AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED BENYA SOLAR PHOTOVOLTAIC (PV) AND GRID CONNECTION INFRASTRUCTURE PROJECT

Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province, South Africa

26/06/2025

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Report Name	**AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED BENYA SOLAR PHOTOVOLTAIC (PV) AND GRID CONNECTION INFRASTRUCTURE PROJECT**	
Specialist Theme	Avifauna Site Sensitivity Verification	
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Reviewer	Andrew Husted (SACNASP 400213/11)	
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 by WKN Windcurrent SA (Pty) Ltd to conduct a Site Sensitivity Verification (SSV) for the proposed Benya Solar Photovoltaic (PV) and Electrical Grid Connection Infrastructure Project. The proposed project involves the development of a photovoltaic (PV) solar energy facility and an associated substation and overhead power line. The development area is situated approximately 21 km West of Dwaalboom within the Thabazimbi Local and Waterberg District Municipalities, in the Limpopo Province, South Africa. The Project Area of Influence (PAOI) consist of a 5 km area surrounding the provided development area (Figure 1-1).

The applicant, WKN Windcurrent SA (Pty) Ltd is proposing the construction and operation of an up to 500MW Solar Photovoltaic (PV) Development and associated infrastructure, including associated Electrical Grid Infrastructure (Powerline and Substation) and Battery Energy Storage System (BESS). The key infrastructure associated with the Benya Solar PV Development includes the following:

- PV modules and mounting structures, up to 8m in height.
- Inverters and transformers.
- Operation and Maintenance buildings (up to 6m in height), including a gate house, ablution facilities, security building, control centre, offices, warehouses and workshops for storage and maintenance.
- An area of up to 10ha will be occupied by buildings.
- Temporary and permanent laydown areas, situated within the assessed development footprint.
- Temporary laydown areas will occupy up to 10ha, while 1ha will remain in place for the permanent laydown area, as required for facility operation.
- Site and internal access roads (between 6 m and 8m wide). Existing internal roads will be used as far as possible.
- Perimeter fencing up to 6m in height.
- Battery Energy Storage System (BESS), up to 4ha in extent. The infrastructure will be located within the assessed development footprint.
- Associated Electrical Grid Connection Infrastructure, including:
- 33kV cabling between the project components and the on-site facility substation;
- A 33kV/132kV Independent Power Producer (IPP) Step-up Substation, up to 1.5ha in extent;
- A 132kV Eskom Switching Substation, up to 1.5ha in extent; and
- A 132kV overhead power line (up to 40m in height) connecting the on-site switching substation to one (1) of the nearby 132 kV Eskom overhead power lines, via a Loop In – Loop Out (LILO) connection.

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.

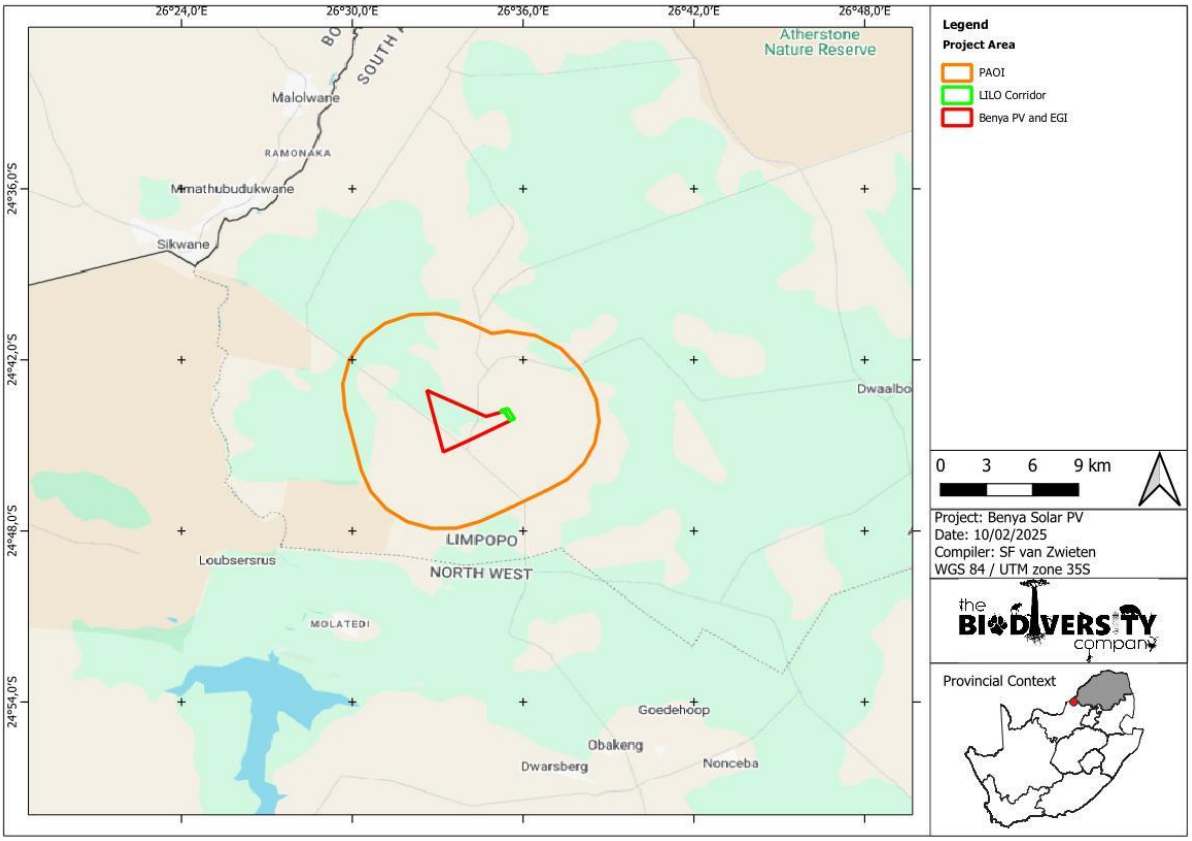


Figure 1-1 Proposed location of the project area in relation to the nearby towns

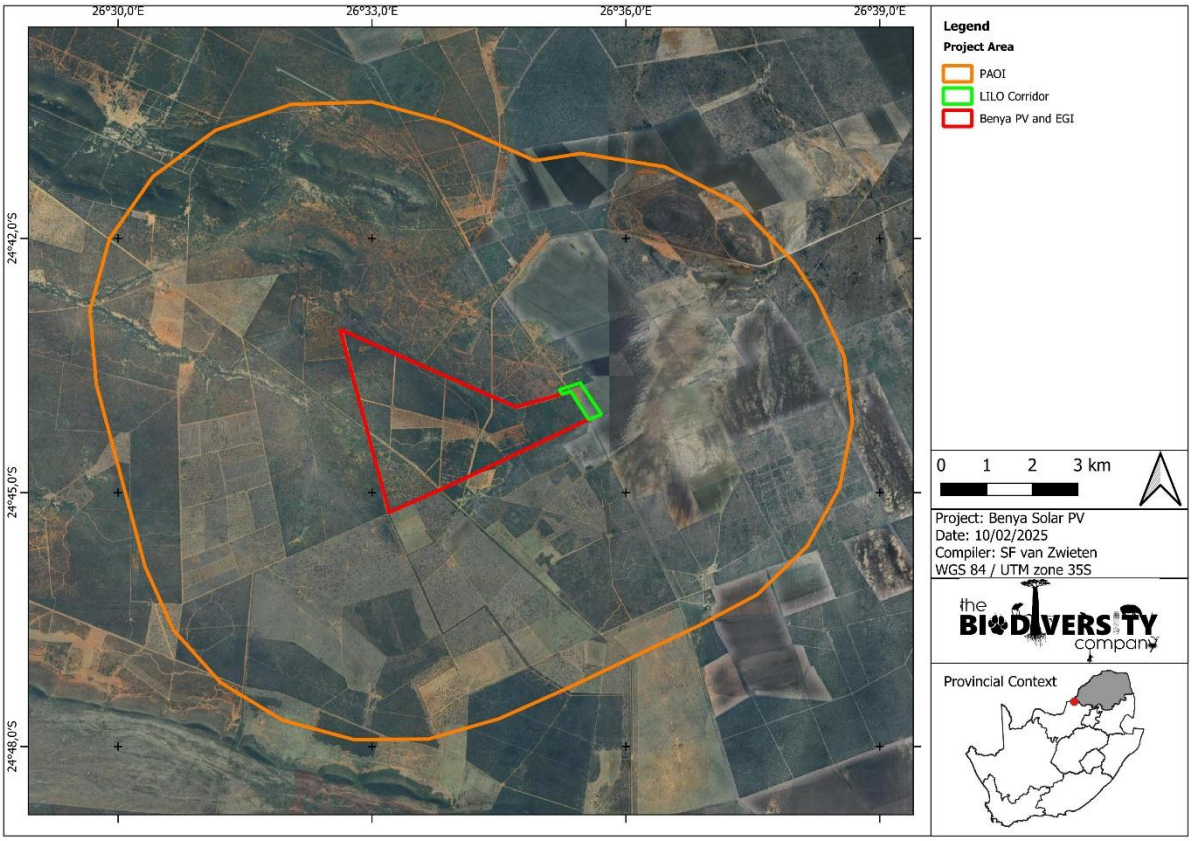


Figure 1-2 Project area of influence

2 Approach

The first field survey for the area was undertaken from the 9th to the 12th of December 2024 to determine the presence and relative abundance of avifauna species within the PAOI, as well as the likelihood of occurrence within the assessed area. The second survey will be conducted as per the BLSA guidelines to be sufficient for a Regime 2 survey. In addition, the second survey will overlap with the breeding season of the White-backed Vulture to understand the impact on this CR species.

2.1 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- 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;
- The avifaunal field survey was conducted from the 9th to the 12th of December 2024, which constitutes a wet season survey. The second survey will be conducted in June, which constitutes a dry season survey to be deemed sufficient for a regime 2 assessment;
- The Site Ecological Importance is based on one full assessment and could possibly change after the required additional 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 investigations due to their secretive behaviour;
- Areas surrounding the development area were assessed, but access was restricted, and;
- The GPS used in the assessment has an accuracy of 5m, and consequently, any spatial features delineated may be offset by up to 5m.

3 Results of Site Sensitivity Verification

3.1 Species of Conservation Concern (SCC)

SABAP2 data indicate that 280 avifauna species are expected for the PAOI and surrounding areas. Of these, 14 are considered SCC. The likelihood of occurrence of these SCCs within the POAI is indicated in Table 3-1.

Table 3-1 Threatened avifauna species that are expected to occur within the PAOI. EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Common Name	Scientific Name	Regional*	Global+	Likelihood of occurrence
Abdim's Stork	*Ciconia abdimii*	NT	LC	High
African Finfoot	*Podica senegalensis*	VU	LC	Low
Black Stork	*Ciconia nigra*	VU	LC	High
European Roller	*Coracias garrulus*	NT	LC	High
Kori Bustard	*Ardeotis kori*	NT	NT	High
Lappet-faced Vulture	*Torgos tracheliotos*	EN	EN	Moderate
Marabou Stork	*Leptoptilos crumenifer*	NT	LC	High

Martial Eagle	*Polemaetus bellicosus*	EN	EN	High
Pallid Harrier	*Circus macrourus*	NT	NT	Low
Southern Ground Hornbill	*Bucorvus leadbeateri*	EN	VU	High
Steppe Eagle	*Aquila nipalensis*	LC	EN	Moderate
Tawny Eagle	*Aquila rapax*	EN	VU	High
White-backed Vulture	*Gyps africanus*	CR	CR	High
Yellow-throated Sandgrouse	*Pterocles gutturalis*	NT	LC	Confirmed

*(Taylor *et al.* 2015), + (IUCN 2021)

3.2 Avifauna Field Assessment

The first field survey was conducted on the 9th to the 12th of December 2024. The field survey was conducted in terms of the following protocol:

Point Counts

Standardized point counts (Buckland et al., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behaviour (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as powerlines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering.

Effort was made to cover all the different habitat types within the limits of time and access. Figure 3-1 shows the locations of the point counts, focal point assessments, and drive transects conducted as well as GPS tracks of the specialist during the survey.

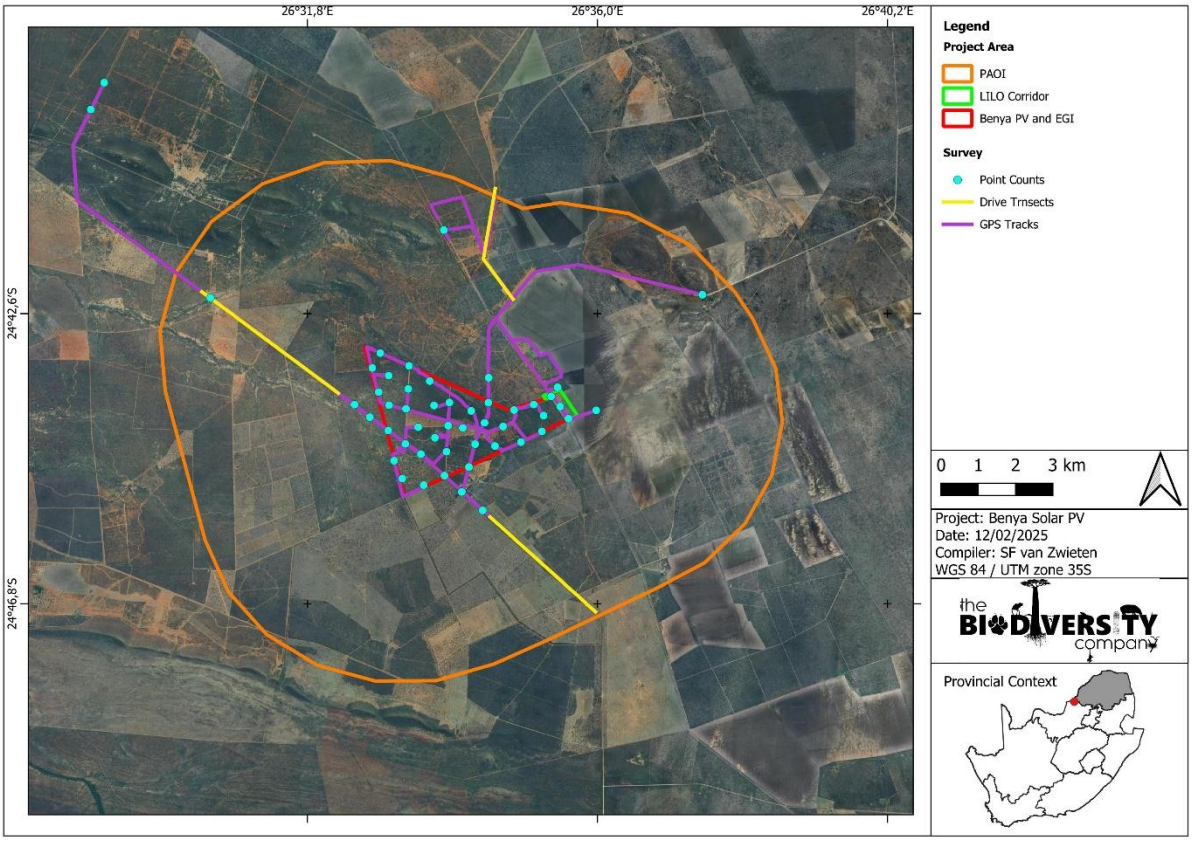


Figure 3-1 Map illustrating the point count locations and GPS tracks in the PAOI

3.3 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. Five (5) habitats were delineated in total (Figure 3-2), a full description of the habitats is provided below.

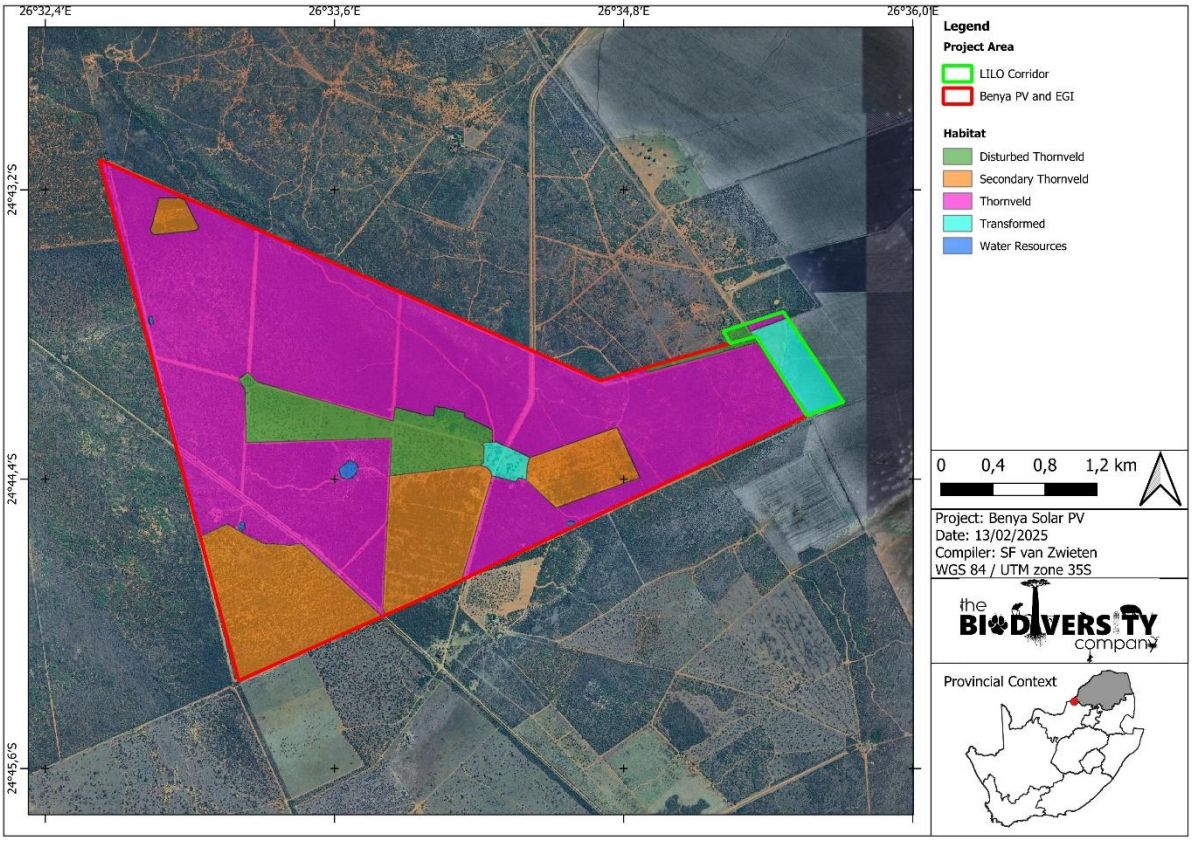


Figure 3-2 Habitats identified within the assessment areas

3.3.1 Disturbed Thornveld

This habitat has been severely altered from its original state, with many trees within this area being cleared. The nature of the authorisation for the clearing of a Critical Biodiversity Area is not yet known. Although this habitat has been severely disturbed, it still provides suitable foraging, nesting and roosting habitats for a variety of avifauna SCC (Figure 3-3).

SCCs possible occupying this habitat: European Roller, Kori Bustard, Marabou Stork, Martial Eagle, Southern Ground Hornbill, Tawny Eagle, and White-backed Vulture.

Figure 3-3 Examples of the Disturbed Thornveld habitat at -24.737600°; 26.567493°

3.3.2 Secondary Thornveld

This habitat is characterized as a recovering habitat, where the thornveld habitat is beginning to re-establish itself after historic clearing for anthropogenic activities. This habitat is associated with grasses, shrubs and scattered trees, although the vegetation varies depending on the amount of recovery that has occurred. This habitat provides suitable foraging, nesting and roosting habitats for a variety of avifauna SCC (Figure 3-4).

SCCs possible occupying this habitat: European Roller, Kori Bustard, Marabou Stork, Martial Eagle, Southern Ground Hornbill, Tawny Eagle, and White-backed Vulture.

Figure 3-4 Example of the Secondary Thornveld habitat at -24.749798°; 26.552920°

3.3.3 Thornveld

This habitat consists of the grasses, shrubs and trees of varying sizes. The majority of the impacts associated with this habitat are associated with habitat fragmentation due to the construction of roads through the habitat. This habitat is still in good condition and provides suitable foraging, nesting and roosting habitats for a variety of avifauna SCC (Figure 3-5).

SCCs possible occupying this habitat: European Roller, Kori Bustard, Marabou Stork, Martial Eagle, Southern Ground Hornbill, Tawny Eagle, and White-backed Vulture.

Figure 3-5 Example of the Thornveld habitat at -24.722623°; 26.554542°

3.3.4 Transformed

This habitat has been severely altered from its natural state to accommodate housing and agricultural activities. Although this habitat has been severely negatively affected, it still provides suitable foraging habitat for avifauna SCC (Figure 3-5).

SCCs possible occupying this habitat: Abdim's Stork, Black Stork, European Roller, and Yellow-throated Sandgrouse.

Figure 3-6 Example of the Transformed habitat at -24.729982°; 26.588846°

3.3.5 Water Resources

This habitat provides crucial habitat for waterbirds, as well as neighbouring thornveld species. Some of the water resources are natural while others are artificial, from an avifauna perspective both are important. Due to the overall importance of this resource the different water resources were combined.

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 3-7).

SCCs possible occupying this habitat: Abdim's Stork, Black Stork, European Roller, Marabou Stork, and Yellow-throated Sandgrouse.

Figure 3-7 Example of the Water Resource at -24.739949°; 26.560793°

3.4 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 species of conservation concern.

Five habitat types were delineated within the Project Area, namely Disturbed Thornveld, Secondary Thornveld, Thornveld, Transformed habitat, and Water Resources. Their respective SEI and the corresponding mitigation guidelines are summarised in Table 3-2.

A potential White-backed Vulture (*Gyps africanus*) nest was observed during the first field survey. However, due to the fact that the field survey was conducted outside the vulture's breeding season, it could not be confirmed if it still in use. The second survey should be conducted in the vulture's breeding season in June, to confirm if the nest is still active. If the nest is found to still be active a 1 km No-Go buffer where no powerlines can be constructed will placed around the nest. If the nest is confirmed to be inactive, necessary permits will need to be obtained and a qualified specialist should be appointed to remove the nest, and the nest buffer will not be put in place (Figure 3-9).

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
	High	**Low**		**High**	**Low**
Disturbed Thornveld	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2.	Several minor and major current negative ecological impacts.	**Medium**	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and	Minimisation and restoration mitigation – development activities of medium to high impact acceptable

	IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.			functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.	followed by appropriate restoration activities.
Secondary Thornveld	**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**	**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.
Thornveld	**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.	**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 impact activities.
Transformed	**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	**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.
Water Resources	**Medium**	**Medium**	**Medium**	**Low**	**High**

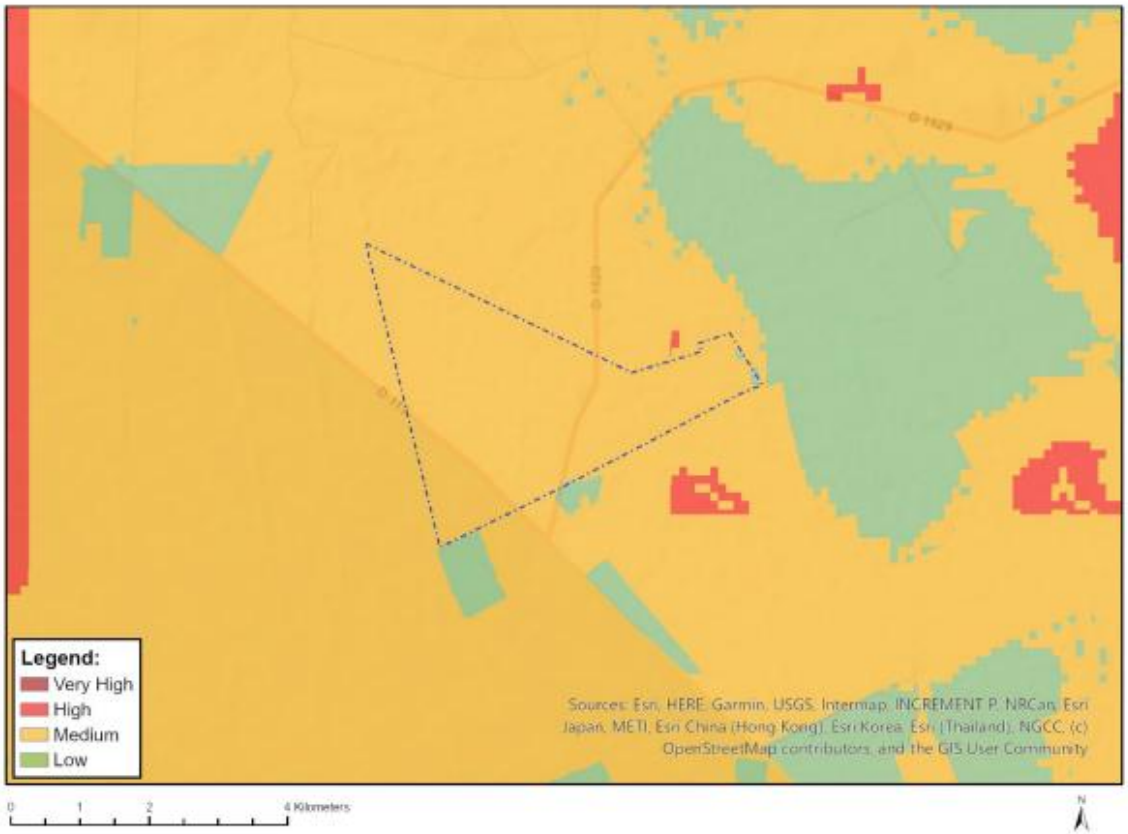
	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	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.	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
1 km Buffer	**Nest**			No-Go development for powerlines

3.4.1 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 'Medium' for the PAOI, with the possibility of Avifauna Species of Conservation Concern (SCC) being present (Figure 3-8).

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)
Low	Subject to confirmation
Medium	Aves-Aquila rapax
Medium	Sensitive species 5
Medium	Mammalia-Lycaon pictus

Figure 3-8 Animal Species Theme Sensitivity

3.4.2 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 are illustrated in Figure 3-9.

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	Medium	Disturbed Thornveld	Low	Disputed – Habitat shows impacts but still provides some suitable habitat for SCC.
		Secondary Thornveld	Medium	Validated – Habitat shows some impacts but is recovering and still provides suitable habitat for SCC.
		Thornveld	High	Disputed – The habitat is in good condition and SCC are likely to occur here, with a low resilience to impacts.
		Transformed	Very Low	Disputed – No natural habitat can be found in this habitat anymore.
		Water Resources	High	Disputed – The habitat is in good condition and SCC are likely to occur here, with a low resilience to impacts.

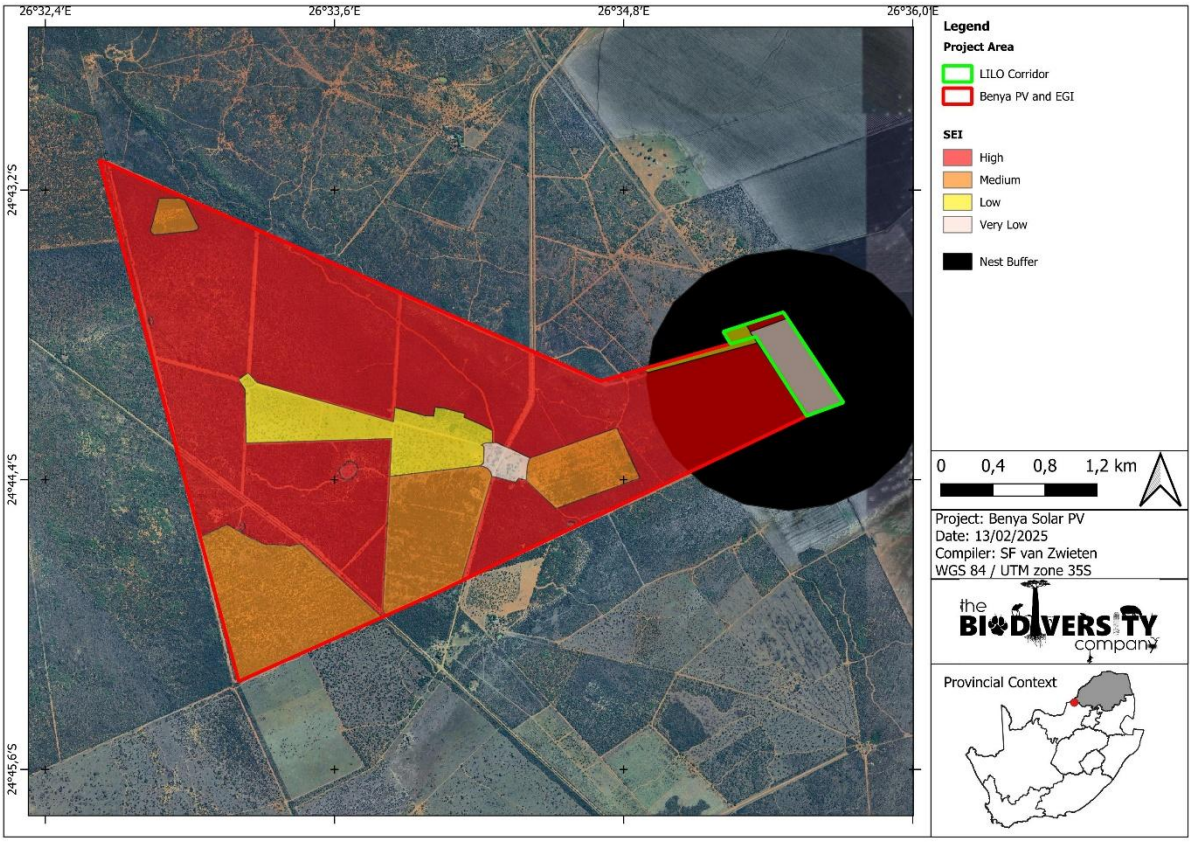


Figure 3-9 Site ecological importance of the project area and buffers associated with the development.

4 Impact Assessment

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 chemicals 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 power lines, 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 birds 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 bird’s 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 lead 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 that 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:

- Only environmentally friendly substances may be used for the cleaning/washing of the panels
- 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 insulation on electrical phases or grounds where adequate separation is not feasible. Examples of insulation covers include insulator/conductor covers, bushing covers, arrester covers, cutout covers, and jumper wire covers.

- Any exposed parts must be covered (insulated) to reduce electrocution risk;

- All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution;

- Markers should be placed on fence to enhance visibility. Additionally, 30cm by 30cm openings must be incorporated at the bottom of the fence to facilitate the free movement of ground-dwelling species.

- 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 screening sensitivity was classified as medium but the assessed SEI for the proposed Solar PV PAOI was determined to be “High”, “Medium”, “Low” and “Very Low” depending on the habitat type. Accordingly, the following guidelines are considered relevant to the proposed development activity:

- 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 Area) – development activities of medium to high impact acceptable followed by appropriate restoration activities.

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

A White-backed Vulture (*Gyps africanus*) nest was found during the survey, which has a 1 km No-Go buffer for power line development. This will directly affect the proposed placement of the LILO connection for the power line. It is recommended that the second survey to be conducted in the vulture’s breeding season in June, to confirm if the nest is still active. If the nest is found to still be active a 1 km No-Go buffer where no power lines can be constructed will be placed around the nest. If the nest is confirmed to be inactive, the nest should be removed, and the nest buffer will not be put in place. If the nest buffer is to be put in place, an alternative route will be required. A proposed alternative route is indicated in Figure 5-1.

Some habitat areas have been assigned a high sensitivity. Selected habitat areas may incur a lowering of the assigned sensitivity to medium, should avoidance be demonstrated by the development, supplemented by findings of the second field survey. Figure 5-1 shows the advised “avoidance” area,

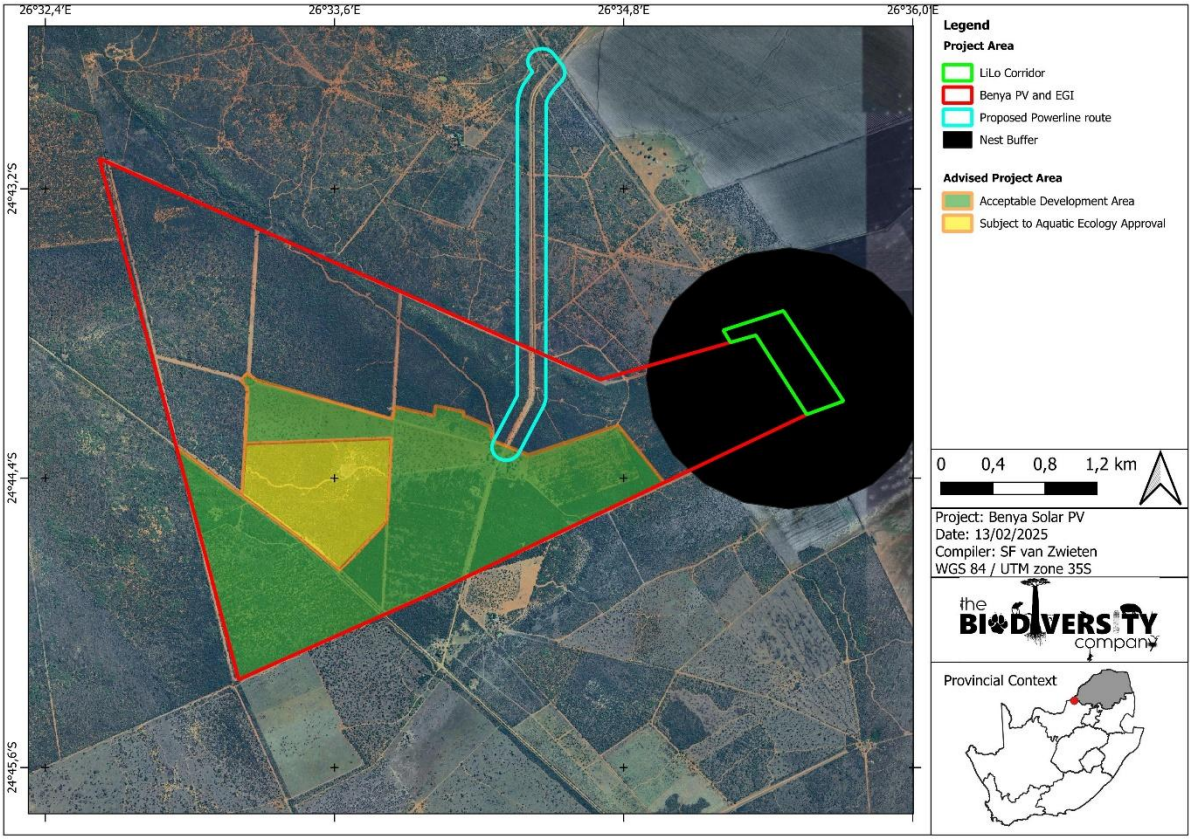


Figure 5-1 Proposed project area alterations

6 References

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

BirdLife International. 2021. The IUCN Red List of Threatened Species 2021

BirdLife South Africa. 2015. Fences & birds, minimising unintended impacts. https://www.birdlife.org.za/what-we-do/landscape-conservation/what-we-do/birds-and-fences/

BirdLife South Africa. 2017. Birds and Solar Energy Best Practice Guidelines. https://www.birdlife.org.za/wp-content/uploads/2020/03/BLSA-Guidelines-Solar-and-Energy.pdf

Buckland, S., Anderson, D., Burnham, K.P. and Laake, J. 1993. Distance Sampling: Estimating Abundance of Biological Populations. 440 pgs., Chapman and Hall, London

Coordinated Avifaunal Roadcounts (CAR) (2020). http://car.birdmap.africa/index.php

Cumming, G.S. & Henry, D.A.W. 2019. Point counts outperform line transects when sampling birds along routes in South African protected areas. African Zoology, 54(4): 187-198. doi: 10.1080/15627020.2019.1658540.

Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. (1996). HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.

Department of Forestry, Fisheries and the Environment (DFFE). 2023a. SACAD (South Africa Conservation Areas Database) and SAPAD (South Africa Protected Areas Database). http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021b. National Protected Areas Expansion Strategy. http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2021c. Renewable Energy EIA Application Database. http://egis.environment.gov.za.

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

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Horvath, G., Blaho, M., Egri A., Kriska, G., Seres, I. & Robertson, B. 2010. Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects Conservation biology 24 (6) 1644-1653

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

Jenkins, A.R., van Rooyen, C.S., Smallie, J.J., Harrison., J.A., Diamond., M., Smit-Robinson., H.A. & Ralston., S. 2015. Birds and Wind-Energy Best-Practice Guidelines. Birds and Wind-Energy Best-Practice Guidelines.

Lovich, J.E. & Ennen, J.R. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61:982-992.

Prinsen, H.A.M., Smallie, J.J., Boere, G.C. & Píres, N. (Compilers). 2012. Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region. AEWA Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWA Technical Series No. 50, CMS Raptors MOU Technical Series No. 3, Bonn, Germany.

Ralston Paton, S., Smallie J., Pearson A., & Ramalho, R. 2017. Wind energy's impacts on birds in South Africa: A preliminary review of the results of operational monitoring at the first wind farms of the

Renewable Energy Independent Power Producer Procurement Programme in South Africa. BirdLife South Africa Occasional Report Series No. 2. BirdLife South Africa, Johannesburg, South Africa

Shaw, J.M., Reid, T.A., Gibbons, B.K., Pretorius, M., Jenkins, A.R., Visagie, R., Michael, M.D. & Ryan, P.G. 2021. A large-scale experiment demonstrates that line marking reduces power line collision mortality for large terrestrial birds, but not bustards, in the Karoo, South Africa. Ornithological Applications, 123: 1-10.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2016. Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.

South African National Biodiversity Institute (SANBI). 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Visser, Elke & Perold, V. & Ralston-Paton, S. & Cardenal, A. C. & Ryan, P.G., 2019. "Assessing the impacts of a utility-scale photovoltaic solar energy facility on birds in the Northern Cape, South Africa," Renewable Energy, Elsevier, vol. 133(C), pages 1285-1294.

7 Appendix Items

7.1 Appendix A: Methodology

7.1.1 Desktop Dataset Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

7.1.1.1 Expected Species

The avifaunal desktop assessment comprised of the following, compiling an expected species list:

- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2435_2625; 2435_2630; 2435_2635; 2435_2640; 2440_2625; 2440_2630; 2440_2635; 2440_2640; 2445_2625; 2445_2630; 2445_2635; 2445_2640.

7.1.1.2 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- Ecosystem Threat Status (ETS) – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. The revised red list of threatened ecosystems was developed between 2016 and 2021 incorporating the best available information on terrestrial ecosystem extent and condition, pressures and drivers of change. The revised list (known as the Red List of Ecosystems (RLE) 2022) is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022;

- Ecosystem Protection level (EPL) informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno et al., 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2023) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus

areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- The Limpopo Conservation Plan was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet et al., 2013). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet et al., 2013). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet et al., 2013).

- Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

- Other Natural Areas (ONAs) consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Driver et al., 2017).

- Areas with No Natural Habitat Remaining (NNR) are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Driver et al., 2017).

- A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives.

  Unlike the Important Bird Areas (IBAs), which primarily focus on birds, the KBA framework encompasses a broader spectrum of biodiversity, including mammals, amphibians, plants, and other taxa. BirdLife South Africa (BLSA), in consultation with the KBA National Coordination Group, has opted to retire IBAs and integrate KBAs into its conservation strategy. This strategic shift acknowledges the necessity of investing resources effectively to protect avian and other macroecological elements at the site level within a comprehensive framework of biodiversity conservation (KBA NCG, 2024); and

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer et al., 2018) – A SAIIAE was established during the NBA of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types and pressures on these systems.

7.1.2 Avifauna Survey

The avifaunal field survey was completed from the 9th-12th of December 2024.

Point Counts

Standardized point counts (Buckland et al., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardized point count technique was utilized as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was conducted over a 10-minute period. The horizontal detection limit was set at 150 meters. At each point, the observer would document the date, start time, end time, habitat, numbers of each species, detection method (seen or heard), behavior (perched or flying), and general notes on habitat and nesting suitability for conservation-important species.

Drive Transects

The drive transects focused on larger terrestrial birds and raptors. Transects were performed in and around the development footprint to ensure the larger area was considered. The transects were conducted by driving at approximately 15 km/h and stopping at regular intervals of 100 meters, scanning the surrounding environment with binoculars. All large terrestrial species and raptors were recorded, including their number, detection method (seen or heard), behavior (perched or flying), and general notes on habitat and nesting suitability.

Water Resource Assessments

Water resources on-site as well as larger features outside the project footprint were assessed. This consisted of a focal assessment at the water's edge to determine if SCC (species of conservation concern) as well as congregator species, were present.

Nest Survey

Possible nesting sites such as power lines, stands of trees, marshes and drainage lines, cliffs, and gravel areas were surveyed for nests. All breeding sites were mapped, and the activity at the nests was assessed during all the surveys.

Incidental Observations

To supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count and drive transect protocols, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods as well as random meandering.

Nests, feathers, individuals and signs were photographed and GPS coordinates were taken.

Relevant field guides and texts consulted for identification purposes included the following:

- Roberts Bird Guide; A comprehensive field guide to over 950 bird species in southern Africa 1st Edition (Chittenden, 2007); and

- Roberts Birds of Southern Africa mobile app.

7.2 Appendix B: Site Ecological Importance

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

SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided Table 7-1 and Table 7-2, respectively.

Table 7-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (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. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 7-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance.

High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 7-3.

Table 7-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity (FI)	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 7-4.

Table 7-4 Summary of Resource Resilience (RR) criteria

Resilience	**Fulfilling Criteria**
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.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
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.

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 Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 7-5.

Table 7-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very high	**High**	**Medium**	**Low**	**Very low**
Receptor Resilience (RR)	**Very Low**	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed development activities is provided in Table 7-6.

Table 7-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

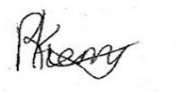
Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
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 impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

7.3 Appendix C: Specialist Declaration of Independence

I, Ryno Kemp, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



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Ecologist

The Biodiversity Company

February 2025