Holland & Associates
Environmental Consultants

Impact Assessments - Environmental Management Programs - Compliance Monitoring - Process Review

THE PROPOSED NOTSI PV 3 SOLAR PHOTOVOLTAIC FACILITY AND ASSOCIATED INFRASTRUCTURE OF UP TO 100 MW NEAR DEALESVILLE IN THE FREE STATE PROVINCE

Avian Species Specialist Impact Assessment Report

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Glossary

Avifauna: taken to mean birds (class: Aves) of a specific area (region, habitat etc.) or time period;

Class: a principal taxonomic grouping that ranks above order and below phylum, such as Aves;

Critical Biodiversity Area (CBA): an area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible;

Cumulative impact: in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities;

Endemic or near-endemic: species where >70% of the population occurs in South Africa, or South Africa, Lesotho and Swaziland, as per Birdlife South Africa Checklist 2019;

Environmental Impact Assessment (EIA): a systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessments and scoping and environmental impact reporting (S&EIR) (see below for definition);

Extent of occurrence (EOO): the area contained within the shortest continuous imaginary boundary that can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy; and in short is the species' contemporary distribution range;

IUCN Red List Categories and Criteria: the threatened species categories used in Red Data Books and Red Lists have been in place for almost 30 years. The IUCN Red List Categories and Criteria provide an easily and widely understood system for classifying species at high risks of global extinction, so as to focus attention on conservation measures designed to protect them;

IUCN Red List status: the conservation status of species, based on the IUCN Red List categories and criteria;

Migratory species: these are defined as per NEMBA to mean the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant portion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. Furthermore, this includes all species that are native to South Africa and are listed under the Convention on the Conservation of Migratory Species of Wild Animals (CMS) or the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), with the exception of those species in respect of which South Africa has entered reservations;

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible;

NEMA EIA Regulations: Environmental Impact Assessment Regulations, 2014 (as amended), in terms of Chapter 5 of NEMA;

Project Area of Influence (PAOI): The geographic area that the proposed development has potential impacts on avifauna.

Screening Tool Report: A report generated by the National web-based Screening Tool for the Project Area of Influence.

Receptor: in the context of impact assessments on biodiversity, receptors are environmental components (e.g., flora/fauna species/communities or habitat type) that may be affected, adversely or beneficially, by the proposed project activities within the project areas of influence (PAOI);

Red Data species: species listed as Near-threatened, Vulnerable, Endangered or Critically Endangered in the Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland[1] or on the IUCN Red List. (The at higher risk value applies)

Species: a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes as subsets, any subspecies, cultivar, variety, geographic race, strain, hybrid or geographically separate population;

Species distribution model (SDM): a probability surface representing relative habitat suitability for a species based on known occurrence records for this species and a suit of environmental predictor variables reflecting the ecological requirements of the species. SDMs can therefore be considered to represent the potential geographic distribution of a species based on habitat suitability. The term 'ecological niche model' is often also used interchangeably with SDM;

Species of Conservation Concern (SCC): includes all species that are assessed according to the IUCN Red List Criteria or in the Eskom Red Data Book of Birds of South Africa as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near-threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare (also referred to in some Red Lists as Critically Rare).

[1] Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.

1 Introduction

1.1 Background

Notsi PV (Pty) Ltd is proposing to develop the Notsi Solar Photovoltaic (PV) cluster with a capacity of up to 100 MW each and the associated infrastructure, near Dealesville in the Free State.

Holland & Associates Environmental Consultants (H&A) were appointed in 2021 as the avifaunal specialist to conduct the avifaunal pre-application monitoring and impact assessments for the proposed developments in line with applicable regulations, protocols, and best practice guidelines.

A site inspection was conducted on 5 November 2021 by the avifaunal specialist confirming the sensitivity of the sites and the required pre-application monitoring assessment regime (Annexure A includes the required site verification report). Pre-application monitoring was then conducted over two seasons in line with Best Practice Guidelines (Birdlife SA 2017) for the study area, which covered the affected farm portions of all five proposed projects and an area of 2 km surrounding these.

Environamics has been appointed by the Applicant as the Environmental Assessment Practitioner (EAP) to conduct the required Environmental Authorisation (EA) process.

This report presents the findings of the pre-application monitoring and the avian species specialist impact assessment for the proposed Notsi PV 3 solar energy facility for inclusion in a Basic Assessment (BA) process. The proposed OHPL is subject of a separate Basic Assessment and EA application process and was not assessed.

1.2 The Legislative Framework

South African environmental legislation contains a plethora of environmentally related statutes, guidelines, and protocols, many of which place onerous responsibilities on landowners, developers, Environmental Assessment Practitioners (EAPs) and independent specialist consultants. The legislation considered most pertinent in the context of undertaking a legally compliant avifaunal assessment, is outlined in detail below.

1.2.1 The Convention on Biological Diversity, 1993

The Convention on Biological Diversity (CBD) is the international legal instrument for the conservation of biological biodiversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources that has been ratified by 196 nations[2]. The overall objective of the CBD is to encourage actions which will lead to a sustainable future. States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. Each contracting party shall, in accordance with its particular conditions and capabilities develop national strategies, plans or programmes for the conservation and

[2] www.cbd.int

sustainable use of biological diversity, and integrate the conservation and sustainable use of biological diversity.

1.2.2 The Convention on the Conservation of Migratory Species of Wild Animals, 1983

The Convention on Migratory Species (CMS), also known as the Bonn Convention, is an environmental treaty of the United Nations that provides a global platform for the conservation and sustainable use of terrestrial, aquatic, and avian migratory animals and their habitats.[3]

Parties that are range states of a migratory species listed as endangered shall endeavour to conserve, and where feasible and appropriate restore the habitats of the species which are of importance in removing the species from danger of extinction, and to prevent, remove, compensate or minimise as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species, and to prevent, reduce or control factors that are endangering or are likely to further endanger the species.

1.2.3 The Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1999

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago[4].

Developed under the framework of the Convention on Migratory Species (CMS) and administered by the United Nations Environment Programme (UNEP), AEWA brings together countries and the wider international conservation community in an effort to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range.

AEWA covers migratory waterbirds that are ecologically dependent on wetlands for at least a part of their annual life cycle. These include divers, grebes, pelicans, gannets, cormorants, herons and egrets, storks, ibises and spoonbills, flamingos, ducks, geese and swans, cranes and rails, waders, gulls, terns, skimmers, tropic and frigate birds, auks and the African Penguin.

All AEWA species cross international boundaries during their migrations and require good quality habitat for breeding as well as a network of suitable sites to support their annual journeys. International cooperation across their entire migratory range, as provided by AEWA, is therefore essential for the conservation and management of migratory waterbird populations and the habitats on which they depend.

1.2.4 Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia

The Signatories agree to take co-ordinated measures to achieve and maintain the favourable conservation status of birds of prey throughout their range and to reverse their decline when and where appropriate.

[3] www.cms.int
[4] Unep-aewa.org

1.2.5 Ramsar Convention on Wetlands of International Importance, Ramsar, 1971

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

1.2.6 The Convention on the International trade in Endangered Species of Wild Flora and Fauna, Washington DC, 1973.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

1.2.7 The Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa provides in the Bill of Rights that: Everyone has the right – (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

1.2.8 National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)

The National Environmental Management: Biodiversity Act (NEM:BA) aims to conserve and manage the country's biodiversity via protecting species and ecosystems, specifically those which are threatened or considered to be critically endangered. The Act calls for the management of all biodiversity within South Africa.

1.2.9 National Environmental Management Act, 1998 (Act No. 107 of 1998)

The National Environmental Management Act (NEMA) No. 107 of 1998, as amended is the legislative framework that gives effect to the environmental rights in the Constitution and sets out guiding principles that apply to organs of state that may affect the environment. One of the key principles of the NEMA is sustainable development and the precautionary approach. Regulations promulgated in terms of the NEMA that are relevant to this study are detailed below.

1.2.9.1 Environmental Impact Assessment Regulations, 2014, as amended.

The Environmental Impact Assessment (EIA) Regulations 2014, as amended, set out requirements for the appointment of specialists, the general requirements of specialists, and the disqualification of specialists. Appendix 6 of the EIA Regulations, 2014, as amended sets out the Contents of Specialist Reports.

1.2.9.2 Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Section 24(5) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation.

On 20 March 2020 general requirements for the undertaking of site sensitivity verification and for protocols for the assessment and minimum report requirements of environmental impacts for environmental themes were prescribed in GN 320 of Government Gazette No. 43110. When the

requirements for a protocol apply, the requirements of Appendix 6 of the EIA Regulations, 2014, as amended are replaced by these requirements.

On 30 October 2020 the "*Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species*." was published in GN 1150 of Government Gazette 43855. This protocol replaces Appendix 6 of the EIA Regulations, 2014, as amended, for the terrestrial animal species theme, which includes avian species.

2 The Proposed Project

The purpose of the proposed project is to generate renewable electricity from solar energy using photovoltaic (PV) technology. The proposed Notsi PV 3 site is located on Farm Welgeluk 1622, approximately 17 km south-west of the centre of Dealesville in the Tokologo Local Municipality within the Lejweleputswa District Municipality in the Free State Province (Figure 1). The assessed area has an extent of 370 ha. Technical details of the facility and associated infrastructure are included in Table 1 copied from Annexure B.

Table 1: Technical details of the proposed facilities (as per technical details supplied by Environamics)

Component	Description / dimensions
Height of PV panels	Up to 4.5 meters
Area of PV Array	TBC - detail will only be available following consideration of the environmental sensitivities of the sites as part of the final facility layout design.
Number of inverters required	To be determined as part of the final facility layout design.
Area occupied by inverter / transformer stations / substations	On-site Facility Substation: up to 4 ha BESS: approximately 2 ha
Capacity of the on-site substation	33 kV / 132 kV
Area occupied by both permanent and construction laydown areas	Up to 4 hectares
Area occupied by buildings	Up to 3 ha: • Administration Office (~500m²); • Switch gear and relay room (~400m²); • Staff lockers and changing room (~200m²); • Security control (~60m²);
Width of internal roads	Between 6 and 8 meters (with 1 m drainage on each side)
Height of fencing	Approximately 2 meters

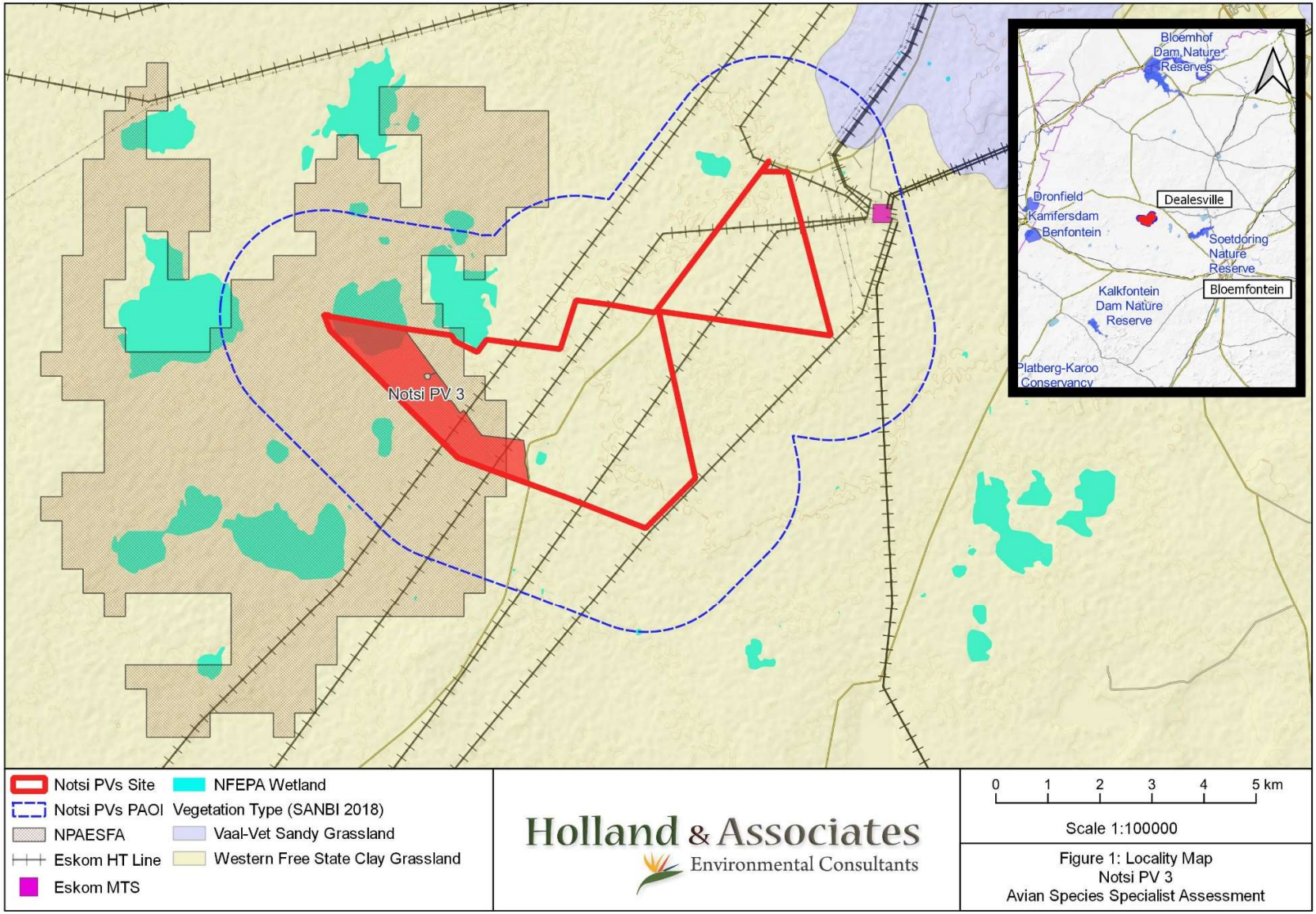


Figure 1: Locality Map

3 Methodology

The Project Description Document: Technical Details (Annexure B) refers and includes a detailed project description of the project that was assessed, as well as the impact assessment methodology used, as provided by the EAP for the project.

The methodology for this avian species specialist assessment is based on the *Birdlife SA Best Practice Guidelines for Birds & Solar Energy* (Birdlife SA 2017) ('the Birds & Solar Energy Guidelines), the "*Protocol for the Specialists Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species"* (GN No. 1150 of 30 October 2020) (the 'Protocol'), as well as the associated "*Species Environmental Assessment Guidelines"* (SANBI 2022) (the 'SANBI Guidelines') which the Protocol refers to.

3.1 Defining the Project Area of Influence (PAOI)

The primary Project Area of Influence (PAOI) was considered to be the proposed development area footprint of the combined site boundary of the proposed Notsi PV Facilities with a 2 km buffer around the PV areas (Figure 1).

3.2 Site Sensitivity Verification

A site inspection was conducted by the avifaunal specialist prior to pre-application monitoring on 5 November 2021. A Site Sensitivity Verification Report for the PAOI was produced and is included as Annexure A.

The Site Sensitivity Verification confirmed the sensitivity of the sites as of high sensitivity with the confirmed presence of four SCC within the PAOI and an avian species specialist assessment being required to be conducted for the proposed sites, in line with the Protocol.

It should be noted that the Screening Tool is continuously updated. Therefore, the Screening Tool was run again in March 2023 to inform this assessment. The national Web-based Screening Tool results differ slightly from the Screening Tool results generated in 2021, and identified the PAOI as of high sensitivity for the avian Species of Conservation Concern (SCC) *Neotis ludwigii* (Ludwig's Bustard) and *Corsorius rufus* (Burchell's Courser), and of medium sensitivity for *Aquila rapax* (Tawny Eagle) and Ludwig's Bustard under the animal species theme.

3.3 Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (Taxon Aves)

The Protocol (GN 1150 of 30 October 2020) sets out the requirements for the assessment of impacts on terrestrial species (Table 2).

Table 2: Terrestrial Species Protocol Assessment Report Content Requirements (as per GN 1150 of 30 October 2020)

Clause	Requirement	Report
3.1.1	Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae	Annexure A & C
3.1.2	A signed statement of independence by the specialist	Annexure C

Clause	Requirement	Report
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	Annexure A
3.1.4	A description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant	Annexure A
3.1.5	A description of the mean density of observations/number of sample sites per unit area and the site inspection observations	Annexure A
3.1.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data	Section 3.8
3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported	Annexure A
3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area	SABAP2 (Birdlasser) Observer 13856
3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant	Figure 3
3.1.10	A discussion of the cumulative impacts	Section 3.9.2 Section 5.6.1
3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr)	Section 6 Table 26
3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant	Section 6
3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 3.2.12 above that were identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate	N/A

3.4 Determining Site Ecological Importance (SEI)

As per the Species Assessment guidelines (SANBI, 2022), the Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the Impact Receptor (i.e., SCC or habitat of the SCC) and its resilience to impacts (Receptor Resilience, RR):

SEI = BI + RR (Table 3)

Table 3: Calculation of Site Ecological Importance (taken from SANBI 2022)

Site Ecological Importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	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

Biodiversity importance in turn is a function of conservation importance (CI) and functional integrity (FI):

BI = CI + FI (Table 4)

Table 4: Calculation of Biodiversity Importance (taken from SANBI 2022)

Biodiversity Importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	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

3.4.1 Conservation Importance

Conservation importance is defined here as: *'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near-threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'* (Table 5).

Table 5: Conservation Importance Criteria as per Species Assessment Guidelines (SANBI 2022)

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU, or Extremely Rare or Critically Rare species that have a global EOO (Extent of Occurrence) 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 EN ecosystem type. Globally significant populations of congregatory species (>10% of global population).
High	Confirmed of highly likely occurrence of CR, EN, VU species that have a global EOO of >10km^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).

Conservation Importance	Fulfilling Criteria
Medium	Confirmed or highly likely occurrence 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. Any area of natural habitat of threatened ecosystems type with status of VU. Presence of range-restricted species. >50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed of 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.

3.4.2 Functional Integrity

Functional integrity (FI) of the receptor is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is: *'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'* (Table 6).

Table 6: Functional Integrity Criteria as per Species Assessment Guidelines (SANBI 2021)

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 disturbances (e.g., ploughing)
High	Large (>20 ha but < 100 ha) intact area for any conservation status of ecosystem type or >10 ha for EN ecosystem types.
Medium	Medium (> 4 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 (e.g., established population of alien and invasive flora) 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 road network surrounds the area. Low rehabilitation potential.
Very Low	Very small (<1 ha) area.

Functional Integrity	Fulfilling Criteria
	No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts

3.4.3 Receptor Resilience

Receptor resilience (RR) is defined here as*: "The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention'.* (Table 7)

Table 7: Receptor Resilience Criteria as per Species Assessment Guidelines (SANBI 2022)

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.

3.4.4 Interpretation of Site Ecological Importance

Site Ecological Importance should be described in the above manner for each impact receptor within the PAOI and clearly mapped in relation to development activities and infrastructure and interpreted in the context of the proposed development activities (Table 8).

Table 8: SANBI (2021) Guidelines for the Interpretation of 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.

3.5 The BirdLife SA Birds and Solar Energy Best Practice Guidelines

The Best Practice Guidelines (Birdlife SA 2017) are the guidelines that were followed for the pre-application avifaunal monitoring.

According to the Birds and Solar Energy Best Practice Guidelines an avifaunal impact assessment of solar power facilities should consist of the following stages:

- *Stage 1: Preliminary Assessment to give an overview of the biological context, likely impacts and potential red flags to development, identify alternatives and determine the appropriate assessment regime.*
- *Stage 2: Data Collection on which to base the impact assessment report, and to provide a baseline against which post-construction monitoring can be compared.*
- *Stage 3: Impact Assessment.*
- *Stage 4: Post-construction monitoring, if required.*

The amount of data to be collected (the avian assessment regime) is prescribed by the guidelines, depending on the technology type, the size of the proposed development and the avifaunal sensitivity of the area (Table 9).

Table 9: Avian Assessment Regimes for Solar Energy Projects (Jenkins *et al.* 2017)

Type of technology	Size	Avifaunal Sensitivity		
		Low	Medium	High
All except CSP power tower	Small (<30 ha)	Regime 1[5]	Regime 1	Regime 2[6]
	Medium (30-150 ha)	Regime 1	Regime 2	Regime 2
	Large (>150 ha)	Regime 2	Regime 2	Regime 3[7]
CSP power tower	All	Regime 3		

The Best Practice Guideline further states:

(2) For multi-phased projects, the aggregate footprint of all the phases should be used. At 3 ha per MW, Small = < 10 MW, Medium = 10-50 MW, Large = > 50MW.

(3) The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development.

For example, an area would be considered to be of high avifaunal sensitivity if one or more of the following is found (or suspected to occur) within the broader impact zone: 1) avifaunal habitat (e.g. a wetlands, nesting or roost sites) of regional or national

[5] Regime 1: One site visit (peak season): minimum 1 – 5 days
[6] Regime 2: Pre- and post-construction: minimum 2-3 days over 6 months (including peak season); carcass searches
[7] Regime 3: Pre- and post-construction: minimum 4-5 days x 4-8 days over 12 months, carcass searches

significance, 2) a population of a priority species that is of regional or national significance, and/or 3) a bird movement corridor that is of regional or national significance, and 4) a protected area and/ or Important Bird and Biodiversity Area.

An area would be considered to be of medium avifaunal sensitivity if it does not qualify as high avifaunal sensitivity, but one or more of the following is found (or suspected to occur) within the broader impact zone 1) avifaunal habitat (e.g., a wetland, nesting or roost sites) of local significance, 2) a locally significant population of a priority species, 3) a locally significant bird movement corridor.

An area would be considered to be of low avifaunal sensitivity if it is does not meet any of the above criteria. that Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

(4) Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

The overall avifaunal sensitivity was determined in terms of The Best Practice Guidelines as discussed above.

Priority Species were defined as species with a Red Data listing of regionally or globally Near-threatened or higher, endemic and near-endemic species, and range-restricted species.

An avifaunal sensitivity map of the PAOI was developed which considers the following features and buffers:

- SCC nests and roosts (none located)
- 200 m NFEPA Wetlands and Rivers
- Reservoirs, dams and waterpoints
- Critical Biodiversity Areas and Ecological Support Areas
- National Protected Area Expansion Focus Areas
- Habitat Suitability Models

3.6 Desktop Study

The following data sources were used to inform this assessment:

- Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute (SANBI) 2018);
- Terrestrial Critical Biodiversity Areas for the Free State (Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), 2015;
- Terrestrial Ecosystem Threat Status and Protection Level (SANBI 2018);
- The Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Screening Tool;
- South African Bird Atlas Project 2 (SABAP2) (Brooks and Ryan 2023);
- Important Bird and Biodiversity Areas (Birdlife South Africa);
- The 2015 Eskom Red Data Book of Birds (Taylor et al. 2015);
- The International Union for Red List of Threatened Species (www.iucnredlist.org);
- South Africa Protected Areas Database (DFFE 2022 Q2);
- South African Conservation Areas (DFFE 2022 Q2);
- Habitat Suitability Models (Birdlife SA 2021);

- Publicly available satellite imagery, elevation; and topographical data; and
- Specialist's knowledge and experience in the immediate area.

The desktop study and site inspection (refer to Annexure A) determined that the area could potentially be considered as of low sensitivity in terms of the Best Practice Guidelines and Sampling Regime 2 was applied due to the size of the proposed development.

The desktop study further identified a list of priority species, which were defined as all species of conservation concern, endemic and near-endemic species, raptors, and large terrestrial species. SABAP-2 data of the six pentads (5°x 5° geographical squares) covering and adjacent to the PAOI were investigated in March 2023 for the assessment. As SABAP2 data is continuously updated, the data informing this assessment differs slightly from the data obtained in 2021 presented in Annexure A.

3.7 Pre-application Monitoring Surveys

Following the Site Inspection on 5 November 2021 (Annexure A), as per Sampling Regime 2 of the Best Practice Guidelines, two seasonal surveys were conducted in early May (autumn) and late July (winter).

A first seasonal pre-application monitoring survey was conducted on both sites over three days from 03 – 05 May 2022. A second seasonal survey was conducted from 28 – 30 July 2022.

The species richness of the area was calculated as a count of species recorded, without taking into account the abundance of species or their relative abundance distributions.

3.7.1 Walked Transects

During each survey five walked transects (WT1 – WT6) with a length of approximately 500 – 850 m, if possible, were sampled three times each (Figure 2). All birds seen on a transect and within 250 m from the transect line, were recorded using Birdlasser software, including GPS location, time, number of individuals, behaviour, age and sex if possible, and environmental variables (wind, cloud cover, visibility, temperature, rain). The Index of Kilometric Abundance (IKA) was calculated by dividing the total number of birds recorded per transect with the total distance surveyed, resulting in the number of birds per km, or IKA.

Table 10: Walked Transect Survey Details

Ref	Transect Start Coordinate	Transect End Coordinate	Transect Length	Date and Time of Transect
WT1	-28.756353; 25.62129	-28.752688; 25.61824	518 m	03/05/2022 07:37 – 07:54 04/05/2022 09:44 – 09:57 05/05/2022 08:34 – 08:46 27/07/2022 15:54 – 16:07 28/07/2022 10:55 – 11:04 30/07/2022 07:35 – 07:47
WT2	-28.750707;26.6206	-28.75352:25.630005	636 m	03/05/2022 08:13 – 08:27 04/05/2022 09:17 – 09:28 05/05/2022 09:01 – 09:12 28/07/2022 11:20 – 11:32 29/07/2022 17:20 – 17:37 30/07/2022 07:13 – 07:28

Ref	Transect Start Coordinate	Transect End Coordinate	Transect Length	Date and Time of Transect
WT3	-28.761243;25.649477	-28.7656;25.648448	601 m	05/03/2022 09:37 – 09:49 04/05/2022 10:39 – 10:51 05/05/2022 07:30 – 07:43 28/07/2022 09:44 – 09:54 29/07/2022 16:29 – 16:41 30/07/2022 08:15 – 08:28
WT4	-28.755705;25.657398	-28.751753;25.65496	519 m	03/05/2022 10:10 – 10:24 04/05/2022 11:05 – 11:22 05/05/2022 07:00 – 07:13 28/07/2022 09:13 – 09:24 29/07/2022 16:46 – 16:56 30/07/2022 08:35 – 08:49
WT5	-28.734807;25.678042	-28.736347;25.68279	546 m	03/05/2022 11:01 – 11:13 04/05/2022 07:59 – 08:15 05/05/2022 09:54 – 10:09 28/07/2022 07:50 – 08:09 29/07/2022 15:48 – 16:01 30/07/2022 09:23 – 09:36
WT6	-28.722953;25.67907	-28.71859;25.68.283	529 m	03/05/2022 11:35 – 11:45 04/05/2022 07:22 – 07:40 05/05/2022 10:27 – 10:37 28/07/2022 07:24 – 07:36 29/07/2022 15:24 – 15:36 30/07/2022 09:51 – 10:51

3.7.2 Focal Sites

Four Focal Sites were established on the sites at locations likely to attract birds or that represent breeding or roosting sites and were visited twice per seasonal survey, if possible (Table 11).

Table 11: Focal Site Survey details

Ref	Coordinate	Type	Date & Time Visited
FS1	-28.734428; 25.676188	Abandoned shed	04/05/2022 08:32 – 08:40 05/05/2022 09:47 – 09:51 28/07/2022 13:29 – 13:50 29/07/2022 13:10 – 13:34
FS2	-28.7499; 25.62663	Greater Kestrel nest	04/05/2022 09:09 – 09:10 05/05/2022 08:20 – 08:30 28/07/2022 13:55 – 14:05 29/07/2022 12:52 – 13:06
FS3	-28.751645; 25.64446	Alien trees	04/05/2022 16:28 – 17:04 05/05/2022 11:05 – 11:20 28/07/2022 15:31 – 15:43 29/07/2022 12:26 – 12:33
FS4	-28.733695; 25.673042	Secretarybird nest	(discovered in July 2022) 28/07/2022 14:55 – 14:58 29/07/2022 11:37 – 11:52

3.7.3 Driven Transects

One driven transect was established and surveyed three times per seasonal survey (Table 12).

Table 12: Driven Transect Survey Details

Ref	Transect Start Coordinate	Transect End Coordinate	Transect Length	Date and Time of Transect
DT1	-28.75782; 25.619993	-28.72307; 25.679035	11.1	03/05/2023 11:57 – 12:40 04/05/2022 16:09 – 16:49 05/05/2023 10:49 – 11:26 27/07/2022 14:14 – 15:42 28/07/2022 11:58 – 13:06 29/07/2022 10:02 – 11:11

3.7.4 Incidental Records and Checklist Survey

In addition to the above, all priority species were recorded incidentally throughout the survey periods using Birdlasser software, including their GPS location, their distance and direction from the point the GPS location was recorded, their behaviour, age and number of individuals. The actual location of the sightings was then plotted on a map using GIS software.

A list of all bird species encountered during all survey days within the PAOI was also kept.

3.8 Assumptions & Limitations

It is assumed that all information provided by the Applicant and EAP is correct.

This report is based on data collected during a single day summer visit, a multi-day autumn and a multi-day winter survey. While the timing of the surveys is deemed as ideal for autumn, winter and summer surveys, inter-annual variations, and inter-seasonal variations (summer and spring) are not accounted for / under-sampled. A precautionary approach was therefore used in the assessment of impacts.

Due to the height of the grass during the surveys, walked transects could not be established in ideal locations, and the open woodland areas were under possibly sampled. Due to the relatively small size of the site the proximity of the habitats to each other, the locations are considered sufficient for the purpose of the assessments.

To date only one peer-reviewed paper on the effects of solar PV facilities on avian species in South Africa has been published (Visser *et al.* 2019). Therefore, much of the assessment is based on information gathered elsewhere in the world.

The analysed SABAP2 data consist of 20 submitted full protocol cards for the six investigated pentads, as well as incidental records submitted. Three to four full protocol cards were submitted for each pentad. This is a relatively low number of full protocol cards per pentad, and low-moderate for the area. Therefore, the confidence is the completeness of the data is considered to be low to moderate.

Walked transects were conducted in seasons outside of the summer during which summer migrant visitors are present, and therefore the calculated Index of Kilometric Abundance and species richness is only comparable to winter count data in other areas.

3.9 Impact Assessment Methodology

Potential impacts on avifauna were first identified through a literature review and desktop study, and further informed by site surveys conducted in March 2022 and July 2022. Impacts were then assessed using an impact assessment methodology supplied by the EAP (refer to Annexure B). For each impact, the nature (positive/negative), extent (spatial scale), magnitude duration (time scale), consequence (calculated numerically) and probability of occurrence is ranked and described. These criteria are used to ascertain the significance of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The impact methodology used is presented in Section B of Annexure B.

3.9.1 Assessment of Alternatives

The Department of Environmental Affairs and Tourism (DEAT) 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. For the proposed development the no-go alternative, technology alternatives and design and layout alternatives will be considered. The proposed location was identified based on various aspects and no further site alternatives are proposed.

3.9.2 Cumulative assessment

The EIA Regulations, 2014, (as amended) determine that cumulative impacts, "in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities." Cumulative impacts can be incremental, interactive, sequential or synergistic.

The term "Cumulative Effect" has been defined by the EAP as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

The cumulative assessment considers known existing, past and proposed projects within a minimum 30 km radius of the proposed development (Table 13) extending over the lifetime of the facility, i.e., for a minimum of 20 years. Avifaunal reports were obtained for cumulatively assessed projects as far as possible.

Table 13: Projects in 30 km radius

Site name	Distance from study area	Proposed capacity	Project status	Available Reports
Visserpan PV 2, 3 & 4	~5 km	75 MW	Approved	PV4: BAR (2020)
Keren Klipbult Solar Plant	~7 km	75 MW	Withdrawn/Lapsed	N/A
Eleven Kentani PV Solar	<1 km	75 MW	Approved (6 of these projects are preferred bidders in REIPPPP round 5 and will commence construction in early 2023 – currently in financial close phase)	EMPr (2022) Draft EIAr Executive Summary (2015)

Site name	Distance from study area	Proposed capacity	Project status	Available Reports
Kentani cluster MTS, BESS & powerlines	<1 km	132 kV / 400 kV	Approved	Draft BAR (2021)
Sebina Letsatsi Solar PV	~12km	75 MW	Approved	N/A
Edison PV Solar	~15km	100 MW	Approved	Amendment Report 2018
Maxwell PV Solar	~17km	100 MW	Approved	Executive Summary Draft EIAr (2016)
Marconi PV Solar	~16km	100 MW	Approved	Executive Summary Draft EIAr (2016)
Watt PV Solar	~18km	100 MW	Approved	N/A
Farday PV Solar	~18km	100 MW	Approved	N/A
Springhaas Solar Facility 1, 3,4,6,8 & 9	~ 8 km	150 - 250 MWac	Approved	Draft BAR

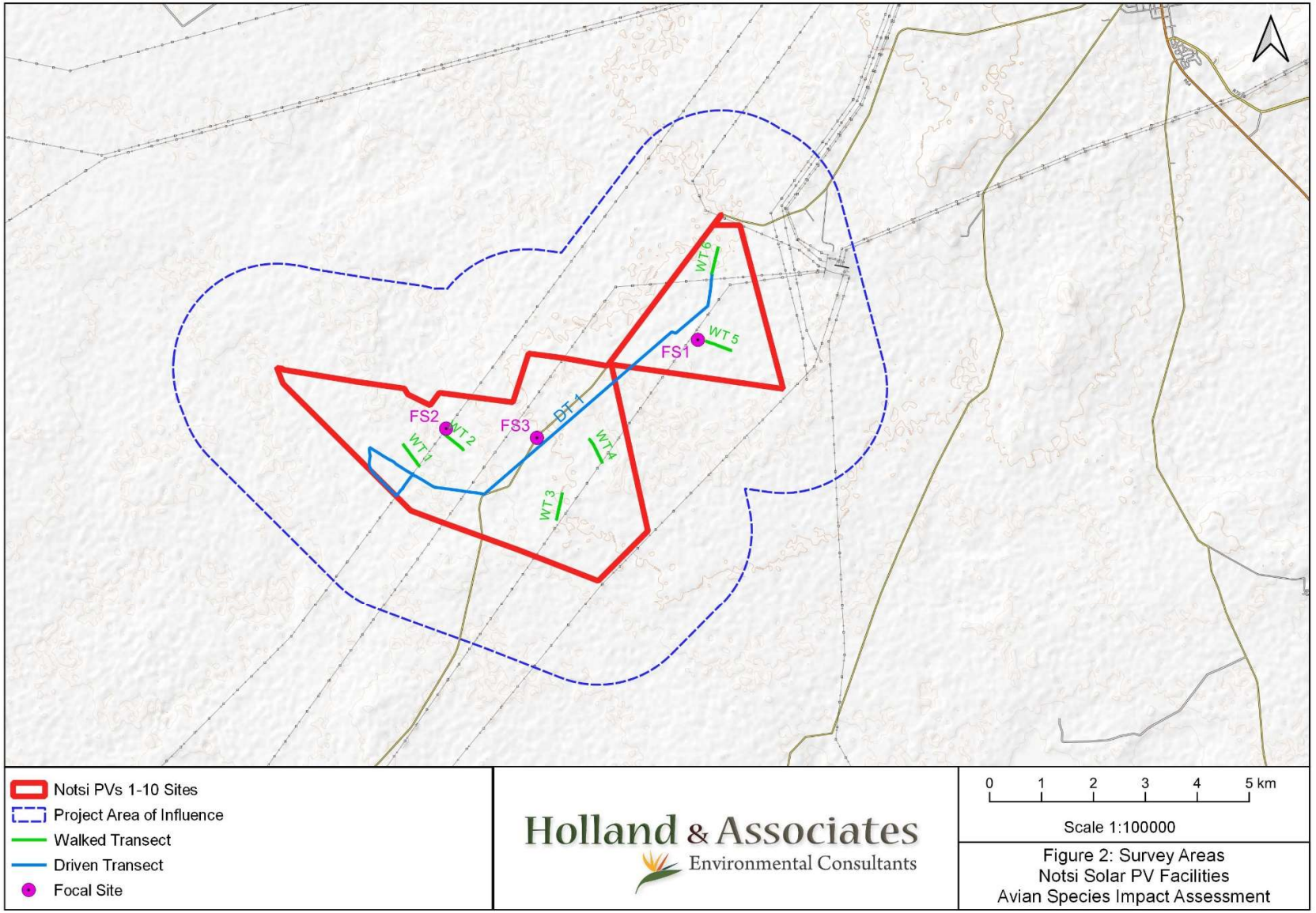


Figure 2: Survey Locations

4 Results

4.1 Regional Context

The proposed development sites are located approximately 13 km south-east of the town of Dealesville in the Free State Province. The sites fall within the Grassland Biome and Dry Highveld Grassland Bioregion. The closest Important Bird Area to the project is the Soetdoring Nature Reserve located approximately 35 km east-south-east of the site. There are a number of Protected Areas in the region, with the closest being the Nielsview Nature Reserve, which was proclaimed a Nature Reserve in 1998, and is located approximately 6 km south of the PAOI. (Figure 1).

4.2 Local Context

The Notsi PV Sites are entirely mapped as Western Free State Clay Grassland (*Least Concern*), with an area of Vaal-Vet Sandy Grassland (*Endangered*) occurring on the eastern section of the PAOI, north-east of the PV Sites (Figure 1). The vegetation within the proposed development footprint of the Notsi PVs was confirmed to be largely grassland and low shrubland used for livestock grazing (refer to Appendix B within Annexure A for photographs). Surrounding land uses within the PAOI consist largely of livestock grazing and cultivated crops.

The western section of the PAOI and PV Sites are mapped as an Ecological Support Area 1 (ESA1) with smaller areas mapped as ESA2. A small area on the eastern boundary of the PAOI, north of the Beta substation is mapped as a Critical Biodiversity Area 1. The proposed development footprint does not contain any Critical Biodiversity Areas.

Critical Biodiversity Areas are required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in systematic biodiversity plans. Ecological Support Areas 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. ESA1 are areas that are currently either in at least fair ecological condition which should be retained in at least fair ecological condition, while ESA2 are areas that are currently in severely modified ecological condition but that nevertheless retain sufficient ecological functioning to fulfil the purpose for which the ESA was selected. The objective is to prevent further deterioration in ecological condition[8].

The proposed development is not expected to impact on the ecological condition of the Critical Biodiversity Areas within the PAOI. The proposed Notsi PV 3 development footprint includes an area of approximately 145 ha of ESA1 and 94 ha of ESA2, which would be lost. In terms of avifauna, birds would be displaced from the PV Sites into the surrounding areas, which is unlikely to result in any significant population level impacts.

Approximately 215 ha of the Notsi PV 3 Site fall within a National Protect Area Expansion Area (Figure 1).

[8] SANBI. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. First Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria.

No NFEPA rivers are mapped in or near the PAOI, and almost no drainage lines occur within the PAOI. However, several NFEPA wetlands occur within in the PAOI, but these have been excluded from the Notsi PV 3 development footprint.

4.3 General Sampling Conditions

The land use on the proposed sites is in line with the results of the screening tool. Sampling was conducted over two seasons (autumn and winter) over several days each, in good weather conditions, in addition to an initial site inspection in a third season (summer).

4.3.1 Sampling effort

The sampling effort of a one-day site inspection in summer and two seasonal multi-day surveys conducted in autumn (May) and winter (July) is considered adequate for the type and size of the development and the avifaunal sensitivity of the site. Sampling effort is in line with Regime 2 of the Best Practice Guidelines, the Species Assessment Guidelines and with the Terrestrial Species Protocol (GN 1150 of October 2020) which refers to the Species Environmental Assessment Guideline (SANBI 2022).

4.4 Avifaunal Habitats

4.4.1 Grassland habitat

This is a relatively uniform habitat in terms of plant species composition and abundance and is dominated by grasses with a few scattered woody species. This type of habitat is favoured by the recorded SCC Secretarybird (*Endangered*), as well as recorded terrestrial species such as Blue Crane (*Near-threatened*), Kori Bustard (*Near-threatened*), Blue Korhaan and Northern Black Korhaan. Ludwig's Bustard (*Endangered*) and Black Harrier (*Endangered*) may also occur here. It is utilised for foraging by small raptors, such as the recorded Greater Kestrel and Amur Falcon, as well as a variety of passerines and terrestrial species such as coursers, spurfowl, quails and guineafowl. Due to the large extent of grassland habitat the density of avian species is typically low. A Secretarybird breeding site was located within the habitat. The sensitivity of this habitat in terms of avifauna is overall considered to be medium, while an area of 1 km surrounding the Secretarybird breeding site of very high sensitivity (No-Go), the area of 1 - 2 km surrounding the breeding site of high sensitivity, and the area of 2 - 3 km of medium sensitivity. The proposed development area falls outside of these medium sensitivity, high sensitivity and no-go areas.

4.4.2 Reservoirs, water troughs and dams

The study area contains some open water troughs, small dams and reservoirs (Figure 3). Open water attracts all avifauna and dams may attract the recorded SCC Secretarybird (*Endangered*) and Blue Crane *(Near-threatened)* who prefer to nest and roost in the vicinity of open water, as well as a variety of raptors including the recorded Cape Vulture (*Endangered*), White-backed Vulture (*Critically Endangered*), Pale Chanting Goshawk, Greater Kestrel and Amur Falcon. Abdim's Stork, Black Stork (*Vulnerable*), Booted Eagle, Black-chested Snake-Eagle and Black winged Kite may also occur here, but the habitat is most frequently utilised by weavers, doves, sparrows, and bishops. Therefore, an area of 100 m of artificial open water bodies is considered to be of high avifaunal sensitivity. The existing open water areas in the PAOI are however not

considered to be irreplaceable, and any man-made open water structures could be removed or covered, which would lower the sensitivity.

4.4.3 Wetlands, pans and vleis

Wetlands, pans and vleis (wet and dry) within the grassland biome attract a variety of water-associated as well as terrestrial species such as the recorded SCC Greater Flamingo (*Near-threatened),* Blue Crane (*Near-threatened),* Secretarybird *(Endangered)* and Kori Bustard *(Near-threatened)*, as well as a variety of waterfowl, waders and passerines. This habitat type and an area of 200 m surrounding delineated wetlands and pans are considered of high avifaunal sensitivity.

4.4.4 Power lines and electricity pylons

Four high voltage transmission lines run through the length of the proposed development areas from the Main Transmission substation (MTS) located in the north-east of the PAOI. Large power lines and their supporting pylons are an important roosting and nesting substrate for a variety of raptors. White-backed Vulture (*Critically Endangered)* and Cape Vulture *(Endangered*) were recorded perched on these lines during pre-application monitoring. A pair of Greater Kestrel was recorded as nesting on one of the electricity pylons. Other raptors and corvids are also likely to utilise the pylons for nesting or perching. Areas around raptor nests on electricity pylons are of high sensitivity, and the size of this area is species dependant. For Greater Kestrel an area of 250 m was determined as of high sensitivity.

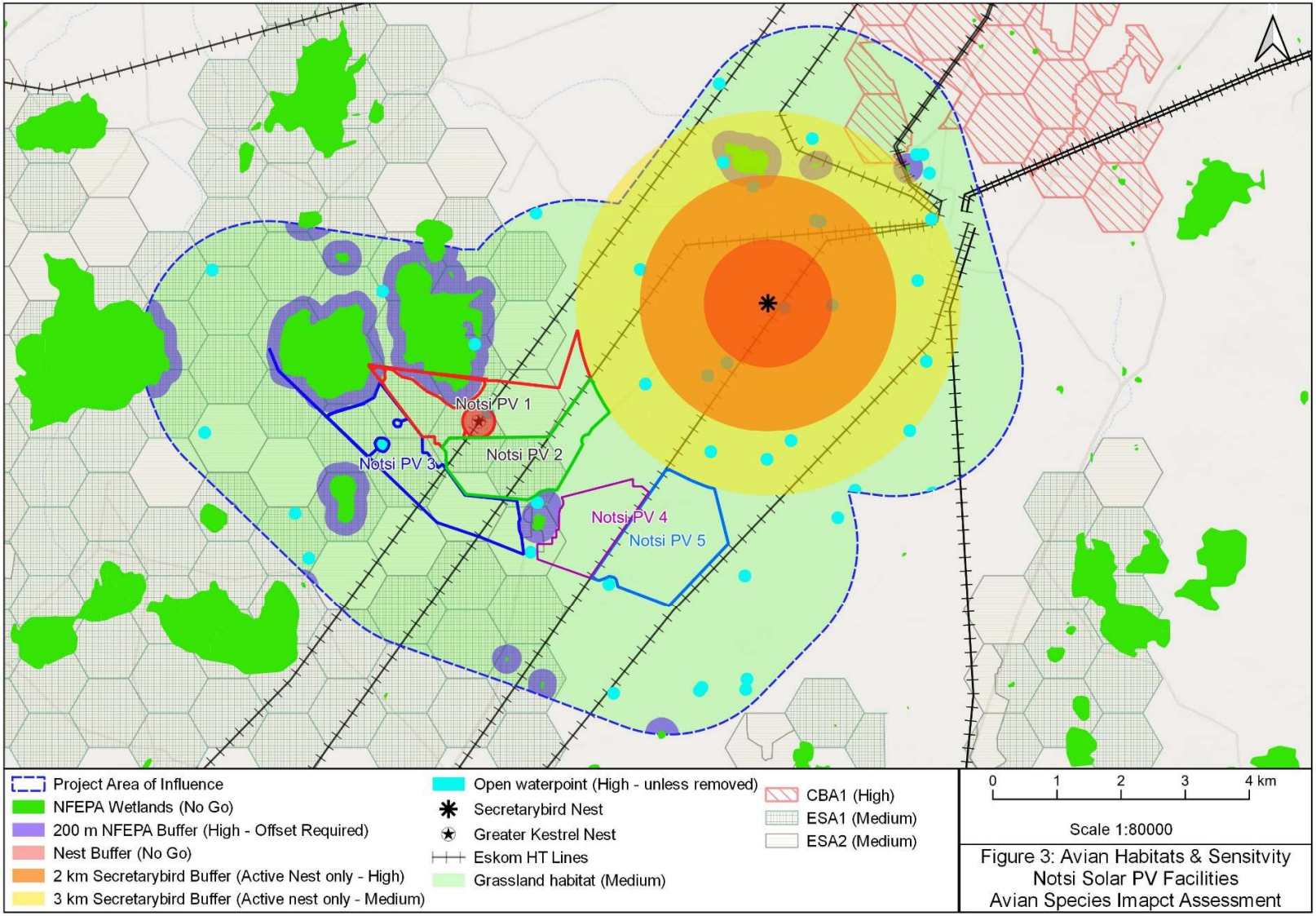


Figure 3: Avian Habitats and Sensitivity

4.5 Current Impacts

The PAOI consists of a *Least threatened* vegetation type, in largely modified to severally modified condition in some areas, which is currently being used for grazing, and interspersed with other anthropogenic influences such as farm roads, fences, farm buildings and resulting erosion and alien invasive plants. Four high voltage transmission lines traverse the PAOI from an MTS located in the north-east of the PAOI in a south-westerly direction. The PAOI is surrounded to the north, east and south by authorised solar PV facilities, that have not yet been constructed.

4.6 Walked Transect Results

During walked transects, 55 avian species were recorded, with 33 species recorded during the early May survey, and 42 avian species recorded during the late July survey. The highest number of individuals and species were recorded on walked transect 2 with an Index of Kilometric Abundance (average number of birds recorded per km) of 46.9 and 30 species recorded (Table 14). Overall, the number of individual birds present is relatively moderate compared to other area's data collected in winter in South Africa in which solar PV developments are proposed, in the specialist's experience.

Table 14: Walked Transect Survey Results

Ref	No. of species	Index of Kilometric Abundance	Most frequently recorded and SCC
WT1	22	45.7	Ant-eating Chat (37), Quailfinch (17), Pied Crow (12)
WT2	30	46.9	Red-billed Quelea (30), Southern Red Bishop (30), Desert Cisticola (17); **Secretarybird (1 - *Endangered*)**
WT3	18	18.0	Quailfinch (14), Pied Crow (10), melodious Lark (7); **White-backed Vulture (2 - *Critically Endangered*)**
WT4	20	27.9	Red-billed Quelea (24). White-browed Sparrow-weaver (15), Quailfinch (9); **White-backed Vulture (2 - *Critically Endangered*)**
WT5	27	38.8	Quailfinch (24), Cloud Cisticola (13), Red-capped Lark (9); **White-backed Vulture (1 - *Critically Endangered*)**
WT6	22	38.8	Speckled Pigeon (36), Helmeted Guineafowl (13), Pied Crow (12)
All	55	36.1	Quailfinch (76), Ant-eating Chat (59), Red-billed Quelea (54)

4.7 Driven Transect Results

A total of seven target species were recorded during driven transects, including three sightings of *Endangered* Secretarybird (4 birds) and three sightings of *Critically Endangered* White-backed Vulture (4 birds). A total distance of 66.6 km was sampled, with a total of 42 sightings of 47 target birds, resulting in an IKA of 1.4 target birds per km. The IKA for SCC was 0.12 birds per km.

Common Name	Scientific Name	May 2022 Sightings (Birds)	July 2022 Sightings (Birds)	Total Sightings (Birds)
Black-winged Kite	*Elanus caeruleus*	6 (8)	5 (6)	11 (14)
Blue Korhaan	*Eupodotis caerulescens*	0	1 (1)	1 (1)

Common Name	Scientific Name	May 2022 Sightings (Birds)	July 2022 Sightings (Birds)	Total Sightings (Birds)
Greater Kestrel	*Falco rupicoloides*	0	6 (8)	6 (8)
Northern Black Korhaan	*Afrotis afraoides*	2 (2)	6 (6)	8 (8)
Pale Chanting Goshawk	*Melierax canorus*	1 (1)	2 (2)	3 (3)
Secretarybird	***Sagittarius serpentarius***	**1 (1)**	**3 (2)**	**4 (4)**
White-backed Vulture	***Gyps Africanus***	**0**	**3 (4)**	**3 (4)**
Total		**12 (16)**	**30 (31)**	**42 (47)**

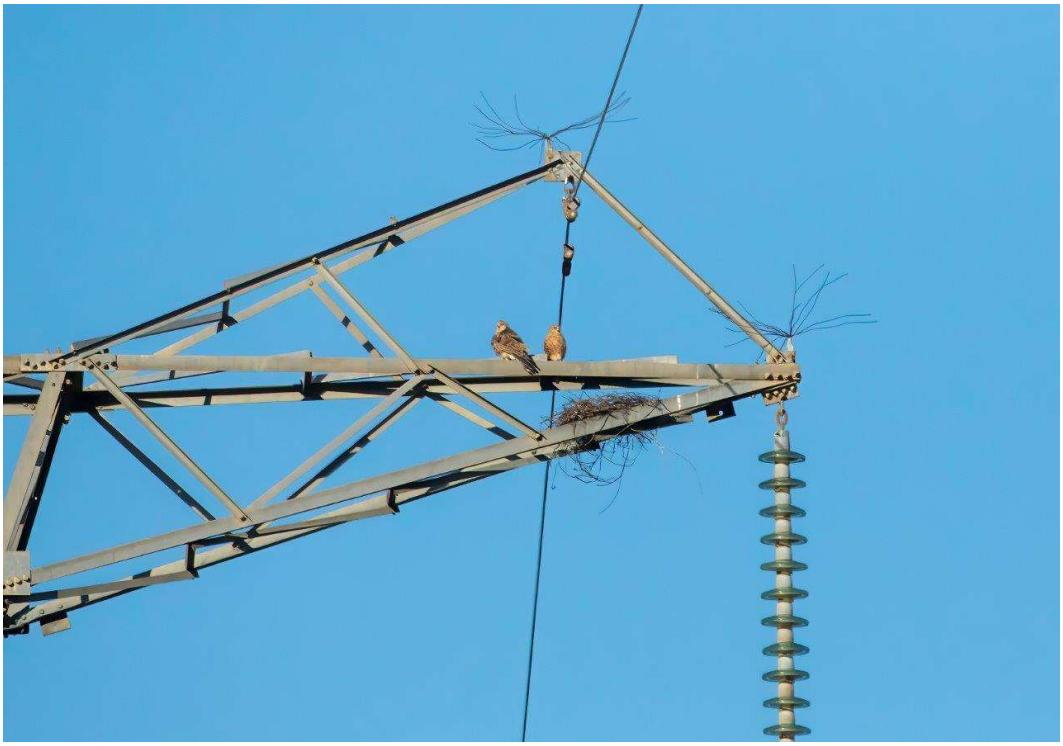
4.8 Focal Site Results

Focal Site 1 is an abandoned farm shed surrounded by mostly alien trees and close to a high voltage transmission line (Figure 1, Photograph 1). A Western Barn Owl was found using the shed during the May survey. Other recorded species included South African Shelduck, Red-billed Quelea, Acacia Pied Barbet and Yellow-billed Duck.

Photograph 1: Focal Site 1 – Abandoned shed and trees

Focal Site 2 is an active Greater Kestrel nest on a powerline pylon (Figure 1, Photograph 2). A bird was recorded on the pylon next to the nest in the May survey, and the pair was found to be breeding in the July survey (Photograph 3).

Photograph 2: Focal Site 2 – Greater Kestrel Nest (May 2022)



Photograph 3: Greater Kestrel Breeding Pair at Nest (July 2022)

Focal Site 3 is a row of alien trees (Photograph 4). Records of note are a Pale Chanting Goshawk which was recorded in May 2022 and a Spotted Eagle Owl recorded in the July 2022 survey.

Photograph 4: Focal Site 4 – Alien Trees

Focal Site 4 was added in July 2022 and is a stick nest in a thorn tree, in which a pair of Secretarybird was observed lining the nest with soft material. The pair was later recorded foraging within 300 m south-east of the nest, and again approximately 1000 m north of the nest.

Photograph 5: Active Secretarybird Nest at Coordinates - 28.733; 25.673

4.9 Incidental Sightings

Twelve species were recorded incidentally throughout the two surveys, with a total of 44 records of 272 birds. Pale Chanting Goshawk, Greater Kestrel and Northern Black Korhaan were the most frequently recorded species, and these are likely to include repeat records of the same individuals or pairs, as these are territorial resident species. A flock of approximately 200 Greater Flamingo was observed in a wetland within the PAOI.

4.10 Predicted and Observed Species, highlighting Species of Conservation Concern

The South African Bird Atlas Project 2 (SABAP2) has recorded 143 species (as of March 2023), which potentially occur in the study area, including 9 Species of Conservation Concern (SCC), within 6 pentads covering and adjacent to the PAOI (Annexure D). An additional fifteen species were recorded during the site inspection and seasonal surveys, including the red listed species Greater Flamingo (*Near-threatened*). Two further red listed species were flagged as potentially present by the Screening Tool (Tawny Eagle and Burchell's Courser). The species richness of the area was 74 species recorded during the three site surveys. This includes five SCCs and ten near-endemic species (Annexure D, Table 15). Of the SCC recorded one is listed as *Critically Endangered* (White-backed Vulture), one is listed as *Endangered* (Secretarybird) and three are listed as *Near-threatened* (Blue Crane, Greater Flamingo and Kori Bustard).

Table 15: Species of Conservation Concern, endemic and near-endemic bird species predicted and recorded during the pre-application monitoring surveys

Common Name	Scientific Name	Red Data Status[9]	Endemism[10]	SABAP2 Reporting Rate (%)	Surveys
Abdim's Stork	*Ciconia abdimii*	NT		5	
Black Harrier	*Circus maurus*	EN	NE	60	
Black Stork	*Ciconia nigra*	VU		5	
Black-eared Sparrow-Lark	*Eremopterix australis*		NE	0	x
Blue Crane	***Grus paradisea***	**NT**		**5**	**x**
Blue Korhaan	*Eupodotis caerulescens*		SLS	25	x
Burchell's Courser		VU		-	
Cape Weaver	*Ploceus capensis*		NE	-	x
Cape White-eye	*Zosterops virens*		NE	-	x
Cloud Cisticola	*Cisticola textrix*		NE	65	x
Fiscal Flycatcher	*Melaeornis silens*		NE	35	x
Greater Flamingo	***Phoenicopterus roseus***	**NT**		**-**	**x**
Karoo Thrush	*Turdus smithi*		NE	5	x
Kori Bustard	***Ardeotis kori***	**NT**		**10**	**x**
Large-billed Lark	*Galerida magnirostris*		NE	10	
Ludwig's Bustard	*Neotis ludwigii*	EN		15	

[9] LC: Least Concern; NT: Near-threatened; VU: Vulnerable; EN: Endangered
[10] E: Endemic; NE: near-endemic; SLS: South Africa, Lesotho & Swaziland

Common Name	Scientific Name	Red Data Status[9]	Endemism[10]	SABAP2 Reporting Rate (%)	Surveys
Melodious Lark	*Mirafra cheniana*		NE	30	x
Secretarybird	***Sagittarius serpentarius***	**EN**		**20**	**x**
Sickle-winged Chat	*Emarginata sinuata*		NE	25	x
South African Cliff Swallow	*Petrochelidon spilodera*		BSLS	35	x
Tawny Eagle	*Aquila rapax*	EN		0	0
White-backed Vulture	***Gyps africanus***	**CR**		**5**	**x**

Table 16 presents the potentially occurring SCC on the proposed development sites, their probability of occurrence, and reasons thereof.

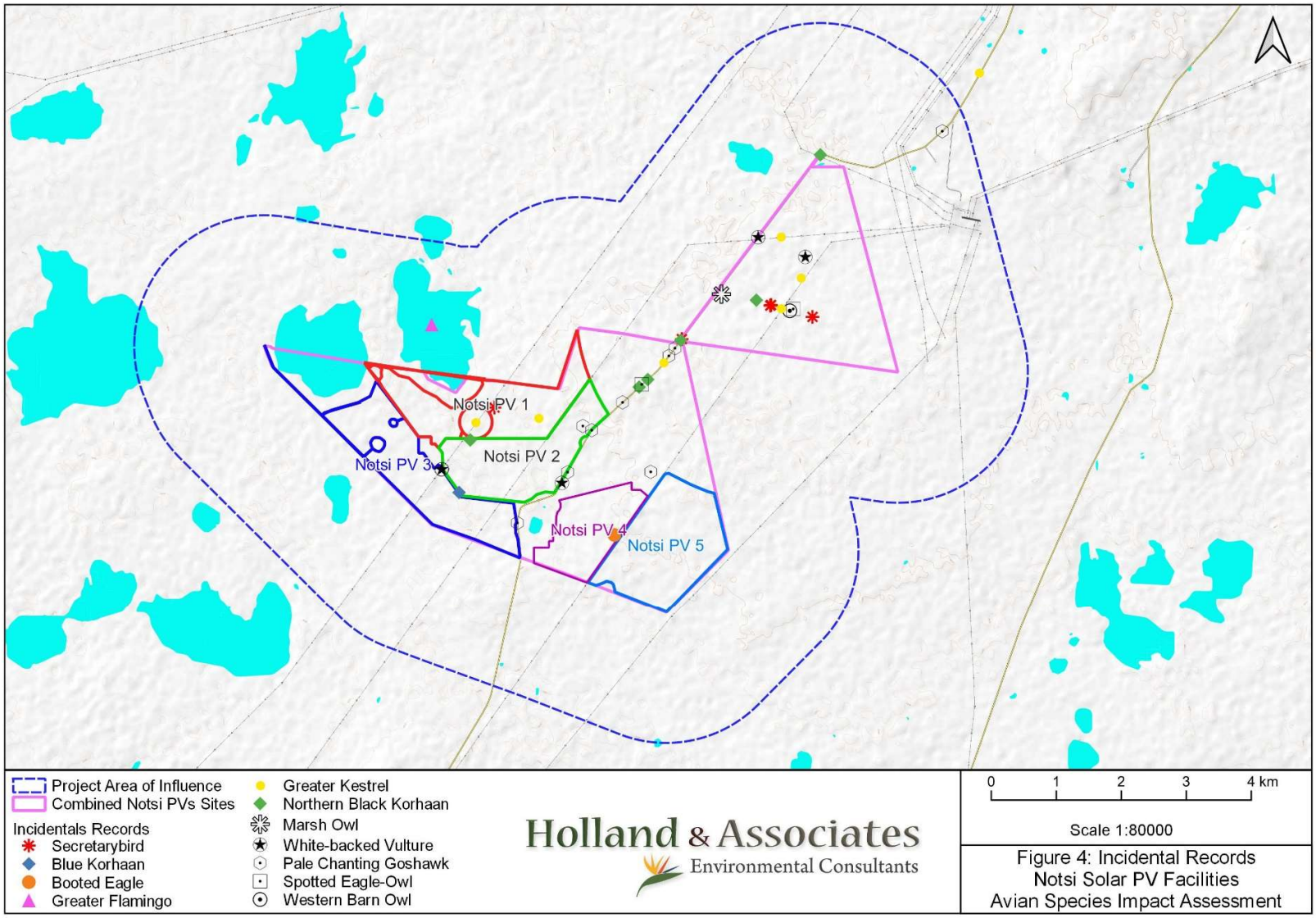


Figure 4: Incidental Records

Table 16: Species of Conservation Concern potentially occurring in the PAOI and their Probability of Occurrence (PoC)

Alphabetical Name	Scientific Name	Red Data Status[11]	Habitat requirement (Hockey *et al*. 2005)	PoC	Reason for PoC
Abdim's Stork	*Ciconia Abdimii*	NT	Grassland, savannah woodland and cultivated fields	Medium	Has been recorded in the region by SABAP2 but with a low reporting rate (RR) (5%), and potentially occurs in the PAOI in the summer months which were under sampled.
Black Harrier	*Circus maurus*	EN	Dry grassland, karoo scrub and agricultural fields.	High	High SABAP2 RR of 50%. None recorded during monitoring, but *'Irruptive in Free State grasslands, probably in response to food availability, with year of abundance sometimes followed by complete absence in following year'* (Hockey *et al* 2005)
Black Stork	*Ciconia nigra*	VU	Dams, pans, flood plains, shallows of rivers, pools in dry riverbeds, and sometimes on marshaland and flooded grassland,	Low	Little suitable habitat within PAOI as it is *'uncommon at seasonal pans lacking fish'* (Hockey et al. 2005). Low SABAP2 RR of 5%.
Blue Crane	***Grus paradisea***	**NT**	**Natural grasslands, wetlands, cultivated pastures, croplands**	**Confirmed**	**A pair was recorded in the PAOI during site inspection.**
Burchell's Courser	*Corsorius rufus*		Sparsely vegetated areas including heavily grazed and burned grasslands, bare and lightly grassed pans.	Low	Low SABAP2 RR of 5% and not recorded during survey, but may occur during dry periods or after burning events.
Greater Flamingo	***Phoenicopterus roseus***	**NT**	**Breeds in saltpans. Inland dams, sewage treatment pans and river mouths.**	**Confirmed**	**A flock of approx. 200 individuals were recorded in a wetland within the PAOI.**
Kori Bustard	***Ardeotis kori***	**NT**	**Dry open savanna woodland, sdwarf shrublands and occasionally grasslands**	**Confirmed**	**Recorded within the PAOI during the site inspection.**
Ludwig's Bustard	*Neotis ludwigii*	EN	Favours semi-arid dwarf shrublands, also in arid savanna and fynbos	Medium	SABAP2 RR of 15% and not recorded during monitoring. Near the western end of its range.
Secretarybird	***Sagittarius serpentarius***	**EN**	**Open grassland, shrubland, open savanna.**	**Confirmed**	**Recorded nest-building in July 2022 in the northern Notsi PVs proposed development area.**

[11] http://speciesstatus.sanbi.org/

Alphabetical Name	Scientific Name	Red Data Status[11]	Habitat requirement (Hockey *et al*. 2005)	PoC	Reason for PoC
Tawny Eagle	*Aquila rapax*	EN	Open savanna woodland and able to colonise treeless grasslands by breeding on pylsons and alien trees	Medium	No SABAP2 Records and not recorded during survey, but closest records within 35 km of site and holds territories of approx. 70 km^2
White-backed Vulture	***Gyps africanus***	**CR**	**Lightly wooded arid savanna and bushveld**	**Confirmed**	**Confirmed roosting on transmission line in the PAOI during all surveys.**

4.11 Site Ecological Importance

The calculation of the Site Ecological Importance is presented in Table 17. Four avifaunal habitat types were identified on the proposed development footprint.

The Conservation Importance for grasslands habitat and wetlands, vleis and pans was determined as medium due to more than 50% of the receptor containing natural habitat with potential to support SCC. Man-made reservoirs, dams, water troughs, and electrical infrastructure were determined as of low conservation importance with less than 50% of receptor containing natural habitat with limited potential to support SCC.

The Functional Integrity of the grasslands habitat and wetlands, vleis and pans was determined as medium with mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance and moderate rehabilitation potential. The functional integrity of the man-made water habitats was determined as low due to the areas being small and isolated. For power line infrastructure this is difficult to determine since the powerline is entirely artificial and does not support any natural elements except functioning as a nesting and roosting substrate for avifauna. For this function it was classified as having a high functional integrity.

The Receptor Resilience of the grasslands habitat and wetlands, vleis and pans habitat has been rated as medium as a recovery to restore >75% of functionality is assumed to be slow, but possible with rehabilitation, over more than 10 years. For man-made structures the receptor resilience was determined as very high.

The resulting Site Ecological Importance rating was calculated as medium for the grassland habitat and the wetlands, vleis and pans habitat on the proposed development site, which means that minimisation and restoration mitigation must be implemented, and development activities of medium residual impact are acceptable if followed by restoration activities (SANBI 2022). The Site Ecological Importance for the man-made habitats was calculated as very low meaning that development activities are acceptable here even with medium to high negative impact significance, and restoration activities may not be required.

Table 17: Calculation of Site Ecological Importance

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Grassland	Medium	Medium	Medium	Medium	Medium
Reservoirs, water troughs & dams	Low	Low	Low	Very high	Very low
Wetlands, pans & vleis	Medium	Medium	Medium	Medium	Medium
Power lines and pylons	Low	High	Medium	Very high	Very low

5 Assessment of Impacts on Avifauna

The following potential impacts on avifauna by the proposed development were identified for the construction phase (IUCN 2021):

- Disturbance
- Habitat loss

The following potential impacts on avifauna by the proposed development were identified for the operational phase:

- Disturbance
- Collisions with PV panels
- Electrocutions and collisions on electrical infrastructure and fencing
- Barrier effects
- Cumulative impacts

The following potential impacts on avifauna by the proposed development were identified for the decommissioning phase:

- Disturbance
- Habitat loss

5.1 Disturbance

Disturbance during the construction, operational and decommissioning phases from construction /decommissioning and maintenance activities can negatively affect all avifauna on an individual or population level by increasing stress, decreasing food and habitat availability, causing displacement into potentially less suitable neighbouring environments, and ultimately potentially decreasing reproductive success (Bennun et al. 2021, Birdlife SA 2017). This is particularly true for resident breeding species, some of which are shy, secretive, and not habituated to human activities. For this project, disturbance is of particular concern due to the confirmed occurrence of the territorial SCC Secretarybird (*Endangered*) breeding in the larger area, and the SCC Blue Crane (Near-threatened) potentially breeding in the larger area. Greater Kestrel was also found nesting on site.

5.1.1 Mitigation of Disturbance:

Disturbance can be managed and mitigated at the design stage by avoiding important nesting, roosting and foraging areas of sensitive species during site selection and layout design. All identified No Go Areas in Figure 3 must excluded from the development footprint, and areas of high sensitivity should be avoided, as was indicated in the Site Inspection Report (Annexure A), The proposed layout (provided 4 April 2023, Figure 3) achieves this and is supported.

The development footprint should exclude a 1 km No-Go buffer (Very High Sensitivity) surrounding any active or inactive/previous Secretarybird breeding site, as per Birdlife SA's Guideline, which is achieved for the Notsi PV 3 for the known current Secretarybird breeding site north of the proposed Notsi PV 3. Secretarybird typically change breeding sites every 1-5 years, and an area of up to 3 km surrounding the proposed development footprint should be monitored regularly post-authorisation in order to avoid conflicts at the start of construction.

It is noted that there are currently no known Secretarybird breeding sites within 3 km of the proposed Notsi PV 3 development footprint. Should a nest be located within 3 km of the authorised facility infrastructure post-authorisation development activities within 1 to 3 km of any active Secretarybird breeding site must be minimised to mitigate disturbance (Birdlife SA 2022) and the applied minimisation measures and any construction activities to take place must be signed-off in advance by a SACNASP registered avifaunal specialist in discussion with the Developer. Minimisation measures could entail amending the construction schedule to commence construction as late as possible within the inside of the buffer area, and only commence with activities that create the least amount of disturbance to a breeding pair and immature bird until it has left the nest. It should be noted that the detail of what can be expected to be acceptable will depend largely on the breeding status at the time, but due to the nature of juvenile dispersal is likely to exclude the clearing of indigenous vegetation within a 1 - 2 km Secretarybird nest buffer area,, which the juvenile bird relies on to forage for food before dispersal. Once the young bird has fledged, and this has been confirmed by an avifaunal specialist, development activities within a 1 – 3 km area may proceed normally. Breeding sites must be monitored regularly to determine breeding activity throughout the year, as Secretarybird can breed any time of the year, influenced by rainfall, until it is confirmed to be abandoned.

A walkthrough of the authorised final development layout and the 3 km surrounding area must be conducted by an avifaunal specialist or observer trained by an avifaunal specialist within 30 days prior to the commencement of construction to confirm SCC breeding activities.

Should any SCC be found breeding within 3 km of the operational facility, or facility to be decommissioned, a 1 km area surrounding the nest must be cordoned off as a no-go area as far as practically possible, and an avifaunal specialist must immediately be consulted for further instruction.

All disturbance can be further minimised by demarcating the disturbance footprint, and minimising this to the development footprint as much as practically possible.

5.1.2 Assessment of Disturbance

The impact assessment of disturbance for the construction, decommissioning and operational phases is presented in Table 18 and Table 19. The post-mitigation value assumes that all recommended mitigation measures are implemented, and the final development layout will exclude any infrastructure in the 200 m NFEPA buffer, as in the assessed layout.

Table 18: Impact Assessment of Disturbance on Avifauna for the Notsi PV 3 during Construction and Decommissioning

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Local (2)	Site (1)
Duration	Long term (3)	Short term (1)
Probability	Definite (4)	Probable (3)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceability	Significant (3)	Marginal (2)
Cumulative effect	Low (2)	Low (2)

Criteria	Pre-mitigation	Post-mitigation
Intensity	High (3)	Medium (2)
Significance	High (51)	Low (22)

Table 19: Impact Assessment of Disturbance on Avifauna for the during the Operational Phase

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Local (2)	Site (1)
Duration	Long term (3)	Long term (3)
Probability	Definite (4)	Probable (3)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceability	Significant (3)	Marginal (2)
Cumulative effect	Low (2)	Low (2)
Intensity	High (3)	Low (1)
Significance	High (51)	Low (13)

5.2 Habitat Loss and Displacement

Any transformation of vegetation leads to habitat loss for avian species utilising that vegetation, causing displacement into areas which are potentially less suitable or already occupied by competing individuals or species (Frid & Dill 2002, Percival 2005, Dwyer et al. 2018). The development of the PV Facility can result in the complete loss of habitat equivalent to the development footprint size, as vegetation underneath the PV panels is generally entirely removed, and the land is transformed. Even if the vegetation beneath the proposed PV panels will not be required to be removed entirely, it will need to be cut and maintained at a low level. Any available perches within the facility may be used as nesting and roosting substrate by some less sensitive species. Some bird species may therefore persist in the proposed development footprint, particularly smaller passerine species, however most avian species will be displaced from the area.

5.2.1 Mitigation of Habitat Loss

Mitigation of habitat loss from construction of the facility is primarily achieved during the design phase by avoiding sensitive and essential habitat, and nest buffers, and minimising the development footprint as far as practically possible. The project layout excludes development within the 250 m Greater Kestrel No Go buffer and the 1 km Secretarybird No Go buffer, as well as the delineated NFEPA wetlands and their buffers, and is supported.

The development footprint should exclude a 1 km No-Go buffer surrounding any active or inactive Secretarybird breeding site, as per Birdlife SA's Guideline (Birdlife 2022), which is achieved for the Notsi PV 3 for the known current Secretarybird breeding site to the north. Secretarybird typically change breeding sites every 1 – 5 years, and an area of up to 3 km surrounding the proposed development footprint should be monitored regularly post-authorisation in order to avoid conflicts at the start of construction.

A walkthrough of the authorised final development layout and the 3 km surrounding area must be conducted by an avifaunal specialist or observer trained by an avifaunal specialist within 30 days prior to the commencement of construction and decommissioning to confirm SCC breeding activities.

Mitigation following authorisation is only marginally possible by retaining as much of the indigenous vegetation as possible beneath the PV panels, and minimising the construction footprint of all associated infrastructure, including buildings, electrical infrastructure and the width and length of roads.

5.2.2 Assessment of Habitat Loss

The assessment of habitat loss during the construction and decommissioning phases is presented in Table 20 and Table 21. The post-mitigation value assumes that all recommended mitigation measures are implemented and the final layout avoids all no go areas and areas of high sensitivity as the assessed proposed layout does.

Table 20: Impact Assessment of Habitat Loss on Avifauna for Notsi PV 3 during the Construction Phase

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Local (2)	Site (1)
Duration	Long term (3)	Long term (3)
Probability	Definite (4)	Definite (4)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceability	Significant (3)	Marginal (2)
Cumulative effect	Medium (3)	Low (2)
Intensity	High (3)	High (3)
Significance	High (51)	Medium (42)

Table 21: Impact Assessment of Habitat Loss on Avifauna for the Notsi PV 3 during the Decommissioning Phase

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Positive
Extent	Local (2)	Local (2)
Duration	Long term (3)	Long term (3)
Probability	Possible (2)	Possible (2)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceability	Marginal (2)	Marginal (2)
Cumulative effect	Low (2)	Low (2)
Intensity	Low (1)	Low (1)
Significance	Low (12)	Low (12)

5.3 Collisions with PV Panels and Associated Infrastructure

While not much research has been conducted in this regard, there is a hypothesis that some avian species, in particular waterbirds, may potentially be attracted by the reflective surfaces of solar PV panels, possibly mistaking them for water bodies, resulting in disorientation, injury or death from colliding with the panels. The proposed site is however not located within any major known flyways. However, Greater Flamingo are confirmed to occur in the PAOI and could traverse the site when commuting between wetlands, pans and other waterbodies, and potentially be at risk. Additionally, glare or polarised lights may attract insects and thus insectivorous birds (Walston et al. 2016, Visser et al. 2019, Kosciuch et al. 2020). Predation or entrapment of birds injured from non-fatal panel collisions can also play a role in avian mortalities at PV plants (Kagan et al. 2014). Results from fatality monitoring at 10 PV plants in the USA over 13 years estimate an average annual fatality of 2.49 birds per MW per year (Kosciuch et al. 2020). Initial evidence however suggests that the collision risk posed by PV panels is likely to be low compared with that posed by transmission lines (Bennun et al. 2021).

The project description does not include any overhead powerlines that could pose a threat to collisions, and it is assumed that all internal cabling will be buried.

Fencing associated with solar PV facilities sometimes includes perimeter double-fencing, in which birds can get trapped, or collide with (Visser et al. 2018). Few fence-related fatalities have however been reported at solar facilities with single-fence designs (Harvey et al. 2015)

5.3.1 Mitigation of Collisions with PV panels

Mitigation measures to avoid collisions with PV panels are limited, but collisions can be reduced by site selection away from areas where birds congregate or known flyways, which the project has achieved, and by making the site otherwise unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching (Bennun et al. 2021). The perimeter and internal fencing should consist of a single-fence design and be in line with the Birdlife SA guideline on Fences & Birds.[12]

All internal power lines must be buried.

Operational phase monitoring of mortalities should be undertaken in line with current Best Practice Guidelines and if unacceptably high levels of mortalities are recorded, adaptive mitigation measures such as deterrent devices may need to be considered.

5.3.2 Assessment of Collisions

The impact of collisions with PV panels and associated infrastructure is presented in Table 22. The post-mitigation values assume that all recommended mitigation measures are implemented and that all internal power lines are buried. The assessment excludes external power lines and grid connections.

[12] https://www.birdlife.org.za/wp-content/uploads/2020/03/BLSA-Guidelines-Fences-Birds.pdf

Table 22: Impact Assessment of Collisions of Avifauna during operation for Notsi PV 3

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Regional (3)	Local (2)
Duration	Long-term (3)	Long term (3)
Probability	Unlikely (1)	Unlikely (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceability	Significant (3)	Marginal (2)
Cumulative effect	Medium (3)	Low (2)
Intensity	High (3)	Medium (2)
Significance	Medium (45)	Low (24)

5.4 Electrocutions

Large birds can be electrocuted or incur electric shock injuries when simultaneously contacting two uninsulated energised components of differing electric potential (phase-to-phase electrocution), or when contacting an uninsulated energised component and a path to ground (phase-to-ground- electrocution) (Dwyer 2006, APLIC 2006). Because electrocutions result from birds bridging airgaps, larger birds with larger wingspans, such as the recorded Critically Endangered White-backed Vulture, are disproportionately affected (Slater et al. 2020). For the proposed project electrocutions could occur at the substation or within the facility at uninsulated electrical infrastructure.

5.4.1 Mitigation of Electrocution and Collisions with Electrical Infrastructure

Bird electrocutions can easily be prevented with bird-friendly pole design i.e., creating separation between conductors of differing electric potential, by placing insulation over conductors, or by redirecting birds to perch or nest away from conductors (APLIC 2006, Dwyer et al. 2017).

5.4.2 Assessment of Electrocutions

The impact of electrocutions is presented in Table 23. The post-mitigation values assume that all recommended mitigation measures are implemented, and all internal power lines are buried. The assessment excludes external power lines and grid connections.

Table 23: Impact Assessment of Electrocution during operation of Avifauna for Notsi PV 3

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Local (2)	Site (1)
Duration	Long-term (3)	Long term (3)
Probability	Probable (3)	Unlikely (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceability	Significant (3)	No loss (1)
Cumulative effect	Low (2)	Low (2)
Intensity	High (3)	Medium (2)
Significance	Medium (48)	Low (20)

5.5 Barrier Effects

Large areas of PV panels and associated infrastructure could potentially affect bird movements by acting as a barrier, for example due to cumulative impacts from several large PV facilities causing the loss of stopover sites for migratory birds along their flyway (Bennun et al. 2020) or due to disorientation, or avoidance of the area when flying. A barrier effect could also arise from the PV site interrupting habitat connectivity and for example isolating a nest from suitable foraging habitat. This is of particular concern for Secretarybird in this instance, as young birds explore their natal home ranges after fledging, with increasingly distanced exploratory trips (Whitecross et. al 2019).

5.5.1 Mitigation of Barrier Effects

The only realistic option to mitigate this impact is to select a site away from known migratory corridors and flyways between roosting and nesting areas. There are no major known migratory flyways in the region, as migrating birds generally disperse into the interior of South Africa, and no distinct flyways between roosting and nesting areas were identified during pre-application monitoring.

The final layout must ensure habitat connectivity for Secretarybird breeding sites and foraging habitat with an infrastructure-free corridor consisting of a 90° area from a Secretarybird breeding site to the foraging habitat / site boundary, as per Birdlife SA guidance (Birdlife SA 2022).

5.5.2 Assessment of Barrier Effects

The impact of barrier effects is presented in Table 24. The post-mitigation values assume that the recommendations will be implemented for the final layout, should any additional Secretarybird nests be located within 3 km of the development footprint post-authorisation.

Table 24: Impact Assessment of Barrier Effects on Avifauna for Notsi PV 3

Criteria	Pre-mitigation	Post-mitigation
Nature	Negative	Negative
Extent	Regional (3)	Regional (3)
Duration	Long-term (3)	Long term (3)
Probability	Possible (2)	Unlikely (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceability	Marginal (2)	No loss (1)
Cumulative effect	Medium (3)	Medium (3)
Intensity	Medium (2)	Low (1)
Significance	Low (28)	Low (12)

5.6 Cumulative Impacts

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Cumulative impacts assessed include the combination of all the impacts discussed above for this project, which may be higher than the sum of impacts, as well as the associated Notsi PV Facilities and associated electrical grid infrastructure. For this project cumulative impacts have been assessed for all known projects in an area of 30 km surrounding the proposed development (Table 13, Annexure B).

The project is located within a Renewable Energy Development Zone, and close to an MTS, from which twelve existing high voltage transmission lines run in all directions. Other existing impacts are largely of agricultural nature and overall, the significance of current impacts on avifauna is estimated as low to moderate. However, the cumulative impact of authorised projects in this area is estimated to be of medium to potentially high negative significance, in particular with regards to the impacts on Secretarybirds.

The reviewed avifauna reports indicate that the latest authorisations have included mostly adequate assessments of impacts on avifauna and mitigation measures that should minimise cumulative impacts, while some older projects did not consider impacts on avifauna at all.

If all the mitigation measures recommended in this report are implemented the contribution of the Notsi PV 3 site to the cumulative impact is considered to be acceptable and unlikely to change the overall significance of cumulative impacts.

5.6.1 Mitigation of Cumulative Impacts

The only real mitigation possible in order to minimise cumulative impacts, is for the Competent Authority to ensure only projects are authorised that are practically mitigatable to an acceptable level, and that do not lead to unacceptable negative impacts, including cumulative impacts, and to ensure the correct implementation of authorised Environmental Management Programmes through compliance audits and enforcement.

6 Conclusion

The Site Ecological Importance (SEI) rating of medium for the majority of the site indicates that the site is potentially suitable for development if minimisation and restoration mitigation are implemented. Impacts of medium negative impact significance are acceptable in medium SEI areas, if followed by restoration activities (SANBI 2022). The Greater Kestrel nest No-Go area and the NFEPA wetland No-Go areas and high sensitivity areas are avoided by the proposed layout.

The impact assessment has identified potential impacts to avian species summarised in Table 25.

Table 25: Impact Assessment Summary

Impact	Significance pre-mitigation	Significance post-mitigation
Disturbance – Construction & Decommissioning Phases	High (-)	Low (-)
Disturbance – Operational Phase	High (-)	Low (-)
Habitat loss – Construction Phase	High (-)	Medium (-)
Habitat Loss – Decommissioning Phase	Low (-)	Low (-)
Collisions with PV Panels & Infrastructure – Operational Phase	Medium (-)	Low (-)
Electrocutions	Medium (-)	Low (-)
Barrier effects	Low (-)	Low (-)

No residual impacts of high significance were identified for the proposed development, if the proposed mitigation measures are implemented.

Due to the footprints of the proposed developments, a loss of SCC grassland habitat is however unavoidable, and even with mitigation this impact is expected to be of medium negative significance for the SCCs that occur here (confirmed or high probability of occurrence). These are Black Harrier (*Endangered*), Blue Crane (*Near-threatened*), and Secretarybird (*Endangered*).

As Secretarybird are confirmed as breeding in the area, but > 3 km from the Notsi 2 Site, it is only a recommendation (not a requirement) that regular nest surveys (twice a year) are conducted post-authorisation within a 3 km radius of the site in the years before construction. Secretarybird hold large territories and typically change breeding sites under 5 years. Should a Secretarybird nest be discovered in the avifaunal specialist walkthrough within 3 km of the development footprint in the walkthrough required to be conducted immediately (within 30 days) prior to construction, then this will have significant implications on the construction schedule.

All other identified impacts are expected to be of low negative significance with mitigation.

The Notsi PV 3 site would not lead to the loss of any CBA areas, and the loss of ESA1 and ESA2 is considered to be acceptable, as there is more suitable grassland and wetland marsh habitat to the west of the site, which is not surrounded by authorised developments and traversed by high voltage transmission lines.

The impact management actions and impact management outcomes (i.e., mitigation measures) presented in Table 26 must be included in the Environmental Management Programmes (EMPr) for the projects The final layout of the facilities must avoid all No-Go areas and areas of high

sensitivity as indicated in Figure 3, in which case an offset for the development is not considered necessary. If these measures are implemented, the proposed development is deemed acceptable form an avifaunal perspective and can be authorised in the specialist's considered opinion.

Table 26: Impact Management Actions and Outcomes to be included in the EMPr

Impact Management Action	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss. All areas outside of disturbance footprint are No Go areas.	Developer's Project Manager (DPM) / Developer Site Supervisor (DSS) / Developer Environmental Officer (dEO) / Contractor / Contractor's Environmental Officer (cEO)	Demarcate disturbance footprint with construction tape or other appropriate effective means.	Pre-construction phase	Environ-mental Control officer (ECO) cEO	Before commencement and monthly throughout construction phase	Disturbance footprint is clearly demarcated and areas outside of disturbance footprint are undisturbed.
Keep vegetation clearing within the development footprint to the minimum practically possible to minimise habitat loss. Indigenous vegetation which does not interfere with the development must be left undisturbed.	DSS dEO Contractor cEO	Demarcate clearance footprint with construction tape or other appropriate effective means.	Construction phase	ECO cEO	Before commencement and monthly throughout construction phase	Areas of indigenous vegetation are demarcated and undisturbed.
Breeding sites of any avian species as identified by an avifaunal specialist within the disturbance footprint must be kept intact and disturbance to breeding birds must be avoided.	dEO/cEO Avifaunal specialist	Avifaunal specialist to undertake an avifaunal walkthrough of the development footprint and a 3 km radius to identify any bird breeding sites. Identified breeding sites must be clearly indicated on a map of the site and all staff must be made aware of these areas. Any additional mitigation measures	Once-off within 4 weeks prior to commencement of Construction phase Once-off within 4 weeks prior to commencement of	ECO cEO	Monthly during construction phase	Avifaunal walkthrough report is kept on file. Map of breeding sites is displayed on site. Documentary/photographic evidence of complying with any additional mitigation measures recommended by the

Impact Management Action	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
		recommended by the avifaunal specialist are implemented.	Decommissioning phase			specialist in the walk-through report are provided.
Avifaunal specialist to train ECO, cEO/dEO and Operations & Maintenance (O&M team) in the identification of SCC potentially occurring on site.	ECO cEO/dEO Avifaunal contractor	Avifaunal specialist to undertake 1 hour training session with ECO and cEO/dEO on site prior to construction activities, and with O&M team prior to operational commencement.	Once-off prior to commencement of construction/ operation/ decommissioning phases	ECO cEO O&M team	Monthly during construction phase	Register of training sessions kept on file.
Breeding sites of SCC must be left intact and undisturbed.	cEO/dEO ECO Avifaunal specialist	Should SCC be found breeding within the site boundary, the disturbance footprint and a 3 km radius, prior to or during construction or decommissioning all works within 1 km of the breeding site must be halted, the area must be demarcated as a No Go area and an avifaunal specialist must be contacted for further instruction within 7 days. Any resulting recommendation by the avifaunal specialist to protect the breeding SCC must be implemented. Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist.	Pre-construction, construction and decommissioning phase	dEO / cEO ECO	Ongoing Monthly	Avifaunal walkthrough report is kept on file. All breeding sites of SCC are clearly demarcated as per the instruction of the avifaunal specialist with photographic evidence provided An avifaunal specialist's recommendation is on file for each breeding site. Documentary / photographic evidence of complying with any additional mitigation measures recommended by the avifaunal specialist is provided.

Impact Management Action	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
Identify actual impacts on avifauna and any additional mitigation measures required.	DPM Avifaunal specialist	A Post-construction monitoring plan is developed by an avifaunal specialist in line with Best Practice Guidelines applicable at the time of commencement of the operational phase. Post-construction monitoring, according to this plan must commence as soon as the facility becomes operational. Any additional mitigation measures recommended in the post-construction monitoring reports by the avifaunal specialist must be implemented. All SCC fatalities must be photographed, recorded and identified (with the assistance of an avifaunal specialist if required). and reported to Birdlife SA energy@birdlife.co.za.	Once prior to commencement of operational phase From commencement of operational phase for the duration identified in the post-construction monitoring plan. Ongoing	ECO O&M team	Once off at commencement. Monthly	A post-construction monitoring plan is on file for implementation. Post-construction monitoring reports as set out in the post-construction monitoring plan are on file. Documentary / photographic evidence of compliance including with any additional mitigation measures recommended by the avifaunal specialist.
Minimal risk of avian mortalities.	DPM	Minimise outdoor lighting needed to operate the facility to the maximum extent practicable. Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible All electrical infrastructure is to be of bird-friendly insulated design in line with the latest Eskom Technical Standards. Bury all low and medium voltage power lines.	Design / pre-construction, construction, operation and decommissioning phases	ECO O&M team	Once-off at commencement Quarterly	Documentary / photographic evidence of compliance.

Impact Management Action	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
		All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing. All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning. No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels				

7 References

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Annexure A: Avian Species Site Inspection & Verification Report

Holland & Associates
Environmental Consultants

Impact Assessments - Environmental Management Programs - Compliance Monitoring - Process Review

THE PROPOSED DEALESVILLE SOLAR PV FACILITY ON FARM 1623 EBENAEZER, WELGELUK 1622, GELUK 1531 AND EENSGEVONDEN 982 NEAR DEALESVILLE IN THE FREE STATE

Avian Species Site Inspection Report

DECEMBER 2021

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1 Introduction

African Clean Energy Developments (ACED) are interested in developing a solar PV facility consisting of ten phases, near Dealesville in the Free State province of South Africa. The proposed PV Site consists of an area with a footprint of approximately 2309 ha (Figure 1). The Projects Area of Influence (PAOI) was determined as a 2 km buffer surrounding the PV Site.

Anja Albertyn of Holland and Associates has been appointed as the Avifaunal Specialist, to conduct the required avifaunal specialist assessment, in line with applicable regulations, protocols, and guidelines.

2 Legislative Context.

South African environmental legislation contains a plethora of environmentally related statutes, guidelines and protocols, many of which place onerous responsibilities on landowners, developers, environmental assessment practitioners (EAP's) and independent specialist consultants. The legislation considered most pertinent in the context of undertaking a legally compliant avifaunal assessment, is outlined in detail within sections 2.1 – 2.4 below.

2.1 The National Web-based Screening Tool and Assessment Protocols

On 5 July 2019 the Minister of Forestry and Fisheries and Environment gave notice in Government Gazette 43561 (No. 960) that the submission of a report generated from the national web-based screening tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations, 2014, as amended, will be compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the EIA Regulations, 2014, as amended after 90 days from the publication of the notice (i.e. from 4 October 2019).

On 20 March 2020, in Government Gazette No. 43110 (GN 320) the Minister of Environment, Forestry and Fisheries prescribed general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report requirements of environmental impacts for environmental themes for activities requiring environmental authorisations. When the requirements of a protocol apply, they replace the requirements of Appendix 6 of the EIA Regulations, 2014, as amended.

On 30 October 2020 the *"Protocol for the Specialists Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species*" (GN No. 1150 of 30 October 2020), was published which replaces the requirements of Appendix 6 of the EIA Regulations.

The National web-based Screening Tool was run for the PAOI for the proposed development and a Screening Tool Report was generated to inform this report (Appendix D). The Screening Tool Report identified the PAOI as of high sensitivity under the avian theme due to the presence of a wetland within 500 m of the PAOI. In addition, the Screening Tool Report identifies the PAOI as of high sensitivity for the avian species of conservation concern (SCC) Ludwig's Bustard (*Neotis ludwigii*), in terms of the terrestrial animal species theme (which includes avian species).

According to the Screening Tool Report an avian impact assessment and animal species assessment (for the avian species Ludwig's Bustard) is required.

The Screening Tool Report refers to the *'Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (Government Gazette No. 43855 published on 30 October 2020)*', referred to as 'the Protocol' hereafter.[1]

2.2 The Protocol for the Specialists Assessment for Environmental Impacts on Terrestrial Animal Species

The following sections of the Protocol are important to note for the proposed development:

(1) This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on terrestrial animal species for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations. The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool) for terrestrial animal species. The relevant terrestrial animal species data in the screening tool has been provided by the South African National Biodiversity Institute (SANBI).

(2) Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a site sensitivity verification.

(2.1) The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

(2.2) The site sensitivity verification must be undertaken through the use of (a) a desktop analysis using satellite imagery (b)a preliminary on-site inspection, and (c) any other available and relevant information.

(2.3) The outcome of the site sensitivity verification must be recorded in the form of a report that (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc, (b) contains a motivation and evidence (e.g photographs) of either the verified or different use of the land and environmental sensitivity; and (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment regulations.

(3) Specialist Assessment and Minimum Report Content Requirements:

(1.1) An applicant intending to undertake an activity in the scope of this protocol on a site identified by the screening tool as 'very high or 'high' sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.

(1.6) If any part of the development falls within an area of confirmed "very high" or "high" sensitivity, the assessment and reporting requirements prescribed for the "very high" or "high" sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.

[1] The Screening Tool Report also incorrectly refers to an avian protocol specific to wind energy developments, which has been queried with the Department of Fisheries, Forestry and Environment.on 14 November 2021.

(1.7) The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.

(1.9) Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.

2.2.1 The Protocol Sensitivity Ratings for Terrestrial Animal Species

The Protocol provides the following descriptions of the sensitivity ratings that the Screening Tool determines. It is important to note that these ratings may differ from the avifaunal sensitivity levels determined by the specialist during the assessment phase in line with applicable Best Practice Guidelines.

'Very High Sensitivity Rating:

(1) Critical habitat for range-restricted species of conservation concern, that have a global range of less than 10 km^2.
(2) SCC listed on the IUCN Red List of Threatened Species or on South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.
(3) Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.
(4) The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.

These areas are irreplaceable for SCC.

High Sensitivity Rating:

(1) Confirmed habitat for SCC.
(2) SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.

These areas are unsuitable for development due to a very likely impact on SCC.

Medium Sensitivity Rating

(1) Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species.
(2) SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.

Low Sensitivity Rating

(1) Areas where no natural habitat remains.
(2) Natural areas where there is no suspected occurrence of SCC.'

2.3 The SANBI Species Environmental Assessment Guidelines

The Species Environmental Assessment Guidelines (the Species Assessment Guidelines) provide guidance on sampling and data collection methodologies for the different taxonomic

groups represented in the Protocol and include a Section on Avifauna (Chapter 10.3). The Species Assessment Guidelines were consulted and are followed for this project. In addition, they state:

(10.3.2) Avifauna-specific guidelines for certain developments: 'Existing guidance should be consulted where available and applicable to a particular development (e.g. BirdLife South Africa's Best Practice guidelines for assessing and monitoring the impact of solar energy facilities on birds; Jenkins et al., 2015).

Therefore, in order to be legally compliant with the Protocol and the Species Assessment Guidelines the BirdLife SA Birds & Solar Energy Best Practice Guidelines[2] ('the Best Practice Guidelines') must be considered.

2.4 The BirdLife SA Birds & Solar Energy Best Practice Guidelines

The Best Practice Guidelines are the guidelines that are also followed for specialist assessments of Solar Energy Facilities under the avian impact assessment theme.

According to the Birds & Solar Energy guidelines an avifaunal impact assessment of solar power facilities should consist of the following stages:

- Stage 1: Preliminary Assessment to give an overview of the biological context, likely impacts and potential red flags to development, identify alternatives and determine the appropriate assessment regime.
- Stage 2: Data Collection on which to base the impact assessment report, and to provide a baseline against which post-construction monitoring can be compared.
- Stage 3: Impact Assessment.
- Stage 4: Post-construction monitoring, if required.

The amount of data to be collected (the avian assessment regime) is prescribed by the guidelines as follows in Table 1:

[2] Jenkins AR, Ralston-Paton S & Smit Robinson HA. 2017. Birds & Solar Energy Best Practice Guidelines. Guidelines for assessing and monitoring the impacts of solar power generating facilities on birds in southern Africa. Birdlife South Africa, Pretoria. 34pp.

Table 1. *Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.*
Regime 1: One site visit (peak season); minimum 1-5 days.
Regime 2: Pre- and post-construction; minimum 2-3 x 3-5 days over 6 months (including peak season); carcass searches.
Regime 3: Pre- and post-construction; minimum 4-5 x 4-8 days over 12 months, carcass searches.

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

The Best Practice Guideline further state:

(2) For multi-phased projects, the aggregate footprint of all the phases should be used. At 3 ha per MW, Small = < 10 MW, Medium = 10-50 MW, Large = > 50MW.

(3) The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development.

For example, an area would be considered to be of high avifaunal sensitivity if one or more of the following is found (or suspected to occur) within the broader impact zone: 1) avifaunal habitat (e.g. a wetlands, nesting or roost sites) of regional or national significance, 2) a population of a priority species that is of regional or national significance, and/or 3) a bird movement corridor that is of regional or national significance, and 4) a protected area and/ or Important Bird and Biodiversity Area.

An area would be considered to be of medium avifaunal sensitivity if it does not qualify as high avifaunal sensitivity, but one or more of the following is found (or suspected to occur) within the broader impact zone 1) avifaunal habitat (e.g. a wetland, nesting or roost sites) of local significance, 2) a locally significant population of a priority species, 3) a locally significant bird movement corridor.

An area would be considered to be of low avifaunal sensitivity if it is does not meet any of the above criteria. that Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

(4) Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

It should be noted that the avifaunal sensitivity as defined by the Best Practice Guidelines is not equivalent to the environmental sensitivity ratings for animal species as defined by the Protocol.

2.5 Specialist Details

Anja Albertyn holds a Master of Science (Ornithology) degree from the Percy FitzPatrick Institute of African Ornithology. She has been working in the environmental consulting field since 2009 as a researcher, environmental practitioner, ecological consultant and avifaunal specialist. The findings, results, observations, conclusions and recommendations given in this report are based on a site visit, available information and her best scientific and professional knowledge. Her CV and SACNASP certificate are attached as **Appendix A.**

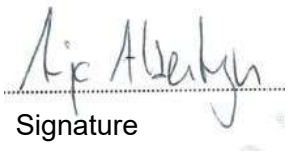
Table 1: Details of the Avian Species Specialist

Specialist	Anja Isabel Albertyn (Terörde)
Qualification	Master of Science Zoology (Ornithology) BSc (Hon) Zoology BSc Zoology and Botany
Professional Affiliation:	South African Council for Natural Scientific Professions
Professional Registration Number:	400037/16
Registration Field:	Ecological Science (Professional Natural Scientist)

2.6 Declaration of Independence

I, Anja Albertyn, as the appointed avian species specialist, hereby declare/affirm the correctness of the information provided in this compliance statement, and that I:

- meet the general requirements to be independent and have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and
- am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014), as amended.



Signature Date: **30 November 2021**

3 Methodology

3.1 Desktop Study

The following information was used to conduct the required desktop study for the site sensitivity verification:

- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI 2018)
- Free State Critical Biodiversity Areas & Ecological Support Areas (DENC 2016)

- National Freshwater Ecosystem Priority Areas (NFEPA);
- Terrestrial Ecosystem Threat Status and Protection Level (SANBI 2018);
- National Protected Area Expansion Strategy for South Africa (NPAES);
- Coordinated Waterbird Counts (CWAC)
- The DFFE National Web-based Screening Tool;
- South African Bird Atlas Project 2 (Brooks & Ryan 2021)
- Important Bird and Biodiversity Areas (Birdlife SA);
- The 2015 Eskom Red Data Book of Birds (Taylor et al. 2015)
- The IUCN Red List of Threatened Species (www.iucnredlist.org)
- South Africa Protected Areas Database (DEA 2019);
- South African Conservation Areas (DEA 2019);
- Habitat Suitability Models (Birdlife SA 2021)
- Publicly available satellite imagery, elevation; and topographical data

3.2 Site inspection

A site visit of the PV Site and PAOI was conducted by the avian species specialist and a field assistant on 5 November 2021 (Figure 1). The entire PV Site was visually covered. All species encountered throughout the site inspection were recorded. Site photographs of the PV Site were taken (Appendix B).

3.3 Avifaunal Sensitivity

The overall avifaunal sensitivity was determined in terms of The Best Practice Guidelines as discussed in Section 2.3

Priority Species were defined as species with a Red Data listing of regionally or globally Near-threatened or higher, endemic and near-endemic species, and range-restricted species.

A preliminary avifaunal sensitivity map of the PAOI was developed which considers the following features and buffers:

- Nests and roosts (none located)
- 200 m NFEPA Wetlands and River Buffer (High sensitivity)
- 100 m Waterpoint Buffer (Medium Sensitivity)
- Critical Biodiversity Areas and Ecological Support Areas
- National Protected Area Expansion Focus Areas
- Habitat Suitability Models

4 Results & Discussion

4.1 The Project Site

The PV Site is entirely mapped as Western Free State Clay Grassland (Least Concern), with an area of Vaal-Vet Sandy Grassland (Endangered) occurring on the eastern section of the PAOI, north-east of the PV Site (Figure 1). The vegetation within the proposed development footprint was confirmed to be largely grassland and low shrubland used for livestock grazing (refer to Appendix B for photographs). Surrounding land uses within the PAOI consist largely of livestock grazing and cultivated crops. The Eskom Beta Substation is located in the north-eastern section

of the PAOI, outside of the PV Site. Three of the high voltage transmission lines that connect to the substation run through the PV site in a south-westerly direction, and one more runs immediately adjacent to the PV Site.

The western section of the PAOI and PV Site are mapped as an Ecological Support Area 1 (ESA1) with smaller areas mapped as ESA2. A small area on the eastern boundary of the PAOI, north of the Beta substation is mapped as a Critical Biodiversity Area 1.

Critical Biodiversity Areas are required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in systematic biodiversity plans. Ecological Support Areas 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. ESA1 are areas that are currently either in at least fair ecological condition which should be retained in at least fair ecological condition, while ESA2 are areas that are currently in severely modified ecological condition but that nevertheless retain sufficient ecological functioning to fulfil the purpose for which the ESA was selected. The objective is to prevent further deterioration in ecological condition3.

The proposed development is not expected to impact on the ecological condition of the Critical Biodiversity Areas within the PAOI. The proposed development footprint would result in a loss of approximately 552 ha of ESA1, which would not be retained in fair ecological condition. Up to 233 ha of ESA2 areas within the PAOI would be affected. In terms of avifauna, birds would be displaced from the PV Site into the surrounding areas, which is unlikely to result in any significant population level impacts.

Approximately 468 ha of the PV Site fall within a National Protect Area Expansion Area (Figure 1).

No NFEPA rivers are mapped in or near the PAOI, and almost no drainage lines occur within the PAOI. However, a pan in the west of the PAOI is mapped as a NFEPA wetland.

4.2 Avifauna

The South African Bird Atlas Project 2 (SABAP2) has recorded 134 species within the pentad (2840_2535, 2840_2540, 2845_2535 and 2845_2540) covering the PAOI (**Appendix C**), with only three cards submnitted per pentad. One of these species are Red Data (Taylor *et al*. 2015) listed as *Critically Endangered* (White-backed Vulture), two as *Endangered* (Black Harrier, and Ludwig's Bustard), two *Vulnerable* (Black Stork and Secretarybird), three are Red Data listed as *Near-threatened* (Abdim's Stork, Blue Crane and Kori Bustard). Eight near-endemic species have been reported for the pentad of which two were recorded during the site inspection (Table 2).

Table 2: Red data listed, endemic and near-endemic bird species recorded to SABAP 2 and during the site inspection

[3] SANBI. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. First Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria.

Common Name	Scientific Name	Red Data Status	Endemism	SABAP2 Bird list	Site Inspection
White-backed Vulture	*Gyps africanus*	CR		x	x
Black Harrier	*Circus maurus*	EN	NE	x	
Ludwig's Bustard	*Neotis ludwigii*	EN		x	
Blue Korhaan	*Eupodotis caerulescens*	LC	SLS	x	
Abdim's Stork	*Ciconia abdimii*	NT		x	
Blue Crane	*Grus paradisea*	NT			x
Kori Bustard	*Ardeotis kori*	NT			x
Black Stork	*Ciconia nigra*	VU		x	
Secretarybird	*Sagittarius serpentarius*	VU		x	x
Black-eared Sparrow-Lark	*Eremopterix australis*		NE		x
Cloud Cisticola	*Cisticola textrix*		NE	x	x
Fiscal Flycatcher	*Melaeornis silens*		NE	x	
Karoo Thrush	*Turdus smithi*		NE	x	
Large-billed Lark	*Galerida magnirostris*		NE	x	
Melodious Lark	*Mirafra cheniana*		NE	x	
Sickle-winged Chat	*Emarginata sinuata*		NE	x	

A total of 29 species were recorded during the site inspection. Four Species of Conservation Concern (SCC) were recorded within the PAOI during the site inspection. Table 3 lists the SCC that occur and potentially could occur at the proposed development, as well as the likelihood of their occurrence, and reasons thereof.

Table 3: Species of Conservation Concern in the PAOI and Likelihood of Ocurrence

Species	Regional Red Data Status	Likelihood of Occurrence	Reason
White-backed Vulture	*Critically Endangered*	Confirmed	Recorded during site inspection
Secretarybird	*Vulnerable*	Confirmed	Recorded during site inspection
Blue Crane	*Near Threatened*	Confirmed	Recorded during site inspection
Kori Bustard	*Near Threatened*	Confirmed	Recorded during site inspection
Ludwig's Bustard	*Endangered*	Medium	The site contains some of their typical preferred shrubland and arid savanna habitat, and is potentially good foraging habitat after rainfall, but on the edge of their distribution range.
Lanner Falcon	*Vulnerable*	Medium	Suitable foraging habitat and breeding habitat on powerlines present. Widespread species.
Black Harrier	*Endangered*	Low	Habitat not very suitable but one SABAP2 record in one pentad, therefore could occasionally occur.

Black Stork	*Vulnerable*	Low	Habitat only potentially suitable following flood events in the area of the pan.
Abdim's Stork	*Near Threatened*	Medium	Suitable grassland habitat. Potential summer visitor.

4.2.1 White-backed Vulture

White-backed Vulture (*Gyps africanus*) is listed regionally and globally as *Critically endangered* (Taylor et al 2015, Birdlife International 2018a) with a decreasing population trend. Several individuals were recorded perched on Eskom high voltage lines within and adjacent to the PV Site. White-backed Vulture are a wide ranging species and it is therefore un known if they can be considered regular visitors to the area, or were attracted by a carcass event, but they have been recorded by SABAP2 for the area.

4.2.2 Secretarybird

Secretarybird (*Sagittarius serpentarius*) is listed regionally as *Vulnerable* (Taylor et al 2015) and globally as *Endangered* (Birdlife International 2020) with a decreasing population trend. Secretarybird has been recorded in SABAP-2 data for the pentad and a pair was recorded foraging on the PV Site during the Site Inspection. Secretarybird have very large foraging ranges and breeding territories (Hockey et al 2005, Whitecross et al 2019), and therefore it is possible that they only utilise the proposed development site on occasion. This requires confirmation through pre-construction monitoring.

4.2.3 Blue Crane

Blue Crane (*Anthropoides paradiseus*) is regionally listed as *Near-threatened* (Taylor et al 2015) and globally as *Vulnerable* (Birdlife International 2019) with a stable population trend. It prefers open grassland habitat and the grassland/Karoo ecotone, but also cultivated pastures and croplands and agricultural fields. It roosts at night in shallow water bodies, often communally and is often found in cereal crop fields, planted pastures and ploughed fields. It is a monogamous, solitary and territorial nester, with nests located in or near wetlands, open grassland, pastures and mostly close to water bodies. It often reuses the same general nesting area over several years, with successive nests sometimes within a few metres of one another (Hockey et al. 2005). A pair of Blue Crane were recorded near an open waterpoint on the PV site, and it is therefore possible that the species is breeding on the PV site.

4.2.4 Kori Bustard

Kori Bustard (*Ardeotis kori)* is regionally and globally listed as *Near-threatened* with a decreasing population trend (Birdlife International 2016c). A pair of Kori Bustard were recorded in the area of the pan located in the western section of the PAOI. It is locally nomadic probably following rainfall, and occurs in dwarf shrubland, grasslands and dry grassy pan edges (Hockey et al 2015). As it had recently rained in the area, it is unknown how frequently Kori Bustard occurs on the site. The grassy pan where it was located during the site inspection, is recommended to be buffered by 200 m to protect this suitable habitat.

4.2.5 Ludwig's Bustard

Ludwig's Bustard (*Neotis ludwigii)* is listed regionally and globally as *Endangered* with a decreasing population trend (Taylor et al 2015, Birdlife International 2018b). Ludwig's Bustard prefer semi-arid shrublands of the Nama Karoo and succulent Karoo and Namib, and its range largely excludes the Grassland biome. The PAOI is located in the most western section of the grassland biome, where it borders the Nama Karoo biome. The Habitat Suitability Model for Ludwig's Bustard (Birdlife SA 2021) determines the suitability of the PAOI in the medium range with values largely around 0.4 - 0.5. The likelihood of occurrence of this species within the PAOI is therefore considered to be medium.

4.2.6 Lanner Falcon

Lanner Falcon is globally listed as *Least Concern* (Birdlife International 2016b) with an increasing population trend, but regionally listed as *Vulnerable* (Taylor et al 2015) with a decreasing population trend. Lanner Falcon frequents open grassland, open or cleared woodland and agricultural areas and nests on cliff ledges but will also use stick nests made by other species in trees or on electricity pylons (Hockey et al 2005). The PV site and PAOI contain suitable foraging and nesting habitat for the species. The species was not recorded in SABAP2 for the area, but this could very well be due to the low number of cards that have been submitted for the region. The likelihood of occurrence is therefore considered to be medium at this stage.

4.2.7 Black Harrier

Black Harrier (*Circus maurus)* is regionally and globally listed as *Endangered* with a decreasing population. The PV site is located in the border of its breeding range (Birdlife International 2017a). The Habitat Suitability Model for Black Harrier (Birdlife SA 2021) determines the suitability of the PAOI as relatively low with values largely between 0.1 and 0.15 (0 = unsuitable; 1= highly suitable), but it has been recorded once in one of the pentads covering the site. The likelihood of occurrence of this species within the PAOI is considered to be relatively low.

4.2.8 Black Stork

Black Stork (*Ciconia nigra*) is regionally listed as *Vulnerable* (Taylor et al 2015) and globally as *Least Concern* (Birdlife International 2017b). It is normally associated with mountainous areas, where it nests on cliffs, but is not restricted to them and locally nomadic, and frequents dams, pans, flood plains, pools in dry riverbeds and flooded grasslands, but uncommon at seasonal pans lacking fish as it is mainly piscivorous, but will also eat frogs, tadpoles, small mammals, nestling birds, tortoises, reptiles, insects and snails (Hockey et al 2015). While it may occasionally occur within the PAOI following flood events, its likelihood of occurrence is considered to be low.

4.2.9 Abdim's Stork

Abdim's Stork (*Circonia abdimii*) is globally listed as Least Concern (Birdlife International 2016a) and regionally as near-threatened with a decreasing population trend. It is a non-breeding summer visitor to southern Africa and is found in grasslands, savanna woodlands, pan edges, pastures, cultivated land sand suburban areas. As the PAOI contains suitable grassland habitat the likelihood of occurrence of this species in the summer months is considered to be medium.

4.3 Avifaunal Sensitivity

The site inspection did not find the PV Site to contain any avifaunal habitat of national, regional or local significance. The pan to the west of the PV Site within the PAOI may however be of local significance. The PAOI has been confirmed to contain at least four Species of Conservation Concern, of which one is *Critically Endangered* (White-backed Vulture). One globally *Endangered* Species (Secretarybird) is confirmed present and uses the area for foraging, which may be of local significance. Blue Crane (regionally Near-threatened) are also potentially breeding within the PAOI. Based on the number of confirmed SCC and three more SCC with a medium likelihood of occurrence for the PAOI, the site is considered to be of overall medium avifaunal sensitivity.

Areas within 200 m of NFEPA wetlands should be avoided by development and have been assigned a high sensitivity in the preliminary sensitivity map of the PAOI (Figure 2). These fall largely outside of the PV Site area. Existing artificial waterpoints should be removed, covered or avoided by 100 m. The PAOI contains Critical Biodiversity Areas which should be avoided by development. However, these currently do not fall within the development footprint of the proposed development. The avifaunal sensitivity map would be updated following seasonal surveys.

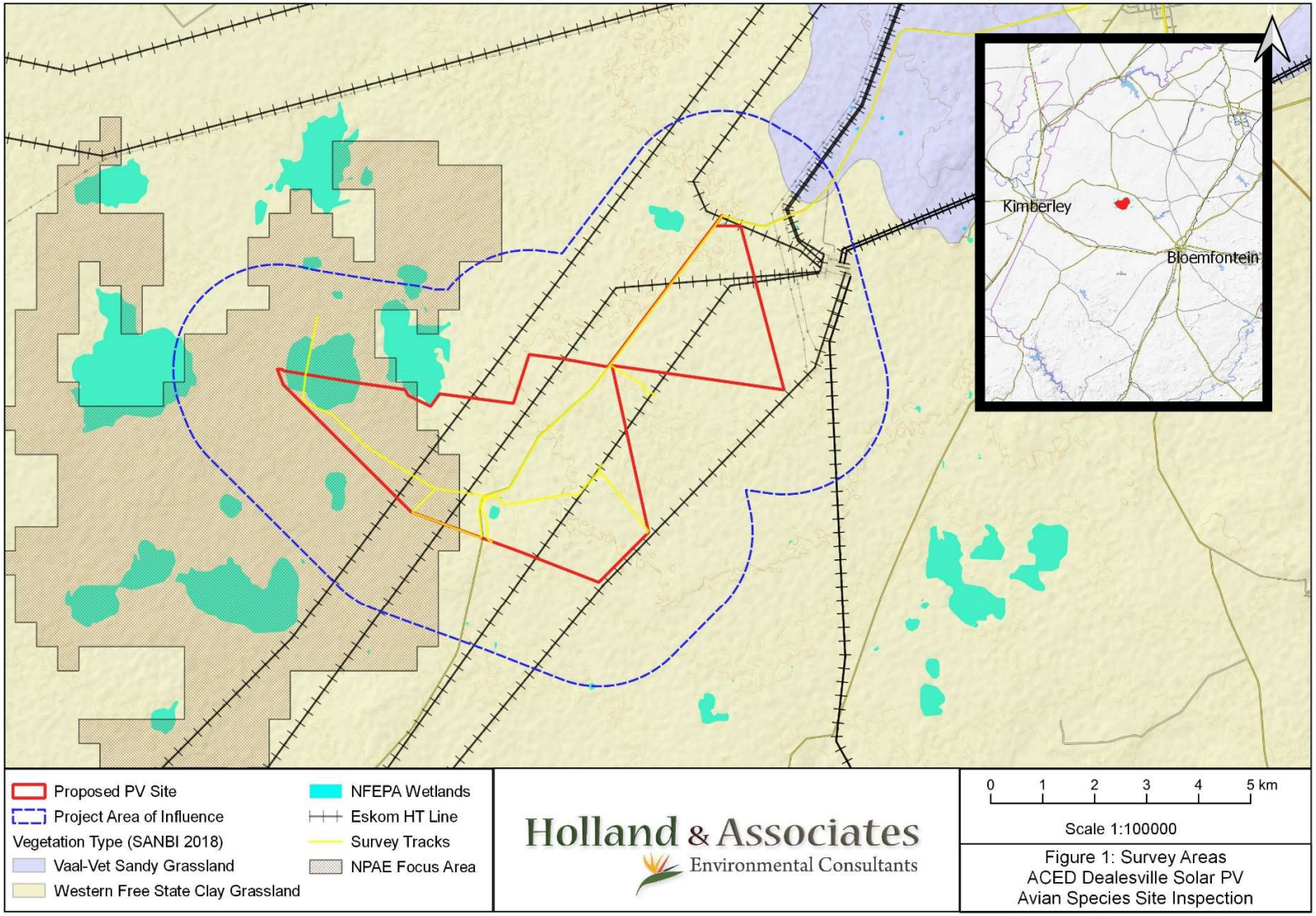


Figure 1: Survey Areas
ACED Dealesville Solar PV
Avian Species Site Inspection

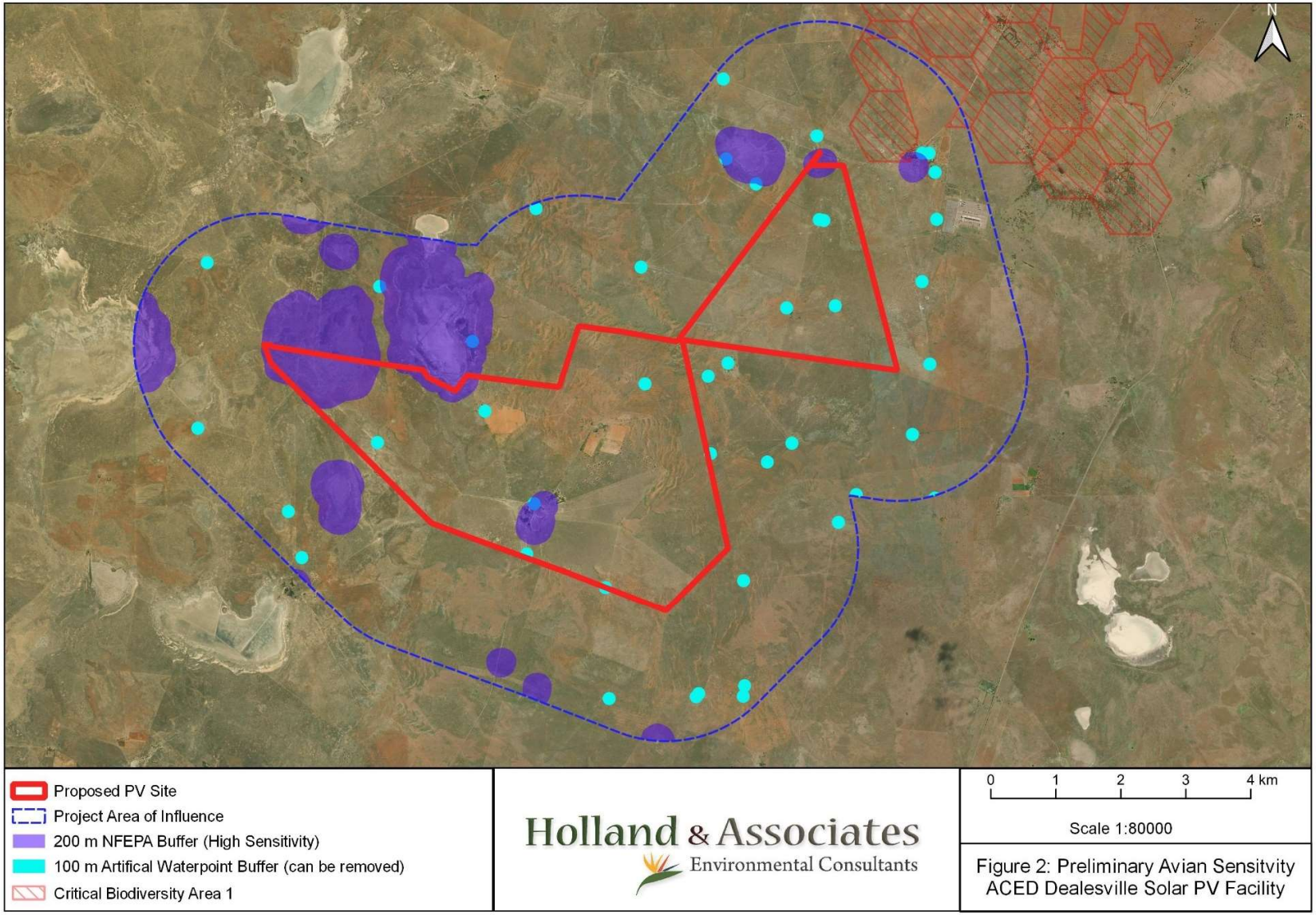


Figure 2: Preliminary Avian Sensitvity
ACED Dealesville Solar PV Facility

5 Conclusion

A site inspection was conducted by a taxon-specific (avian) SACNASP registered specialist (Table 4). The presence of avian species of conservation concern (SCC) was confirmed on the proposed development site, and that the site is of high sensitivity for avian SCC in terms of the classification of '*the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (Government Gazette No. 43855 published on 30 October 2020)*'. Therefore, a Terrestrial Animal Species Specialist Assessment must be submitted for the avian SCC in accordance with the requirements specified for very high and high sensitivity in the protocol.

In addition, the site was determined to be of medium avifaunal sensitivity in terms of the Best Practice Guidelines, as detailed in Section 2.3 above. Therefore, in order to comply with the Best Practice Guidelines and the Protocol, Sampling Regime 2 must be followed. It is therefore recommended to proceed with pre-construction monitoring consisting of a minimum of two seasonal surveys over a minimum of three days each. The first seasonal survey could be conducted in summer (January/February 2022), followed by an autumn (April/May 2022) or winter (July/August 2022) survey.

The following mitigation measures are likely to be required for inclusion in the EMPr for the project:

- Vegetation clearing within the development footprint, including underneath the PV panels must be in line with the recommendations of the vegetation specialist and kept to the practically and safe possible minimum.
- The footprint of disturbance must be kept to a minimum surrounding the development footprint, during construction and demarcated. Construction activities must be limited to the proposed development footprint as much as possible.
- Non-SCC ground nesting birds must be allowed to passively vacate the area if they are encountered during construction.
- An avian species specialist must train the ECO in the identification of the SCCs (identified as potentially present in the area in this report), and the presence, location and behaviour thereof during any site visits must be reported to the avian species specialist following each site visit.
- A walkthrough of the site should be conducted by the ECO for the project within 30 days prior to any activities taking place, in order to confirm that no avian SCC are breeding within the development footprint. If any potential breeding activity of suspected avian SCC is observed, this must be reported, with photographic evidence if possible, to an avian species specialist prior to any construction activities occurring.
- Should any SCC be found breeding within the development footprint at any point during construction, all works within 250 m of the breeding site must be halted, and the avian species specialist must be contacted for further instruction.
- All electrical infrastructure to be of bird-friendly insulated design in line with the latest Eskom Technical Standards.
- Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents where required.
- Minimise outdoor lighting needed to operate the facility to the maximum extent practicable.
- Install line markers along the entire length of all overhead powerlines, in line with the latest Eskom Technical Standards.

- Bury low and medium voltage powerlines wherever practically possible.
- Minimise the length of all overhead powerlines.
- All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing.
- All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning.
- Any fatalities of SCC must be reported by the environmental manager to the consulting specialist, Birdlife SA, and the Competent Authority.
- No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.
- Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off and the avian species specialist must be contacted for further instruction.

Based on the initial site inspection, no red flags for the project have been identified and pre-construction monitoring can proceed as per the Best Practice Guidelines.

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Appendix A: Specialist CV and SACNASP Certificate

ANJA ISABEL ALBERTYN

neé Terörde, in Germany 1977
RSA permanent resident

CURRICULUM VITAE

Ornithologist and Environmental Consultant and with eleven years of experience in the environmental consulting field, including five years conducting EIAs & Basic Assessments, and nine years of avifaunal specialist studies. SACNASP Registered Professional Natural Scientist (Ecological Science) (400037/16) with eight scientific publications on avian ecology to date. Selected member of the Birds and Renewable Energy Specialist Group (BARESG).

Professional Experience

2019 - present	**Environmental Assessment Practitioner and Avifaunal Specialist** *Holland & Associates Environmental Consultants, Tokai*
2017-2019	**Avifauna Specialist & Environmental Assessment Practitioner** *Arcus Consultancy Services South Africa, Cape Town*
2013 - 2017	**Ecology Consultant (Avifauna)** *Arcus Consultancy Services South Africa, Cape Town*
2011 - 2013	**Avifaunal Monitoring Services** *Self-employed, Cape Town*
2011 - 2013	**Project Manager and UX Designer (part-time)** *the binary family, Cape Town / Berlin*
2009 - 2011	**Researcher** *Anchor Environmental Consultants, Tokai*
2005 - 2008	**Director & Co-founder** *Fishriver Horse Safaris, Port Alfred*
2002 - 2003	**Assistant Camp Manager** *Mashatu Game Reserve, Tuli Block, Botswana*
1999 - 2002	**Wildlife Research Assistant** *Centre for Wildlife Management, Pretoria / Mashatu Game Reserve, Botswana*

Academic Qualifications

- *Department of Environmental Science, Rhodes University, 2015:* Introduction to Environmental Impact Assessment Procedure **Short Course** *(Highly competent)*
- *Percy FitzPatrick Institute, University of Cape Town, 2006-2009:* Zoology (Ornithology), **Master of Science**

- *Rhodes University, 2005-2006:* Zoology, Bachelor of Science (**Honours**)
- *University of South Africa, 2002 – 2004:* Zoology & Botany, **Bachelor of Science** (*cum laude*)
- *Heinrich-Heine Universität, Düsseldorf, Germany, 1999 – 2002,* Biology, Vordiplom

PROJECT EXPERIENCE

Pre-construction Avifaunal Monitoring and Impact Assessments for Wind Energy Facilities:

- Proposed WEF Mossel Bay, WC
- Proposed WEF Pofadder, NC
- Proposed WEF Aggeneys, NC
- Paulputs WEF Pofadder, NC
- Highlands WEF Somerset East, EC
- Proposed WEF Victoria West, NC
- Proposed WEF Loxton, NC
- Proposed WEF Riebeek East, EC
- Proposed WEF Eastern Cape
- Kap Vley WEF Kleinzee, NC
- Kolkies WEF Touw's River, WC
- Karee WEF Touws River, WC
- Komsberg WEFs, Sutherland WC
- Grassridge II WEF Addo, EC
- Proposed WEF Elliot, EC
- Proposed WEF Indwe, EC
- Koingnaas WEF NC
- Richtersveld WE Alexander Bay, NC
- Namakwaland WEF, NC
- Springbok WEF, NC

Post-construction Avifaunal Monitoring for Wind Energy Facilities:

- West Coast 1 WEF, Western Cape
- Hopfield WEF, Western Cape
- Gouda WEF, Western Cape

Avian Species Specialist Impact Assessments / Compliance Statements:

- Welgegund Agricultural Expansion, Robertson
- Jan Rabie Dam Enlargement Robertson
- Auriga Thermal Power Plant Saldanha Bay
- Vortum Gas Cycle Turbine in Saldanha Bay
- SPV Renfields Solar PV Facility Hopefield
- Parsons PV Power Park, Qbergha, EC
- Hive Energy Solar Project, Qberha, EC
- Bokpoort Solar Farm, Groblershoop, NC
- Metsimatala CSP Facility, NC
- Avifaunal Impact Assessment 132 kV Mbumbu-Tsakani Powerline
- Avifaunal Walkthrough, Robben Island PV, Western Cape

<u>Avian Feasibility Studies and Specialist Nest Surveys</u>

- Avifaunal Feasibility Assessment, 2 Confidential WEFs, Western Cape
- Avifaunal Feasibility Assessment, 5 Confidential WEFs, Eastern Cape
- Avifaunal Feasibility Assessment, 6 Confidential WEFs, Northern Cape
- Canal Walk Wetlands Avifauna Study, Cape Town
- Review and mitigation strategy design for birds at the Kinangob Wind Park, Kenya

<u>Environmental Impact Assessment Practitioner:</u>

- Brandwagt Agricultural Expansion Robertson, Basic Assessment Process
- Ouplaas Dam Enlargement, near Greyton, S24G Application
- Boekenhoutskloof Agricultural Expansion near Hermanus, Basic Assessment Process

- Malmesbury Mall & Hospital, WC, Basic Assessment Process
- Namaquasfontein Skool Dam, WC, Section 24G Application
- De Molen Dam, WC, Section 24G Application, De Molen Dam, WC
- Oude Schuur Agricultural Developments, Worcester, Scoping & EIA Process
- Highlands WEFs, Eastern Cape, Scoping & EIA Process
- Phezukomoya WEF, Noupoort, Scoping & EIA Process
- San Kraal WEF, Noupoort, Scoping & EIA Process
- Kolkies WEF, Scoping Process, Western Cape
- Karee WEF, Scoping Process, Western Cape
- Komsberg WEFs, Sutherland, Scoping & EIA Process
- Umsinde Emoyeni WEFs and Grids, Murraysburg, WC, Scoping & EIA Process

Scientific Publications & Conferences

Cowley, PD, Terörde, AI & Whitfield, AK. **2018**. Birds as major predators of fishes in a small estuary: does this influence the nursery area concept for estuary-associated fish species? African Zoology 52: 147-154

Maree, BA, Cowley, PD, Naesje, TF Childs, A-R, Terörde, AI & Thorstad, EB. 2016. Influence of prey abundance and abiotic factors on the long-term home-range and movement dynamics of spotted grunter Pomadasys commersonnii in an intermittently open estuary. African Journal of Marine Science 2016: 1-10

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Terörde, AI & Turpie, JK. 2008. Use of a small, intermittently-open estuary by waterbirds: a case study of the East Kleinemonde estuary, Eastern Cape, South Africa. South African Marine Science Symposium 2008. (Awarded best student oral presentation)

Terörde, AI & Turpie, JK. 2007. Birds. In: Whitfield AK, Bate GC (eds). A Review of Information on Temporarily Open/closed Estuaries in the Warm and Cool Temperate Biogeographic Regions of South Africa, with Particular Emphasis on the Influence of River Flow on these Systems. WRC Report No. 1581/1/07.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Anja Isabel Albertyn

Registration Number: 400037/16

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **27 January 2016** Expires **31 March 2022**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

Appendix B: Site Photographs

Appendix C: List of Observed and Potential Bird Species

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Abdim's Stork	*Ciconia abdimii*	NT		x	
Acacia Pied Barbet	*Tricholaema leucomelas*			x	
African Pipit	*Anthus cinnamomeus*			x	x
African Red-eyed Bulbul	*Pycnonotus nigricans*			x	
African Stonechat	*Saxicola torquatus*			x	
Alpine Swift	*Tachymarptis melba*			x	
Amur Falcon	*Falco amurensis*			x	
Ant-eating Chat	*Myrmecocichla formicivora*			x	x
Ashy Tit	*Melaniparus cinerascens*			x	
Barn Swallow	*Hirundo rustica*			x	x
Black Harrier	*Circus maurus*	EN	NE	x	
Black Stork	*Ciconia nigra*	VU		x	
Black-chested Prinia	*Prinia flavicans*			x	
Black-eared Sparrow-Lark	*Eremopterix australis*		NE		x
Black-faced Waxbill	*Estrilda erythronotos*			x	
Blacksmith Lapwing	*Vanellus armatus*			x	x
Black-throated Canary	*Crithagra atrogularis*			x	
Black-winged Kite	*Elanus caeruleus*			x	x
Blue Crane	*Grus paradisea*	NT			x
Blue Korhaan	*Eupodotis caerulescens*	LC	SLS	x	
Bokmakierie	*Telophorus zeylonus*			x	
Brown-crowned Tchagra	*Tchagra australis*			x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Buffy Pipit	*Anthus vaalensis*			x	
Cape Longclaw	*Macronyx capensis*			x	
Cape Penduline Tit	*Anthoscopus minutus*			x	
Cape Robin-Chat	*Cossypha caffra*			x	
Cape Sparrow	*Passer melanurus*			x	x
Cape Starling	*Lamprotornis nitens*			x	x
Cape Turtle Dove	*Streptopelia capicola*			x	
Cape Vulture	*Gyps coprotheres*	EN			x
Cape Wagtail	*Motacilla capensis*			x	
Capped Wheatear	*Oenanthe pileata*			x	
Chat Flycatcher	*Melaeornis infuscatus*			x	
Chestnut-backed Sparrow-Lark	*Eremopterix leucotis*			x	
Chestnut-vented Warbler	*Sylvia subcoerulea*			x	
Cinnamon-breasted Bunting	*Emberiza tahapisi*			x	
Cloud Cisticola	*Cisticola textrix*		NE	x	x
Common Buttonquail	*Turnix sylvaticus*			x	
Common Buzzard	*Buteo buteo*			x	x
Common Ostrich	*Struthio camelus*			x	
Common Quail	*Coturnix coturnix*			x	
Common Scimitarbill	*Rhinopomastus cyanomelas*			x	
Common Swift	*Apus apus*			x	
Crested Barbet	*Trachyphonus vaillantii*			x	
Crowned Lapwing	*Vanellus coronatus*			x	
Desert Cisticola	*Cisticola aridulus*			x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Diederik Cuckoo	*Chrysococcyx caprius*			x	
Double-banded Courser	*Rhinoptilus africanus*			x	
Eastern Clapper Lark	*Mirafra fasciolata*			x	x
Egyptian Goose	*Alopochen aegyptiaca*			x	
European Bee-eater	*Merops apiaster*			x	
Familiar Chat	*Oenathe familiaris*			x	
Fiscal Flycatcher	*Melaeornis silens*		NE	x	
Gabar Goshawk	*Melierax gabar*			x	
Greater Kestrel	*Falco rupicoloides*			x	x
Greater Striped Swallow	*Cecropis cucullata*			x	
Green-winged Pytilia	*Pytilia melba*			x	
Grey-backed Sparrow-Lark	*Eremopterix verticalis*			x	x
Grey-backed Sparrow-Lark	*Eremopterix verticalis*				x
Hadada Ibis	*Bostrychia hagedash*			x	x
Helmeted Guineafowl	*Numida meleagris*			x	x
House Sparrow	*Passer domesticus*			x	
Jacobin Cuckoo	*Clamator jacobinus*			x	
Jameson's Firefinch	*Lagonosticta rhodopareia*			x	
Kalahari Scrub Robin	*Cercotrichas paena*			x	
Karoo Chat	*Emarginata schlegelii*			x	
Karoo Thrush	*Turdus smithi*		NE	x	
Kori Bustard	*Ardeotis kori*	NT			x
Large-billed Lark	*Galerida magnirostris*		NE	x	
Lark-like Bunting	*Emberiza impetuani*			x	
Laughing Dove	*Spilopelia senegalensis*			x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Lesser Grey Shrike	*Lanius minor*			x	
Lesser Kestrel	*Falco naumanni*			x	
Levaillant's Cisticola	*Cisticola tinniens*			x	
Lilac-breasted Roller	*Coracias caudatus*			x	
Little Grebe	*Tachybaptus ruficollis*			x	
Little Swift	*Apus affinis*			x	x
Long-billed Crombec	*Sylvietta rufescens*			x	
Long-tailed Widowbird	*Euplectes progne*			x	
Ludwig's Bustard	*Neotis ludwigii*	EN		x	
Melodious Lark	*Mirafra cheniana*		NE	x	
Monotonous Lark	*Mirafra passerina*			x	
Mountain Wheatear	*Oenanthe monticola*			x	x
Namaqua Dove	*Oena capensis*			x	x
Neddicky	*Cisticola fulvicapilla*			x	
Northern Black Korhaan	*Afrotis afraoides*			x	x
Orange River Francolin	*Scleroptila gutturalis*			x	
Orange River White-eye	*Zosterops pallidus*			x	
Pale Chanting Goshawk	*Melierax canorus*			x	x
Pied Crow	*Corvus albus*			x	x
Plain-backed Pipit	*Anthus leucophrys*			x	
Pririt Batis	*Batis pririt*			x	
Quailfinch	*Ortygospiza fuscocrissa*			x	
Red-backed Shrike	*Lanius collurio*			x	
Red-billed Quelea	*Quelea quelea*			x	x
Red-billed Teal	*Anas erythrorhyncha*			x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Red-breasted Swallow	*Cecropis semirufa*			x	
Red-capped Lark	*Calandrella cinerea*			x	
Red-eyed Dove	*Streptopelia semitorquata*			x	
Red-faced Mousebird	*Urocolius indicus*			x	
Red-headed Finch	*Amadina erythrocephala*			x	
Rock Kestrel	*Falco rupicolus*			x	
Rufous-eared Warbler	*Malcorus pectoralis*			x	
Rufous-naped Lark	*Mirafra africana*			x	
Sabota Lark	*Calendulauda sabota*			x	
Scaly-feathered Weaver	*Sporopipes squamifrons*			x	
Secretarybird	*Sagittarius serpentarius*	VU		x	x
Sickle-winged Chat	*Emarginata sinuata*		NE	x	
South African Cliff Swallow	*Petrochelidon spilodera*		BSLS	x	
South African Shelduck	*Tadorna cana*			x	
Southern Fiscal	*Lanius collaris*			x	
Southern Grey-headed Sparrow	*Passer diffusus*			x	
Southern Masked Weaver	*Ploceus velatus*			x	
Southern Red Bishop	*Euplectes orix*			x	
Speckled Pigeon	*Columba guinea*			x	
Spike-heeled Lark	*Chersomanes albofasciata*			x	x
Spotted Flycatcher	*Muscicapa striata*			x	
Spotted Thick-knee	*Burhinus capensis*			x	
Spur-winged Goose	*Plectropterus gambensis*			x	
Swainson's Spurfowl	*Pternistis swainsonii*			x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Site Visit
Three-banded Plover	*Charadrius tricollaris*			x	
Wattled Starling	*Creatophora cinerea*			x	
Western Barn Owl	*Tyto alba*			x	
Western Cattle Egret	*Bubulcus ibis*			x	
White Stork	*Ciconia ciconia*			x	
White-backed Mousebird	*Colius colius*			x	
White-backed Vulture	*Gyps africanus*	CR		x	
White-bellied Sunbird	*Cinnyris talatala*			x	
White-browed Sparrow-Weaver	*Plocepasser mahali*			x	
White-rumped Swift	*Apus caffer*			x	
White-throated Swallow	*Hirundo albigularis*			x	
Willow Warbler	*Phylloscopus trochilus*			x	
Yellow Canary	*Crithagra flaviventris*			x	x
Yellow-bellied Eremomela	*Eremomela icteropygialis*			x	
Yellow-billed Duck	*Anas undulata*			x	
Yellow-crowned Bishop	*Euplectes afer*			x	
Zitting Cisticola	*Cisticola juncidis*			x	

Annexure B: Project Description Document: The Development of the Proposed Notsi PV Cluster near Dealesville, Free State Province

PROJECT DESCRIPTION DOCUMENT: TECHNICAL DETAILS

February 2023

The development of the Notsi PV Cluster near Dealesville, Free State Province

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No's. : To be obtained

Project Title : The development of the proposed Notsi PV Cluster near Dealesville, Free State Province

1. **Notsi PV 1 near Dealesville, Free State Province**
2. **Notsi PV 2 near Dealesville, Free State Province**
3. **Notsi PV 3 near Dealesville, Free State Province**
4. **Notsi PV 4 near Dealesville, Free State Province**
5. **Notsi PV 5 near Dealesville, Free State Province**

Authors : Mrs. Lisa de Lange

Client : Notsi PV (Pty) Ltd

Report Status : Project Description Document: Technical Details

Submission date : February 2023

When used as a reference this report should be cited as: Environamics (2023). Project Description Document: The development of the proposed Notsi PV cluster near Dealesville, Free State Province

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1 INTRODUCTION

This document provides the technical details of the project description for the development of five (05) separate solar photovoltaic (PV) facilities and associated infrastructure that will be considered and assessed as part of Basic Assessment (BA) process.

1.1 PROJECT SCHEDULE

Please note that all specialist reports must be submitted to Environamics no later than **Friday 10 March 2023**.

2 TECHNICAL DETAILS

This section aims to provide a description of the technical details of the proposed projects.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

Table 2.1: General site information

Description of affected farm portions (information to be used for the respective project as relevant)	**Notsi PV 1** Farm Ebenhaezer 1623 **Notsi PV 2** Farm Ebenhaezer 1623 **Notsi PV 3** Farm Welgeluk 1622 **Notsi PV 4** Farm Welgeluk 1622 **Notsi PV 5** Farm Welgeluk 1622 Farm Ebenhaezer 1623
Province	Free State Province
District Municipality	Lejweleputswa District Municipality
Local Municipality	Tokologo Local Municipality
Ward numbers	3
Closest towns	**Notsi PV 1** Approximately 13 km southwest of the centre of Dealesville in the Free State Province **Notsi PV 2** Approximately 14 km southwest of the centre of Dealesville in the Free State Province **Notsi PV 3** Approximately 17 km southwest of the centre of Dealesville in the Free State Province

	Notsi PV 4 Approximately 14 km southwest of the centre of Dealesville in the Free State Province **Notsi PV 5** Approximately 13 km southwest of the centre of Dealesville in the Free State Province
21 Digit Surveyor General codes	**Notsi PV 1** Farm Ebenhaezer 1623 - F00400000000162300000 **Notsi PV 2** Farm Ebenhaezer 1623 - F00400000000162300000 **Notsi PV 3** Farm Welgeluk 1622 - F00400000000162200000 **Notsi PV 4** Farm Welgeluk 1622 - F00400000000162200000 **Notsi PV 5** Farm Welgeluk 1622 - F00400000000162200000 Farm Ebenhaezer 1623 - F00400000000162300000
Type of technology	Photovoltaic
Structure Height	**Notsi PV 1-5** PV Panels: up to 4.5m Battery Energy Storage System (BESS): ≤ 8m Buildings: up to 4m On-site Facility Substation: < 30m
EIA footprint (area assessed for the placement of the development footprint)	**Notsi PV 1** 260ha **Notsi PV 2** 220ha **Notsi PV 3** 370ha **Notsi PV 4** 220ha

	Notsi PV 5 195ha
Structure orientation	Tracking PV with mono- or bi-facial panels. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types. The development of the PV facility will take into consideration during the final design phase the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed-tilt mounting structures. Both options are considered feasible for the site.
Generation capacity	Up to 100MW per PV facility

2.1.1 TECHNICAL DETAILS

Notsi PV 1-5

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 100MW electricity.
- Battery Energy Storage System (BESS) – The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 2ha. The

containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.

- Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required:

    - Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office;
    - Site Administration Office (~500m^2);
    - Switch gear and relay room (~400m^2);
    - Staff lockers and changing room (~200m^2);
    - Security control (~60m^2);
    - Operations & Maintenance (O&M) building (~ 500 m^2); and
    - Warehouse.

- Roads – Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side).

- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2m in height.

Table 2.2: Technical details for the proposed Notsi PV 1 -5 solar energy facilities

Component	Description / dimensions
Height of PV panels	Up to 4.5 meters
Area of PV Array	TBC - detail will only be available once the layouts for the repsective facilities have been designed following consideration of the environmental sensitivities of the sites as part of the final facility layout design.
Number of inverters required	To be determined as part of the final facility layout design.
Area occupied by inverter / transformer stations / substations	On-site Facility Substation: Up to 4ha Eskom Portion of the Substation: up to 5ha BESS: 2 ha
Capacity of the on-site substation	33kV / 132kV
Area occupied by both permanent and construction laydown areas	Up to 4 hectares

Area occupied by buildings	Up to 3ha: • Administration Office (~500m²); • Switch gear and relay room (~400m²); • Staff lockers and changing room (~200m²); • Security control (~60m²);
Width of internal roads	Between 6 and 8 meters
Height of fencing	Approximately 2 meters

2.1.2 CONSIDERATION OF ALTERNATIVES – NOTSI PV 1-5

The Department of Environmental Affairs and Tourism (DEAT) 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site assessment was conducted by the developer and the farm portions were found favorable due to its proximity to grid connections, solar radiation, site access and relative flat terrain. These factors were then taken into consideration and avoided as far as possible, where required.

The following alternatives were considered in relation to the proposed activity and all specialists should also make mention of these:

<u>No-go alternative</u>

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for these purposes. The potential opportunity costs in terms of adding solar energy generation to the current land use, would be lost if the status quo persist, and therefore all positive socio-economic opportunities and associated growth will also be lost.

<u>Location alternatives</u>

The location identified for the development is based on various aspects considered by the Applicant from a technical, economic, and environmental perspective. This includes the solar radiation values of the area, proximity to the national grid, available grid connection capacity in the national grid, readily available access to the development, landowner support, terrain characteristics and the absence of potentially sensitive environmental features and areas. The properties proposed are considered suitable for the development by the Applicant and therefore the area has been demarcated and indicated as being preferred. No other properties have been identified for the development in the Dealesville area.

Technical alternatives: BESS

Three types of battery technologies are being considered for the proposed project: Lithium-ion (Lithium-Phosphate), Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009). Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the baseload and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

Design and layout alternatives

Design alternatives will be considered throughout the planning and design phase and specialist studies are expected to inform the final layout of the proposed development.

Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. Due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

3 LEGAL MANDATE

3.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an EA from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324, 325, and 327 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 3.1: Listed activities – Notsi PV 1-5

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered as hazardous goods (including diesel, petrol, oils, hydraulic oil, paints, grease and sealants) will need to be stored for the project with a combined capacity of more than 80 cubes but less than 500 cubes. It is planned that storage for 100 cubes of hazardous goods will need to be stored and handled.

GNR. 327 (as amended in 2017)	Activity 24 (ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."* • Activity 24 (ii) is triggered as internal and external roads will be developed and will have a width of approximately 8 m.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected farm has been previously used for agricultural activities and the property will be re-zoned to "special" use. The development footprint will be more than 1 hectare.
GNR. 327 (as amended in 2017)	Activity 56 (ii):	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered as the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.
GNR. 325 (as amended in 2017)	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 100 megawatts of electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • More than 20 hectares of indigenous vegetation will be cleared. The development footprint will be over 300 hectares in extent.

The activities triggered under Listing Notice 1 & 2 (Regulation 327 & 325) for the projects implies that the developments are considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. The project is located in the Kimberley Solar Renewable Energy Development Zone (REDZ5). Therefore, the project is subject to a Basic Assessment process, as well as the 57-day timeframe for the processing of the Application for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE).

It must be noted that activities listed under Listing Notice 3 may be applicable to the development, however this will only be determined during the BA process and applied for accordingly.

4 CUMULATIVE EFFECTS ASSESSMENT

4.1 INTRODUCTION

The EIA Regulations (as amended) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project-level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention and for each impact, a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

4.2 GEOGRAPHIC AREA OF EVALUATION

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed developments – refer to below.

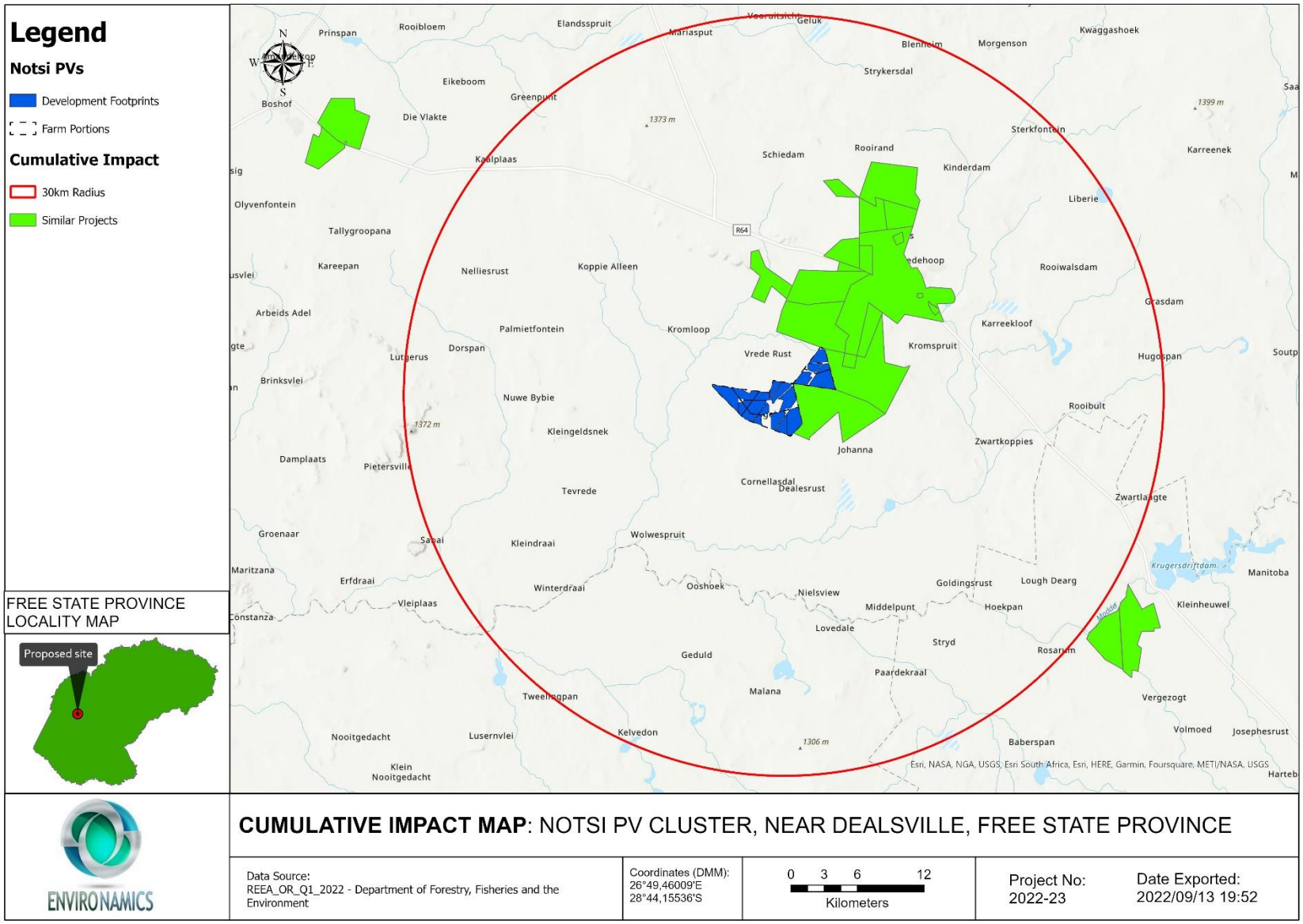

Figure 3: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines for the Notsi PV Cluster and Notsi Grid Connection, near Dealesville, Free State Province

The geographic spread of PV solar projects, administrative boundaries, and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State Province.

A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

4.3 TEMPORAL BOUNDARY OF EVALUATION

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is the anticipated lifespan of the Proposed Project, beginning in 2024 and extending out at least 20 years, which is the minimum expected project life of the proposed projects. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

4.4 OTHER PROJECTS IN THE AREA

The following section provides details on existing and project being proposed in the geographical area of evaluation.

4.4.1 Existing projects in the area

Table 4.1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the cluster.

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Visserpan PV 2	~5km	75MW	14/12/16/3/3/1/2154	Basic Assessment	Approved
Visserpan PV 3	~5km	75MW	14/12/16/3/3/1/2155	Basic Assessment	Approved
Visserpan PV 4	~5km	75MW	14/12/16/3/3/1/2156	Basic Assessment	Approved
Keren Klipbult Solar Plant	~7km	75MW	14/12/16/3/3/2/432	Scoping and EIA	Withdrawn/Lapsed
Eleven Kentani PV Solar	<1km	75MW	14/12/16/3/3/2/717	Scoping and EIA	Approved (6 of these projects are

			14/12/16/3/3/2/718 14/12/16/3/3/2/719 14/12/16/3/3/2/720 14/12/16/3/3/2/721 14/12/16/3/3/2/722 14/12/16/3/3/2/723 14/12/16/3/3/2/724 14/12/16/3/3/2/725 14/12/16/3/3/2/726 14/12/16/3/3/2/728		preferred bidders in REIPPPP round 5 and will commence construction in early 2023 – currently in financial close phase)
Sebina Letsatsi Solar PV	~12km	75MW	14/12/16/3/3/2/755	Basic Assessment	Approved
Edison PV Solar	~15km	100MW	14/12/16/3/3/2/851	Scoping and EIA	Approved
Maxwell PV Solar	~17km	100MW	14/12/16/3/3/2/852	Scoping and EIA	Approved
Marconi PV Solar	~16km	100MW	14/12/16/3/3/2/853	Scoping and EIA	Approved
Watt PV Solar	~18km	100MW	14/12/16/3/3/2/854	Scoping and EIA	Approved
Farday PV Solar	~18km	100MW	14/12/16/3/3/2/855	Scoping and EIA	Approved
Springhaas Solar Facility 1	~ 8 km	250 MWac	14/12/16/3/3/1/2523	Basic Assessment	Approved
Springhaas Solar Facility 3	~ 8 km	150 MWac	14/12/16/3/3/1/2524	Basic Assessment	Approved
Springhaas Solar Facility 4	~ 8 km	150 MWac	14/12/16/3/3/1/2525	Basic Assessment	Approved
Springhaas Solar Facility 5	~ 8 km	150 MWac	14/12/16/3/3/1/2526	Basic Assessment	Approved
Springhaas Solar Facility 6	~ 8 km	250 MWac	14/12/16/3/3/1/2527	Basic Assessment	Approved

Springhaas Solar Facility 8	~ 8 km	150 MWac	14/12/16/3/3/1/2528	Basic Assessment	Approved
Springhaas Solar Facility 9	~ 8 km	150 MWac	14/12/16/3/3/1/2529	Basic Assessment	Approved

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture. It is quite possible that future solar farm development may take place within the general area.

***It is important that each specialist consider the possible cumulative impacts that the project could have if all the projects within the geographical area were to be approved.*

5 ASSESSMENT METHODOLOGY

5.1 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 5.1.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

5.1.1 Impact Rating System

Impact assessment must take account of the nature, scale, and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 5.1: The rating system

NATURE
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted by a particular action or activity.

GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).

4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component, and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component, and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

***Each specialist should use the rating system supplied to conduct their impact assessment.*

Annexure C: Specialist's Declaration & SACNASP Certificate

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

THE PROPOSED NOTSI PV 3 SOLAR PHOTOVOLTAIC FACILITY AND ASSOCIATED INFRASTRUCTURE OF UP TO 100 MW NEAR DEALESVILLE IN THE FREE STATE PROVINCE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Holland Group (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	
Specialist name:	Anja Isabel Albertyn			
Specialist Qualifications:	Master of Science Zoology (Ornithology)			
Professional affiliation/registration:	SACNASP 400037/16			
Physical address:	459 West River Road, Seafield / Kleinemonde, 6172, Eastern Cape			
Postal address:	4 Central Building Apartments, Central Square, Pinelands			
Postal code:	7405	Cell:	0762658933	
Telephone:	0466751056	Fax:	n/a	
E-mail:	anja@hollandandassociates.net			

2. DECLARATION BY THE SPECIALIST

I, ___Anja Isabel Albertyn _____, 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 48 and is punishable in terms of section 24F of the Act.

Anja

Signature of the Specialist

Holland Group (Pty) Ltd

Name of Company:

04/04/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ___Anja Isabel Albertyn_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Anja Albertyn

Signature of the Specialist

Holland Group (Pty) Ltd

Name of Company

04/04/2023

Date

Signature of the Commissioner of Oaths

Ref no 9/1/8/2
B.G. Sudano
Commissioner of Oaths

Date

SUID AFRIKAANSE POLISIEDIENS
STASIEBEVELVOERDER
PINELANDS
04 APR 2023
STATION COMMANDER
PINELANDS
SOUTH AFRICAN POLICE SERVICES

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Anja Isabel Albertyn

Registration Number: 400037/16

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **27 January 2016** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

Annexure D: Updated List of Observed and Potential Bird Species

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Abdim's Stork	*Ciconia abdimii*	NT		5			
Acacia Pied Barbet	*Tricholaema leucomelas*			45		x	x
African Pipit	*Anthus cinnamomeus*			75	x	x	x
African Quail-finch	Ortygospiza atricollis			80		x	x
African Red-eyed Bulbul	*Pycnonotus nigricans*			40		x	x
African Stonechat	*Saxicola torquatus*			25			x
Alpine Swift	*Tachymarptis melba*			5			
Amur Falcon	*Falco amurensis*			25			
Ant-eating Chat	*Myrmecocichla formicivora*			95	x	x	x
Ashy Tit	*Melaniparus cinerascens*			5			
Barn Swallow	*Hirundo rustica*			60	x		
Black Harrier	*Circus maurus*	EN	NE	60			
Black Stork	*Ciconia nigra*	VU		5			
Black-chested Prinia	*Prinia flavicans*			5			x
Black-chested Snake Eagle	*Circaetus pectoralis*			75			
Black-eared Sparrow-Lark	*Eremopterix australis*		NE	0	x		
Black-faced Waxbill	*Estrilda erythronotos*			5			
Black-headed Heron	*Ardea melanocephala*			10		x	
Blacksmith Lapwing	*Vanellus armatus*			40	x	x	x
Black-throated Canary	*Crithagra atrogularis*			45			x
Black-winged Kite	*Elanus caeruleus*			30	x	x	x
Blue Crane	*Grus paradisea*	NT		5	x		
Blue Korhaan	*Eupodotis caerulescens*		SLS	25			x

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Bokmakierie	*Telophorus zeylonus*			20		x	x
Booted Eagle	*Hieraaetus pennatus*			-		x	
Brown-crowned Tchagra	*Tchagra australis*			5			
Brown-throated Martin	*Riparia paludicola*			-			x
Buffy Pipit	*Anthus vaalensis*			20			
Burchell's Courser	*Cursorius rufus*	VU		5			
Cape Starling	*Lamprotornis nitens*			35			x
Cape Longclaw	*Macronyx capensis*			35			
Cape Penduline Tit	*Anthoscopus minutus*			20			
Cape Robin-Chat	*Cossypha caffra*			20			
Cape Sparrow	*Passer melanurus*			90	x	x	x
Cape Turtle Dove	*Streptopelia capicola*			50		x	x
Cape Vulture	*Gyps coprotheres*	EN		-		x	x
Cape Wagtail	*Motacilla capensis*			35		x	x
Cape Weaver	*Ploceus capensis*		NE	-			x
Cape White-eye	*Zosterops virens*		NE	-		x	
Capped Wheatear	*Oenanthe pileata*			60			
Chat Flycatcher	*Melaeornis infuscatus*			10			
Chestnut-vented Warbler	*Sylvia subcoerulea*			35			x
Cinnamon-breasted Bunting	*Emberiza tahapisi*			30			
Cloud Cisticola	*Cisticola textrix*		NE	65	x	x	x
Common Buttonquail	*Turnix sylvaticus*			5			
Common Buzzard	*Buteo buteo*			10	x		x
Common Myna	*Acridotheres tristis*			-			x
Common Ostrich	*Struthio camelus*			30			

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Common Quail	*Coturnix coturnix*			20		x	
Common Scimitarbill	*Rhinopomastus cyanomelas*			10			
Common Starling	*Sturnus vulgaris*			-			x
Common Swift	*Apus apus*			10			
Crested Barbet	*Trachyphonus vaillantii*			20			
Crowned Lapwing	*Vanellus coronatus*			80		x	x
Desert Cisticola	*Cisticola aridulus*			95		x	x
Diederik Cuckoo	*Chrysococcyx caprius*			40			
Double-banded Courser	*Rhinoptilus africanus*			10			
Eastern Clapper Lark	*Mirafra fasciolata*			75	x	x	
Egyptian Goose	*Alopochen aegyptiaca*			15		x	x
European Bee-eater	*Merops apiaster*			5			
Familiar Chat	*Oenathe familiaris*			45		x	x
Fan-tailed Widowbird	*Euplectes axillaris*			-		x	
Fawn-coloured Lark	*Calendulauda africanoides*			5		x	x
Fiscal Flycatcher	*Melaeornis silens*		NE	35		x	x
Fork-tailed Drongo	*Dicrurus adsimilis*			-			x
Gabar Goshawk	*Melierax gabar*			5			
Great Sparrow	*Passer motitensis*			-			x
Greater Flamingo	*Phoenicopterus roseus*	NT		-			x
Greater Kestrel	*Falco rupicoloides*			5	x	x	x
Greater Striped Swallow	*Cecropis cucullata*			50		x	
Green-winged Pytilia	*Pytilia melba*			5			
Grey-backed Sparrow-Lark	*Eremopterix verticalis*			10	x	x	
Hadada Ibis	*Bostrychia hagedash*			40	x	x	x

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Helmeted Guineafowl	*Numida meleagris*			60	x	x	x
House Sparrow	*Passer domesticus*			40	x	x	x
Jacobin Cuckoo	*Clamator jacobinus*			5			
Jackal Buzzard	*Buteo rufofuscus*			10			
Jameson's Firefinch	*Lagonosticta rhodopareia*			5			
Kalahari Scrub Robin	*Cercotrichas paena*			35			x
Karoo Chat	*Emarginata schlegelii*			5			
Karoo Thrush	*Turdus smithi*		NE	5		x	
Kori Bustard	*Ardeotis kori*	NT		10	x		
Large-billed Lark	*Galerida magnirostris*		NE	10			
Lark-like Bunting	*Emberiza impetuani*			10			
Laughing Dove	*Spilopelia senegalensis*			80		x	x
Lesser Grey Shrike	*Lanius minor*			15			
Lesser Kestrel	*Falco naumanni*			50			
Levaillant's Cisticola	*Cisticola tinniens*			10			
Lilac-breasted Roller	*Coracias caudatus*			5			
Little Grebe	*Tachybaptus ruficollis*			5			
Little Swift	*Apus affinis*			40	x	x	x
Long-billed Crombec	*Sylvietta rufescens*			15			
Long-tailed Widowbird	*Euplectes progne*			50			
Ludwig's Bustard	*Neotis ludwigii*	EN		15			
Marsh Owl	*Asio capensis*			-			x
Melodious Lark	*Mirafra cheniana*		NE	30		x	x
Monotonous Lark	*Mirafra passerina*			5			
Mountain Wheatear	*Oenanthe monticola*			45	x		x

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Namaqua Dove	*Oena capensis*			40	x	x	x
Namaqua Sandgrouse	*Pterocles namaqua*			0			
Natal Spurfowl	*Pternistis natalensis*			-		x	
Neddicky	*Cisticola fulvicapilla*			45			
Northern Black Korhaan	*Afrotis afraoides*			90	x	x	x
Orange River Francolin	*Scleroptila gutturalis*			10			
Orange River White-eye	*Zosterops pallidus*			10		x	x
Pale Chanting Goshawk	*Melierax canorus*			30	x	x	x
Pearl-breasted Swalloq	*Hirundo dimidiata*			-		x	
Pied Crow	*Corvus albus*			75	x	x	
Pied Starling	*Lamprotornis bicolor*			-			x
Pink-billed Lark	*Spizocorys conirostris*			5		x	
Plain-backed Pipit	*Anthus leucophrys*			15			
Pririt Batis	*Batis pririt*			20		x	
Red-backed Shrike	*Lanius collurio*			30			
Red-billed Quelea	*Quelea quelea*			65	x		x
Red-billed Teal	*Anas erythrorhyncha*			5		x	
Red-breasted Swallow	*Cecropis semirufa*			15			
Red-capped Lark	*Calandrella cinerea*			20		x	
Red-eyed Dove	*Streptopelia semitorquata*			5		x	
Red-faced Mousebird	*Urocolius indicus*			15			
Red-headed Finch	*Amadina erythrocephala*			50			
Rock Kestrel	*Falco rupicolus*			5			
Rock Martin	*Ptyonoprogne fuligula*			5		x	
Rufous-eared Warbler	*Malcorus pectoralis*			55			

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
Rufous-naped Lark	*Mirafra africana*			35			
Sabota Lark	*Calendulauda sabota*			10		x	x
Scaly-feathered Weaver	*Sporopipes squamifrons*			50			
Secretarybird	*Sagittarius serpentarius*	EN		20	x	x	x
Sickle-winged Chat	*Emarginata sinuata*		NE	25		x	x
South African Cliff Swallow	*Petrochelidon spilodera*		BSLS	35			
South African Shelduck	*Tadorna cana*			5		x	x
Southern Fiscal	*Lanius collaris*			90		x	x
Southern Grey-headed Sparrow	*Passer diffusus*			65			x
Southern Masked Weaver	*Ploceus velatus*			90		x	
Southern Red Bishop	*Euplectes orix*			30		x	
Speckled Pigeon	*Columba guinea*			55			x
Spike-heeled Lark	*Chersomanes albofasciata*			80	x	x	x
Spotted Eagle-Owl	*Bubo africanus*			5		x	x
Spotted Flycatcher	*Muscicapa striata*			5			
Spotted Thick-knee	*Burhinus capensis*			10			
Spur-winged Goose	*Plectropterus gambensis*			20		x	
Swainson's Spurfowl	*Pternistis swainsonii*			25		x	
Three-banded Plover	*Charadrius tricollaris*			5		x	
Wattled Starling	*Creatophora cinerea*			15			
Western Barn Owl	*Tyto alba*			20		x	x
Western Cattle Egret	*Bubulcus ibis*			10		x	
White Stork	*Ciconia ciconia*			20			
White-backed Mousebird	*Colius colius*			20		x	

Common Name	Scientific Name	Red Data Status	Endemism	SABAP	Nov 2021	May 2022	Jul 2022
White-backed Vulture	*Gyps africanus*	CR		5		x	x
White-bellied Sunbird	*Cinnyris talatala*			95			
White-browed Sparrow-Weaver	*Plocepasser mahali*			25		x	
White-fronted Bee-eater	*Merops bullockoides*			-			x
White-rumped Swift	*Apus caffer*			20			
White-throated Swallow	*Hirundo albigularis*			0			
Willow Warbler	*Phylloscopus trochilus*			35			
Yellow Canary	*Crithagra flaviventris*			5	x		x
Yellow-bellied Eremomela	*Eremomela icteropygialis*			5		x	
Yellow-billed Duck	*Anas undulata*			10		x	
Yellow-crowned Bishop	*Euplectes afer*			45			
Zitting Cisticola	*Cisticola juncidis*			5			