AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED VANDERKLOOF SOLAR PHOTOVOLTAIC (PV) PROJECT

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30/10/2024

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Report Name	**AVIFAUNA SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED VANDERKLOOF SOLAR PHOTOVOLTAIC (PV) PROJECT**
Specialist Theme	Avifauna Theme
Project Reference	Vanderkloof PV Project
Report Version	Draft 1 / 30/10/2024
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Report Writer	Dr Lindi Steyn (SACNASP 119992)
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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 by to undertake an Avifauna Site Sensitivity Verification (SSV) report for the proposed Vanderkloof Solar Photovoltaic (PV) energy project. The proposed project is located approximately 2.5 km south of Luckhoff in the southwestern part of the Free State Province (Figure 1-1). The Project Area of Interest (PAOI) consists of the project area provided (Figure 1-2).

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 taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities at a scoping level, enabling informed decision making.

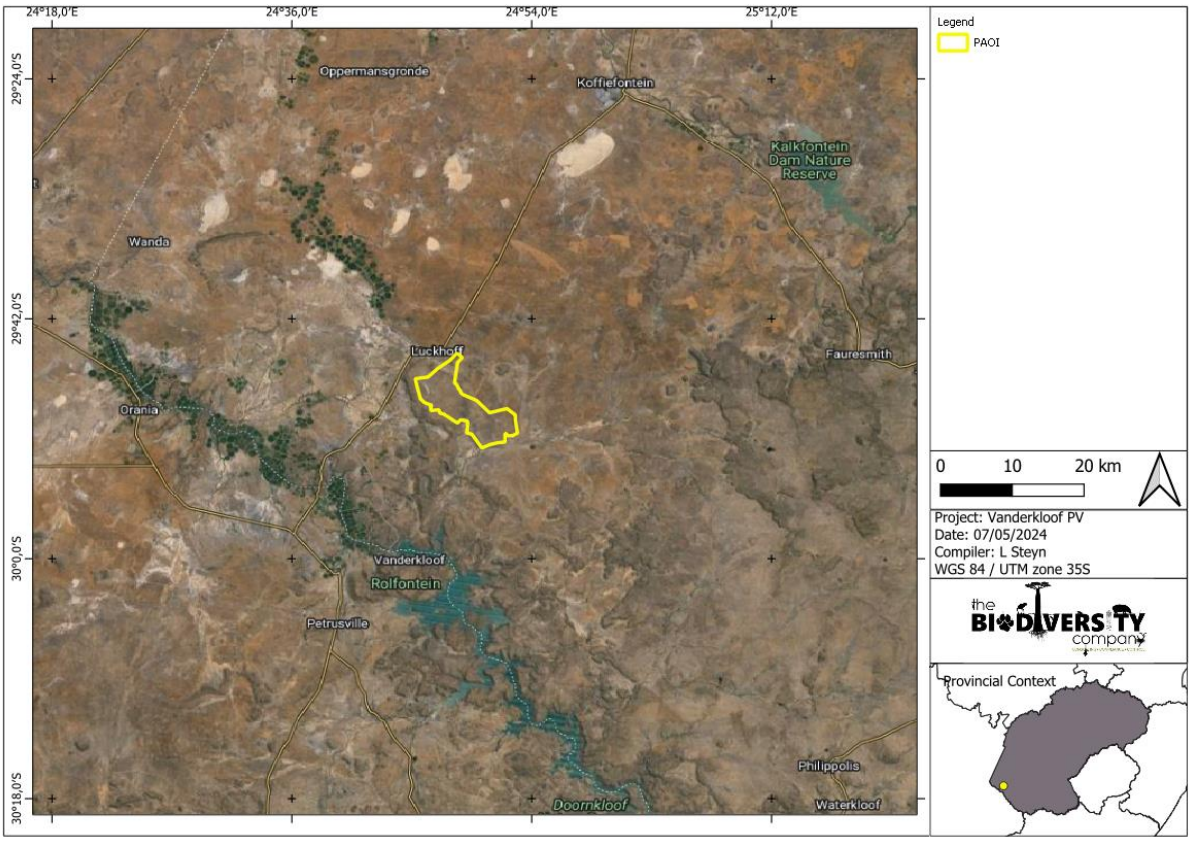

Figure 1-1 Proposed location of the project area in relation to the nearby towns

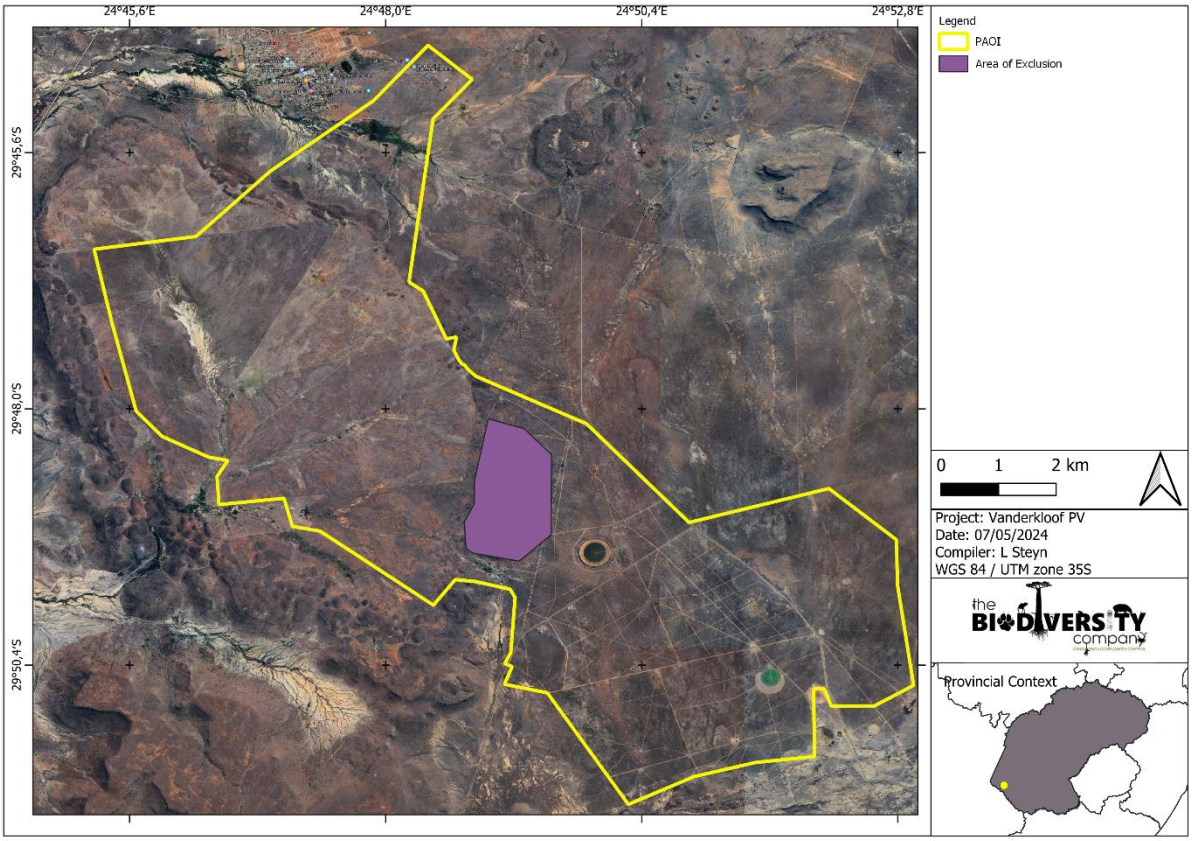

Figure 1-2 Project area of influence

2 Results of Site Sensitivity Verification

2.1 Species of Conservation Concern (SCC)

SABAP2 data indicate that 206 avifauna species are expected for the PAOI and surrounding areas. Of these, 12 are considered SCC (Table 2-1). The likelihood of occurrence within the POAI is included here. Six (6) SCCs were recorded during the assessment. One observed SCC, the Lesser Flamingo (*Phoeniconaias minor*), was not a part of the expected SCC list from the SABAP2 data.

Table 2-1 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	Screening tool
Abdim's Stork	*Ciconia abdimii*	NT	LC	Medium	
African Rock Pipit	*Anthus crenatus*	NT	LC	Medium	
Blue Crane	*Anthropoides paradiseus*	NT	VU	Confirmed	
Blue Korhaan	*Eupodotis caerulescens*	LC	NT	Confirmed	
Caspian Tern	*Hydropogne caspia*	VU	LC	Medium	Medium
Kori Bustard	*Ardeotis kori*	NT	NT	Medium	
Ludwig's Bustard	*Neotis ludwigii*	EN	EN	Confirmed	High
Maccoa Duck	*Oxyura maccoa*	NT	EN	Medium	
Secretarybird	*Sagittarius serpentarius*	VU	EN	Confirmed	
Sentinel Rock Thrush	*Monticola explorator*	LC	NT	Medium	
Tawny Eagle	*Aquila rapax*	EN	VU	High	Medium
Verreaux's Eagle	*Aquila verreauxii*	NA	LC	Confirmed	
Lesser Flamingo	*Phoeniconaias minor*	NT	NT	Confirmed	

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

2.2 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. Six (6) habitats were delineated in total (Figure 2-1), a full description of the habitats is provided below.

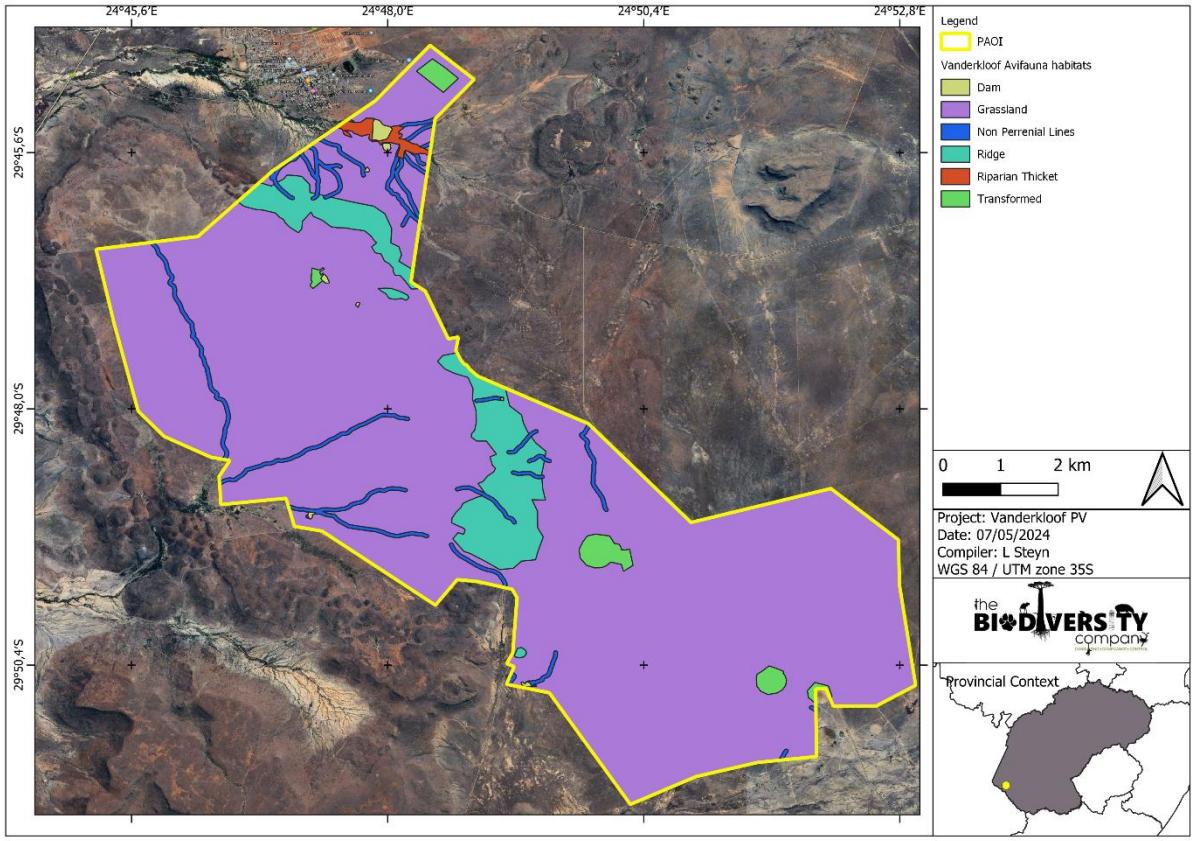

Figure 2-1 Habitats identified within the assessment areas

2.2.1 Grassland

This habitat is dominated by grass species and short shrubs that are interspersed. The dominant species is dependant on the land use in the sections. The habitat is also more disturbed in certain sections compared to others, the disturbance is mainly as a result of overgrazing.

SCC possible occupying this habitat: Blue Crane, Ludwigs Bustard, Blue Korhaan, Secretarybird.

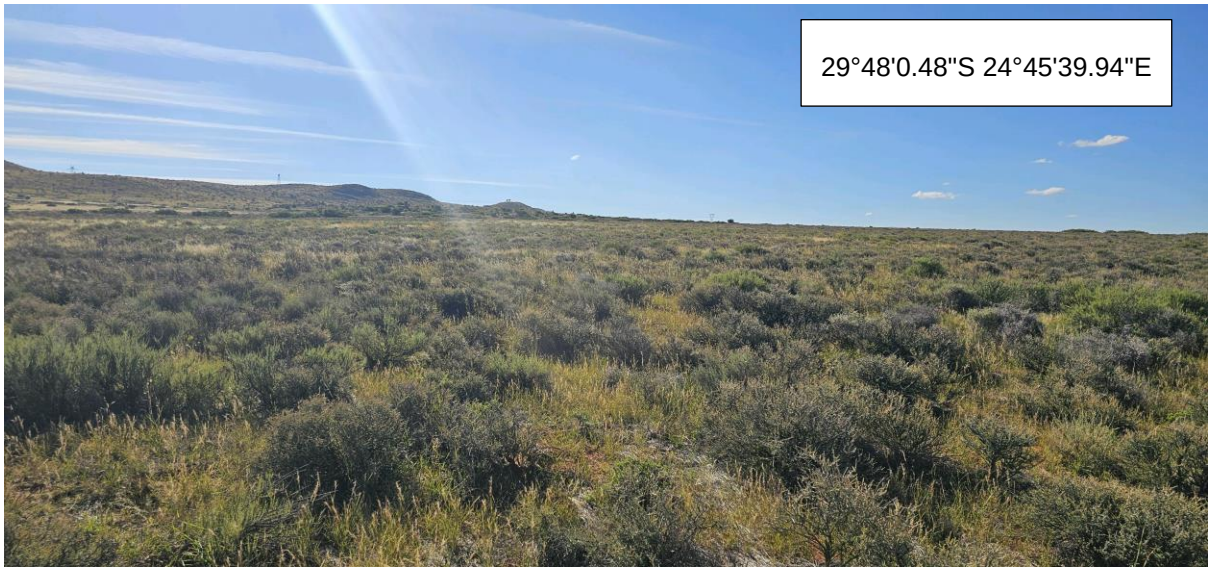

Figure 2-2 Examples of the Grassland habitat

2.2.2 Non Perennial Lines

The non perennial drainage line forms part of the Lemoenspruit tributary (Figure 2-3). These lines are bare in certain areas while others have small pools of water. The surrounding habitat is representative of the grassland habitat.

SCC possible occupying this habitat: Blue Crane, Blue Korhaan, Kori Bustard, Ludwig's Bustard, and Secretarybird. More water dependant avifauna species such as Caspian Terns could possibly use this habitat in wetter years.

Figure 2-3 Example of a drainage line (29°48'4.51"S 24°48'0.70"E)

2.2.3 Ridges

These ridges are in a natural state with limited development or transformation. Made up of mostly the Besemkaree Koppies Shrubland, large boulders and rocky terrain provides habitat for avifauna species needing a rocky surface to forage or nest (Figure 2-4).

SCC possible occupying this habitat: Sentinel Rock Thrush, and Verreaux's Eagle.

Figure 2-4 Example of the Ridge Habitat (29°48'35.71"S 24°49'7.71"E)

2.2.4 Transformed

The transformed areas have little to no remaining natural vegetation due to land transformation by historic and current housing, power station, agricultural fields and roads (Figure 2-5). 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.

No SCC is expected to utilise this habitat.

Figure 2-5 Example of the transformed habitat (29°44'54.56"S 24°48'26.41"E)

2.2.5 Riparian Thickets

This habitat is dominant by tree species often associated with water resources. One dominant tree species recorded here was *Vachellia karoo* (Figure 2-6). The density of the tree species in this area varies.

No SCC is expected to exclusively utilise this habitat.

Figure 2-6 Example of the riparian thicket habitat (29°45'35.27"S 24°48'20.73"E)

2.2.6 Dam

This habitat provides crucial habitat for waterbirds. Some of the water resources are natural while others are artificial, from an avifauna perspective both are important (Figure 2-7). The SCC recorded and expected would also utilise varying depths of water. Due to the overall importance of this resource the different water resources were combined.

SCC possible occupying this habitat: Lesser Flamingo, Caspian Tern, Maccoa Duck, Abdims Stork.

Figure 2-7 One of the Dam habitats recorded (29°45'29.30"S, 24°4754.36"E)

2.3 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 species of conservation concern.

Six habitat types were delineated within the Project Area, namely Grassland, Ridges, Dam, Transformed, Riparian Thicket and Non-Perennial Lines. Their respective SEI and the corresponding mitigation guidelines are summarised in Table 2-2.

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

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance Guidelines
Riparian Thicket	**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.
Grassland	**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.
Ridges	**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	**High** Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**High**	**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	**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

	any criterion other than A.			impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	acceptable. Offset mitigation may be required for high impact activities.
Transformed	**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.
Dam	**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** 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.	**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.
Non-perennial Lines	**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	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	

2.3.1 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 2-8).

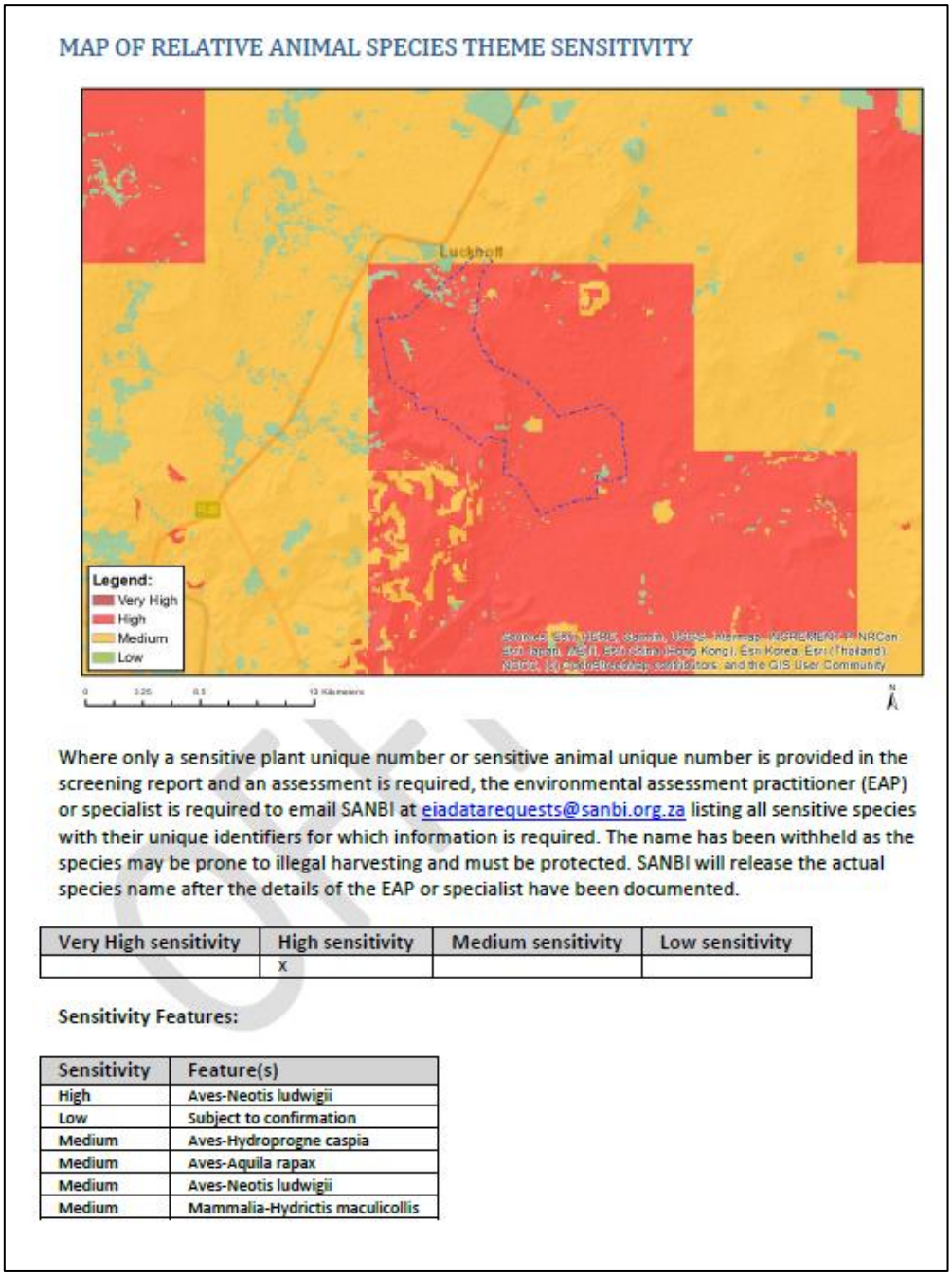

Figure 2-8 Animal Species Theme Sensitivity

2.3.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 2-3 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 2-9.

Table 2-3 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	Riparian Thicket	Medium	Disputed – Habitat has been altered in portions with limited potential to support SCC.
		Grassland	Medium	Disputed – Habitat shows some negative impacts, but still provide suitable habitat for SCC. A number of SCC were also recorded in this habitat. The Biodiversity Importance were rated as high, but the receptor resilience is medium leading to the overall medium rating.
		Ridges	High	Validated – Habitat is generally intact, and high likelihood of SCC.
		Transformed	Very Low	Disputed – Habitat has been severely altered with limited potential to support SCC.
		Dam	High	Validated – Habitat shows some impacts, but still provide suitable habitat for SCC. SCC were also recorded here.
		Non-perennial Lines	Medium	Disputed – Habitat shows some negative impacts, but still provide suitable habitat for SCC.

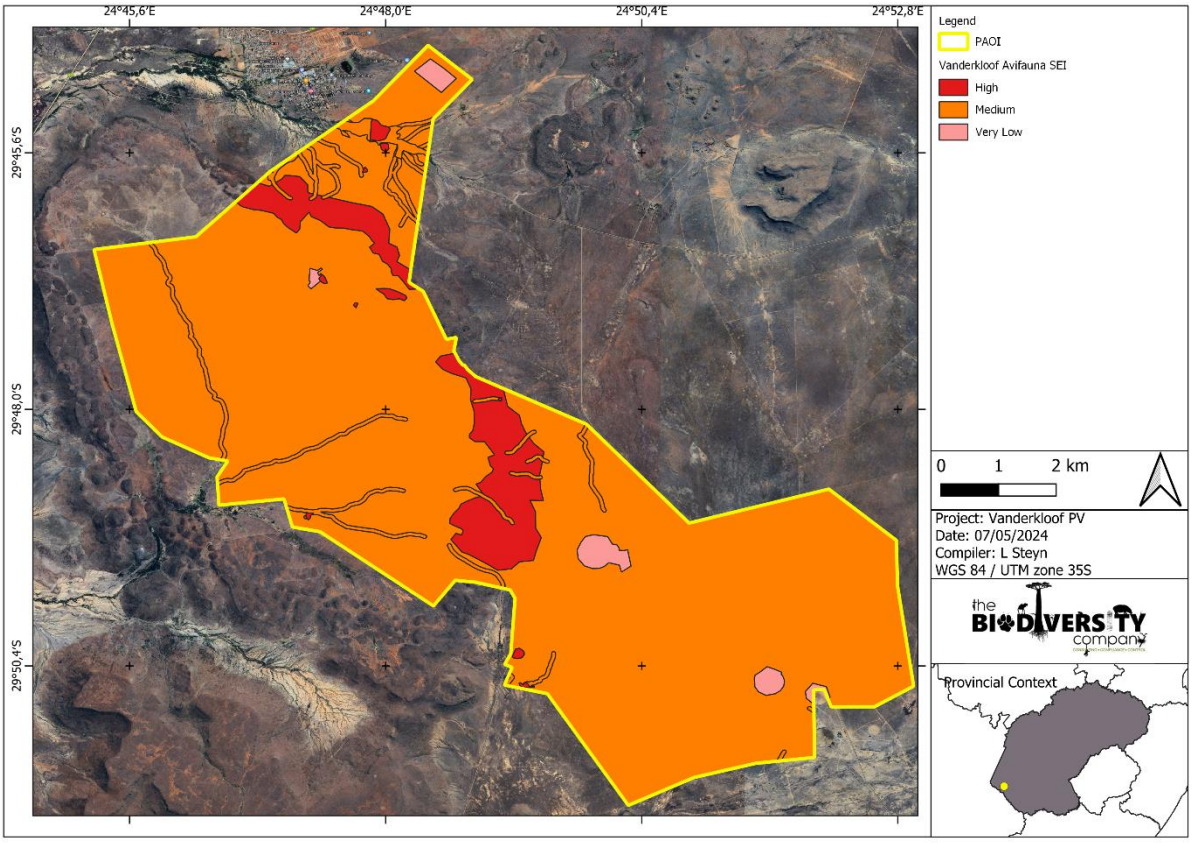

Figure 2-9 Site ecological importance of the project area of influence

3 Impact Assessment

3.1 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.

Electrocution and collisions due to the powerlines are also a concern. Birds prone to collisions can be divided into five categories; 1) large species with high body weight ratio to wingspan resulting in low manoeuvrability, 2) species that are distracted in flight this include predatory birds and smaller species with areal displays, 3) species flying at high speeds, 4) crepuscular species that are active in low light conditions, and 5) species with limited narrow forward vision (Jenkins *et al.,* 2010; Noguera *et al.,* 2010). Species that tend to fly in flocks also may be influenced more by collisions as the birds flying in the rear will not be able to detect the powerlines. 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. Winds parallel or diagonal to cross-arms are the most detrimental, due to exacerbating the difficulty in manoeuvrability during landing or take-off.

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.

3.2 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.
- Appropriate collision and electrocution mitigations based on the high number of SCC will need to be included. This will be included in the final report.
- 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.

4 Conclusion

The avifauna SEI for the proposed Vanderkloof Solar PV PAOI was determined to be ‘High’, ‘Medium’ or ‘Very Low’, depending on the habitat. 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 Areas)** – Any development activities of medium impact acceptable followed by appropriate restoration be activities.

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

It is important to note that a potential Verreaux's Eagle nest was recorded on site. The purpose of the second visit will be to confirm whether the nest is indeed being used. If the nest is found to be active, a buffer area will be established around it.

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6 Appendix Items

6.1 Appendix A: Methodology

6.1.1 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.

6.1.1.1 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 2940_2440; 2940_2445; 2940_2450; 2940_2455; 2945_2440; 2945_2445; 2945_2450; 2945_2455; 2950_2440; 2950_2445; 2950_2450; 2950_2455; 2955_2440; 2955_2445; 2955_2450; 2955_2455.

6.1.1.2 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.

- Free State Terrestrial CBA Plan (2015): The Free State Department of Environment and Nature Conservation has developed the CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. The identification of Critical Biodiversity Areas was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. The Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province.

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2017) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; 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.

6.1.2 Avifauna Survey

Sampling took place from 13th to the 18th of April 2024. Sampling consisted of standardized point counts as well as random diurnal incidental surveys. Standardised 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 utilised as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was run over a 10 min period. The horizontal detection limit was set at 150 m. At each point the observer would document the date, start time, and 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. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal and nocturnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, random meandering and road cruising. Effort was made to cover all the different habitat types within the limits of time and access.

Nests, feathers, individuals and signs were photographed and GSP 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.

6.2 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 6-1 and, respectively.

Table 6-1 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 6-2 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 4 3.

Table 6-3 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 4 4.

Table 6-4 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 4 5.

Table 6-5 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 4 6.

Table 6-6 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.

6.3 Appendix C: Specialist Declaration of Independence

I, Lindi Steyn, 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.

Lindi Steyn

Ecologist

The Biodiversity Company

May 2024

6.4 Appendix D – Specialist CVs

Available on request