The survey assessed avifaunal diversity and evaluated habitat conditions within the proposed project site footprint, including the Project Area of Influence (PAOI) of at least covering 300m.

This assessment has made the following findings:

- At least 73 bird species have been observed directly, either flying, perching, feeding, and interacting, from the project footprint, including the PAOI.
- Over 80% of these species are provincial species of conservation concern (LEMA)
- Nationally protected and Critically Endangered species, the White-backed Vulture (*Gyps africanus*) was observed soaring within the area, but no nesting or roosting sites (trees) are present within the footprint (including the 500m site buffer)
 - The White-backed Vulture, generally colonial nesters, typically concentrated either in tall trees along watercourses or in open woodland areas (Mundy *et al.* 1992). This characteristic is not observed or suitable; therefore, the area is not suitable for nesting but for foraging/feeding (due to potential livestock carcasses from the local communities)
- Drainage lines surrounding the project site may present suitable habitats for diverse species, but no SCC waterbird was observed.

Several potential impacts associated with the proposed solar facility and associated infrastructure were identified. These include:

- **Habitat loss and alteration** within the project footprint that covers at least 305ha.
- **Collision risk** to large soaring birds such as vultures and eagles on transmission infrastructure or other species that may mistakenly perceive solar infrastructure as a water source and dive directly to it. This is due to these groups of birds having a wider area of occupancy (AOO) that goes up to 10km.
- **Electrocution risk** at pylons and all other associated components of the infrastructure that are live.
- **Disturbance and displacement** of localised bird species during construction and operation phases.
- **Pollution risks**, including waste, chemicals, and noise.
- **Loss of Connectivity or corridor** for local migratory species

The potential risks and their expected significance, drawn directly from the impact assessment tables, are summarised below.

Potential Impact	Project Stage	Without Mitigation	With Mitigation
Collision of birds with solar structures and associated lines	Construction & Operation	Medium-High	Medium-low negative
Electrocution of birds at the solar plant, transmission pylons, and substation	Operation	High	Low negative
Disturbance of key habitats and pollution (waste, noise, chemicals)	Construction & Operation	Medium	Medium negative
Habitat loss within the project footprint	Construction & Operation	Medium	Medium negative

Cumulative impacts on regional bird mortality (esp. vultures, raptors)	Long-term Operation	Medium	Medium negative
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Considering all the data and potential impacts associated with the proposed activities, this assessment considers the impact to be **Medium** without the implementation of the mitigation hierarchy and long-term cumulative impact. Areas with sensitive such as drainage lines, must be buffered with at least 50m to protect the remaining natural servitudes in the area for local bird residents.

Recommendations to be considered are:

Pre-construction site preparation phase

- The enclosure of the site with fencing must be erected. The entire fence must be visible and high enough to deter any collision or entanglement or collision.
 - Monthly monitoring of this fence must be conducted to detect if there are any incidents
 - Barbed wires must be avoided where possible.
- The drainage lines as water courses must be clearly marked and demarcated with signage from their 50m buffer line. This must be communicated to all workers, including full and part-time workers, entering the project site.
- Killing, hunting, or harming of the birds within the project footprint must be restricted. This must be communicated to all entering the site. Amongst others, include the implementation of speed limits and reporting of any roadkill on the road.
- Prevent Electrocution – all the infrastructure and components, such as the powerline overhead line, must be protected with conductors to reduce potential electrocution. Any incident must be reported and documented.
- Duty of Care must always be practised. It is strongly recommended that rodenticides be avoided to control rodents during the project life cycle.
- To Prevent Collision – the overhead lines and other infrastructures must be fitted with Eskom-approved anti-bird collision devices/ bird flight diverters.
- Monitoring For A Year – during the operation phase, the monitoring of the site for bird mortality must be conducted by a qualified specialist.

- Mitigation measures, such as bird guards, bird diverters, insulation of pylons, habitat buffers, and strict construction-phase management, are proposed to reduce risks to avifauna.

Environmental Impact Statement from this assessment

The proposed project is largely going to transform the area due to habitat loss and local species displacement. Overall, the species observed are locally tolerant to disturbance and adaptive, with no unique or sensitive micro-habitat identified. A pre-construction assessment during the dry or winter season must be conducted. It is herewith the specialist's experience, knowledge, and opinion, supported by literature and this field survey evidence, that the proposed Phase 2 GILIMBERG SPV 2, 200MW Cluster solar PV Facility and Associated Infrastructure, including its 2km overhead connecting line to Boruto Eskom substation, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province, should be considered at this stage. Provided that all recommendations in this report and all relevant ones are adhered to. Importantly, under the condition that, during the construction and operations stage, a monitoring within the footprint is conducted for at least a full year period. Provided strict adherence to mitigation and monitoring protocols to safeguard avifaunal diversity in the region.

3. Structure of the Report

The following report has been compiled in accordance with the EIA regulations, 2014 as outlined in Government Notice (GN), R982 and the Birdlife South African best practice guidelines for birds and solar energy (Jenkins et al, 2017). A summary of the report structure is outlined below.

Requirements of Appendix 6 – GN R326 2014 EIA Regulations, 7 April 2017	Page in the Report
1. (1) A specialist report prepared in terms of these Regulations must contain a) details of: i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	66
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	xiii
c) an indication of the scope of, and the purpose for which, the report was prepared;	1
cA. an indication of the quality and age of base data used for the specialist report;	2
cB. a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	42
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	17
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its	40

associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	
g) an identification of any areas to be avoided, including buffers;	40
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	40
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	2
k) any mitigation measures for inclusion in the EMPr;	51
l) any conditions for inclusion in the environmental authorisation;	52
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	51 and 52
n) a reasoned opinion i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	52
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A

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5. List

AIP	Alien Invasive Plant
BGIS	Biodiversity Geographic Information System
BUFFER ZONE	A zone established around areas that are identified as sensitive for bats and includes flyways, foraging areas and bat roosts.
CBA	Critical Biodiversity Areas
CMS	Conservation of Migratory Species
CR PE	Critically Endangered (Possibly Extinct
CR	Critically Endangered
CUMULATIVE IMPACT	Impacts created due to past, present, and future activities and impacts associated with these activities.
DDD	Data Deficient— Insufficient Information
DWS	Department of Water and Sanitation
EAA	Environmental Authorisation Application
EAP	Environmental Assessment Practitioners
EC	Ecological Categories
EIS	Ecological Importance and Sensitivity
EMPR: ENVIRONMENTAL MANAGEMENT PROGRAMME	A legally binding working document that stipulates environmental and socio-economic mitigation measures to be implemented by several responsible parties throughout the proposed project.
EN	Endangered
GA	General Authorisation

GN R	General Regulation
GPS	Global Positioning System
IBAs	Important Biodiversity Areas
IUCN	International Union for Conservation of Nature
QGIS	Quantum Geographic Information System
LC	Least Concern
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NEMWA	Waste Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
NWA	National Water Act
PES	Present Ecological Status
POSA	Plants of South Africa
PROJECT AREA OF INFLUENCE (PAOI)	Project Area of Influence: the area that is affected by the proposed development.
RDL	Red Data Listed
SACNASP	South African Council for Natural Scientific Professionals
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species
VU	Vulnerable

6. DECLARATION OF INDEPENDENCE

Sediba Sa Metse (Pty) Ltd and its members/co-workers/staff:

- Acted independently,
- Have no vested interest in the property studied, nor is it affiliated with any other person/body involved with the property and/or proposed development,
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed as set and mandated by relevant environmental legislation,
- Declare that remuneration and/or any financial gains for this study provided by the client are not subject to or based on or influenced by any of the (Abantu Environmental Services) (Pty) Ltd client's authorities, directors, or anyone in association with.
- 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 NEMA (Environmental Impact Assessment Regulations, 2014, as amended).
- Reserve the right to modify/add aspects of the present investigation should additional information become available through ongoing research and/or further work in this field.
- We reserve the right to perform our duties free from any external influence, but only base our conclusions, points, and facts on scientific information and experience.

1. First Specialist: Mr Prince Molokomme, MSc in Zoology and Life Sciences

: 

2. Second Specialist: Mr Rebotile Rachuene, Hons. Enviro Sciences and Nat.

Conservation

: 

INDEMNITY

The client has total responsibility and powers to implement the recommendation (s) of this report.

This report is based on survey and assessment techniques, which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.

This report is based on a desktop investigation using available information and data related to the site to be affected, in fieldwork, surveys, and assessments, and the specialists' best scientific and professional knowledge.

The Precautionary Principle has been applied throughout this investigation.

The findings, results, observations, conclusions and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of the study.

Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.

The specialist reserves the right to modify this report, recommendations, and conclusions at any stage should additional information become available.

Information and recommendations in this report cannot be applied to any other area without proper investigation.

This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.

Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

I, Mokgatla Molepo, in my capacity as a specialist consultant, hereby declare the content of this report:



Rebotile Rachuene, Pr.Nat. Sci. 154249

7. Introduction

Abantu Environmental Services appointed Sediba Sa Metse (Pty) Ltd to undertake an Avifaunal Impact Assessment for the basic assessment process for a proposed Phase 2 GILIMBERG SPV 2, 200MW Cluster solar PV Facility and Associated Infrastructure, including its 2km overhead connecting line to Boruto Eskom substation, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province. The proposed 305ha site is located approximately 30km north of Mokopane, outside Sekuruwe village, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province. The proposed development of a solar facility, by its nature, has a direct impact on birds. A screening site visit and pre-construction bird monitoring site visits were conducted on-site.

The development of renewable energy infrastructure in South Africa is a national priority under the Integrated Resource Plan (IRP, 2019), aimed at diversifying the energy mix and reducing reliance on coal. However, the establishment of large-scale solar projects requires careful evaluation of potential ecological impacts, particularly where proposed footprints intersect with sensitive biodiversity areas. This report intends to investigate the species diversity, sensitive areas and suggest mitigation that will be implemented to minimize any predicted impact the powerline would have on the birds.

A need for an avifaunal (birdlife) assessment for solar farms is essential to avoid and minimize the possible negative impacts of solar energy on the birds in that region. Solar farms have been known to increase the chances of bird mortality by collision and burning. As per the prescribed of the legislation, EIA Regulations 2014 of The National Environmental Management Act (Act No. 10, 1998). This assessment is required and undertaken by specialists. It also adhered to the protocol as described by the “**Best Practices Guidelines: Birds & Solar Energy, by A.R. Jenkins, et.al., 2017,**”

8. The scope of work for the project:

- Assessing the bird species, including species of concern that occur and may occur around the proposed powerline
- Assess the habitats and ecological status and sensitivity within the proposed powerline
- Identify the potential impacts the development of powerlines will have on birdlife
- Recommend appropriate mitigation measures to combat and minimize/reduce the impacts

- Document the findings and produce the report

9. Terms Of Reference

Sediba Sa Metse (Pty) Ltd was appointed by Abantu Environmental Services (Pty) Ltd. to conduct an Avifaunal Impact Assessment for the proposed Sola Farm Plant on a 305ha Area, and its 2km Powerline - Mokopane, Limpopo Province. This survey is intended to give a full picture of the status of the bird diversity, potential impacts, and recommended mitigation measures for the proposed activities.

- The terms of reference for this study are as follows:
- Assessing the list of bird species, including species of concern that occur and may occur around areas of the proposed solar farm
- Assess the habitats and ecological status and sensitivity within the proposed solar farm
- Identify the potential impacts the development of the powerline will have on birdlife
- Recommend appropriate mitigation measures to combat and minimize/reduce the impacts
- Document the findings and produce the report
- Align findings with Bird Life South Africa solar guidelines and the Draft Avian Protocol for solar facilities

10. Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- Surveys conducted March 2026 (Autumn), limiting detection of annual, ephemeral, and some migratory species.
- Methods used: vehicle transects, on-foot walks, and key-point sampling; possible bias from noise or limited spatial coverage.
- Avian list reflects only species directly or indirectly observed; cryptic, nocturnal, and some priority taxa likely under-recorded.
- Nesting and foraging areas may have been missed due to the short survey duration.

- Secondary datasets (SABAP2, CWAC, literature) are assumed to be accurate and sufficient, as no recent detailed studies exist for the site.
- Overall assessment constrained by time, seasonality, and data gaps; further monitoring is recommended.

Sediba Sa Metse (Pty) Ltd exercises reasonable skill, care, and diligence in the provision of its services. However, it accepts no liability or consequential liability for the use of the supplied project deliverables (in part or whole) and any information or material contained therein. The client, including their agents, employees, contractors and subcontractors, by receiving these deliverables, indemnifies Sediba Sa Metse (Pty) Ltd (including its members, employees, and sub-consultants) against any actions, claims, demands, losses, liabilities, costs, damages and expenses arising directly or indirectly from or in connection with services rendered, directly or indirectly.

The project deliverables, including the reported results, comments, recommendations and conclusions, are based on the author/s professional knowledge as well as available information. The study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of survey undertaken. Sediba Sa Metse (Pty) Ltd, therefore, reserves the right to modify aspects of the project deliverables if and when new/additional information becomes available from research or further work in the applicable field of practice or about this study. *All copyrights are reserved*

11. Background and Literature Review

South Africa is recognised globally as one of the most biodiverse countries, and Limpopo Province makes a major contribution through its rich savanna ecosystems, escarpment habitats, and extensive river systems that provide critical resources for a wide variety of birds. This richness faces growing pressure from increasing human populations, infrastructure expansion, and energy demand. The country has lost a significant portion of its biodiversity in the past decades as a result of anthropogenic activities such as agriculture, mining, urbanisation, and pollution, which continue to drive habitat loss and fragmentation (Wright et al., 2018).

These pressures are particularly pronounced in Limpopo, where expanding settlement and agricultural development intersect with sensitive habitats that support Species of Conservation Concern, including large terrestrial birds, raptors, and waterbirds (Taylor et al., 2015; Taylor & Peacock, 2018). In response to climate change and energy security concerns, South Africa has invested heavily in renewable energy, particularly solar power. Limpopo, with its high solar radiation, is a key area for this transition (Fluri, 2009; Walwyn & Brent, 2015).

The clearing of vegetation for panel installation and associated infrastructure results in habitat loss, degradation, and displacement of species (Lovich & Ennen, 2011). Ground-nesting and wide-ranging species such as bustards, cranes, and vultures are especially vulnerable to these disturbances because they depend on large, open landscapes that are increasingly fragmented by development (BirdLife South Africa, 2017).

Globally, the impacts of solar facilities on birds are not yet fully understood, but evidence is growing. Mortality can occur from collisions with panels, mistaken for open water surfaces due to polarised light, a phenomenon termed the “lake effect” (Horváth et al., 2009; Kagan et al., 2014). This risk is particularly relevant where solar arrays are located near wetlands or migratory corridors. Studies in North America have documented significant bird fatalities linked to solar PV developments, highlighting that waterbirds and migratory species are often disproportionately affected (Walston et al., 2016). Although similar data from South Africa remain limited, the potential for such impacts exists, especially given Limpopo’s mix of seasonal wetlands, riparian systems, and migratory pathways.

Indirect effects of solar farms also alter avifaunal dynamics. For example, construction activities involving clearing, excavation, vehicle movement, and noise can disturb sensitive species during breeding or roosting periods, leading to permanent displacement from suitable habitats (Müllner et al., 2004). The presence of new structures such as panels, fences, and

service roads can also attract novel species that exploit perching, nesting, or foraging opportunities, thereby changing local community composition (DeVault et al., 2014). Conversely, sensitive species such as large raptors may avoid these areas due to disturbance or perceived risk, resulting in a reduction in habitat availability (BirdLife South Africa, 2017).

The broader energy infrastructure associated with solar facilities, including substations and transmission lines, compounds these risks. Powerlines pose significant threats to large-bodied, heavy-winged birds such as vultures, storks, and cranes, which are prone to collisions due to their flight morphology and behaviour (Bevanger, 1998; Jenkins et al., 2010). Electrocution risks further threaten species like vultures and eagles that perch on pylons, often bridging live wires and completing circuits (Ledger & Annegarn, 1981; Lehman et al., 2007). In Limpopo, this is of special concern because the province supports important populations of Cape Vulture (*Gyps coprotheres*) and other large raptors that utilise cliffs, ridges, and tall structures for breeding and roosting (Endangered Wildlife Trust, 2018).

Despite these risks, the shift to solar energy also has positive environmental implications, particularly by reducing reliance on fossil fuels and mitigating climate change (Pickett & Cadenasso, 2008; Walwyn & Brent, 2015). Solar farms can also create novel habitats, for instance, evaporation ponds that may benefit certain waterbirds, although these features can equally act as ecological traps if poorly designed (Hernandez et al., 2014). Thus, while the ecological trade-offs of solar energy are complex, careful site selection, mitigation, and monitoring are critical to minimising impacts. BirdLife South Africa's guidelines for solar energy developments emphasise the need for robust baseline studies, impact assessment, and long-term monitoring to ensure that projects such as this proposed one proceed sustainably and without irreversibly compromising Limpopo's avifaunal diversity (BirdLife South Africa, 2017; Jenkins et al., 2017).

12. Relevant Legislation and Compliance

Project Area of Influence (PAOI)

The **Project Area of Influence (PAOI)** includes all areas that may be affected directly or indirectly by the proposed development.

For the Phase 2 Gilimberg project, the PAOI includes:

- The development footprint, including solar panels, inverters, and associated infrastructure;
- All access roads, cabling routes, and powerline connections;
 - Areas affected by indirect impacts, including:
 - Dust generation
 - Noise disturbance
 - Soil erosion and runoff
 - Alteration of natural drainage patterns

The PAOI was used to assess ecological receptors, including vegetation communities, fauna, and SCC, in line with the Species Environmental Assessment Guideline

Protocol Compliance Statement

This Assessment has been conducted in accordance with:

- The Species Environmental Assessment Guideline (2022);

The assessment included:

- Use of the Environmental Screening Tool and verification of sensitivity;
- A desktop assessment using national biodiversity datasets (SANBI BGIS, Red Lists, POSA);
- A field-based assessment to confirm habitat condition and species presence;
- Identification and assessment of Species of Conservation Concern (SCC);
- Evaluation of ecological sensitivity, impacts, and mitigation measures in accordance with protocol requirements.

The Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) – Section 24.

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights, in which basic human rights are enshrined. The government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the NWA, the NEMA, etc.

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended.

NEMA replaces a number of provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance, and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration, and implementation of the Act with regard to the protection and/ or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that “sustainable development requires the consideration of all relevant factors, including aspects specifically relevant to biodiversity.”

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits arising from bioprospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA.

Protected Areas Act of 2003 (Act 57 of 2003)

The Protected Areas Act promotes the establishment and management of formally protected areas. It promotes the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes. These may be at all national, provincial and local levels. It advocates the management of those areas in accordance with national norms and standards; for intergovernmental cooperation and public consultation in matters concerning protected areas; and for matters in connection therewith. Only areas listed as protected areas under the Protected Areas Act contribute to the protected areas network. The Protected Areas Act allows for the declaration of a protected area on state, private or communal land and for the landowner to be recognised as the management or co-management authority of a protected area in certain instances (Taylor and Peacock, 2018).

Conservation of Agricultural Resources Act (Act 43 of 1983)

The Conservation of Agricultural Resources Act provides for the regulation and control over the utilisation of natural agricultural resources to promote the conservation of soil, water, and vegetation, and provides for combating weeds and invasive plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants, and those listed

under Category 1 are prohibited and must be controlled, while those listed under Category 2 must be grown within a demarcated area under a permit. Category 3 includes ornamental plants that may no longer be planted, but existing plants may remain, provided that all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

Convention on the Conservation of Migratory Species (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned 22 with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 117 (as of 1 June 2012) Parties from Africa, Central and South America, Asia, Europe and Oceania. South Africa is a signatory to this convention.

Convention on Biological Diversity (CBD)

This global treaty promotes the conservation of biological diversity, sustainable use of its components, and equitable sharing of benefits arising from the use of genetic resources. South Africa, as a signatory, is committed to integrating biodiversity considerations into national and local planning.

National Biodiversity Strategy and Action Plan (NBSAP)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for the management and conservation of South Africa's biodiversity within the framework of NEMA for the protection of species and ecosystems that warrant national protection; for the sustainable use of indigenous biological resources; for the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; for the establishment and functions of a South African National Biodiversity Institute (SANBI); and for matters connected therewith. It provides for the coordinated management, conservation and sustainable use of biodiversity across the whole country. The Biodiversity Act is key for threatened bird species as well as threatened ecosystems.

Limpopo Environmental Management Act (LEMA)

LEMA is provincial legislation aimed at conserving biodiversity and managing natural resources in Limpopo Province. It addresses matters such as the protection of provincial nature reserves, management of protected species, and regulation of environmental activities within sensitive areas, including Critical Biodiversity Areas (CBAs). The project area falls within

both CBA 1 and CBA 2, making LEMA provisions particularly relevant to development planning and biodiversity protection in this case.

Other Relevant Legislation and Guidelines:

Biodiversity management plans (BMP); and

National Biodiversity Assessment 2018 (NBA).

The NBA is a periodic assessment of the state of South Africa's biodiversity. It is a project that consists of multi-party stakeholders and is led by SANBI. In this project, the government, through SANBI, intends to monitor and report on the country's biodiversity.

13. Project Locality

The proposed project site is located at (23°54'5.85" S and 29° 1'2.35" E), approximately 2 km west of Mars village, about 7km east of N11, and 30km north of Mokopane town, in the Mogalakwena Local Municipality, Waterberg District, Limpopo (Figure 1). The proposed site is about 305ha as well as the 2km overhead powerline connecting the PVC with the Boruto Eskom substation. This assessment also covered its 200-300m buffer in the aspect of avifaunal study.

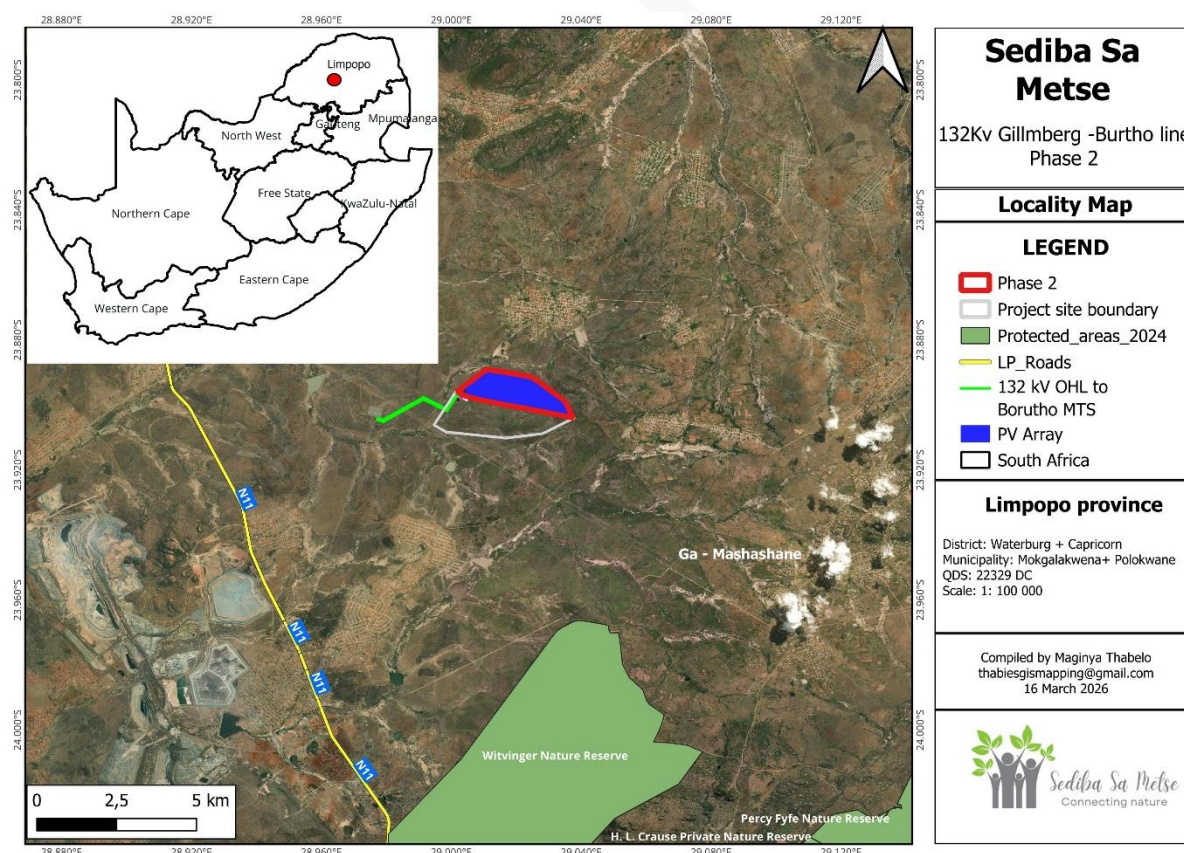


Figure 1: Locality of the proposed Phase 2 Gilimberg Solar PV

14. Receiving Environment.

The study area was assessed through a desktop review of available avifaunal and environmental data, supplemented by field surveys conducted on **12–16 March 2026**. The survey provided a snapshot of habitat conditions and avifaunal presence within the Project Area of Influence (PAOI), with results considered sufficient to inform habitat suitability, ecological sensitivity, and the likelihood of occurrence of Species of Conservation Concern (SCC), although seasonal variation may not be fully represented

Climate

Summer rainfall with very dry winters. MAP from about 400 mm in the northwest to about 600 mm where it borders on the foot of mountains to the east and south. Frost is fairly infrequent. Mean monthly maximum and minimum temperatures for Polokwane are 33.2°C and 0.6°C for October and June, respectively (Mucina and Rutherford, 2006).

Vegetation

Vegetation units are broadly classed and may include several distinct vegetation communities within a unit (Mucina and Rutherford, 2006). The vegetation type found on the study site is Makhado Sweet Bushveld and Polokwane Plateau Bushveld, Figure 2

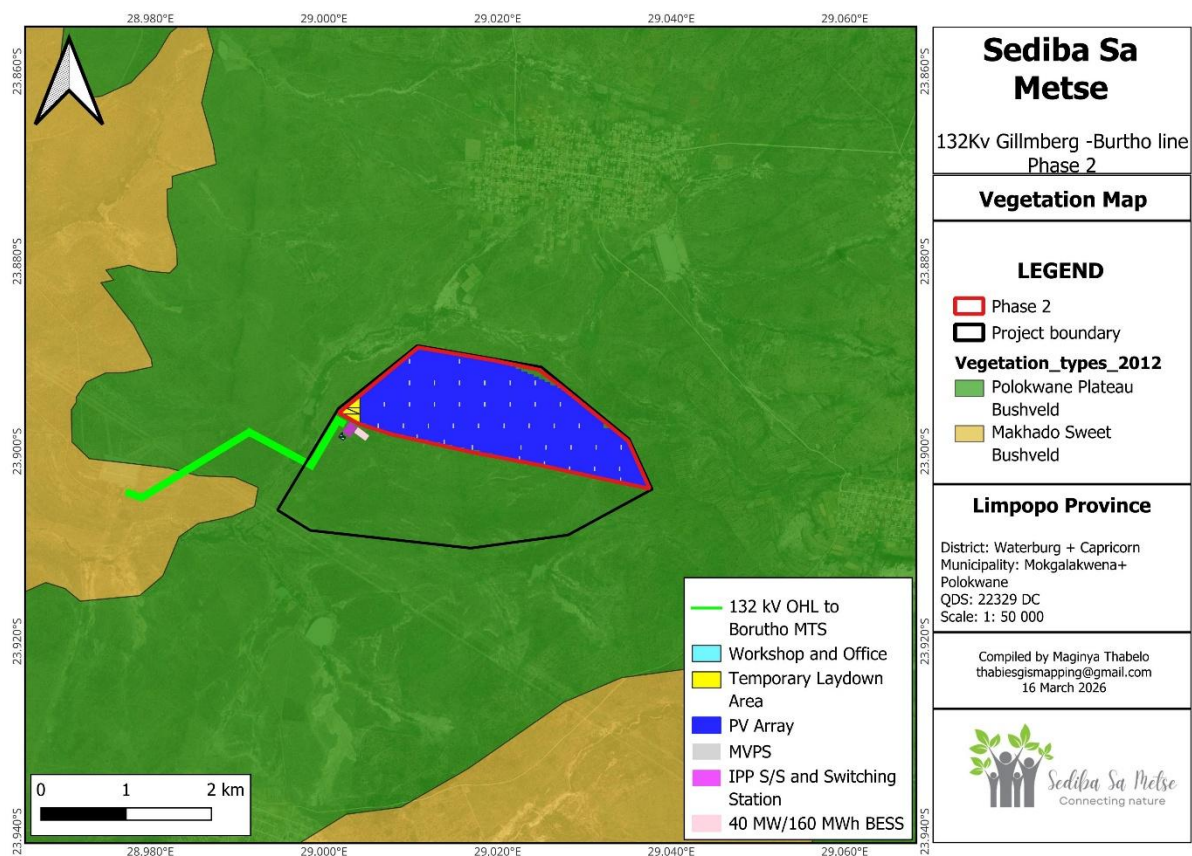


Figure 2: Vegetation type within the proposed Phase 2 Gilimberg Solar PV.

Makhado Sweet Bushveld

Distribution

Limpopo Province: Straddling the Tropic of Capricorn, it occurs on the plains south of the Soutpansberg, east of the Waterberg, and on the apron surrounding the Blouberg and Lerataupje Mountains, and north of the Polokwane Plateau and west of the escarpment, with extensions to Mokopane to the south and to the north near Vivo. Altitude about 850–1 200 m.

Vegetation & Landscape Features

Slightly to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poorly developed grass layer.

Conservation

Vulnerable. Target 19%. About 1% statutorily conserved, mainly in the Bellevue Nature Reserve. Some 27% transformed, mainly by cultivation, with some urban and built-up areas.

The southwestern half of the unit is home to densely populated rural communities. Erosion is low to high.

Polokwane Plateau Bushveld

Distribution

Limpopo Province: The higher-lying plains around Polokwane, north of the Strydpoort Mountains and south of the Makhado Sweet Bushveld. Altitude about 1,100– 1,500 m.

Vegetation & Landscape Features

Moderately undulating plains with short open tree layer with a well-developed grass layer to grass plains with occasional trees at higher altitudes (for example, the Mashashane area in the southwest and the southeastern watershed of the Sand River catchment, such as around Eersteling). Hills and low mountains of the Mamabolo Mountain Bushveld are embedded within this unit.

Conservation

Least threatened according to remote sensing sources, but with over one-third of the remaining vegetation regarded as degraded, it would probably be regarded as susceptible. Target 19%. Less than 2% statutorily conserved mainly in the Percy Fyfe and Kuschke Nature Reserves. In addition, 0.7% conserved in other reserves, for example, the Polokwane Game Reserve. Some 17% transformed, including about 10% cultivated and 6% urban and built-up. A dense concentration of rural human settlements is found particularly in the eastern and northwestern parts of the unit. In some regions, scattered populations of alien *Agave*, *Jacaranda mimosifolia*, *Melia azedarach*, *Opuntia ficus-indica*, and *Ricinus communis* are of concern. Erosion is high to moderate.

Limpopo Conservation Overview

Application of the Limpopo Conservation Plan v2 to the Project Area

The Limpopo Conservation Plan v2 provides a spatial framework to guide land-use planning and biodiversity conservation within Limpopo Province. It identifies areas essential to meeting biodiversity targets and maintaining ecological processes.

Where development is proposed within areas classified as CBA 1, CBA 2, or ESA, these areas are considered environmentally sensitive and require careful management to avoid or minimise impacts on biodiversity. The presence of CBAs or ESAs within or adjacent to the proposed Citrus Farm Extension indicates that biodiversity considerations must be incorporated into project planning, design, and implementation.

The Limpopo Conservation Plan v2 is designed to inform environmental impact assessments and land-use decision-making, but it does not replace the need for site-specific ecological assessments. Detailed field verification is required to confirm the site's ecological condition and sensitivity and to guide appropriate mitigation measures.

According to the Limpopo Conservation Plan version 2 (LCPv2) (2013), the study area is classified as CBA2 (Figure 3).

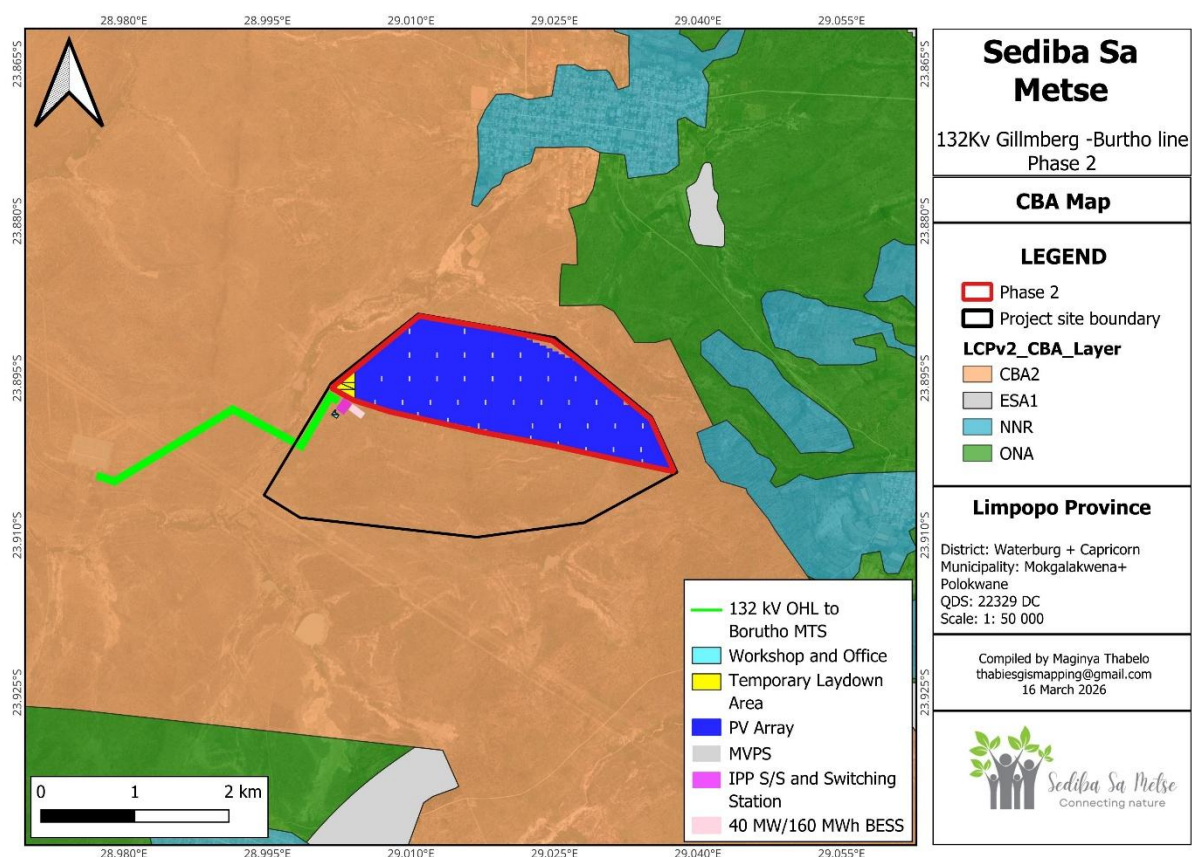


Figure 3: The CBA of the site and the surrounding

15. Birdlife Overview

Of a total of 856 South African bird species, at least 132 are regionally threatened or near threatened (Taylor and Peacock, 2018). Raptors, for instance, in South Africa are declining at a very alarming rate. The most threatened species on solar farms are pipits and larks, of which none were sighted during field surveys.

Raptors and other large birds in the Limpopo savanna biome are particularly sensitive to disturbance and habitat loss, as many require extensive territories, undisturbed

nesting areas, and suitable hunting grounds to persist. Within the Gilimberg Solar Farm area, SABAP2 and other citizen science data indicate the presence of key species such as the White-backed Vulture (*Gyps africanus*), Bateleur (*Terathopius ecaudatus*), and Martial Eagle (*Polemaetus bellicosus*) (see Appendix II & III). These species are either regionally threatened or of high conservation concern due to declining populations linked to habitat transformation, poisoning, and collision or electrocution on energy infrastructure.

Martial Eagles and Tawny Eagles (*Aquila rapax*) are wide-ranging apex predators of the savanna, requiring large home ranges and tall trees for nesting, and they are highly vulnerable to human disturbance. The Bateleur, another savanna specialist, has undergone substantial declines in southern Africa and is sensitive to habitat fragmentation and reduced prey availability. White-backed Vultures are dependent on safe nesting colonies and open foraging areas, but are severely threatened across their range by poisoning, electrocution, and reduced food supply. These large soaring species are of particular concern because their flight behaviour makes them vulnerable to collisions with tall infrastructure associated with solar developments and grid connections. Other notable raptors recorded include the African Fish Eagle — *Haliaeetus vocifer*

Steppe Buzzard — *Buteo buteo vulpinus*, Lanner Falcon (*Falco biarmicus*), and Brown Snake Eagle (*Circaetus cinereus*), all of which are important indicators of ecosystem health in savanna landscapes. Beyond raptors, large terrestrial birds such as the Kori Bustard (*Ardeotis kori*) and ground-nesting species like the Secretarybird (*Sagittarius serpentarius*) are also significant, as they rely on extensive tracts of open savanna and are highly sensitive to disturbance, fragmentation, and habitat conversion.

Collectively, these species highlight the ecological importance of the mopane-dominated savanna in northern Limpopo. The presence of vultures, eagles, and large terrestrial birds underscores the need for careful impact assessment of these taxa, as these taxa are both ecologically significant and highly vulnerable to habitat alteration, disturbance during construction, and risks associated with solar and transmission infrastructure.

Birds of the Project Site and Mokopane Areas

According to various sources, this assessment suggests over 300 of southern Africa's endemic and near-endemic avifaunal species are found within the project site. Various habitats found along the proposed solar farm result in a large number of diverse bird species. Even though the proposed solar farm does not fall within any of the Important Biodiversity/Bird Areas (IBAs), at least within a 5km radius.

The Red List bird species that are likely to occur or have been recorded in the area before are presented in Table 1 below. As per the data of The South African Bird Atlas Project, these species are found within the area. These are species of concern (SOC) as per the Red List Categories of the International Union for Conservation of Nature (IUCN, 2016).

Table 1: Red List Species likely to occur in the area.

Scientific_name	Common_name	Conservation status
<i>Aquila nipalensis</i>	Steppe Eagle	Endangered
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable
<i>Ardeotis kori</i>	Kori Bustard	Near Threatened
<i>Gyps africanus</i>	White-backed Vulture	Critically Endangered
<i>Gyps coprotheres</i>	Cape Vulture	Vulnerable
<i>Polemaetus bellicosus</i>	Martial Eagle	Endangered
<i>Sagittarius serpentarius</i>	Secretarybird	Endangered
<i>Terathopius ecaudatus</i>	Bateleur	Endangered
<i>Torgos tracheliotos</i>	Lappet-faced Vulture	Endangered

16. Methodology

Literature Review and Desktop Assessment

Before the field survey, the following desktop activities were taken to attain the current status of the birds in the areas where the powerline will be. Applications such as Google Earth Pro (version 3) and Quantum Geographic Information Systems (QGIS 3.28.0) were used to establish present and past imagery of the terrain while identifying these ecosystems.

A literature review of publications related and relevant to the study area and province was undertaken (see list [References](#)). These were essential mainly during the identification of species, assessment guidelines, processes, and protocols relevant to birds (red list), as well as verification of some of the bird sightings that may have been reported. Other resources visited and consulted include;

- The recent “Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. (Jenkins, Ralston-Paton & Smit-Robinson, 2017) was consulted for guidance on relevant aspects and for pre-construction bird monitoring requirements for the site.
- SANBI Institute’s Biodiversity-GIS Map Viewer and database *Biodiversity Data* (sanbi.org) to access and view current aquatic systems from the study area,
- **Title: Lee ATK, Rose S, Banda S, Bezeng SB, Maphalala MI, Maphisa DH, Smit-Robinson HA (eds), *The 2025 Red Data Book of Birds of South Africa, Lesotho and Eswatini*. Johannesburg, South Africa: BirdLife South Africa) – an updated and peer-reviewed conservation status assessment of the 856 bird species occurring in South Africa, including the Prince Edward Islands, Lesotho and Swaziland.**
 - This is accessible on [Red Data Book - BirdLife South Africa](#)
- The Important Bird & Biodiversity Areas (IBBA or IBA) programme of BirdLife South Africa was consulted (Marnewick, Retief, Theron, Wright, & Anderson, 2015). There are no IBBA’s within close proximity to the proposed SEF.
 - These are the concepts used and accepted worldwide by the communities to safeguard the birdlife of the area. They serve as important habitats for a diverse number of birds. Recently, the IBA’s concept has been used even in other areas, such as in marine biodiversity, as compared to when it was initially

created for terrestrial areas. The Important Bird and Biodiversity Areas (IBAs) are:

- Places identified under strict criteria and of international significance for the conservation of birds and other biodiversity
 - Distinctive areas recognized worldwide as practical tools for conservation.
 - Sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment
- Bird distribution data from the South African Bird Atlas Projects 1 and 2 were obtained (April 2026) to ascertain which bird species occur in the study area (Harrison *et al.* 1997, SABAP 2, at pentad [SABAP2 Coverage: 2350 2900](#) and [SABAP2 Coverage: 2350 2855](#) , see Figure 4
 - iNaturalist – the area refined to the project site is accessible at the link below, with at least 47 species reported/observed. (accessed on: April 2026)
 - https://www.inaturalist.org/observations?nelat=-23.23114618347739&nelng=29.526872632837293&order_by=observed_on&q=Birds&subview=map&swlat=-24.487044833323832&swlng=28.658952710962293&taxon_id=3&view=species&iconic_taxa=Aves
 - Coordinated Water-bird Count (Animal Demography Unit) was also consulted to check all the water birds existing within the project footprint
 - Latest available versions of the Vegetation Map of South Africa (e.g., South African National Biodiversity Institute, 2018, and Mucina & Rutherford, 2006).

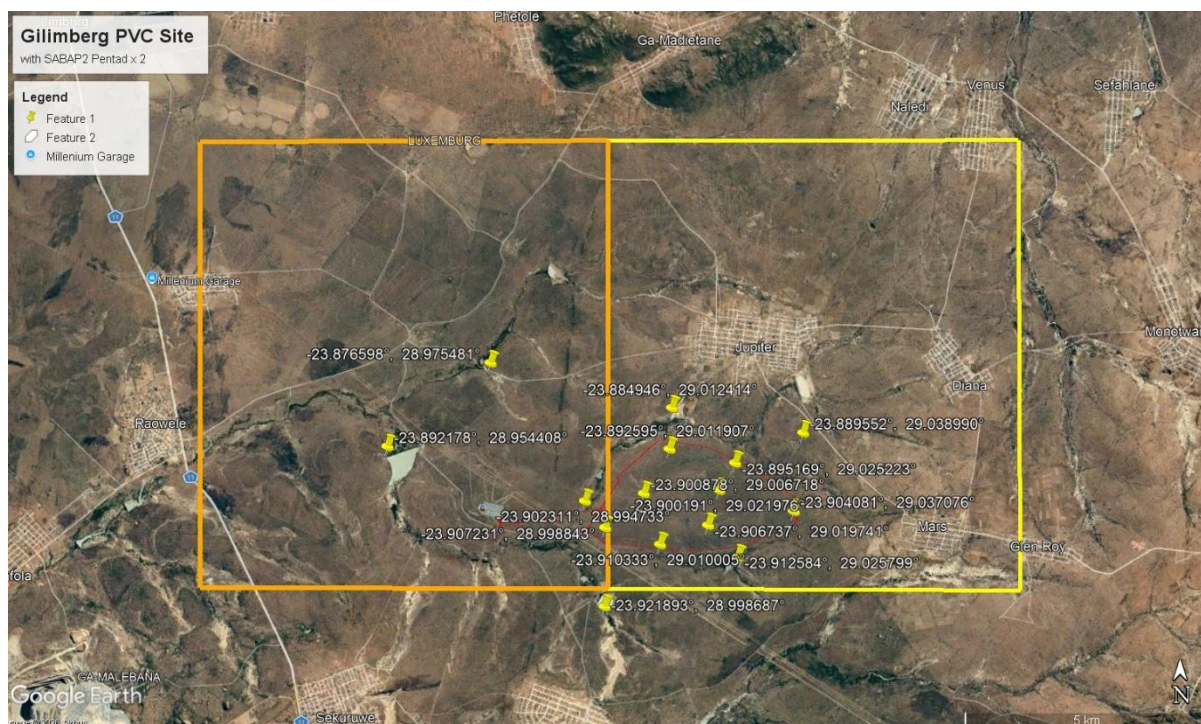


Figure 4: The SABAP2 pentad of the site

Site Sensitivity Verification

Remote sensing and assessment of the area were performed prior to the site/field visit. As part of the site sensitivity verification, the available data and information (such as of [Literature Review and Desktop Assessment](#)) was also used in this process. Mainly, this process aimed at identifying all the key ecosystems, micro-habitats, and features that may occur within the area and present the suitable habitats for SSC birds.

As a legal requirement, a report generated from the national web-based environmental screening tool, 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, is mandatory compliant as from 4 October 2019. During environmental authorization submission as in terms of regulation 19 and regulation 21 of the Environmental Impact Assessment Regulations, 2014, this Screening Tool Report must be provided with the assessment report.

For instance, the protocols state that if any of the themes (agriculture, avifauna, biodiversity (terrestrial and aquatic), noise, defense, and civil aviation) is rated High or Medium Sensitivity, it is imperative to conduct a full and rigorous assessment and report its findings. The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring environmental assessment.

Based on the Screening Tool report generated for this proposed project, the **Avian Theme** was rated *Very High Sensitivity*,” (Figure 5) and that is due to the “Colonies within 50km.” which is likely to be of the **Critically Endangered** White-backed Vulture. And whilst the development site is located within the Critical Biodiversity Area (CBA), the faunal and floral themes are on **Medium Sensitivity**, and the Terrestrial Theme is rated **Very High Sensitivity**, Figure 6).

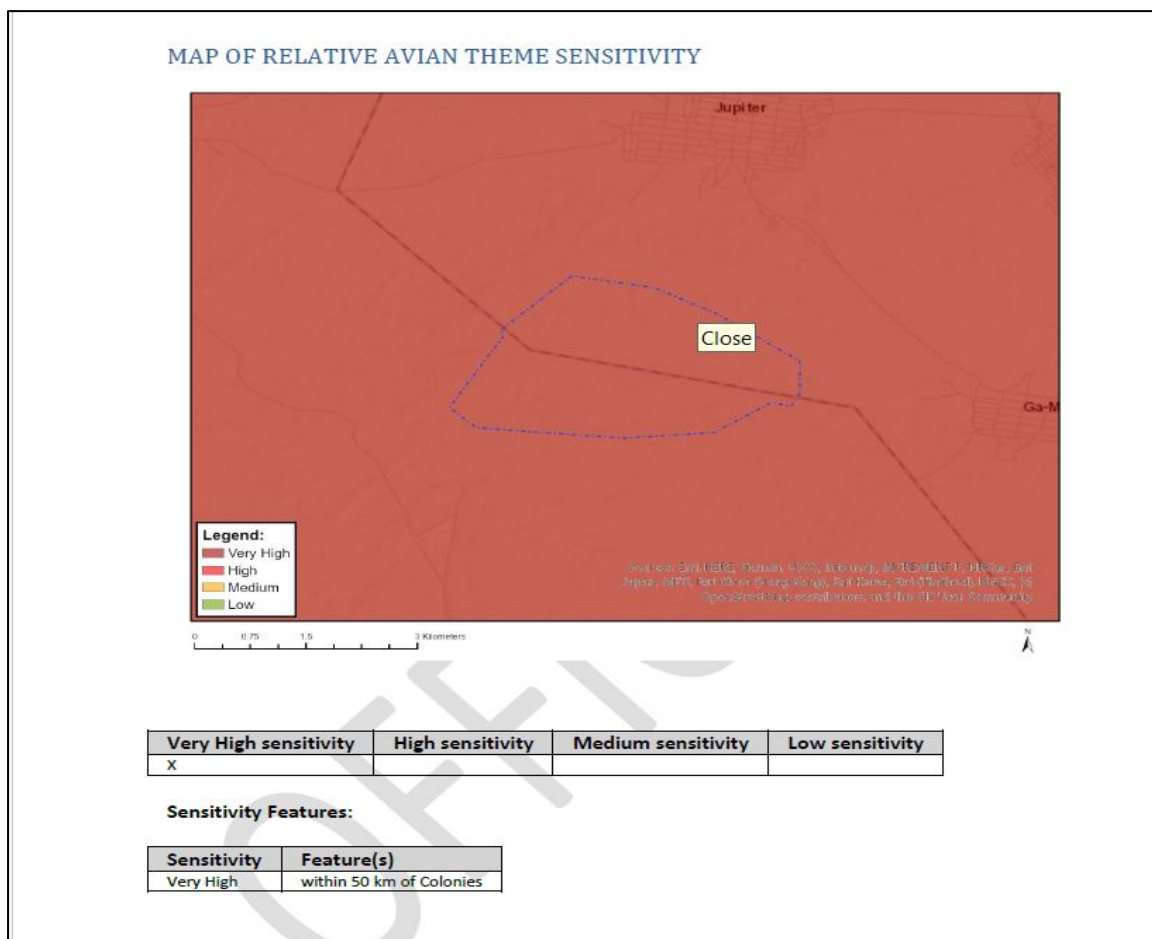


Figure 5: Screening Tool result for Avian Theme

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Avian Theme	X			
Civil Aviation (Solar PV) Theme				X
Defence Theme				X
Landscape (Solar) Theme	X			
Paleontology Theme			X	
Plant Species Theme			X	
RFI Theme			X	
Terrestrial Biodiversity Theme	X			

Figure 6: Screening Tool results for all themes.

In-Field Assessment Approach

Following the desktop review, the literature review, and the Screening Tool exercise, this assessment referred to the key technical approach and standard for commencing the site/field assessment.

In accordance with the Best Practice Guidelines: Birds and Solar Energy: Guidelines for monitoring the impact of solar power generating facilities on birds in southern Africa (Jenkins et al, 2017), the following key points were made: the proposed solar farm is over **305ha** in size and rated **High Sensitivity** by the Screening Tool on Avian Theme, and the recommended monitoring is presented in [Table 2](#). Therefore, the project is at **Stage 2** (Data Collection to inform application process) under **Regime 3** ([Figure 7](#) and [Figure 8](#)). This means that this assessment covers the **First** and **Second** stages of the four (4) to be conducted within the 12-month period pre and post construction phase of the project.

Table 2: The Recommended Monitoring for Proposed Project guided by *Jenkins, et al., 2017*

Assessment Number	First Assessment	Second Assessment	Third Assessment	Fourth Assessment
Project Footprint	~305ha			
Screening Tool Result	Very High Sensitivity			
Regime	Regime 3 (4 – 5 pre- and post-construction visits spread over 12 months)			
Stage Number	Stage 1	Stage 2	Stage 3	Stage 4
Stage of Protocol	Preliminary assessment	Data Collection	Impact Assessment	Monitoring
Method	Desktop	Site Assessment		
Stage of Project	Plan Environmental Authorisation (EA) application	Informs the Environmental Authorisation (EA) application		During and post-construction
Period	1 x 1-3 Days	1 x 5 Days	2 x 4 – 8 Days	

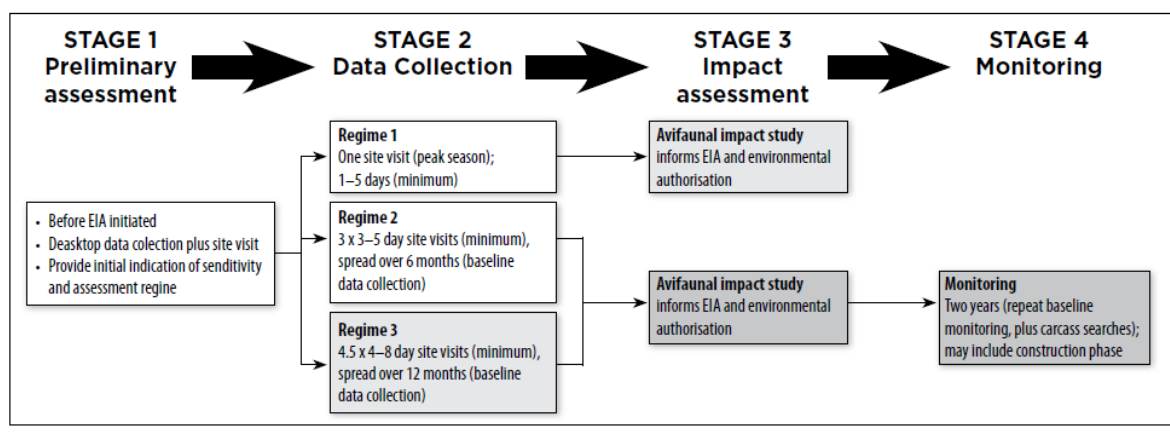


Figure 7: Assessment Stages of Solar Farm Development (from Jenkins, *et al.*, 2017)

Table 1. Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

Regime 1: One site visit (peak season); minimum 1-5 days.

Regime 2: Pre- and post-construction; minimum 2-3 x 3-5 days over 6 months (including peak season); carcass searches.

Regime 3: Pre- and post-construction; minimum 4-5 x 4-8 days over 12 months, carcass searches.

Type of technology ¹	Size ²	Avifaunal Sensitivity ³		
		Low	Medium	High
All except CSP power tower	Small (<30 ha)	Regime 1	Regime 1	Regime 2
	Medium (30-150 ha)	Regime 1	Regime 2	Regime 2
	Large (> 150 ha)	Regime 2 ⁴	Regime 2	Regime 3
CSP power tower	All	Regime 3		

Figure 8: Recommended regimes related to solar farm (from Jenkins, *et al.*, 2017).

In-field assessment approach

Before the field survey, all the survey points and transects were marked and identified through the Google Earth application and verified on foot, in one day (12 March 2026). This is a wet season (October – April) survey for the project.

The points were strategically identified based on the locality and characteristics of the surroundings/habitats. These points were either the ridges, deep slopes, drainage lines, or open bushveld.

Equipment and materials

Four prominent cellphone applications (Sasol eBook - for Bird Species Identification; Geo Tracker Version 5.1.5 - for marking and recording the points, and Birdlasser Version 1.0.8 Build 8 - for recording and keeping of the species identified and behaviour, and iNaturalist app for sound recording and bird documentation) were used together with a notebook and black pen to gather/capture the data. The specialist used a pair of binoculars and a digital camera for photographing some of the birds observed.

Vintage Points or Fixed Point Survey

More than 30 points were identified and surveyed. These points were visited and used to gather information on birdlife around the proposed solar farm. Two specialist observers sat down close to each other, facing opposite directions. Each observer with a pair of binoculars will observe at least a 180° view to collect data. The observations from all these points were during the day. At each point, at least 20-45 minutes were spent recording the appropriate data. The data collected includes;

- Identify and record the species
- behavior it was recorded displaying (e.g., flying, perching, calling, or singing)
- GPS coordinates of the species

Bird micro habitats

Some of the points were placed around or at the micro-habitats to cover a variety of representative areas of the study area. It is important to understand that some of the birds will dwell and live in the smaller habitats available to them. These microhabitats from this study area were identified as drainage lines, as well as the bushveld areas. The points were placed

at these habitats to conduct surveys, as they are known to be home to several species and are also at high risk of collision with the solar plants.

Transects On Foot Survey

On-foot surveys were taken and strategically undertaken in the areas where there will be less access for vehicles to drive, or where points cannot be placed. At least 10 of these transects, ranging from 10 to 300m were made along various sites of the lines. At each transect, a minimum of 20 minutes was spent walking quietly and slowly into the area while recording all birds, either seen, heard calling, or/their remains such as feathers and nests.

On Roads Survey (drive)

Two observers with binoculars were using a 4x4 bakkie to drive on the roads around the proposed site. These roads run mainly all around the project site, (see blue line in [Figure 9](#)). The speed driven was less than 20km/h. Only species flying past the observers and those perching in the trees, ground, and structures were recorded.

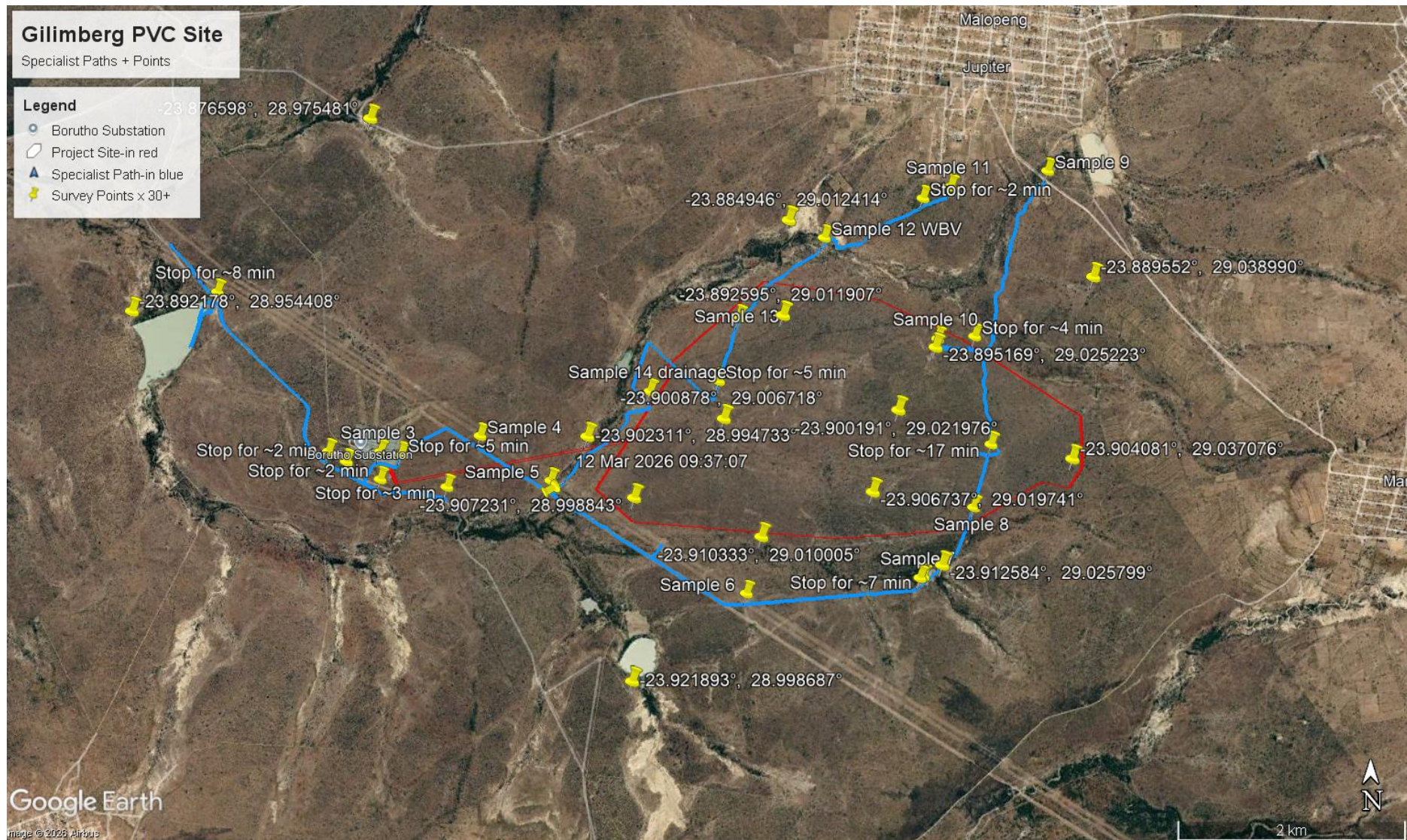


Figure 9: The Observers' Trails during field assessment.



Figure 10: Observers during field assessment at the proposed site for Phase 2.

17. Results

It is widely accepted that birds are good indicators of biodiversity status and habitat conditions (review: Koskimies 1989; Potts et al. 2014; Bregman *et al.* 2016). It is therefore imperative to assess the status of the birdlife in an area before any development in compliance with the relevant legislation (Jenkins, *et al.*, 2017; NEMA Act No. 107 of 1998).

Vegetation and Habitat

According to the Limpopo Conservation Plan version 2 (LCPv2) (2013), the study area is classified as CBA2 (Figure 2 and Figure 3 above). The project site falls within two vegetation types, the **Makhado Sweet Bushveld (Vulnerable)** and **Polokwane Plateau Bushveld (Least Concern)**, (SANBI 2018). The locality of the proposed solar farm is at the site that has been historically used for farming and currently utilized for livestock grazing and wood collection, amongst others.



Figure 11: Makhado Sweet Bushveld



Figure 12: Polokwane Plateau Bushveld

Avifaunal

Desktop and third-party results

According to both SABAP1 and SABAP2, from two pentads (2350_2855 and 2350_2900), there are around 600 species (see [Appendix I: Potential Species Likely to Occur \(SABAP 2\)](#)) potential to occur within and around the project footprint. The species may directly or indirectly be affected by the proposed development through many means, such as noise, displacement, and habitat loss, amongst others. Whilst the iNaturalist identifies at least 47 species of potential to occur, [Observations · iNaturalist](#). There are species of conservation concern (SCC) such as African Fish-Eagle (*Ichthyophaga vocifer*) and Secretarybird (*Sagittarius serpentarius*).

This assessment did not observe these two species, but highly potential due to the terrain and habitat availability.

Field Assessment Results

This assessment confirmed at least 73 bird species from the proposed site, including its Project Area Of Influence (PAOI), covering around a 200-300m buffer. Most of these species are common residents and resistant to fragmentation or land change.

- At least 73 bird species have been observed directly, either flying, perching, feeding, and interacting, from the project footprint, including the PAOI.
- Over 80% of these species are provincial species of conservation concern (LEMA).
- There is an IBBA (Witvinger Nature Reserve) about 7km south of the project site.
- Nationally protected and Critically Endangered species, the White-backed Vulture (*Gyps africanus*) was observed soaring within the area, but no nesting or roosting sites (trees) are present within the footprint (including the 500m site buffer)
 - The White-backed Vulture, generally colonial nesters, typically concentrated either in tall trees along watercourses or in open woodland areas (Mundy *et al.* 1992). This characteristic is not observed or suitable; therefore, the area is not suitable for nesting but for foraging/feeding (due to potential livestock carcasses from the local communities)
- The habitat and general area present the habitat for the Secretary bird as well as the Fish Eagle but were not observed during this assessment.

The drainage lines surrounding the project site may present suitable habitats for diverse species, but no SCC waterbird was observed. In general, the majority of these species were observed more than twice in their habitat within the project site. However, there were the most widespread species such as Fork-tailed Drongo, Southern Yellow-billed Hornbill, Red-faced Mousebird, Common Bulbul, and Golden-breasted Bunting. [Table 3](#) and [Figure 13](#) below presents about 73 bird species observed and recorded in the area of the proposed solar farm during this survey.

Table 3: The list of bird species observed during this survey

No.	Scientific names	Common names	IUCN Status	Protected species	Observation
1	<i>Accipiter badius</i>	Shikra	LC	LEMA protected	Seen
2	<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC		Seen
3	<i>Ardea ibis</i>	Western Cattle Egret	LC	LEMA protected	Seen
4	<i>Ardea melanocephala</i>	Black-headed Heron	LC	LEMA protected	Seen
5	<i>Aviceda cuculoides</i>	African Cuckoo-Hawk	LC	LEMA protected	Seen
6	<i>Brunhilda erythronotos</i>	Black-faced Waxbill	LC	LEMA protected	Seen
7	<i>Calendulauda sabota</i>	Sabota Lark	LC	LEMA protected	Seen
8	<i>Centropus burchellii</i>	Burchell's Coucal	LC	LEMA protected	Seen
9	<i>Cercotrichas leucophrys</i>	White-browed Scrub Robin	LC	LEMA protected	Seen
10	<i>Charadrius tricollaris</i>	Three-banded Plover	LC	LEMA protected	Seen

11	<i>Cinnyris mariquensis</i>	Marico Sunbird	LC	LEMA protected	Seen
12	<i>Cinnyris talatala</i>	White-bellied Sunbird	LC	LEMA protected	Seen
13	<i>Circaetus cinereus</i>	Brown Snake Eagle	LC	LEMA protected	Seen
14	<i>Circaetus pectoralis</i>	Black-chested Snake Eagle	LC	LEMA protected	Seen
15	<i>Cisticola chiniana</i>	Rattling Cisticola	LC	LEMA protected	Seen
16	<i>Cisticola fulvicapilla</i>	Neddicky	LC	LEMA protected	Seen
17	<i>Clamator levaillantii</i>	Levaillant's Cuckoo	LC	LEMA protected	Seen
18	<i>Colius striatus</i>	Speckled Mousebird	LC		Seen
19	<i>Coracias caudatus</i>	Lilac-breasted Roller	LC	LEMA protected	Seen
20	<i>Coracias garrulus</i>	European Roller	LC	LEMA protected	Seen
21	<i>Coracias naevius</i>	Purple Roller	LC	LEMA protected	Seen
22	<i>Corvus albus</i>	Pied Crow	LC		Seen
23	<i>Crinifer concolor</i>	Grey Go-away-bird	LC	LEMA protected	Seen
24	<i>Crithagra atrogularis</i>	Black-throated Canary	LC	LEMA protected	Seen

25	<i>Crithagra flaviventris</i>	Yellow Canary	LC	LEMA protected	Seen
26	<i>Crithagra mozambica</i>	Yellow-fronted Canary	LC	LEMA protected	Seen
27	<i>Curruca subcoerulea</i>	Chestnut-vented Warbler	LC	LEMA protected	Seen
28	<i>Dendrocygna viduata</i>	White-faced Whistling Duck	LC		Seen
29	<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC	LEMA protected	Seen
30	<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	LC	LEMA protected	Seen
31	<i>Gyps africanus</i>	White-backed Vulture	CR	LEMA protected	Seen
32	<i>Hieraaetus wahlbergi</i>	Wahlberg's Eagle	LC	LEMA protected	Seen
33	<i>Hirundo albigularis</i>	White-throated Swallow	LC	LEMA protected	Seen
34	<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	LEMA protected	Seen
35	<i>Lamprotornis nitens</i>	Cape Starling	LC	LEMA protected	Seen
36	<i>Laniarius atrococcineus</i>	Crimson-breasted Shrike	LC	LEMA protected	Seen

37	<i>Lanius collurio</i>	Red-backed Shrike	LC	LEMA protected	Seen
38	<i>Lanius minor</i>	Lesser Grey Shrike	LC	LEMA protected	Seen
39	<i>Lophoceros nasutus</i>	African Grey Hornbill	LC	LEMA protected	Seen
40	<i>Melaenornis mariquensis</i>	Marico Flycatcher	LC	LEMA protected	Seen
41	<i>Merops bullockoides</i>	White-fronted Bee-eater	LC	LEMA protected	Seen
42	<i>Mirafrā africana</i>	Rufous-naped Lark	LC	LEMA protected	Seen
43	<i>Numida meleagris</i>	Helmeted Guineafowl	LC		Seen
44	<i>Oena capensis</i>	Namaqua Dove	LC	LEMA protected	Seen
45	<i>Ortygornis sephaena</i>	Crested Francolin	LC	LEMA protected	Seen
46	<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC	LEMA protected	Seen
47	<i>Passer melanurus</i>	Cape Sparrow	LC		Seen
48	<i>Platalea alba</i>	African Spoonbill	LC	LEMA protected	Seen
49	<i>Plocepasser mahali</i>	White-browed Sparrow-Weaver	LC	LEMA protected	Seen

50	<i>Ploceus velatus</i>	Southern Masked Weaver	LC		Seen
51	<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	LEMA protected	Seen
52	<i>Pternistis natalensis</i>	Natal Spurfowl	LC		Seen
53	<i>Pternistis swainsonii</i>	Swainson's Spurfowl	LC		Seen
54	<i>Pycnonotus barbatus</i>	Common Bulbul	LC		Seen
55	<i>Pytilia melba</i>	Green-winged Pytilia	LC	LEMA protected	Seen
56	<i>Scopus umbretta</i>	Hamerkop	LC	LEMA protected	Seen
57	<i>Spilopelia senegalensis</i>	Laughing Dove	LC		Seen
58	<i>Sporopipes squamifrons</i>	Scaly-feathered Weaver	LC	LEMA protected	Seen
59	<i>Streptopelia capicola</i>	Ring-necked Dove	LC		Seen
60	<i>Sylvietta rufescens</i>	Long-billed Crombec	LC	LEMA protected	Seen
61	<i>Tchagra australis</i>	Brown-crowned Tchagra	LC	LEMA protected	Seen
62	<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill	LC	LEMA protected	Seen

63	<i>Tringa glareola</i>	Wood Sandpiper	LC	LEMA protected	Seen
64	<i>Upupa africana</i>	African Hoopoe	LC	LEMA protected	Seen
65	<i>Uraeginthus angolensis</i>	Blue Waxbill	LC	LEMA protected	Seen
66	<i>Uraeginthus granatinus</i>	Violet-eared Waxbill	LC	LEMA protected	Seen
67	<i>Urocolius indicus</i>	Red-faced Mousebird	LC		Seen
68	<i>Urolestes melanoleucus</i>	Magpie Shrike	LC	LEMA protected	Seen
69	<i>Vanellus armatus</i>	Blacksmith Lapwing	LC	LEMA protected	Seen
70	<i>Vanellus coronatus</i>	Crowned Lapwing	LC	LEMA protected	Seen
71	<i>Vidua macroura</i>	Pin-tailed Whydah	LC	LEMA protected	Seen
72	<i>Vidua regia</i>	Shaft-tailed Whydah	LC	LEMA protected	Seen
73	<i>Zosterops virens</i>	Cape White-eye	LC	LEMA protected	Seen



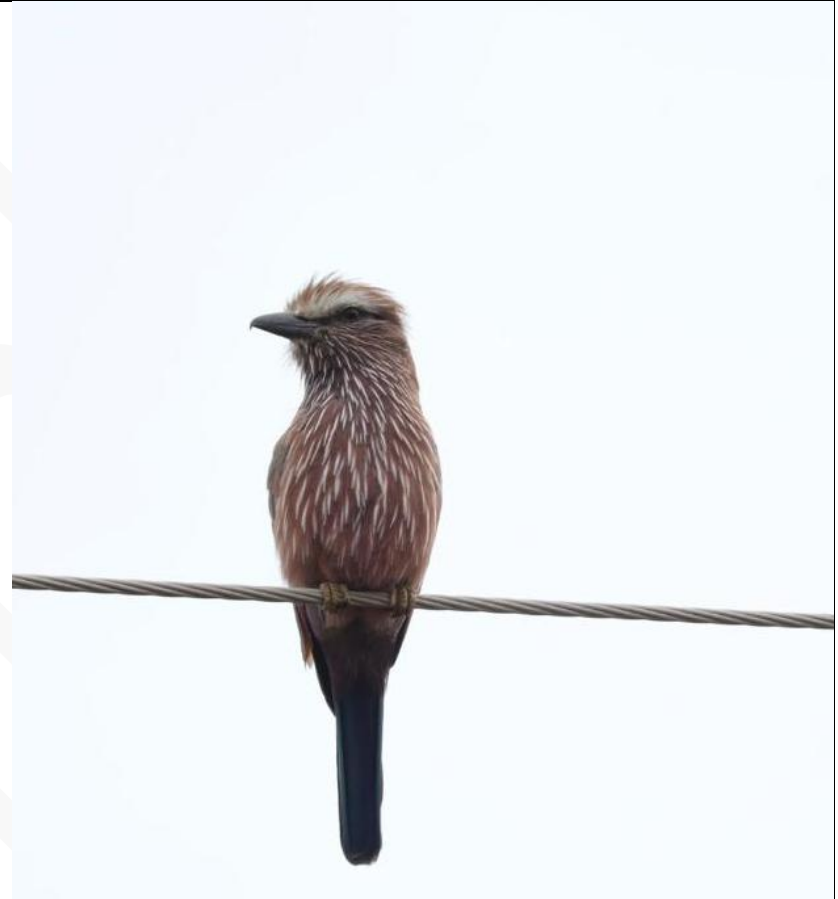
Southern, Yellow-billed Hornbill



Black-chested Snake Eagle



Burchell's Coucal



Purple Roller



Figure 13: Some birds were seen from the site.

Sensitivity Areas or habitat: Avifauna

The proposed Phase 2 Gilimberg Solar PV Farm is within the **bushveld** habitat type. This vegetation type presents a suitable habitat for a variety of species, see [Figure 15](#) and [Figure 16](#). The sensitivity of the solar farm to the avifauna was determined and presented below. The sensitivity of the area was determined to be **high** by the Screening Tool. This assessment, therefore, with the data thus far (e.g., drainage lines represented in red [Figure 14](#)), determined the project site, including its 500m buffer, to be **Medium Sensitive** and due to a lack of sensitive breeding habitats, and persisting impacts (overgrazing and tree cutting for wood). There is a Witvinger Nature Reserve, about 7km south of the project site, which must be regarded as an Important Biodiversity/Birds Area (IBAs), [Figure 14](#). However, the presence of the White-backed Vulture seen soaring in the sky must be noted.

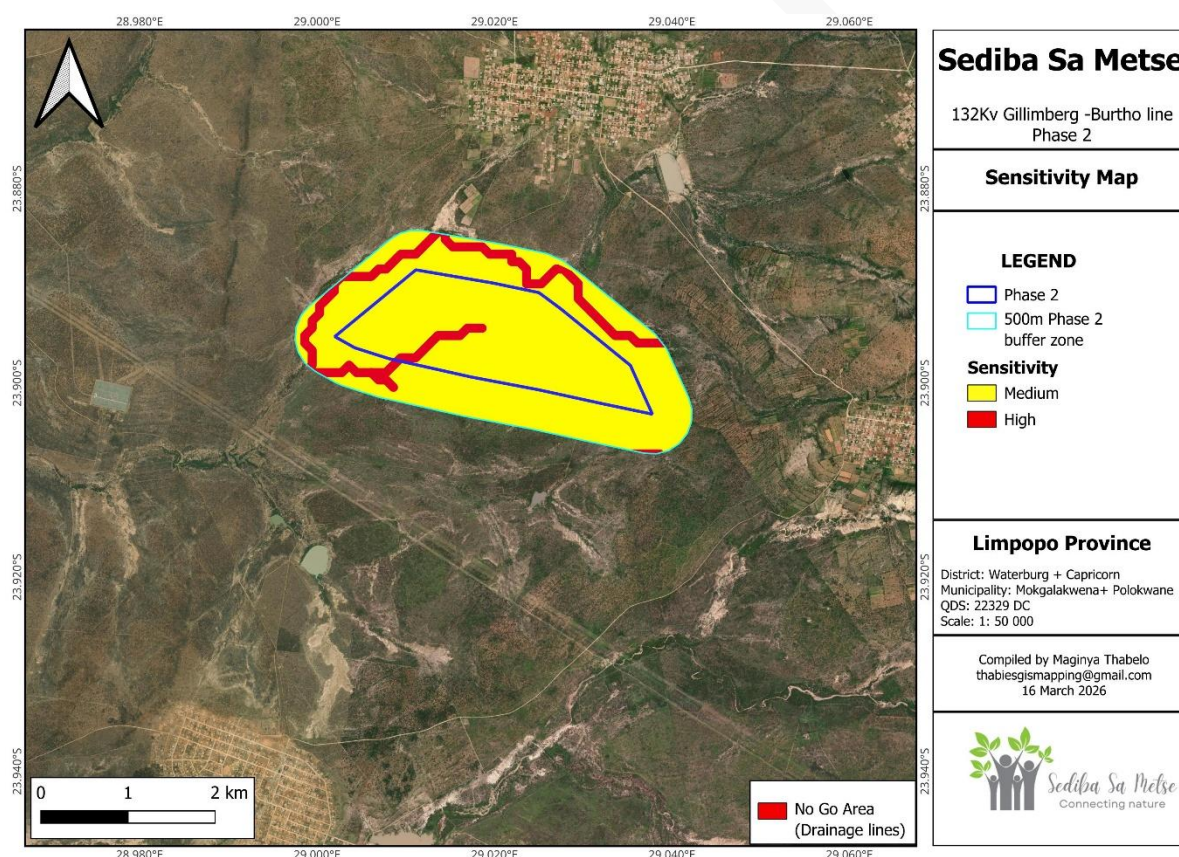


Figure 14: Sensitivity level of the project site.



Figure 15: Habitat type around the drainage line.



Figure 16: Bushveld of the project site.

18. IMPACT DESCRIPTION, ASSESSMENT AND MITIGATION

The potential impacts assessment was assessed based on the guidelines provided by the NEMA regulations (2014). Any development and its operations in a natural system will have an impact on the environment, usually in a negative way. It is vitally important during planning that all appropriate mitigation measures are developed. It is imperative for such developments to be prioritized and happen in areas that are already fragmented or modified (Edwards, *et al.*, 2018).

Table 4 below presents the guidelines used when assessing the significance of the potential impacts.

Table 4: The significance scoring for the impacts.

PROBABILITY	DURATION
<i>1-very improbable</i>	<i>very short duration (0-1years)</i>
<i>2-improbable</i>	<i>short duration (2-5 years)</i>
<i>3-probable</i>	<i>medium term (5-15 years)</i>
<i>4-high probable</i>	<i>long term (>15 years)</i>
<i>5-definite</i>	<i>permanent/unknown</i>
EXTEND	MAGNITUDE
<i>1- Limited to the site</i>	<i>2- minor</i>
<i>2- Limited to the local area</i>	<i>4- low</i>
<i>3-Limited to the region</i>	<i>6-moderate</i>
<i>4-National</i>	<i>8-high</i>
<i>5-International</i>	<i>10-very high</i>

The proposed Gilimberg solar farms potentially have the following impacts, as outlined in [Table 5](#) below. The proposed activity is likely to cause **permanent habitat loss and displacement of the local species** and cumulative impacts. The positioning of the project (surrounded by villages such as Mars, Jupiter, Sekuruwe) is fairly in the area subject to human influence and disturbance, with no Species of Conservation Concern recorded breeding or nesting within the 200m around the site.

Table 5: Potential Impacts identified for the proposed Gilimbergi Solar farm.

Impact	Stage of Construction	Without Mitigation	With Mitigation
Habitat Loss	Construction Stage	Moderate-High	High
	Operation Stage	Moderate	Low
Collision	Construction Stage	Low	Low
	Operation Stage	Moderate	Low
Electrocution	Construction Stage	Low	Low
	Operation Stage	Moderate-High	Low
Electromagnetic Fields (EMFs)	Construction Stage	Low	Low
	Operation Stage	Low	Low
Disturbance and Land Pollution	Construction Stage	Moderate	Low
	Operation Stage	Low	Low

Habitat Loss

Habitat loss, including disturbance to biodiversity, refers to the removal or alteration of natural plant and animal communities, which ultimately reduces species richness and ecosystem function (Brown et al., 2021). At the Phase 2 Gilimberg Solar Farm site, this impact is of particular concern because the area is dominated by over 90% of indigenous vegetation species. The site falls within the **Vulnerable Makhado Sweet Bushveld** and **Least Concern Polokwane Plateau Bushveld**. These bushvelds support over 600 bird species and this assessment confirmed at least 73 species in the project footprint. Construction activities such as vegetation clearing, grading, road development, and the establishment of temporary structures will therefore result in direct loss of habitat, disturb the natural corridor, and the displacement of the local residents and associated species. The cumulative effect of clearing large portions of bushveld for solar arrays, service roads, and security infrastructure is potentially significant.

Table 6: Potential Impact-Habitat Loss and Destruction.

Potential Impact (1): Habitat loss and destruction during the construction and operation of the solar farm								
	Construction Stage				Operation Stage			
	Without Mitigation		With Mitigation		Without Mitigation		With Mitigation	
Probability	4	high probable	3	probable	4	high probable	2	improbable
Duration	5	permanent	4	long term	5	permanent	4	long term
Extent	3	regional	2	local	3	regional	2	local

Magnitude	8	high	4	low	6	moderate	4	low
Significance (calc)	64	Moderate-High	27	Low	56	Moderate	20	Low
Status (N or P)	Negative		Negative		Negative		Negative	
Reversibility	Low		Low		Low		Low	
Irreplaceable loss of resources?	High		Medium		Medium		Medium	
Mitigation	· Limit vegetation clearance to the smallest footprint necessary.							
	· Avoid sensitive habitats such as drainage lines.							
	· Prioritise already disturbed or degraded areas for infrastructure placement.							
	· Maintain ecological corridors and buffer zones.							
	· A bird specialist must conduct pre-construction surveys (in the dry season) for Species of Conservation Concern.							
	· Rehabilitate disturbed areas not covered by panels or access roads.							
Can impacts be mitigated?	YES							
Cumulative impacts:	Clearance of habitat adds to habitat loss, especially if more solar facilities are established in Limpopo.							
Residual impacts	Even with mitigation, long-term loss of habitat within the project footprint is expected, though impacts can be reduced locally through careful siting and rehabilitation.							

Collision

Collision risk arises when birds in flight strike solar farm infrastructure, particularly associated transmission lines that connect the facility to the grid. Large soaring species such as vultures and eagles are especially vulnerable due to their wingspan, flight behaviour, and frequent use of thermal currents (McKechnie, 2016). While collisions with solar panels themselves are less documented in South Africa, some studies suggest a potential “lake effect,” where panels are mistaken for water bodies by certain species, leading to disorientation.

Table 7: Collision of birds.

Potential Impact (2): Collision of birds with solar farm: During the construction and operational stage of the solar farm.								
	Construction Stage				Operation Stage			
	Without Mitigation		With Mitigation		Without Mitigation		With Mitigation	
Probability	2	improbable	1	very improbable	4	high probable	2	improbable
Duration	2	short	1	very short	4	long term	3	medium term
Extent	2	local	1	site	3	regional	2	local
Magnitude	2	minor	2	minor	4	low	4	low

Significance	12	Low	4	Low	44	Moderate	18	Low
Status (N or P)	Negative		Negative		Negative		Negative	
Reversibility	Medium		Medium		Low		Medium	
Irreplaceable loss of resources?	Low		Low		Medium		Low	
Mitigation	Mark any overhead spans with flight diverters; avoid routing near known flyways; reduce night lighting; implement carcass-search monitoring with adaptive triggers.							
Can impacts be mitigated?	YES							
Cumulative impacts:	May add to regional bird mortality							
Residual impacts	With mitigation, only low-level, occasional collisions are expected, mainly involving wide-ranging species.							

Electrocution

Electrocution risk within a solar farm development is generally limited to supporting infrastructure such as substations, transformers, and overhead conductors within the facility boundary. While the photovoltaic panels and ground-mounted arrays themselves do not present a hazard, certain structures can attract large raptors and scavenging birds that may perch or attempt to roost (McKechnie, 2016).

Table 8: Electrocuting of birds when perched on towers.

Potential Impact (3): Electrocuting of birds when perched on towers, especially during the operational stage of the solar farm.									
	Construction Stage					Operation Stage			
	Without Mitigation		With Mitigation		Without Mitigation		With Mitigation		
Probability	1	Improbable	1	Improbable	5	High	2	Improbable	
Duration	2	Short	2	Short	4	Medium-Long	3	Medium	
Extent	2	Low	2	Low	4	Medium	2	Low	
Magnitude	4	Low	2	Medium	7	High	4	High	
Significance	8	Low	6	Low	75	High	18	Low	
Status (N or P)	Negative		Negative		Medium		Negative		
Reversibility	Low		Low		Low		Low		
Irreplaceable loss of resources?	Low		Low		Medium-high		Low		
Mitigation	• Electrocuting is likely if perching areas are not insulated.								
	• Fit Bird Guards on pylons/wires near sensitive areas (e.g., water bodies).								
	• More cost-effective to install insulators/diverters during construction.								

	• Insulate pylons, wires, and substation structures. • Follow Eskom Guidelines for installation.
Can impacts be mitigated?	YES
Cumulative impacts	Electrocution is more likely during operation; seasonal monitoring of key areas is required.
Residual impacts	Impact ceases at the end of the line of life.

Disturbance

Disturbance and land pollution are significant considerations during the development of a solar farm. The construction phase involves extensive human activity, including site clearing, movement of machinery, establishment of temporary structures, and increased noise levels. These activities can disrupt the breeding periods and behaviours of sensitive bird species, particularly ground-nesting raptors and bustards found in these vegetation types. Noise, vibration, and frequent human presence may lead to nest abandonment or reduced foraging efficiency, with potential long-term effects on local populations if disturbances coincide with critical breeding seasons. Land pollution may also occur through improper management of solid waste, oil leaks, chemical spills, and construction debris, which can degrade habitats and reduce the ecological integrity of the site.

Table 9: Disturbance of key habitats.

Potential Impact (4): Disturbance of key habitats and pollution of the surrounding environment during the operational stage of the solar farm				
	Construction Stage		Operation Stage	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation

Probability	4	Probable	2	Improbable	2	Improbable	1	Improbable
Duration	3	Medium	2	Short	2	Short	1	Short
Extent	2	Low	1	Low	1	Medium	1	Low
Magnitude	3	Low	2	Medium	2	High	2	High
Significance	32	Moderate	10	Low	10	Low	4	Low
Status (N or P)	Negative		Negative		Low		Negative	
Reversibility	Low		Low		Low		Low	
Irreplaceable loss of resources?	Low		Low		Low		Low	
Mitigation	• Keep all activities within the approved footprint.							
	• Provide designated waste areas with appropriate bins/skips.							
	• Dispose of chemicals/metal offcuts per the Waste Act.							
	• Manage noise and littering to avoid disrupting breeding periods.							
Can impacts be mitigated?	YES							
Cumulative impacts	Uncontrolled/mismanaged pollution and movement can disturb breeding aves.							
Residual impacts	With ongoing training, this can be managed.							

19. Proposed Mitigation Measures

- **Independent oversight:** Appoint a qualified avifaunal specialist to oversee all construction activities, maintain monitoring records (including photographic evidence), and guide adaptive management.
- **Habitat protection:** Limit vegetation clearing to essential areas only; avoid drainage lines that are around the project site and some inside the site.
- **Buffer zones and corridors:** Maintain ecological corridors and establish a minimum of 50m buffer zones around sensitive habitats (drainage lines) to reduce disturbance.
- **Noise and activity control:** Schedule noisy activities outside critical breeding seasons (summer period Oct – Feb); confine movement of machinery and personnel to designated routes and work areas.
- **Pollution management:** Duty of Care must be implemented. Provide designated waste storage and disposal facilities; manage chemical spills, oil leaks, and debris in line with the Waste Act.
- **Infrastructure precautions:** Install insulation and bird guards on pylons and substation structures during construction; fit line markers and diverters before grid connection.
- **Awareness training:** Train construction crews on avifaunal sensitivity, species of concern, and incident reporting procedures.
- **Monitoring:** Conduct mortality searches and inspections at least once every 30 days for a minimum of 12 months post-construction.

20. Conclusion and recommendations

The proposed Phase 2 GILIMBERG SPV 2, 200MW Cluster solar PV Facility and Associated Infrastructure, including its 2km overhead connecting line to Boruto Eskom substation, in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province, lies within a degraded site of CBA from [Makhado Sweet Bushveld](#) and [Polokwane Plateau Bushveld](#) of Limpopo Province, 30km north of Mokopane town. The site, including its PAOI, is subjected to persisting human-induced impacts such as livestock grazing, cutting of trees for subsistence farming and firewood, as well as hunting, amongst others.

The site is **medium**-sensitive to the development of this nature, as it will permanently destroy the vegetation for local species. The main risks relate to habitat transformation, disturbance, and interactions with solar and grid infrastructure.

The mitigation measures presented, including targeted habitat protection, specialist monitoring, infrastructure modifications, and pollution control, are reasonable and sufficient to reduce most impacts to low-medium significance. However, habitat loss is imperative, and probable and residual long-term habitat loss within the project footprint will occur.

- At least 73 bird species have been observed directly, either flying, perching, feeding, and interacting, from the project footprint, including the PAOI.
- Over 80% of these species are provincial species of conservation concern (LEMA)
- Nationally protected and Critically Endangered species, the White-backed Vulture (*Gyps africanus*) was observed soaring within the area, but no nesting or roosting sites (trees) are present within the footprint (including the 500m site buffer)
 - The White-backed Vulture, generally colonial nesters, typically concentrated either in tall trees along watercourses or in open woodland areas (Mundy et al. 1992). This characteristic is not observed or suitable; therefore, the area is not suitable for nesting but for foraging/feeding (due to potential livestock carcasses from the local communities)
- Drainage lines surrounding the project site may present suitable habitats for diverse species, but no SCC waterbird was observed

It is recommended that:

- Pre-construction – an impact assessment will be conducted pre-construction during **the dry season (May – August)** to identify and confirm/dispute the findings of this assessment. Preferably within 12 months prior to the construction phase starting.

- **Construction and operation** proceed only under the guidance of an independent avifaunal specialist.
- **Mitigation measures** should be implemented in full, with adaptive management applied if mortality or displacement exceeds expected thresholds.
- **Long-term monitoring** will be carried out, particularly on vultures, eagles, and large terrestrial birds, with reporting to relevant authorities and stakeholders.
- The project aligns its monitoring programme with **Birdlife South Africa's solar guidelines** and the **Draft Avian Protocol for solar facilities**.

Recommendations must be implemented. The proposed activities contribute to renewable energy goals while minimising risks to avifaunal diversity. It is herewith the specialist's experience, knowledge, and opinion, supported by literature and this field survey evidence, that the environmental permitting of this proposed project should be considered. Condition that, during the construction and operations stage, a monitoring of birds within the project site and the surrounding area will be conducted for at least a full year period. Provided strict adherence to mitigation and monitoring protocols to safeguard avifaunal diversity in the region.

21. References

- Acocks, J.P.H. 1988. *Veld types of South Africa*. 3rd ed. Memoirs of the Botanical Survey of South Africa 57: 1–146.
- Bevanger, K. 1998. Biological and conservation aspects of bird mortality caused by electricity power lines: a review. *Biological Conservation* 86: 67–76.
- BirdLife South Africa. 2017. *Birds and Solar Energy Guidelines*. Johannesburg.
- Brown, C., et al. 2021. Habitat loss and biodiversity impacts of renewable energy development. *Conservation Biology* 35: 1–12.
- DeVault, T.L., et al. 2014. Bird use of solar energy facilities. *Environmental Management* 53: 1111–1121.
- Endangered Wildlife Trust. 2018. *Vulture Conservation Strategy for South Africa*. Johannesburg.
- Fluri, T.P. 2009. The potential of concentrating solar power in South Africa. *Energy Policy* 37: 5075–5080.
- Hernandez, R.R., et al. 2014. Environmental impacts of utility-scale solar energy. *Renewable and Sustainable Energy Reviews* 29: 766–779.
- Horváth, G., et al. 2009. Polarized light pollution by photovoltaic panels. *Journal of Experimental Biology* 212: 176–181.
- Jenkins, A.R., et al. 2010. Avian collisions with power lines: a global review. *Biological Conservation* 143: 2893–2902.
- Jenkins, A.R., et al. 2017. *Avian monitoring protocols for renewable energy developments*. BirdLife South Africa.
- Kagan, R.A., et al. 2014. Avian mortality at solar energy facilities in California. *Wildlife Society Bulletin* 38: 429–436.
- Ledger, J.A. & Annegarn, H.J. 1981. Electrocution hazards to the Cape Vulture. *Biological Conservation* 20: 15–24.

- Lehman, R.N., et al. 2007. Raptor electrocution and distribution power lines. *Journal of Wildlife Management* 71: 2752–2762.
- Lovich, J.E. & Ennen, J.R. 2011. Wildlife conservation and solar energy development. *BioScience* 61: 982–992.
- McKechnie, A.E. 2016. Avian responses to renewable energy infrastructure. *South African Journal of Science* 112: 1–3.
- Mucina, L. & Rutherford, M.C. 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: SANBI.
- Müller, A., et al. 2004. Ecotourism impacts on hoatzin chicks. *Biological Conservation* 118: 549–558.
- Pickett, S.T.A. & Cadenasso, M.L. 2008. Linking ecological and built systems. *Ecology and Society* 13(2): 9.
- Taylor, M.R., Peacock, F. & Wanless, R.M. (eds.). 2015. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. BirdLife South Africa.
- Taylor, M.R. & Peacock, F. 2018. *State of South Africa's Birds Report 2018*. BirdLife South Africa.
- Walston, L.J., et al. 2016. Assessing impacts of solar energy on avifauna in the United States. *Renewable Energy* 94: 133–144.
- Walwyn, D.R. & Brent, A.C. 2015. Renewable energy and development in South Africa. *Renewable and Sustainable Energy Reviews* 41: 113–120.
- Wright, D.R., et al. 2018. Privately protected areas and biodiversity stewardship in South Africa. *Parks* 24(2): 25–38.

22. Appendix I: Potential Species Likely to Occur (SABAP 2)

Ref	Common_group	Common_species	Genus	Species
637		Neddicky	<i>Cisticola</i>	<i>fulvicapilla</i>
844		Quailfinch	<i>Ortygospiza</i>	<i>atricollis</i>
432	Barbet	Acacia Pied	<i>Tricholaema</i>	<i>leucomelas</i>
431	Barbet	Black-collared	<i>Lybius</i>	<i>torquatus</i>
439	Barbet	Crested	<i>Trachyphonus</i>	<i>vaillantii</i>
673	Batis	Chinspot	<i>Batis</i>	<i>molitor</i>
404	Bee-eater	European	<i>Merops</i>	<i>apiaster</i>
410	Bee-eater	Little	<i>Merops</i>	<i>pusillus</i>
812	Bishop	Yellow-crowned	<i>Euplectes</i>	<i>afer</i>
709	Boubou	Southern	<i>Laniarius</i>	<i>ferrugineus</i>
545	Bulbul	Dark-capped [x]	<i>Pycnonotus</i>	<i>barbatus</i>
872	Bunting	Cinnamon-breasted	<i>Emberiza</i>	<i>tahapisi</i>
874	Bunting	Golden-breasted	<i>Emberiza</i>	<i>flaviventris</i>
154	Buzzard	Common	<i>Buteo</i>	<i>buteo</i>
860	Canary	Black-throated	<i>Crithagra</i>	<i>atroregularis</i>
866	Canary	Yellow	<i>Crithagra</i>	<i>flaviventris</i>
630	Cisticola	Desert	<i>Cisticola</i>	<i>aridulus</i>
642	Cisticola	Rattling	<i>Cisticola</i>	<i>chiniana</i>
212	Coot	Red-knobbed	<i>Fulica</i>	<i>cristata</i>
47	Cormorant	White-breasted	<i>Phalacrocorax</i>	<i>lucidus</i>
621	Crombec	Long-billed	<i>Sylvietta</i>	<i>rufescens</i>
523	Crow	Cape	<i>Corvus</i>	<i>capensis</i>
522	Crow	Pied	<i>Corvus</i>	<i>albus</i>
352	Cuckoo	Diederik	<i>Chrysococcyx</i>	<i>caprius</i>
317	Dove	Laughing	<i>Spilopelia</i>	<i>senegalensis</i>
318	Dove	Namaqua	<i>Oena</i>	<i>capensis</i>

316	Dove	Ring-necked	<i>Streptopelia</i>	<i>capicola</i>
940	Dove	Rock	<i>Columba</i>	<i>livia</i>
517	Drongo	Fork-tailed	<i>Dicrurus</i>	<i>adsimilis</i>
100	Duck	White-faced Whistling	<i>Dendrocygna</i>	<i>viduata</i>
96	Duck	Yellow-billed	<i>Anas</i>	<i>undulata</i>
59	Egret	Little	<i>Egretta</i>	<i>garzetta</i>
61	Egret	Western Cattle	<i>Bubulcus</i>	<i>ibis</i>
114	Falcon	Lanner	<i>Falco</i>	<i>biarmicus</i>
661	Flycatcher	Marico	<i>Melaenornis</i>	<i>mariquensis</i>
654	Flycatcher	Spotted	<i>Muscicapa</i>	<i>striata</i>
174	Francolin	Crested	<i>Ortygornis</i>	<i>sephaena</i>
339	Go-away-bird	Grey	<i>Crinifer</i>	<i>concolor</i>
89	Goose	Egyptian	<i>Alopochen</i>	<i>aegyptiaca</i>
6	Grebe	Little	<i>Tachybaptus</i>	<i>ruficollis</i>
192	Guinea fowl	Helmeted	<i>Numida</i>	<i>meleagris</i>
54	Heron	Grey	<i>Ardea</i>	<i>cinerea</i>
418	Hoopoe	African	<i>Upupa</i>	<i>africana</i>
426	Hornbill	Southern Yellow-billed	<i>Tockus</i>	<i>leucomelas</i>
84	Ibis	Hadada	<i>Bostrychia</i>	<i>hagedash</i>
224	Korhaan	Red-crested	<i>Lophotis</i>	<i>ruficrista</i>
245	Lapwing	Blacksmith	<i>Vanellus</i>	<i>armatus</i>
458	Lark	Rufous-naped	<i>Mirafr</i>	<i>africana</i>
460	Lark	Sabota	<i>Calendulauda</i>	<i>sabota</i>
465	Lark	Short-clawed	<i>Certhilauda</i>	<i>chuana</i>
506	Martin	Rock	<i>Ptyonoprogne</i>	<i>fuligula</i>
392	Mousebird	Red-faced	<i>Urocolius</i>	<i>indicus</i>
390	Mousebird	Speckled	<i>Colius</i>	<i>striatus</i>
734	Myna	Common	<i>Acridotheres</i>	<i>tristis</i>

311	Pigeon	Speckled	<i>Columba</i>	<i>guinea</i>
692	Pipit	African	<i>Anthus</i>	<i>cinnamomeus</i>
695	Pipit	Buffy	<i>Anthus</i>	<i>vaalensis</i>
694	Pipit	Plain-backed	<i>Anthus</i>	<i>leucophrys</i>
237	Plover	Kittlitz's	<i>Charadrius</i>	<i>pecuarius</i>
238	Plover	Three-banded	<i>Charadrius</i>	<i>tricoloris</i>
650	Prinia	Black-chested	<i>Prinia</i>	<i>flavicans</i>
649	Prinia	Tawny-flanked	<i>Prinia</i>	<i>subflava</i>
830	Pytilia	Green-winged	<i>Pytilia</i>	<i>melba</i>
805	Quelea	Red-billed	<i>Quelea</i>	<i>quelea</i>
808	Red Bishop	Southern	<i>Euplectes</i>	<i>orix</i>
582	Robin-Chat	White-throated	<i>Cossypha</i>	<i>humeralis</i>
258	Sandpiper	Common	<i>Actitis</i>	<i>hypoleucos</i>
421	Scimitarbill	Common	<i>Rhinopomastus</i>	<i>cyanomelas</i>
586	Scrub Robin	Kalahari	<i>Cercotrichas</i>	<i>paena</i>
588	Scrub Robin	White-browed	<i>Cercotrichas</i>	<i>leucophrys</i>
867	Seedeater	Streaky-headed	<i>Crithagra</i>	<i>gularis</i>
711	Shrike	Crimson-breasted	<i>Laniarius</i>	<i>atrococcineus</i>
706	Shrike	Lesser Grey	<i>Lanius</i>	<i>minor</i>
708	Shrike	Red-backed	<i>Lanius</i>	<i>collurio</i>
786	Sparrow	Cape	<i>Passer</i>	<i>melanurus</i>
784	Sparrow	House	<i>Passer</i>	<i>domesticus</i>
4142	Sparrow	Southern Grey-headed	<i>Passer</i>	<i>diffusus</i>
484	Sparrow-Lark	Chestnut-backed	<i>Eremopterix</i>	<i>leucotis</i>
485	Sparrow-Lark	Grey-backed	<i>Eremopterix</i>	<i>verticalis</i>
780	Sparrow-Weaver	White-browed	<i>Plocepasser</i>	<i>mahali</i>
185	Spurfowl	Swainson's	<i>Pternistis</i>	<i>swainsonii</i>
737	Starling	Cape	<i>Lamprotornis</i>	<i>nitens</i>
745	Starling	Red-winged	<i>Onychognathus</i>	<i>morio</i>

755	Sunbird	Marico	<i>Cinnyris</i>	<i>mariquensis</i>
763	Sunbird	White-bellied	<i>Cinnyris</i>	<i>talatala</i>
493	Swallow	Barn	<i>Hirundo</i>	<i>rustica</i>
502	Swallow	Greater Striped	<i>Cecropis</i>	<i>cucullata</i>
503	Swallow	Lesser Striped	<i>Cecropis</i>	<i>abyssinica</i>
501	Swallow	Red-breasted	<i>Cecropis</i>	<i>semirufa</i>
387	Swift	African Palm	<i>Cypsiurus</i>	<i>parvus</i>
385	Swift	Little	<i>Apus</i>	<i>affinis</i>
383	Swift	White-rumped	<i>Apus</i>	<i>caffer</i>
714	Tchagra	Brown-crowned	<i>Tchagra</i>	<i>australis</i>
97	Teal	Red-billed	<i>Anas</i>	<i>erythrorhyncha</i>
514	Tit	Ashy	<i>Melaniparus</i>	<i>cinerascens</i>
531	Tit	Cape Penduline	<i>Anthoscopus</i>	<i>minutus</i>
686	Wagtail	Cape	<i>Motacilla</i>	<i>capensis</i>
658	Warbler	Chestnut-vented	<i>Curruca</i>	<i>subcoerulea</i>
841	Waxbill	Black-faced	<i>Brunhilda</i>	<i>erythronotos</i>
839	Waxbill	Blue	<i>Uraeginthus</i>	<i>angolensis</i>
843	Waxbill	Common	<i>Estrilda</i>	<i>astrild</i>
840	Waxbill	Violet-eared	<i>Uraeginthus</i>	<i>granatinus</i>
789	Weaver	Scaly-feathered	<i>Sporopipes</i>	<i>squamifrons</i>
803	Weaver	Southern Masked	<i>Ploceus</i>	<i>velatus</i>
791	Weaver	Spectacled	<i>Ploceus</i>	<i>ocularis</i>
852	Whydah	Long-tailed Paradise	<i>Vidua</i>	<i>paradisaea</i>
846	Whydah	Pin-tailed	<i>Vidua</i>	<i>macroura</i>
847	Whydah	Shaft-tailed	<i>Vidua</i>	<i>regia</i>
447	Woodpecker	Golden-tailed	<i>Campethera</i>	<i>abingoni</i>
614	Wren-Warbler	Barred	<i>Calamonastes</i>	<i>fasciolatus</i>

23. Appendix II: Potential Species Likely to Occur (other citizen science data, e.g., iNaturalist data), including there status.

scientific name	common name	Conservation status
<i>Acridotheres tristis</i>	Common Myna	Exotic
<i>Actitis hypoleucos</i>	Common Sandpiper	LC
<i>Actophilornis africanus</i>	African Jacana	LC
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	LC
<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC
<i>Amadina erythrocephala</i>	Red-headed Finch	LC
<i>Amadina fasciata contigua</i>	Buffy Cut-throat Finch	LC
<i>Anaplectes rubriceps</i>	Red-headed Weaver	LC
<i>Anas erythrorhyncha</i>	Red-billed Teal	LC
<i>Anastomus lamelligerus</i>	Openbill Stork	LC
<i>Anhinga rufa rufa</i>	Mainland African Darter	LC
<i>Anthus cinnamomeus</i>	Grassveld Pipit	LC
<i>Anthus leucophrys</i>	Plain-backed Pipit	LC
<i>Apalis flavida</i>	Yellow-breasted Apalis	LC
<i>Aquila nipalensis</i>	Steppe Eagle	Endangered
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable
<i>Aquila spilogaster</i>	African Hawk Eagle	LC
<i>Aquila verreauxii</i>	African Black Eagle	LC
<i>Ardea cinerea</i>	Grey Heron	LC
<i>Ardea goliath</i>	Goliath Heron	LC
<i>Ardea ibis</i>	Western Cattle-Egret	LC
<i>Ardea melanocephala</i>	Black-headed Heron	LC
<i>Ardeotis kori</i>	Kori Bustard	Near Threatened
<i>Aviceda cuculoides</i>	African Cuckoo-Hawk	LC
<i>Batis molitor</i>	Chinspot Batis	LC
<i>Bostrychia hagedash hagedash</i>	Southern Hadedash	LC
<i>Botaurus sturmii</i>	Dwarf Bittern	LC
<i>Bubalornis niger</i>	Red-billed Buffalo-Weaver	LC
<i>Bubo africanus</i>	Spotted Eagle-Owl	LC
<i>Buphagus africanus</i>	Yellow-billed Oxpecker	LC
<i>Buphagus erythrorhyncha</i>	Red-billed Oxpecker	LC
<i>Burhinus capensis capensis</i>	Southern Spotted Dikkop	LC
<i>Burhinus vermiculatus</i>	Water Thick-knee	LC
<i>Buteo buteo</i>	Common Buzzard	LC
<i>Butorides striata</i>	Striated Heron	LC
<i>Bycanistes bucinator</i>	Trumpeter Hornbill	LC
<i>Calendulauda sabota</i>	Sabota Lark	LC
<i>Calidris minuta</i>	Little Stint	LC
<i>Camaroptera brachyura</i>	Green-backed Camaroptera	LC
<i>Campethera abingoni suahelica</i>	Pale Goldentail Woodpecker	LC

<i>Campethera bennettii</i>	Bennett's Woodpecker	LC
<i>Caprimulgus europaeus</i>	Eurasian Nightjar	LC
<i>Caprimulgus fossii</i>	Mozambique Nightjar	LC
<i>Caprimulgus pectoralis</i>	Fiery-necked Nightjar	LC
<i>Caprimulgus tristigma</i>	Freckled Nightjar	LC
<i>Caprimulgus vexillarius</i>	Pennant-winged Nightjar	LC
<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC
<i>Cecropis senegalensis</i>	Mosque Swallow	LC
<i>Centropus burchellii burchellii</i>		LC
<i>Centropus grillii</i>	Black Coucal	LC
<i>Centropus senegalensis</i>	Senegal Coucal	LC
<i>Cercotrichas leucophrys</i>	White-browed Scrub Robin	LC
<i>Ceryle rudis</i>	Pied Kingfisher	LC
<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	LC
<i>Chlorocichla flaviventris</i>	Yellow-bellied Greenbul	LC
<i>Chlorophoneus sulfureopectus similis</i>	Southern Orange-breasted Bushshrike	LC
<i>Chloropicus namaquus</i>	Bearded Woodpecker	LC
<i>Chrysococcyx caprius</i>	Diederik Cuckoo	LC
<i>Ciconia ciconia</i>	White Stork	LC
<i>Ciconia microscelis</i>	African Woolly-necked Stork	LC
<i>Ciconia nigra</i>	Black Stork	LC
<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	LC
<i>Cinnyris talatala</i>	White-bellied Sunbird	LC
<i>Circaetus cinereus</i>	Brown Snake-Eagle	LC
<i>Circaetus pectoralis</i>	Black-chested Snake-Eagle	LC
<i>Cisticola chiniana</i>	Rattling Cisticola	LC
<i>Cisticola erythrops</i>	Red-faced Cisticola	LC
<i>Cisticola juncidis</i>	Zitting Cisticola	LC
<i>Clamator glandarius</i>	Great Spotted Cuckoo	LC
<i>Clamator jacobinus</i>	Pied Cuckoo	LC
<i>Clamator levaillantii</i>	Levaillant's Cuckoo	LC
<i>Clanga pomarina</i>	Lesser Spotted Eagle	LC
<i>Colius striatus</i>	Speckled Mousebird	LC
<i>Columba livia domestica</i>	Feral Pigeon	LC
<i>Coracias caudatus</i>	Lilac-breasted Roller	LC
<i>Coracias garrulus</i>	European Roller	LC
<i>Coracias naevius</i>	Purple Roller	LC
<i>Corythornis cristatus cristatus</i>	Southern Malachite Kingfisher	LC
<i>Cossypha heuglini</i>	White-browed Robin-Chat	LC
<i>Creatophora cinerea</i>	Wattled Starling	LC
<i>Crecopsis egregia</i>	African Crake	LC
<i>Crinifer concolor</i>	Grey Go-away-bird	LC
<i>Crithagra mozambica</i>	Yellow-fronted Canary	LC
<i>Cuculus canorus</i>	Common Cuckoo	LC
<i>Cuculus gularis</i>	African Cuckoo	LC

<i>Cursorius temminckii</i>	Temminck's Courser	LC
<i>Delichon urbicum</i>	Western House Martin	LC
<i>Dendrocygna viduata</i>	White-faced Whistling-Duck	LC
<i>Dendropicos fuscescens</i>	Cardinal Woodpecker	LC
<i>Dessonornis humeralis</i>	White-throated Robin-Chat	LC
<i>Dicrurus adsimilis</i>	Forktail Drongo	LC
<i>Dryoscopus cubla</i>	Black-backed Puffback	LC
<i>Egretta ardesiaca</i>	Black Heron	LC
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC
<i>Emberiza flaviventris</i>	Golden-breasted Bunting	LC
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	LC
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork	LC
<i>Eremopterix leucotis</i>	Chestnut-backed Sparrow-Lark	LC
<i>Euplectes albonotatus</i>	White-winged Widow-bird	LC
<i>Euplectes orix</i>	Southern Red Bishop	LC
<i>Eurystomus glaucurus</i>	Broad-billed Roller	LC
<i>Falco amurensis</i>	Amur Falcon	LC
<i>Falco biarmicus</i>	Lanner Falcon	LC
<i>Falco dickinsoni</i>	Dickinson's Kestrel	LC
<i>Falco rupicolus</i>	Rock Kestrel	LC
<i>Falco subbuteo</i>	Eurasian Hobby	LC
<i>Glaucidium perlatus</i>	Pearl-spotted Owlet	LC
<i>Granatina granatina</i>	Violet-eared Waxbill	LC
<i>Guttera edouardi edouard</i>	Southern Crested Guinea fowl	LC
<i>Gymnoris superciliaris</i>	Yellow-throated Bush Sparrow	LC
<i>Gyps africanus</i>	White-backed Vulture	Critically Endangered
<i>Gyps coprotheres</i>	Cape Vulture	Vulnerable
<i>Halcyon albiventris</i>	Brown-hooded Kingfisher	LC
<i>Halcyon chelicuti</i>	Striped Kingfisher	LC
<i>Halcyon leucocephala</i>	Grey-headed Kingfisher	LC
<i>Halcyon senegalensis</i>	Woodland Kingfisher	LC
<i>Hedydipna collaris</i>	Collared Sunbird	LC
<i>Hieraaetus wahlbergi</i>	Wahlberg's Eagle	LC
<i>Hirundo rustica</i>	Barn Swallow	LC
<i>Ichthyophaga vocifer</i>	African Fish-Eagle	LC
<i>Indicator indicator</i>	Greater Honeyguide	LC
<i>Kaupifalco monogrammicus</i>	Lizard Buzzard	LC
<i>Ketupa lactea</i>	Giant Eagle-Owl	LC
<i>Lagonosticta rhodopareia jamesoni</i>	Jameson's Robbin	LC
<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC
<i>Lamprotornis chalybaeus</i>	Greater Blue-eared Starling	LC
<i>Lamprotornis mevesii</i>	Meves's Starling	LC
<i>Lamprotornis nitens</i>	Cape Glossy-Starling	LC
<i>Laniarius ferrugineus</i>	Southern Boubou	LC
<i>Laniarius major</i>	Tropical Boubou	LC

<i>Lanius collurio</i>	Redback Shrike	LC
<i>Lanius minor</i>	Lesser Grey Shrike	LC
<i>Leptoptilos crumenifer</i>	Marabou Stork	LC
<i>Lophoceros alboterminatus</i>	Crowned Hornbill	LC
<i>Lophoceros nasutus</i>	African Grey Hornbill	LC
<i>Lophotis ruficrista</i>	Red-crested Bustard	LC
<i>Lybius torquatus</i>	Black-collared Barbet	LC
<i>Malaconotus blanchoti</i>	Grey-headed Bushshrike	LC
<i>Megaceryle maxima</i>	Giant Kingfisher	LC
<i>Melaenornis pammelaina</i>	Southern Black-Flycatcher	LC
<i>Melaniparus niger</i>	Southern Black Tit	LC
<i>Melierax metabates mehowi</i>		LC
<i>Merops apiaster</i>	European Bee-eater	LC
<i>Merops bullockoides</i>	White-fronted Bee-eater	LC
<i>Merops nubicoides</i>	Southern Carmine Bee-eater	LC
<i>Merops persicus</i>	Blue-cheeked Bee-eater	LC
<i>Merops pusillus</i>	Little Bee-eater	LC
<i>Microcarbo africanus africanus</i>	African Reed Cormorant	LC
<i>Micronisus gabar</i>	Gabar Goshawk	LC
<i>Milvus migrans</i>	Black Kite	LC
<i>Mirafrapasserina</i>	Monotonous Lark	LC
<i>Motacilla alba alba</i>	Panafrican Pied Wagtail	LC
<i>Muscicapa striata</i>	Spotted Flycatcher	LC
<i>Myrmecocichla arnotti</i>	Arnot's Chat	LC
<i>Nilaus afer</i>	Brubru	LC
<i>Numida meleagris</i>	Helmeted Guineafowl	LC
<i>Oena capensis</i>	Namaqua Dove	LC
<i>Oriolus larvatus</i>	Black-headed Oriole	LC
<i>Oriolus oriolus</i>	European Golden Oriole	LC
<i>Ortygornis sephaena</i>	Crested Francolin	LC
<i>Otus senegalensis</i>	African Scops-Owl	LC
<i>Paragallinula angulata</i>	Lesser Moorhen	LC
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC
<i>Passer domesticus</i>	House Sparrow	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Pelecanus onocrotalus</i>	Great White Pelican	LC
<i>Pernis apivorus</i>	European Honey-buzzard	LC
<i>Phoeniculus purpureus</i>	Green Woodhoopoe	LC
<i>Pinarocorys nigricans</i>	Dusky Lark	LC
<i>Plectropterus gambensis</i>	Spur-winged Goose	LC
<i>Plegadis falcinellus</i>	Glossy Ibis	LC
<i>Plocepasser mahali</i>	White-browed Sparrow Weaver	LC
<i>Ploceus cucullatus</i>	Village Weaver	LC
<i>Ploceus intermedius</i>	Lesser Masked Weaver	LC
<i>Ploceus ocularis</i>	Spectacled Weaver	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC

<i>Poicephalus cryptoxanthus</i>	Brown-headed Parrot	LC
<i>Poicephalus fuscicollis</i>	Grey-headed Parrot	LC
<i>Poicephalus meyeri</i>	Meyer's Parrot	LC
<i>Polyboroides typus</i>	African Harrier-Hawk	LC
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC
<i>Prionops plumatus</i>	White-crested Helmetshrike	LC
<i>Pternistis natalensis</i>	Natal Spurfowl	LC
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	LC
<i>Pterocles bicinctus</i>	Double-banded Sandgrouse	LC
<i>Pycnonotus barbatus</i>	Common Bulbul	LC
<i>Pytilia melba</i>	Melba Finch	LC
<i>Quelea quelea</i>	Red-billed Quelea	LC
<i>Rhinoptilus chalcopterus</i>	Bronze-winged Courser	LC
<i>Riparia paludicola</i>	Brown-throated Martin	LC
<i>Rostratula benghalensis</i>	Greater Painted-Snipe	LC
<i>Sagittarius serpentarius</i>	Secretarybird	Endangered
<i>Sarkidiornis melanotos</i>	Knob-billed Duck	LC
<i>Scopus umbretta</i>	Hamerkop	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Stephanoaetus coronatus</i>	Crowned Eagle	LC
<i>Streptopelia capicola</i>	Cape Turtle Dove	LC
<i>Streptopelia decipiens ambigua</i>		LC
<i>Strix woodfordii woodfordii</i>	Southern African Wood-Owl	LC
<i>Struthio camelus</i>	Common Ostrich	LC
<i>Sylvietta rufescens</i>	Long-billed Crombec	LC
<i>Tachybaptus ruficollis</i>	Little Grebe	LC
<i>Tachyspiza badia</i>	Shikra	LC
<i>Tchagra australis</i>	Brown-crowned Tchagra	LC
<i>Tchagra senegalus</i>	Black-crowned Tchagra	LC
<i>Telacanthura ussheri</i>	Mottled Spinetail	LC
<i>Terpsiphone viridis</i>	African Paradise-Flycatcher	LC
<i>Thamnolaea cinnamomeiventris</i>	Mocking Cliff-Chat	LC
<i>Thinornis tricolor</i>	Three-banded Plover	LC
<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill	LC
<i>Tockus rufirostris</i>	Southern Red-billed Hornbill	LC
<i>Trachyphonus vaillantii</i>	Crested Barbet	LC
<i>Treron calvus</i>	Green Pigeon	LC
<i>Tringa glareola</i>	Wood Sandpiper	LC
<i>Tringa nebularia</i>	Common Greenshank	LC
<i>Tringa stagnatilis</i>	Marsh Sandpiper	LC
<i>Turdoides jardineii</i>	Arrow-marked Babbler	LC
<i>Turdus libonyana</i>	Kurrichane Thrush	LC
<i>Turdus litsitsirupa</i>	Groundscraper Thrush	LC
<i>Turtur chalcospilos</i>	Emerald-spotted Wood-Dove	LC
<i>Turtur tympanistria</i>	Tambourine Dove	LC
<i>Tychaedon quadrivirgata</i>	Bearded Scrub-Robin	LC

<i>Upupa epops africana</i>	African Hoopoe	LC
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC
<i>Urocolius indicus transvaalensis</i>	Common Redface Mousebird	LC
<i>Urolestes melanoleucus</i>	Magpie Shrike	LC
<i>Vanellus albiceps</i>	White-crowned Lapwing	LC
<i>Vanellus armatus</i>	Blacksmith Lapwing	LC
<i>Vanellus coronatus</i>	Crowned Lapwing	LC
<i>Vanellus spinosus</i>	Spur-winged Lapwing	LC
<i>Vidua chalybeata</i>	Village Indigobird	LC
<i>Vidua funerea</i>	Dusky Indigobird	LC
<i>Vidua macroura</i>	Pin-tailed Whydah	LC
<i>Vidua paradisaea</i>	Eastern Paradise-Whydah	LC
<i>Zapornia flavirostra</i>	Black Crake	LC

24. Appendix III: CVs of Specialists

Mr Tselane Rebotile RACHUENE

Qualification s): Honours Degree: Environmental Monitoring and Modelling (Science)

Project: *“Securing and protecting the habitats for the African Grass Owls on the Highveld coal belt area of South Africa, 2021”*

Advanced Diploma: Nature Conservation and National Diploma Nature Conservation

Rebotile is an experienced ecologist/conservationist and an African Grass Owl specialist. He has over 10 years of experience with government and private institutions (e.g. SANBI and Endangered Wildlife Trust). His field of expertise and experience is in wetlands, birds and ecology. He has thus far worked on over 11 specialist projects from coal and cement (PPC) mines, agriculture and protected areas. He is a senior ecologist at Sediba Sa Metse (pty) Ltd, providing his expertise on various projects around the country (KZN, North West, Limpopo, Mpumalanga, Western Cape, Free State and Gauteng provinces). He has several training certificates such as Wetland Legislation (WetRest) and Research Writing in the Sciences (INASP – Author Aid, United Kingdom). He co-authored a few papers, which are still under publication review and is busy with his own to be published. He is currently a registered scientist with SACNASP (Pr. Sci. Nat. 154249) and does his work under the supervision of over 20 years of experience. Sci. Nat. scientists. (see references). He is a full member of the South African Wetland Society, Gauteng Wetland Forum.

WORK EXPERIENCE

Current

Position: Senior Ecologist & Director
Pty Ltd

Company: Sediba Sa Metse

PREVIOUS WORK EXPERIENCE

Position: Project Coordinator

Company: Endangered Wildlife Trust

Duration: 1 July 2016 – September 2022 (6 years)

Responsible for the overall African Grass Owl research project activities/tasks;

Conduct wetland assessments, negotiate rehabilitation and servitudes approach/plans with landowners, lawmakers, donors

Conduct various projects on raptors research and monitoring.

Company

SANBI

Position/title

Project Field Intern (Groen Sebenza)

Year

May 2013 – Oct 2015 (3 years)

Reason for Leaving

Contract Expired

AFFILIATION AND MEMBERSHIP

SACNASP

Registered as Candidate

Gauteng Wetland Forum (GWF)

full-time member, 2017 –present.

South African Wetland Society

full-time member (No.435341)

Gauteng Environmental Education Forum (GEEF) an active member

UNISA

ULUMNI, lecturer assistant,

and a guest

speaker to events

National Geographic Society

Nat Geo Explorer

RB Rebo Pty and Sediba Pty Ltd

director of the business and

ecologist

25. Annexure A: Photographs of Bird Species



Figure 17: Birds observed; (A) Forked-tailed Drongo, (B) Common Bulbul, (C) Southern Yellow-billed Hornbill, (D) Brubru, (E) Southern Laughing Dove.