AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED KOPANYA SOLAR PHOTOVOLTAIC (PV) PROJECT AND ASSOCIATED INFRASTRUCTURE

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Report Name	**AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED KOPANYA SOLAR PHOTOVOLTAIC (PV) PROJECT AND ASSOCIATED INFRASTRUCTURE**
Specialist Theme	Avifauna Site Sensitivity Verification
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, Amended. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to conduct a Site Sensitivity Verification (SSV) for the for the proposed Kopanya Solar Photovoltaic (PV) Project and associated infrastructure. The proposed project will be located on the Remaining Extent (Portion 0) of Farm Booysendal No. 43 JT and Portion 2 of the Der Brochen Farm No. 7 JT, near the Burgersfort/Mashishing town within the Fetakgomo Tubatse Local Municipality of the Sekhukhune District Municipality in the Limpopo Province, South Africa (Figure 1-1). The project includes the proposed construction of a solar energy facility designed with a capacity of 25 MW and with two proposed powerline options. Due to the proposed overhead powerlines being situated in a Strategic Electricity Grid Infrastructure Corridor, a 2 kilometre (km) buffer around the proposed corridors is considered as the Project Area of Influence (PAOI) (Figure 1-2). This report only pertains to the proposed Kopanya Solar PV Project.

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria).

This report, after considering the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making.

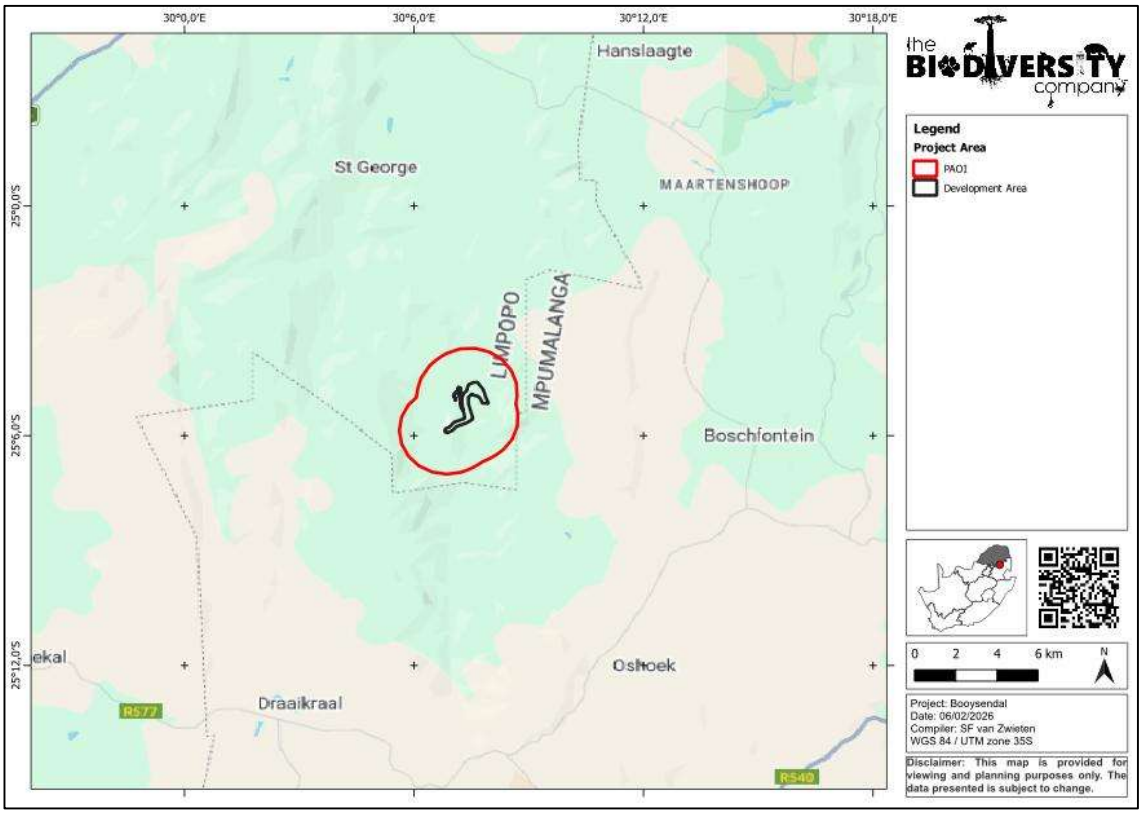


Figure 1-1 Proposed location of the project area in relation to the nearby towns

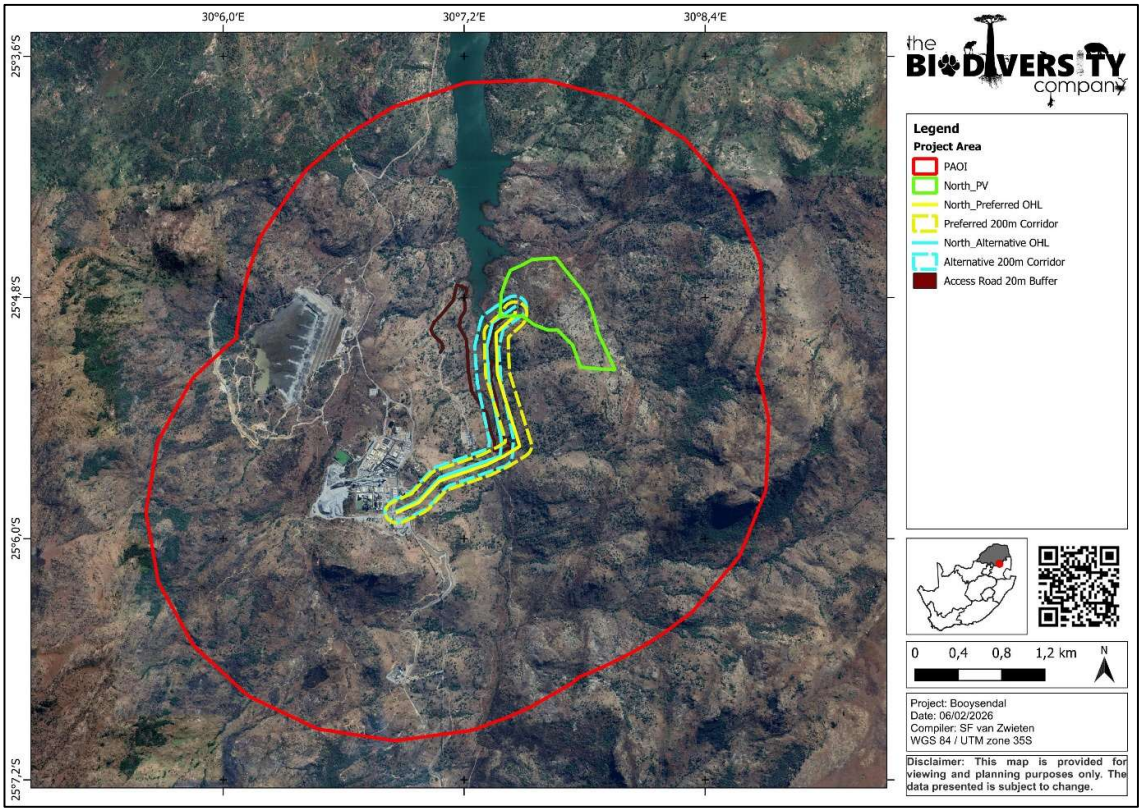


Figure 1-2 Proposed Project Site of the proposed Kopanya Solar PV Project

2 Assumptions and Limitations

The following limitations and assumptions are relevant to the assessment:

- The field assessment was conducted from the 26th to the 30th of January 2026, which constitutes a wet season survey (Figure 2-1). This is not deemed sufficient for a Regime 2 survey, and an additional survey will be required;
- The PAOI was based on the project footprint area as provided by the client. Any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed and, hence the results of this assessment;
- Whilst every effort was made to cover as much of the PAOI as possible, it is possible that some species that are present within the PAOI were not recorded during the field investigation due to their secretive behaviour;
- The GPS used in the assessment has an accuracy of 5 m, and consequently, any spatial features delineated may be offset by up to 5 m.

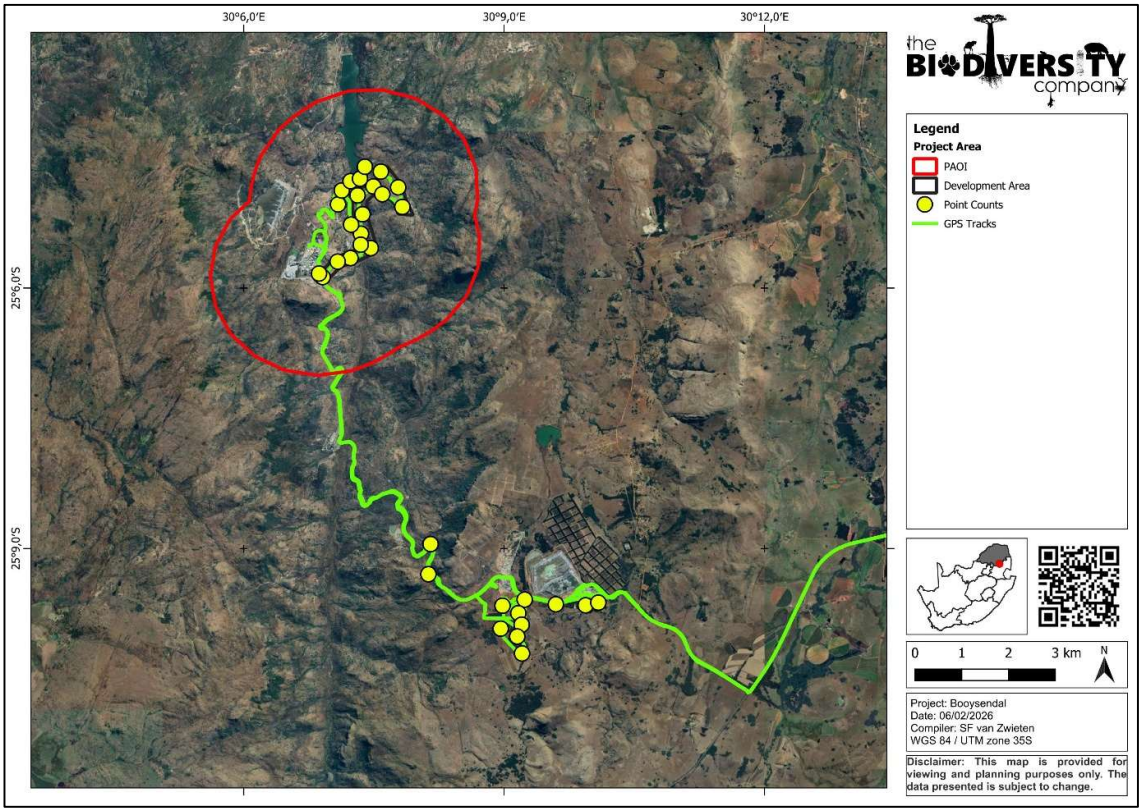


Figure 2-1 Map illustrating the GPS tracks of the specialist during the field survey

3 Results of Site Sensitivity Verification

3.1 Species of Conservation Concern (SCC)

SABAP2 data indicate that 352 avifauna species are expected for the PAOI and surrounding areas. Of these 33 are considered SCC (Table 3-1). Two additional species have been included due to their presence in the screening tool, being the African Finfoot (*Podica senegalensis*) and Caspian Tern (*Hydropogne caspia*). The likelihood of occurrence within the PAOI is indicated below.

Table 3-1 Threatened avifauna species that are expected to occur within the PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NA = Not Applicable, NT = Near Threatened and VU = Vulnerable

Scientific Name	Common Name	Regional *	Global (IUCN)+	Likelihood of occurrence
Alcedo semitorquata	Half-collared Kingfisher	VU	LC	Confirmed
Anas erythrorhyncha	Red-billed Teal	NT	LC	High
Anas undulata	Yellow-billed Duck	NT	LC	High
Anhinga rufa	African Darter	NT	LC	High
Anthropoides paradiseus	Blue Crane	VU	VU	Low
Anthus brachyurus	Short-tailed Pipit	VU	LC	Low
Anthus chloris	Yellow-breasted Pipit	VU	VU	Low
Aquila rapax	Tawny Eagle	EN	VU	Confirmed
Aquila verreauxii	Verreaux's Eagle	VU	LC	High
Ardea alba	Great Egret	NT	LC	High
Ardea brachyrhyncha	Yellow-billed Egret	NT	LC	High
Asio capensis	Marsh Owl	NT	LC	Moderate
Balearica regulorum	Grey Crowned Crane	VU	EN	Moderate
Circus ranivorus	African Marsh Harrier	VU	LC	Moderate
Coracias garrulus	European Roller	NT	LC	Moderate
Elanus caeruleus	Black-winged Kite	NT	LC	High
Eupodotis senegalensis	White-bellied Bustard	VU	LC	Moderate
Falco biarmicus	Lanner Falcon	NT	LC	High
Falco naumanni	Lesser Kestrel	VU	LC	Moderate
Geocolaptes olivaceus	Ground Woodpecker	NT	NT	Low
Geronticus calvus	Southern Bald Ibis	NT	NT	High
Gyps coprotheres	Cape Vulture	VU	VU	High (Confirmed nearby)
Hydropogne caspia	Caspian Tern	VU	LC	Moderate
Monticola explorator	Sentinel Rock Thrush	LC	NT	Moderate
Netta erythrophthalma	Southern Pochard	NT	LC	Moderate
Nycticorax nycticorax	Black-crowned Night Heron	NT	LC	Moderate
Podica senegalensis	African Finfoot	VU	LC	Moderate
Polemaetus bellicosus	Martial Eagle	EN	EN	Moderate

Promerops gurneyi	Gurney's Sugarbird	LC	NT	High (Confirmed nearby)
Sagittarius serpentarius	Secretarybird	VU	EN	High
Sarkidiornis melanotos	Knob-billed Duck	NT	LC	Low
Scopus umbretta	Hamerkop	NT	LC	High
Stephanoaetus coronatus	Crowned Eagle	VU	NT	Low
Thalassornis leuconotus	White-backed Duck	NT	LC	Moderate
Tyto capensis	African Grass Owl	VU	LC	Low

*(Lee *et al.* 2025), + (IUCN 2025)

3.2 Habitat Assessment

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities.

The main habitat types identified across the PAOI were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Four (4) habitats were delineated in total (Figure 3-1), a full description of the habitats is provided below.

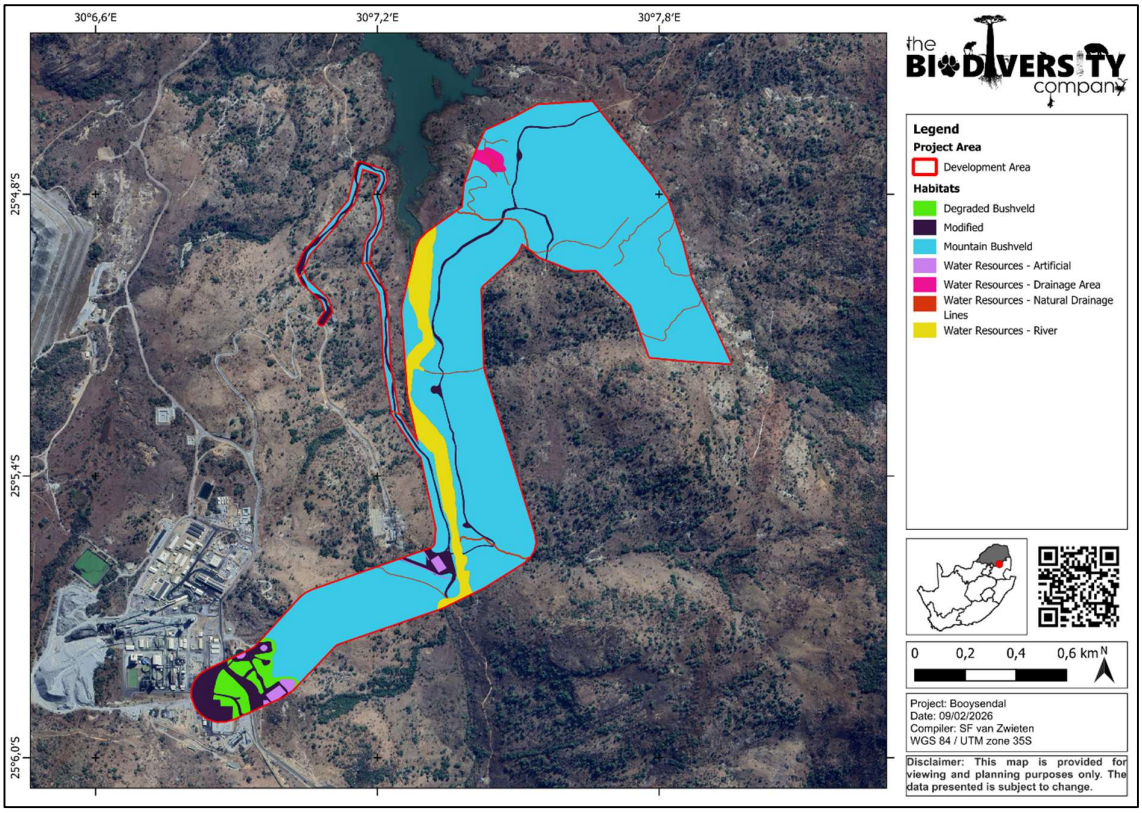


Figure 3-1 Habitats identified within the assessment areas

3.2.1 Degraded Bushveld

This habitat comprises bushveld that has undergone significant degradation over time, primarily as a result of ongoing mining activities, pronounced edge effects, the proliferation of alien and invasive

species, and extensive fragmentation. As a consequence, the area offers limited ecological value and is unlikely to support a diverse or stable avifaunal community. Bird species observed within the PAOI are expected to utilise the area opportunistically, primarily for foraging, rather than for breeding or residency. Any SCCs detected are likely to be transient individuals, merely passing through or temporarily exploiting available resources, rather than establishing territories or persisting within the PAOI (Figure 3-2).

SCCs possible occupying this habitat: Black-winged Kite, Hamerkop, Lanner Falcon, and Tawny Eagle.



Figure 3-2 Example of the Degraded Bushveld habitat at Lat: -25.097305 Lon: 30.114732

3.2.2 Modified

This habitat has been modified from its original state and have little to no remaining natural vegetation due to land transformation by mining, roads and other anthropogenic infrastructure. These habitats exist in a constant disturbed state as it cannot recover to a more natural state due to ongoing disturbances and impacts it receives (Figure 3-3).



Figure 3-3 Example of the Modified habitat at Lat: -25.098037 Lon: 30.113846

3.2.3 Mountain Bushveld

This habitat comprises well-preserved bushveld embedded within the broader Sekhukhune Montane Grassland, characterised by a mosaic of rocky hills, scattered trees, and dense grassland. The area retains much of its natural structure and plant diversity, with minimal evidence of disturbance or degradation. Large norite boulders and shallow, stony soils support a heterogeneous mix of indigenous grasses, shrubs, and small trees, providing a variety of foraging and nesting opportunities for birds. The presence of both open grassland and bushy thickets allows for a diverse avifaunal community, including species that utilise the grassland for feeding and those that depend on woody vegetation for cover and breeding. The intact nature of this habitat enhances its ecological value, supporting both resident and migratory bird species, and increasing the likelihood of SCCs establishing territories or to persist within the area (Figure 3-4).

SCCs possible occupying this habitat: Black-winged Kite, Cape Vulture, Gurney's Sugarbird, Hamerkop, Lanner Falcon, Secretarybird, Southern Bald Ibis, Tawny Eagle, and Verreaux's Eagle.



Figure 3-4 Example of the Mountain Bushveld habitat at Lat: -25.080497 Lon: 30.124862

3.2.4 Water Resources

This habitat provides crucial habitat for waterbirds, as well as the neighbouring bushveld species. The water resources include natural and artificial, with the avifaunal communities using both. For further descriptions on the water resources, please see the Wetlands report. These delineations were used to discern between the different features which were given their resulting sensitivities. The SCC recorded and expected would also utilise varying depths of water, including the riparian vegetation. This habitat provides a vital source of hydration, as well as providing suitable foraging and nesting site for the local avifauna (Figure 3-5).

SCCs possible occupying this habitat: African Darter, Cape Vulture, Great Egret, Hamerkop, Half-collared Kingfisher, Lanner Falcon, Red-billed Teal, Secretarybird, Southern Bald Ibis, Yellow-billed Duck, and Yellow-billed Egret.



Figure 3-5 Example of Water Resource at Lat: -25.079487 Lon: 30.120522

3.3 Site Ecological Importance

The different habitat types within the PAOI were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Site Ecological Importance (SEI) categories based on their ecological integrity, conservation value, the presence of SCC.

Four habitat types were delineated within the project area, namely Degraded Bushveld, Modified, Mountain Bushveld, and Water Resources. Their respective SEI and the corresponding mitigation guidelines are summarised in Table 3-2.

Table 3-2 Summary of habitat types delineated within field assessment area

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance Guidelines
Degraded Bushveld	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Low** Several minor and major current negative ecological impacts.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or	**Low** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

				species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	
Modified	**Very Low** No natural habitat remaining.	**Very Low** Several major current negative ecological impacts.	**Very Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low** Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Mountain Bushveld	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**High** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high
Water Resource – Artificial	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Low** Several minor and major current negative ecological impacts.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once	**Low** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

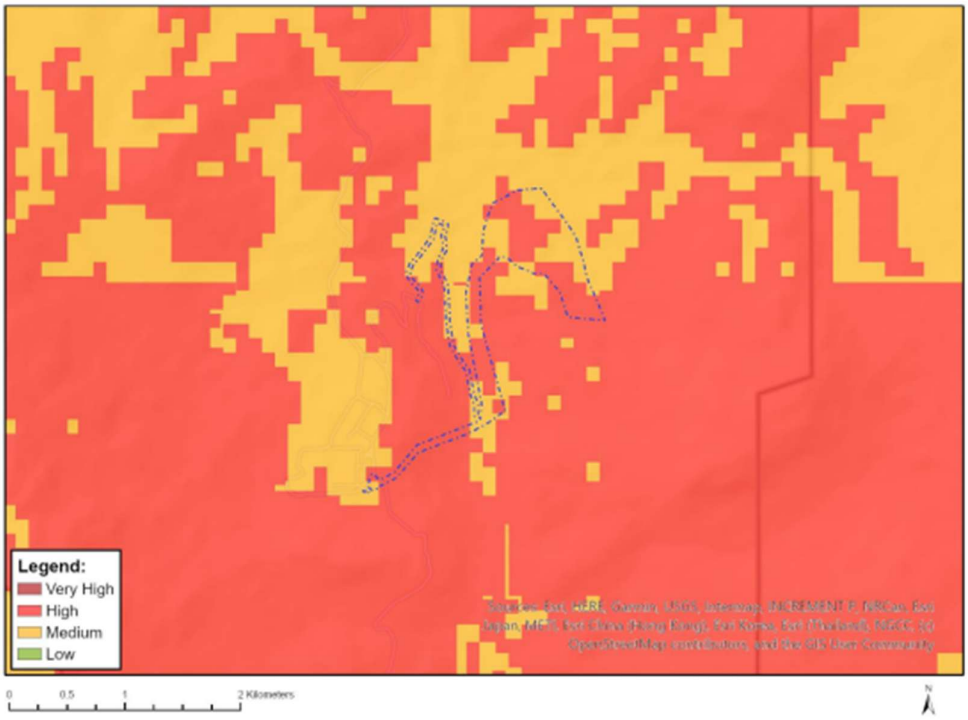
				the disturbance or impact has been removed.	
Water Resource – Drainage Area	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
Water Resource – River	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	**High** Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**High**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**Very High** Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains

3.3.1 Desktop Ecological Sensitivity

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Animal Species Theme sensitivity is 'High' for the PAOI, with the possibility of Avifauna Species of Conservation Concern (SCC) being present (Figure 3-6).
- Avian Theme sensitivity is 'Low' for the PAOI (Figure 3-7).

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Falco biarmicus
High	Aves-Geronticus calvus
High	Aves-Aquila rapax
Medium	Aves-Podica senegalensis
Medium	Aves-Hydroprogne caspia
Medium	Aves-Geronticus calvus
Medium	Aves-Aquila rapax
Medium	Aves-Eupodotis senegalensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Lycaon pictus

Figure 3-6 Animal Species Theme Sensitivity

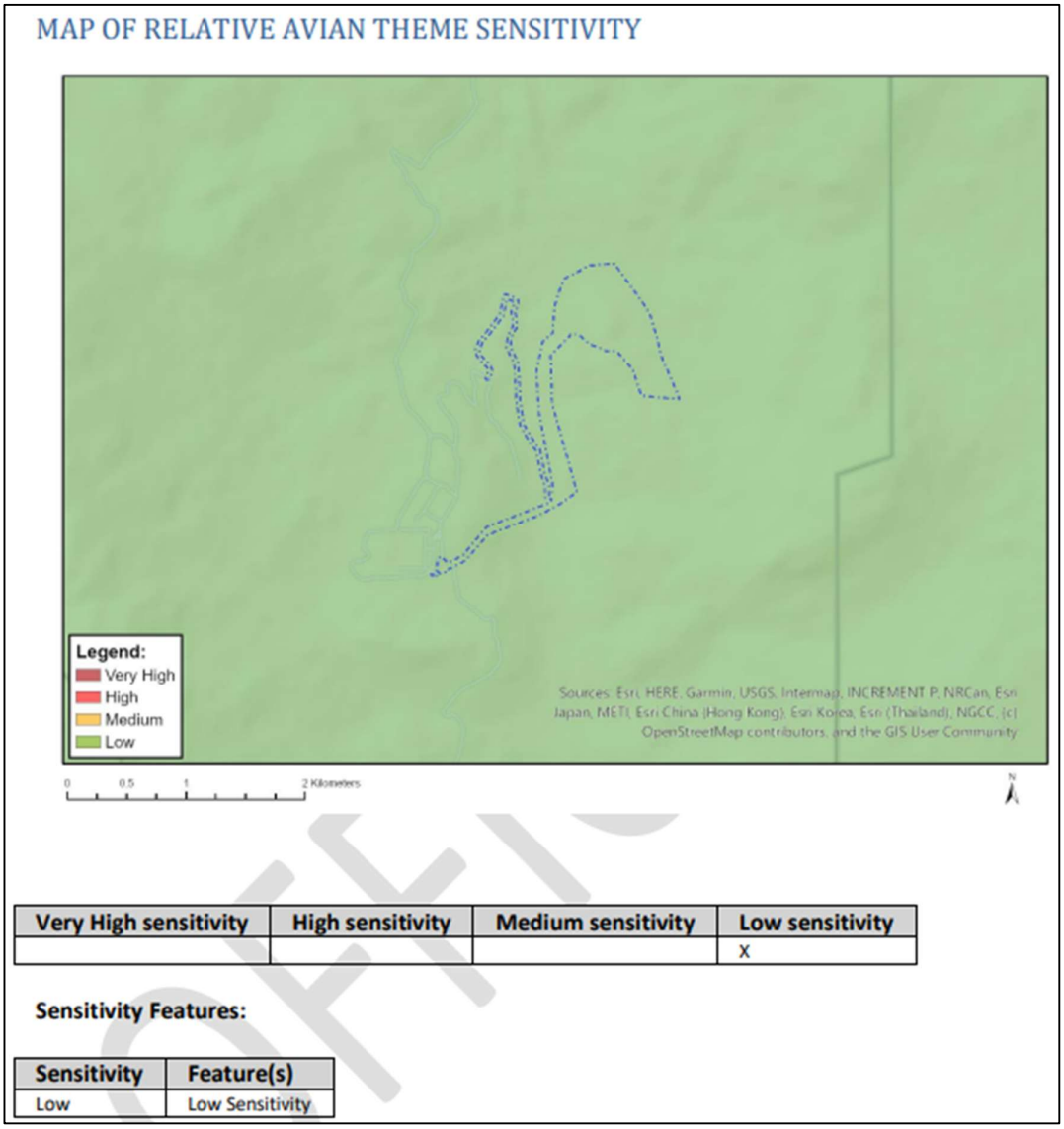


Figure 3-7 Avian Theme Sensitivity

3.3.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-3 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC or protected species. The sensitivities delineated for the project area is illustrated in Figure 3-8.

Table 3-3 Summary of the screening tool vs specialist-assigned sensitivities

Screening Tool Theme	Screening Tool	Habitat	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	High	Degraded Bushveld	Low	Disputed – Habitat has been severely altered but still has the potential to support avifauna. Any SCC presence would be transient or temporary.
		Modified	Very Low	Disputed – Habitat has been severely altered and has limited potential to support SCC.

	Mountain Bushveld	**High**	Validated – Habitat is in a good natural condition and provides suitable foraging, nesting, and roosting habitat for SCC
	Water Resource – Artificial	**Low**	Disputed – Habitat has been severely altered but still has the potential to support avifauna. Any SCC presence would be transient or temporary.
	Water Resource – Drainage Area	**Medium**	Disputed – Habitat has been impacted but still supports the avifaunal community, including providing nesting and foraging habitat for SCCs
	Water Resource – River	**Very High**	Disputed – Habitat is in a good natural condition and provides suitable foraging, nesting, and roosting habitat for SCC, with a low resilience to the potential impacts of the project.

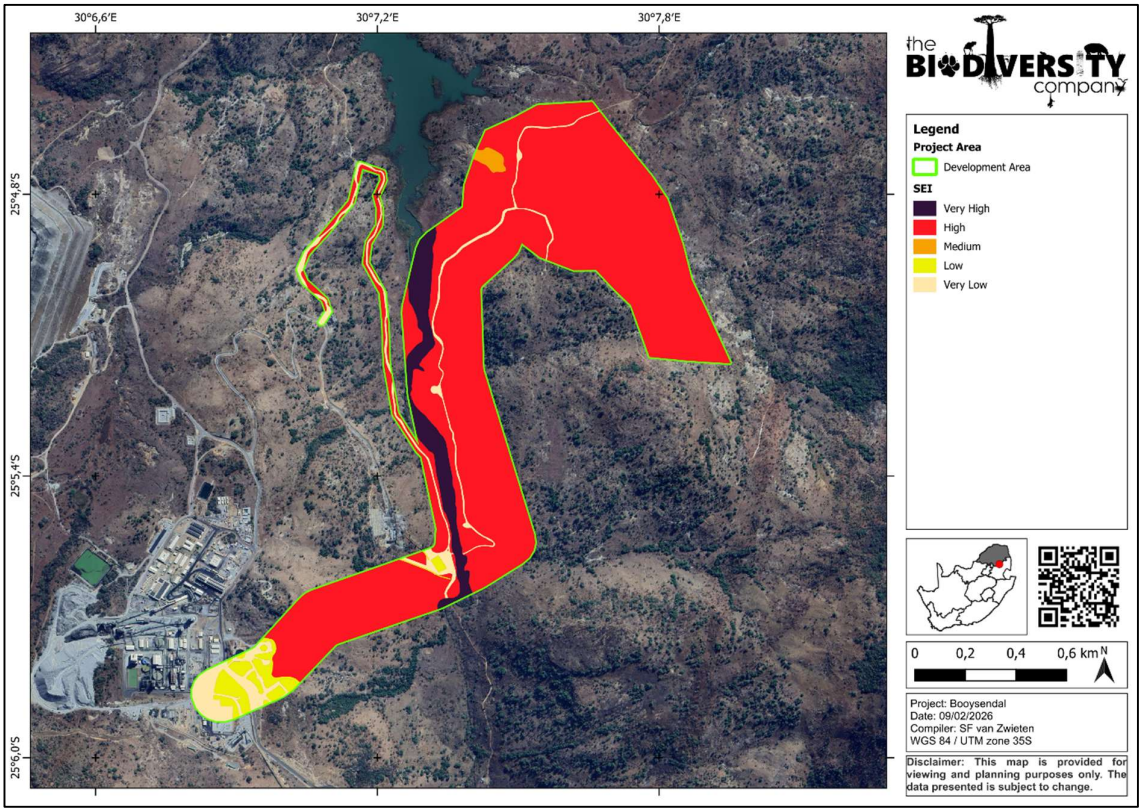


Figure 3-8 Site ecological importance of the development area

4 Avifauna Impact Management Actions

4.1 Potential Impacts to Avifauna

This section describes the potential impacts on avifauna associated with the construction, operational and decommissioning phases of the proposed development. During the construction phase vegetation clearing and brush cutting of vegetation for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise and cause dust pollution. Should non-environmentally friendly dust suppressants be used, chemical pollution can take place. Increased human presence can lead to poaching and the increase in vehicle traffic will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemical for the cleaning of the PV panels and habitat loss. Solar panels have been implicated

as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the "lake effect" (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This "lake-effect" hypothesis has not been substantiated or refuted to date (Visser *et al.*, 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser *et al.* (2019) performed a study at a utility-scale PV SEF in the Northern Cape and found that most of the species affected by the facility were passerine species. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties.

Fencing of the PV site can influence birds in six ways (Birdlife SA, 2015):

- Snagging – Occurs when a body part is impaled on one or more barbs or razor points of a fence;
- Snaring – When a birds foot/leg becomes trapped between two overlapping wires;
- Impact injuries – birds flying into a fence, the impact may kill or injure the bird;
- Snarling – When birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon);
- Electrocution – Electrified fence can kill or severely injure birds; and
- Barrier effect – Fences may limit flightless birds (e.g., moulting waterfowl) from resources.

Chemical pollution from PV cleaning, if not environmentally friendly, will result in either long term or short-term poisoning. Should this chemical run into the water sources it would also impact the whole bird population and not just species found in and around the PV footprint.

PV sites leads to a significant loss of vegetation, to minimise the risk of fire (Birdlife, 2017), which will to the displacement of various avifauna species.

4.2 Management & Mitigation Measures

This section provides the management and mitigation measures the are deemed applicable for the proposed development. Note that this is not a complete list of mitigation measures for the proposed development but those considered to be pertinent. Further mitigation measures may be provided within the Impact Assessment report upon identification of further impacts. Appropriate mitigation measures include:

- Indigenous herbaceous and graminoid vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion. Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- Compile and implement a Rehabilitation Plan from the onset of the project.
- Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site.

- A Solid Waste Management Plan must be developed and implemented to avoid impacts to surrounding habitats.

- Applying covers on phases or grounds where adequate separation is not feasible. Examples of covers include insulator/conductor covers, bushing covers, arrester covers, cutout covers, and jumper wire covers.

- Fencing mitigations:

    - Top 2 strands must be smooth wire.

    - Routinely retention loose wires.

    - Minimum 30 cm between wires.

- Environmental Awareness Training for all staff and contractors. Hunting of species must be made a punishable offence. This is especially pertinent to avifauna SCC.

5 Conclusion

The avifauna SEI for the proposed Kopanya Solar PV Project was determined to be “Very high”, “High”, “Medium”, “Low” and “Very Low” depending on the habitat. Accordingly, the following guidelines are considered relevant to the proposed development activity:

- **Avoidance mitigation (Very High SEI Areas)** – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.

- **Avoidance mitigation wherever possible. Minimisation mitigation (High SEI Areas)** – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

- **Minimisation and restoration mitigation (Medium SEI Area)** – development activities of medium impact acceptable followed by appropriate restoration activities.

- **Minimisation and restoration mitigation (Low SEI Areas)** – Any development activities of medium impact acceptable followed by appropriate restoration be activities.

- **Minimisation mitigation (Very Low Areas)** – development activities of medium to high impact acceptable and restoration activities may not be required.

6 References

Bird Atlas Project (SABAP2). (2022). http://vmus.adu.org.za/

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