

Appendix 1: Chance Finds Protocol for Developer

Palaeontology

Any subsurface evidence of palaeontological remains - i.e. the remains or traces of plants and animals that has been buried a long time ago – must be reported to the SAHRA APM Unit (Tel. 021 462 5402). In some fossils the original bone was not lithified. It disappeared completely, but left an impression or mould in the sediment. Sometimes leaf impressions are purely a kind of mould and/or cast of a leaf, but often some of the original leaf is left behind in a carbonized form in the impression. Trace fossils includes footprints, burrows and tracks. Sometimes fossil remains may also resemble modern- looking, but more or less lithified animal bones and teeth.

- Freshly exposed fossil remains will require contracting a **professional palaeontologist for appropriate monitoring for fossil remains** by during the construction phase of the project.
- If any newly discovered palaeontological resources prove to be significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;
- The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.

Archaeology

Any subsurface evidence of archaeological sites or remains (e.g. stone tool artifacts, bone or ostrich eggshell fragments, charcoal and ash heaps, or remnants of stone-made structures or unmarked graves) found during construction phase of development, must be reported to the SAHRA APM Unit (Tel. 021 462 5402).

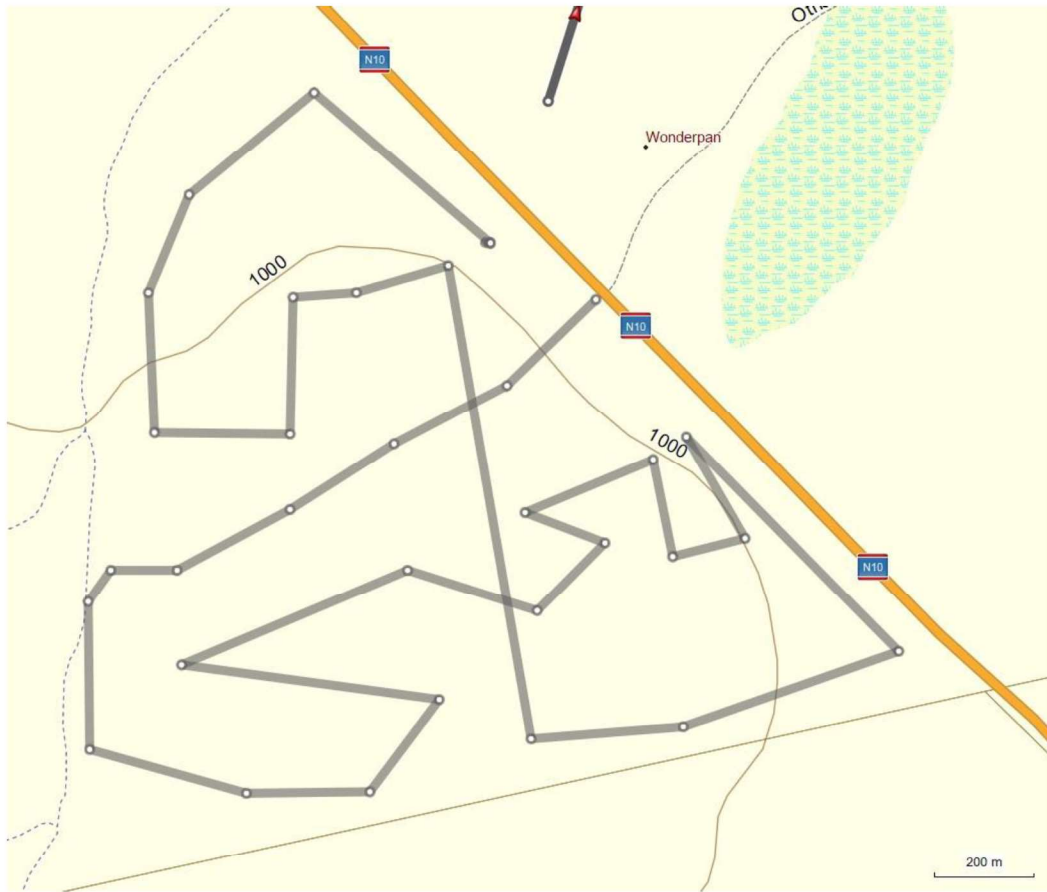
- In the meantime, *potential archaeological structures such as stone-build enclosures, buildings or graves* must be avoided by a no-go buffer zone until further confirmation by the archaeologist. Smaller *in situ* material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet.

- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit must be alerted immediately. A professional archaeologist must be contracted as soon as possible to inspect the findings.
- If newly discovered heritage resources prove to be of archaeological significance, a Phase 2 rescue operation may be required, subject to permits issued by SAHRA.

Appendix 2: Track Logs

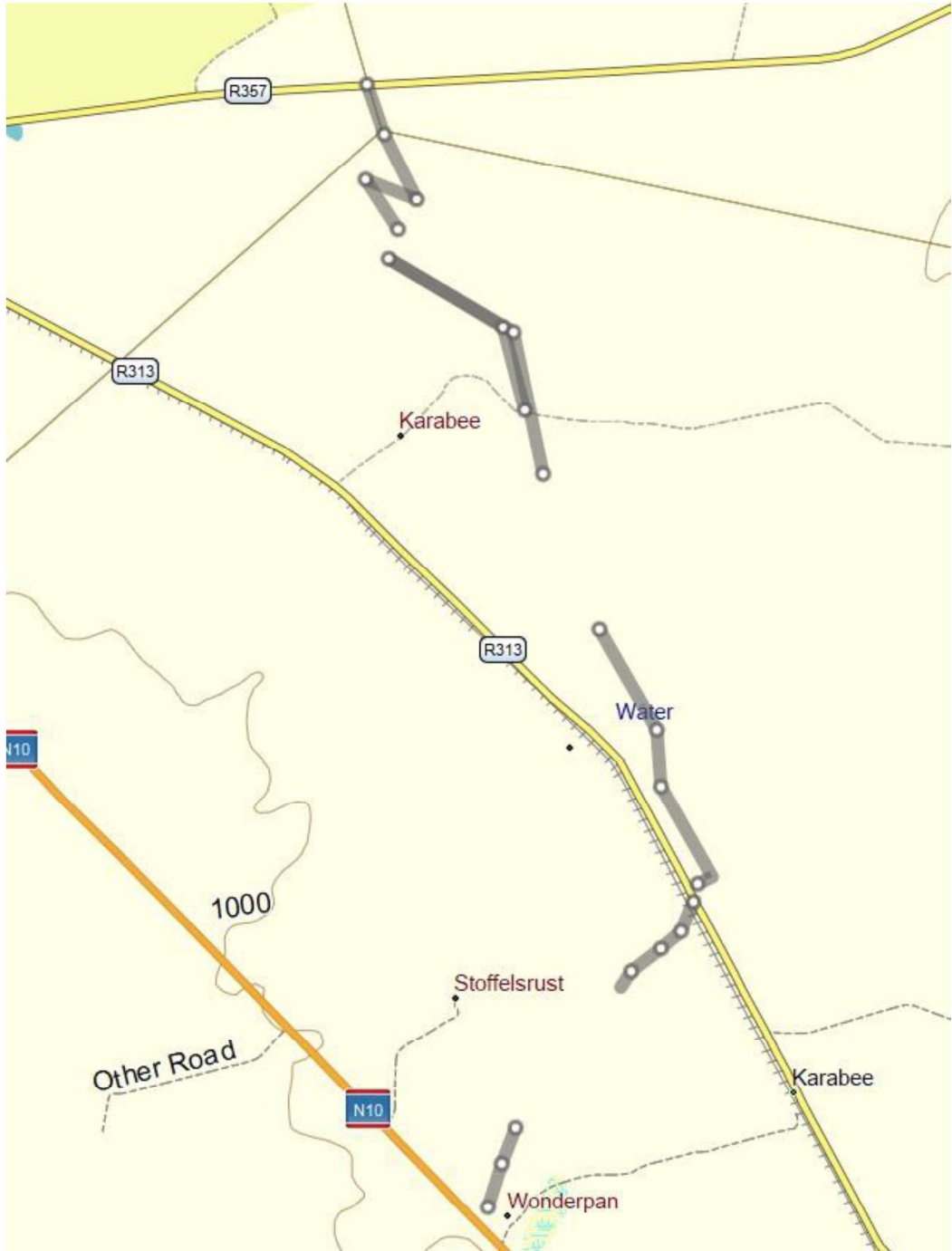
Track Log Solar Footprint

Index	Position
1	S29 48.021 E22 51.632
2	S29 48.113 E22 51.530
3	S29 48.176 E22 51.399
4	S29 48.247 E22 51.279
5	S29 48.311 E22 51.149
6	S29 48.311 E22 51.073
7	S29 48.345 E22 51.046
8	S29 48.504 E22 51.048
9	S29 48.551 E22 51.229
10	S29 48.549 E22 51.371
11	S29 48.450 E22 51.451
12	S29 48.413 E22 51.154
13	S29 48.311 E22 51.415
14	S29 48.355 E22 51.564
15	S29 48.282 E22 51.643
16	S29 48.250 E22 51.550
17	S29 48.193 E22 51.698
18	S29 48.297 E22 51.721
19	S29 48.277 E22 51.804
20	S29 48.169 E22 51.736
21	S29 48.399 E22 51.981
22	S29 48.479 E22 51.733
23	S29 48.492 E22 51.557
24	S29 47.985 E22 51.462
25	S29 48.014 E22 51.356
26	S29 48.019 E22 51.283
27	S29 48.166 E22 51.279
28	S29 48.164 E22 51.123
29	S29 48.014 E22 51.116
30	S29 47.909 E22 51.163
31	S29 47.799 E22 51.307
32	S29 47.960 E22 51.510
33	S29 47.960 E22 51.503
34	S29 47.957 E22 51.503
35	S29 47.962 E22 51.510



Track Log Powerline

Index	Position
1	S29 47.808 E22 51.577
2	S29 47.571 E22 51.658
3	S29 47.377 E22 51.739
4	S29 46.144 E22 52.782
5	S29 46.302 E22 52.709
6	S29 46.397 E22 52.591
7	S29 46.521 E22 52.417
8	S29 46.608 E22 52.356
9	S29 46.046 E22 52.806
10	S29 46.008 E22 52.892
11	S29 45.514 E22 52.591
12	S29 45.204 E22 52.567
13	S29 44.657 E22 52.231
14	S29 43.463 E22 51.794
15	S29 43.010 E22 51.666
16	S29 42.636 E22 50.995
17	S29 43.036 E22 51.727
18	S29 43.812 E22 51.901
19	S29 41.684 E22 50.868
20	S29 41.956 E22 50.969
21	S29 42.315 E22 51.160
22	S29 42.205 E22 50.860
23	S29 42.477 E22 51.050



Appendix D4
Avifaunal report

AVIFAUNAL IMPACT ASSESSMENT

**60MW Wonderpan Solar 1 PV Facility
near Prieska in the Northern Cape Province**



October 2022

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EXECUTIVE SUMMARY

Prieska Power Reserve (Pty) Ltd is proposing the construction and operation of a 60MW photovoltaic (PV) solar energy facility, to be known as the Wonderpan Solar 1 PV Facility, and its associated infrastructure on portions 2, 4 and 8 of Farm 50 Karabee, located approximately 18 km south-east of the town of Prieska, within the Siyathemba Local Municipality, Northern Cape Province. The project is planned as part of a larger cluster of solar and wind energy facilities which will provide energy to produce green hydrogen and ammonia, to be known as the Prieska Power Reserve.

The proposed Wonderpan Solar PV 1 Facility has a development area of 137 ha within the 1526 ha available on farm Karabee 50/4 situated south of the N10 road. Installed hardware will have the potential to generate 60 MW by PV technology. Renewable energy production will be facilitated through eight (8) blocks of fixed tilt (30° north facing) solar arrays. A small on-site substation and its associated hardware will convert the solar output to AC through eight (8) 7.5MW inverters, whereby the green energy will be relayed via the proposed 132kV transmission line to the Camel Thorn solar facility.

Associated infrastructure forming part of the Wonderpan Solar PV development includes a 132kV transmission line. The mentioned 132kV transmission line traverses through Portions 4, 2, and 8 of Farm Karabee 50 and will ultimately connect the Wonderpan and Camel Thorn solar facilities. An environmental authorisation (EA) for the Camel Thorn solar facility has already been approved by the National Department of Environment, Forestry and Fisheries (DFFE), in December 2021.

The proposed development constitutes listed activities in terms of the 2014 EIA Regulations (as amended in 2017) as promulgated under the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended). As such, the proposed development requires an Environmental Authorisation (EA) prior to the commencement of construction and operation. Environmental Management Group (Pty) Ltd. has been appointed by the applicant to facilitate the EA application process. The nature of the proposed development requires a Scoping and Environmental Impact Report (S&EIR) as part of the EA application process. Chris van Rooyen Consulting has been contracted by the Environmental Management Group to assess the potential impacts of the solar facility and associated 132kV grid connection on avifauna.

AVIFAUNA

The SABAP2 data, combined with the result of the two pre-construction monitoring surveys, indicate that a total of 179 bird species could potentially occur within the broader area – Appendix 1 provides a comprehensive list of all the species. Of these, 60 species are classified as solar priority species and 50 as powerline sensitive species (see definition of priority species in Section 4). Nine (9) of these are South African Red List species. Of the solar priority species, 26 are likely to occur at the development area regularly. Of the powerline sensitive species, 25 are likely to occur at the development area regularly (see Table 2 in Section 7).

The table below contains a summarised assessment of the anticipated impacts.

Environmental Parameter	Nature of the Impact	Rating prior to mitigation	Rating post mitigation
Avifauna	Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure.	55 MEDIUM	45 MEDIUM

Environmental Parameter	Nature of the Impact	Rating prior to mitigation	Rating post mitigation
	Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure.	65 HIGH	44 MEDIUM
	Mortality of priority species due to collisions with solar panels.	18 LOW	18 LOW
	Entrapment of large-bodied birds in the double perimeter fence.	36 MEDIUM	20 LOW
	Mortality of priority species due to electrocution in the substations	36 MEDIUM	10 LOW
	Mortality of priority species due to collisions with the 132kV powerline	36 MEDIUM	20 LOW
	Mortality of priority species due to electrocution on the 132kV powerline	60 HIGH	10 LOW
	Displacement of priority species due to disturbance associated with decommissioning of the PV plant and associated infrastructure.	55 MEDIUM	45 MEDIUM
	Displacement of priority species due to disturbance associated with construction of the 132kV overhead power line.	44 MEDIUM	18 LOW
	AVERAGE SIGNIFICANCE RATING	45 MEDIUM	25 LOW

ENVIRONMENTAL SENSITIVITIES

For the Wonderpan Solar 1 PV development area (i.e., project area of impact - PAOI) no avifaunal environmental sensitivities were identified. However, it should be noted that nesting sites of Verreaux's Eagles were recorded about 4km from the development area. Due to the distance of the nests from the PAOI, no buffer zone is required at this stage (Figure i).

It should also be noted that there is an established White-backed Vulture and Lappet-faced Vulture roost (>100 birds) using the existing Burchell - Cuprum 132kV overhead powerline which is within close proximity of the PAOI. Based on interviews with landowners and personal observations, it seems that the numbers of White-backed Vultures and Lappet-faced Vultures are on the increase south of the Orange River in the Northern Cape during the non-breeding season (December to May). These birds establish temporary roosts on power lines, and it is entirely possible that the birds could on occasion roost on the proposed Wonderpan 132kV powerline. Depending on the proposed pole design, this could place them at risk of electrocution.

Avifaunal sensitivities in the general area of the proposed Wonderpan Solar PV 1 Facility fall outside of the PAOI and therefore do not require a buffer zone (Figure i).

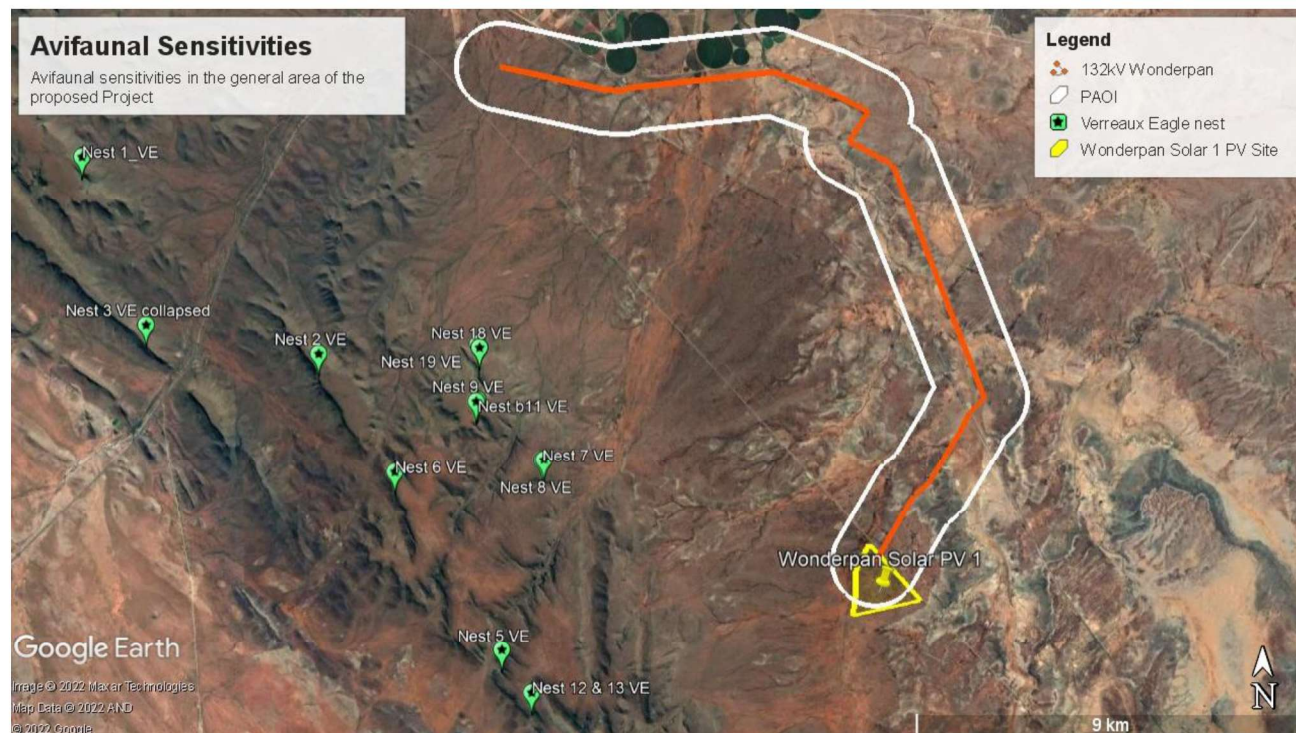


Figure (i): Avifaunal sensitivities in the general area of the proposed Wonderpan Solar PV 1 Facility and 132 kV overhead powerline. These sensitivities fall outside of the PAOI and therefore do not require a buffer zone.

CUMULATIVE IMPACTS

According to the DFFE national database of renewable energy applications, there are currently six renewable energy projects (all solar) within a 30km radius around the proposed Wonderpan Solar 1 PV facility (Table 4 and Figure 10).

The total affected land parcel area taken up by authorised and planned renewable energy projects within a 30 km radius around the proposed Wonderpan Solar 1 PV facility is approximately 271 km². The total affected land parcel area affected by the proposed Wonderpan Solar 1 PV facility equates to approximately 1.37km². The combined land parcel area affected by authorised renewable energy developments within the 30 km radius around the proposed Wonderpan Solar 1 PV facility, including the latter, thus equals approximately 272.37 km². Of this, the proposed Wonderpan Solar 1 PV facility land parcel areas constitute 0.5 %. The cumulative impact of the proposed Wonderpan Solar 1 PV facility is thus anticipated to be **low** after mitigation.

The total area within the 30km radius around the proposed projects equates to about 2976 km² of similar habitat (excluding urban areas). The total combined size of the land parcels potentially affected by renewable energy projects will equate to 9.1% of the available habitat in the 30km radius. Assuming that all the projects are actually constructed, the cumulative impact of all the proposed renewable energy projects is estimated to be **medium**. However, the actual physical footprint of the renewable energy facilities will be much smaller than the land parcel areas themselves. Furthermore, several of these projects must still be subject to a competitive bidding process where only the most competitive projects will win a power purchase agreement required for the project to proceed to construction. If all mitigation measures are strictly implemented the cumulative impact could be reduced to **low**.

The cumulative impact of all the planned renewable energy facilities in this area is rated as **medium** pre-mitigation, and **low** post-mitigation, **provided all the proposed mitigation measures are strictly applied**.

As far as the proposed 132kV grid connection is concerned, the grid connection will add approximately 21km to the existing high voltage grid (approximately 61km) in the 30km radius around the proposed facility, of which approximately 6km will run parallel to existing high voltage lines¹. This amounts to an increase of approximately 24% in the length of new high voltage lines within this area, if the length of line running next to existing lines is discounted. The cumulative impact of the proposed 132kV grid, is thus anticipated to be **medium** before mitigation, but it should be reduced to **low** with mitigation.

CONCLUSIONS

The proposed Wonderpan Solar 1 PV Facility could have a range of potential pre-mitigation impacts on priority avifauna ranging from low to high, which is expected to be reduced to medium and low with appropriate mitigation measures. No fatal flaws were discovered during the investigations. The proposed Project is supported provided that all mitigation measures are adhered to.

¹ No information could be sourced on the length of the grid lines for the other planned PV facilities.

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DETAILS OF THE SPECIALIST

Chris van Rooyen (Bird Specialist)

Chris has 26 years' experience in the management of wildlife interactions with electricity infrastructure. He was head of the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has worked in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. Chris also has extensive project management experience and has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author of 15 academic papers (some with co-authors), co-author of two book chapters and several research reports. He has been involved as ornithological consultant in numerous power line and wind generation projects. Chris is also co-author of the Best Practice for Avian Monitoring and Impact Mitigation at Wind Development Sites in Southern Africa, which is currently (2016) accepted as the industry standard. Chris also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

Albert Froneman (Bird and GIS Specialist)

Albert is a registered Professional Natural Scientist with the South African Council of Natural Scientific Professionals (SACNASP) in the field of Zoology and has an M. Sc. in Conservation Biology from the University of Cape Town. He started his career in the natural sciences as a Geographic Information Systems (GIS) specialist at Council for Scientific and Industrial Research (CSIR). In 1998, he joined the Endangered Wildlife Trust where he headed up the Airports Company South Africa – EWT Strategic Partnership, a position he held until he resigned in 2008 to work as a private ornithological consultant. Albert's specialist field is the management of wildlife, especially bird related hazards at airports. His expertise is recognized internationally; in 2005 he was elected as Vice Chairman of the International Bird Strike Committee. Since 2010, Albert has worked closely with Chris van Rooyen in developing a protocol for pre-construction monitoring at wind energy facilities, and he is currently jointly coordinating pre-construction monitoring programmes at several wind farm facilities. Albert also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

Megan Loftie-Eaton (Ecologist and Avifaunal Specialist)

Megan is a registered Professional Natural Scientist with the South African Council of Natural Scientific Professionals (SACNASP) in the field of Ecology, and she is a member of the Zoological Society of Southern Africa (ZSSA). Megan is also a part-time Environmental Assessment Practitioner and assists with Environmental Impact Assessments (EIA's), Basic Assessments (BA's) and provides specialist input within the avifaunal and ecological fields. She obtained her BSc in Environmental & Conservation Sciences with distinction through the University of Alberta in Edmonton, Canada. After moving back to South Africa in 2011 she went on to complete her MSc in Zoology (2014) at the University of Cape Town (UCT), and her PhD in Biological Sciences (2018), UCT, looking at the impacts of bush encroachment on bird distributions in the savanna biome of South Africa. Megan has conducted avifaunal field surveys and has ample experience with avifaunal impact assessments

1. INTRODUCTION

Prieska Power Reserve (Pty) Ltd is proposing the construction and operation of a 60MW photovoltaic (PV) solar energy facility, to be known as the Wonderpan Solar 1 PV Facility, and its associated infrastructure on portions 2, 4 and 8 of Farm 50 Karabee, located approximately 18 km south-east of the town of Prieska, within the Siyathemba Local Municipality, Northern Cape Province. The project is planned as part of a larger cluster of solar and wind energy facilities which will provide energy to produce green hydrogen and ammonia, to be known as the Prieska Power Reserve.

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The technical components of the proposed Project are the following:

Solar field:

- Eight (8) blocks of fixed-tilt panel arrays
- Steel support structure and tracker system on concrete foundations
- Inverter stations as part of the PV field (8 total 7.5MW inverters)
- Transformer, switchgear, and related equipment as part of the substations
- Fencing around the site perimeter (2.5m high)
- Internal roads.

Associated infrastructure:

- Substation complex (33/132kV) including control rooms and grid control yard
- Transmission lines and transmission towers (towards the Camelthorn Solar PV Plant - 21km in length)
- Battery energy storage system
- Operations and maintenance buildings
- Access and internal roads
- Perimeter fencing and access control point (gate and security building).

Technical development specifications:

Item / component	Specification
One (1) block	
Generation capacity	7.5 MW DC
Total area required	0.8 ha / MW
PV array information	
Total blocks (full 60 MW)	8 blocks (fixed tilt)
Module output	Canadian solar CS7N-660MS 1500v / 660wat
Average panel height	3 meters
Fixed panel tilt	30° north
Total panels required (full 60MW generation)	± 105 000 units
Inverters	(8) x 7.5 MW inverters
Total PV array area (physical clearance)	104.3 ha
Total Wonderpan solar farm area (site)	137 ha

Please see Figures 1 and 2 for location maps of the proposed development.

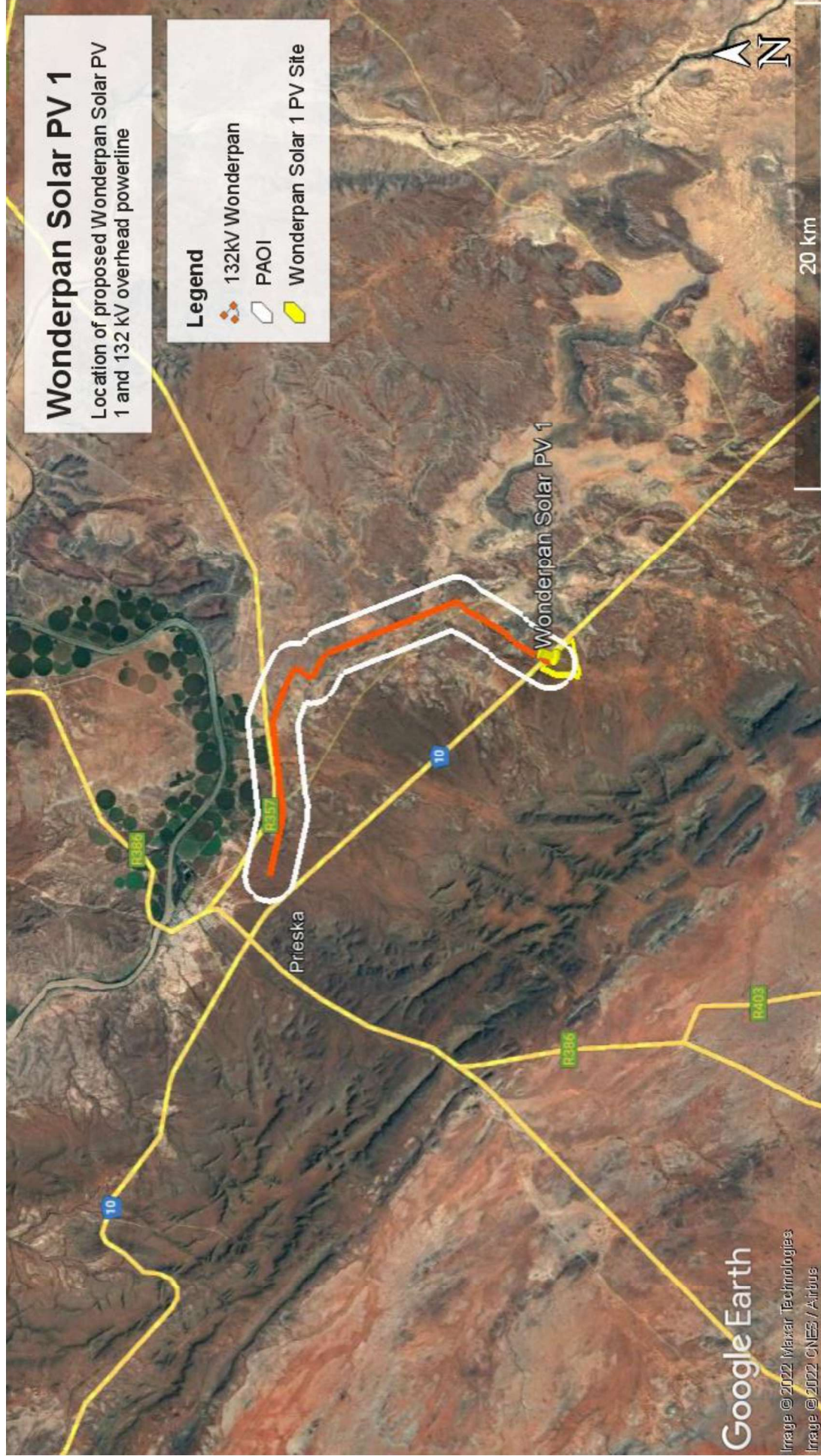


Figure 1: Locality map of the development area of the proposed 60 MW Wonderpan Solar PV 1 and the proposed 132 kV overhead powerline.

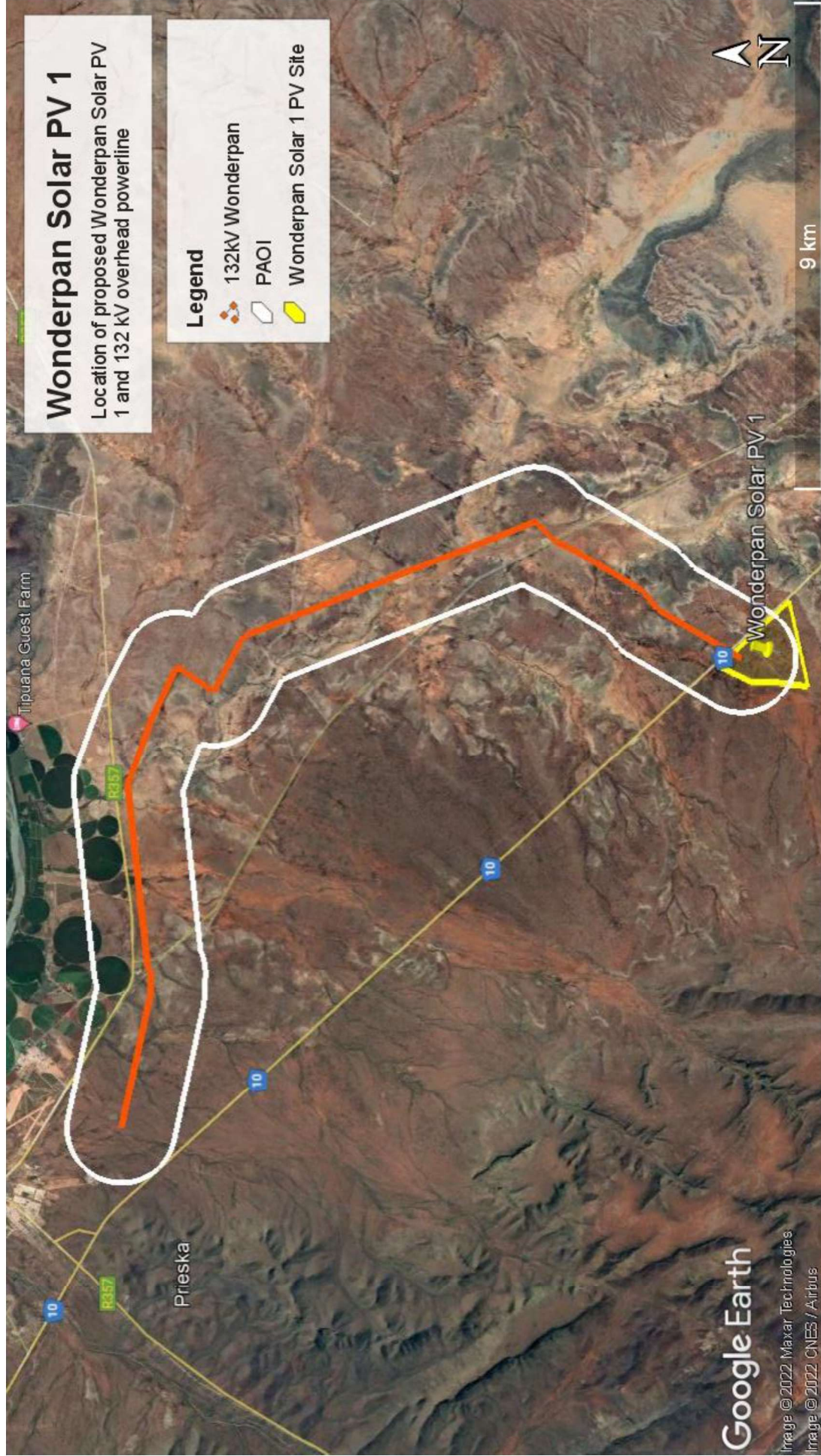


Figure 2: Close-up of the proposed 60 MW Wonderpan Solar PV 1 development area and PAOI.

2 PROJECT SCOPE

The purpose of the impact assessment report is to determine the main issues and potential impacts of the proposed project based on existing information and field assessments. The terms of reference as follows:

- Describe the affected environment from an avifaunal perspective
- Discuss gaps in baseline data and other limitations and describe the expected impacts associated with the solar facility and associated infrastructure
- Identify potential sensitive environments and receptors that may be impacted on by the proposed facility and the types of impacts that are most likely to occur.
- Determine the nature and extent of potential impacts during the construction, operational and decommissioning phases.
- Identify 'No-Go' areas, where applicable.
- Recommend mitigation measures to reduce the impact of the expected impacts to acceptable levels.
- Indicate if any fatal flaws have been identified during the scoping phase.

3 OUTLINE OF METHODOLOGY AND INFORMATION REVIEWED

The following methods were used to compile this scoping report:

- The project area of impact (PAOI) was defined as the total PV development site and a 1km buffer around the proposed 132kV grid connection.
- The PV development site was defined as the 137-ha area where the solar panels and associated infrastructure will be constructed.
- Bird distribution data from the Southern African Bird Atlas Project 2 (SABAP 2) was obtained (<http://sabap2.adu.org.za/>) to ascertain which species occur in the pentads where the proposed development is located. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5' × 5'). Each pentad is approximately 8 × 7.6 km. **A consolidated data set was obtained for a total of 6 pentads which overlaps with the PAOI, henceforth referred to as the broader area. The PAOI was defined as an aggregate area comprising of the proposed PV development area and a 1km radius around the proposed 132kV powerline.** The 6 pentad grid cells are the following: 2940_2240, 2940_2245, 2940_2250, 2945_2240, 2945_2245 and 2945_2250 (Figure 33). A total of 41 full protocol lists (i.e., bird listing surveys lasting at least a minimum of two hours each) and 50 ad hoc protocol lists (surveys lasting less than two hours but still yielding valuable data) have been completed to date for the 6 pentads where the PAOI is located. The SABAP2 data was therefore regarded as a reliable reflection of the avifauna which occurs in the area, but the data was also supplemented by data collected during dedicated site surveys and previous work done for renewable energy projects in the area.
- A classification of the vegetation types in the development area was obtained from the Atlas of Southern African Birds 1 (SABAP1), the National Vegetation Map compiled by the South African National Biodiversity Institute (Mucina & Rutherford 2006) and the scoping report compiled by Dr. D.J. van Niekerk (2021).
- The national threatened status of all priority species was determined with the use of the most recent edition of the Red List Book of Birds of South Africa, Lesotho, and Swaziland (Taylor *et al.* 2015), and the latest authoritative summary of southern African bird biology (Hockey *et al.* 2005).
- The global threatened status of all priority species was determined by consulting the latest (2022) IUCN Red List of Threatened Species (<http://www.iucnredlist.org/>).
- The Important Bird and Biodiversity Areas of South Africa (Marnewick *et al.* 2015; <http://www.birdlife.org.za/conservation/important-bird-areas>) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- An intensive internet search was conducted to source information on the impacts of solar facilities on avifauna.

- Satellite imagery (Google Earth © 2021) was used in order to view the broader area on a landscape level and to help identify bird habitat on the ground.
- The South African National Biodiversity BGIS map viewer was used to determine the locality of the development area relative to National Protected Areas.
- The DFFE National Screening Tool (<https://screening.environment.gov.za/>) was used to determine the assigned avian sensitivity of the development area.
- The following sources were consulted to determine the investigation protocol that is required for the site:
 - Procedures for the Assessment and Minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of NEMA when applying for Environmental Authorisation (Gazetted October 2020)
 - Guidelines for the Implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for EIAs in South Africa produced by the South African National Biodiversity Institute on behalf of the Department of Environment, Forestry and Fisheries (2020).
 - The BirdLife South Africa (BLSA) Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa by Jenkins, A.R., Ralston-Patton, Smit- Robinson, A.H. 2017 (hereafter referred to as the Solar Guidelines) were consulted to determine the level of survey effort that is required.
- The main source of information on the avifaunal diversity and abundance at the PAOI (including the development area) are pre-construction monitoring surveys that were conducted in May and September 2022 (see Section 7.1).

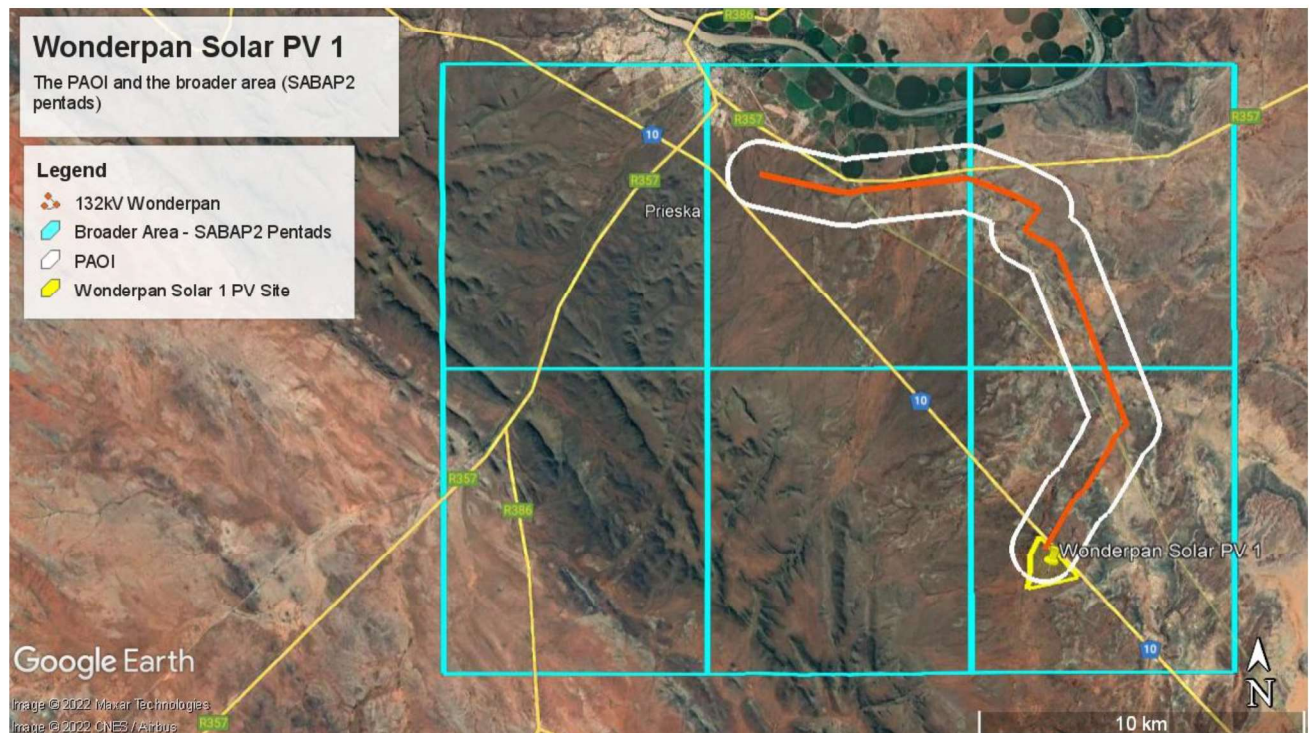


Figure 3: The PAOI within the broader area i.e., the area covered by the four SABAP2 pentads.

4 ASSUMPTIONS AND LIMITATIONS

This study assumed that the sources of information used in this report are reliable. In this respect, the following must be noted:

- The focus of the study is primarily on the potential impacts on solar priority species and powerline sensitive species.
- Priority species were defined as follows:
 - South African Red Data species: High conservation significance

- South African endemics and near-endemics: High conservation significance
- Raptors: High conservation significance. Raptors are at the top of the food chain and play a key role in their ecosystems. When populations of birds of prey go down, then the numbers of their prey species go up, creating an imbalance in the ecosystem.
- Waterbirds: Evidence indicates that waterbirds may be particularly susceptible to collisions with solar arrays due to the so-called lake effect, caused by the reflection of the sun of the smooth surface of solar panels. However, due to the lack of permanent waterbodies in the PAOI waterbirds are probably at low risk for this Project.
- Powerline sensitive species are defined as follows: Species which could potentially be impacted by powerline collisions or electrocutions, based on their morphology. Larger birds, particularly raptors and vultures, are more vulnerable to electrocution as they are more likely to bridge the clearances between electrical components than smaller birds. Large terrestrial species and certain waterbirds with high wing loading are less manoeuvrable than smaller species and are therefore more likely to collide with overhead lines.
- The impact of solar installations on avifauna is a new field of study, with only two published scientific studies on the impact of PV facilities on avifauna in South Africa (Rudman *et al.*, 2017; Visser *et al.*, 2019); and one related study on the impacts of concentrated solar power facilities on wildlife in South Africa (Jeal *et al.*, 2019). Strong reliance was therefore placed on expert opinion and data from existing monitoring programmes at solar facilities in the USA where monitoring has been ongoing since 2013. The pre-cautionary principle was applied throughout as the full extent of impacts on avifauna at solar facilities is not presently known.
- The assessment of impacts is based on the baseline environment as it currently exists in the project site.
- Conclusions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.

5 LEGISLATIVE CONTEXT

There is no legislation pertaining specifically to the impact of solar facilities and associated electrical infrastructure on avifauna.

5.1 Agreements and conventions

Table 1 below lists agreements and conventions which South Africa is party to, and which is relevant to the conservation of avifauna².

Table 1: Agreements and conventions which South Africa is party to, and which is relevant to the conservation of avifauna.

Convention name	Description	Geographic scope
African-Eurasian Waterbird Agreement (AEWA)	<p>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.</p> <p>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.</p>	Regional

² (BirdLife International (2016) Country profile: South Africa. Available from: http://www.birdlife.org/datazone/country/south_africa. Checked: 2016-04-02).

Convention name	Description	Geographic scope
Convention on Biological Diversity (CBD), Nairobi, 1992	The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. It has 3 main objectives: The conservation of biological diversity The sustainable use of the components of biological diversity The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Global
Convention on the Conservation of Migratory Species of Wild Animals, (CMS), Bonn, 1979	As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.	Global
Convention on the International Trade in Endangered Species of Wild Flora and Fauna, (CITES), Washington DC, 1973	CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	Global
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.	Global
Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia	The Signatories will aim 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.	Regional

5.2 National legislation

5.2.1 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.

5.2.2 The National Environmental Management Act 107 of 1998 (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) creates the legislative framework for environmental protection in South Africa and is aimed at giving effect to the environmental right in the Constitution. It sets out a number of guiding principles that apply to the actions of all organs of state that may significantly affect the environment. Sustainable development (socially, environmentally and economically) is one of the key principles, and internationally accepted principles of environmental management, such as the precautionary principle and the polluter pays principle, are also incorporated. NEMA also provides that a wide variety of listed developmental activities, which may significantly affect the environment, may be performed only after an environmental impact assessment has been done and authorization has been obtained from the relevant authority. Many of these listed activities can potentially have negative impacts on bird populations in a variety of ways. The clearance of natural vegetation, for instance, can lead to a loss of habitat and may depress prey populations, while erecting structures needed for generating and distributing energy, communication, and so forth can cause mortalities by collision or electrocution.

NEMA makes provision for the prescription of procedures for the assessment and minimum criteria for reporting on identified environmental themes (Sections 24(5)(a) and (h) and 44) when applying for environmental authorisation. The Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020) is applicable in the case of solar PV developments.

5.2.3 The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations)

The most prominent statute containing provisions directly aimed at the conservation of birds is the National Environmental Management: Biodiversity Act 10 of 2004 read with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.

5.3 Provincial Legislation

The current legislation applicable to the conservation of fauna and flora in the Northern Cape is the Northern Cape Nature Conservation Act No 9 of 2009. It provides for the sustainable utilisation of wild animals, aquatic biota, and plants; the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; describes offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; provides for the issuing of permits and other authorisations; and provides for matters connected therewith.

6 BASELINE ASSESSMENT

6.1 Important Bird Areas

There are no Important Bird Areas (IBA) located closely to the proposed PV 1 facility. The closest IBA to the project site is the Platberg-Karoo Conservancy IBA SA037 which is located ~120 km away at its closest point. It is therefore highly unlikely that the proposed development will have a negative impact on any IBA due to the distance from the project site.

6.2 DFFE National Screening Tool

The project site and immediate environment is classified as **Medium and High** sensitivity for terrestrial animals according to the Terrestrial Animal Species Theme³. The High classification is linked to the possible occurrence of Lanner Falcon *Falco biarmicus* and to Ludwig’s Bustard *Neotis ludwigii*. The Medium sensitivity classification is linked to the possible occurrence of Tawny Eagle *Aquila rapax*. The PAOI contains confirmed habitat for species of conservation concern (SCC) as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020, namely listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable.

The presence of, and/or habitat for, SCC was confirmed during the on-site field surveys i.e., Ludwig’s Bustard (Globally and Regionally Endangered), Lanner Falcon (Regionally Vulnerable), Verreaux’s Eagle (Regionally Vulnerable), White-backed Vulture (Regionally Critically Endangered) and Lappet-faced Vulture (Globally and Regionally Endangered). Based on the field surveys and available SABAP2 data, a classification of **High** sensitivity for avifauna in the screening tool is suggested (Figure 4).

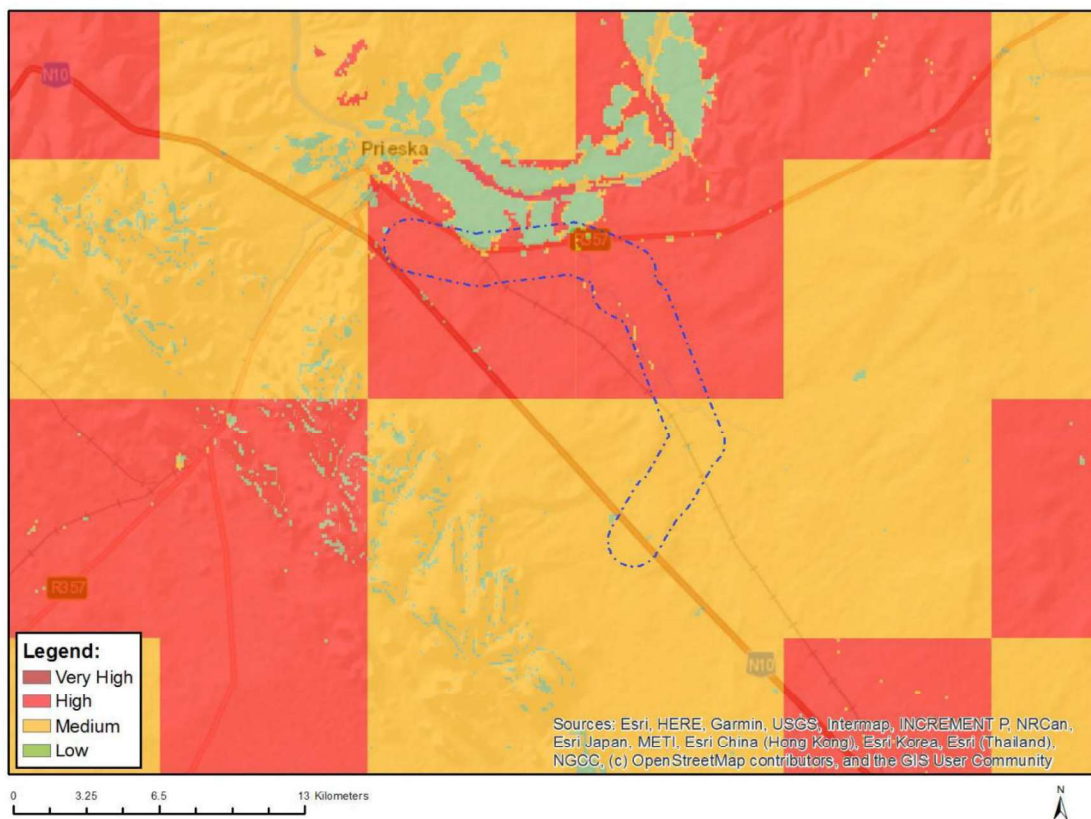


Figure 4: The National Web-Based Environmental Screening Tool map of the PAOI, indicating sensitivities for the Terrestrial Animal Species theme. The High sensitivity classification is linked to Lanner Falcon *Falco biarmicus* and Ludwig’s Bustard *Neotis ludwigii*. The Medium sensitivity classification is linked to Tawny Eagle *Aquila rapax*.

Please see Appendix 3 for the Site Sensitivity Verification report.

6.3 Protected Areas

The project site does not fall within a formally protected area.

³ Note that the Avian theme for PV in the Screening Tool is incorrect, as it displays the sensitivities for bats, and not birds.

6.4 Biomes and vegetation types

The PAOI falls within the Nama Karoo Biome (Mucina & Rutherford 2006), but the vegetation on site is an ecotone between Karoo and Savanna. The vegetation in the PAOI can be described as shrubland dominated by *Rhigozum trichotomum* (Driedoring) and a well-developed grassy layer. *Senegalia mellifera* (Swarthaak) dominates along drainage lines and forms large shrubs and small trees. The topography in the PAOI is flat, but mountainous terrain is present towards the west and south of the PAOI. The average annual rainfall in the Prieska area is ~200 mm with most rain falling from February to April (Mucina & Rutherford 2006). Temperatures range from an average daytime high of about 35° Celsius in January to about 19° Celsius in June/July (<https://www.meteoblue.com/>).

Whilst the distribution and abundance of bird species in the development area are typical of the broad vegetation type, it is also necessary to examine bird habitats in more detail as it may influence the distribution and behaviour of priority species. These are discussed in more detail below.

The priority species most likely associated with the various bird habitat features are listed in Table 2 and Section 6.5 below.

6.5 Bird Habitat

6.5.1 Grassland/shrub

See description in 6.4 above. The priority species (PV and powerline) with a medium to high probability of occurring in the PAOI which could use this habitat are the following:

- Lappet-faced Vulture
- White-backed Vulture
- Abdim's Stork
- Black-headed Heron
- Black-winged Kite
- Common Buzzard
- Jackal Buzzard
- Karoo Korhaan
- Kori Bustard
- Lanner Falcon
- Ludwig's Bustard
- Pale Chanting Goshawk
- Pygmy Falcon
- Rock Kestrel
- Verreaux's Eagle
- Western Barn Owl
- Western Cattle Egret
- Yellow-billed Kite
- Hadada Ibis
- Helmeted Guineafowl
- Northern Black Korhaan
- Pied Crow
- Red-crested Korhaan

6.5.2 Woodland

The drainage lines in the PAOI are characterised by dense clumps of *Senegalia mellifera* (Swarthaak) shrubs and low trees in the riparian zone, giving a distinct woodland character to the vegetation. The priority species (PV and powerline) with a medium to high probability of occurring in the PAOI which could use this habitat are the following:

- Pale Chanting Goshawk
- Pygmy Falcon
- Spotted Eagle-Owl
- Hadada Ibis
- Helmeted Guineafowl
- Pied Crow
- Red-crested Korhaan
- Fairy Flycatcher
- Fiscal Flycatcher
- Karoo Thrush
- Layard's Warbler
- Namaqua Warbler
- Pearl-spotted Owlet
- Lappet-faced Vulture
- White-backed Vulture

6.5.3 Drainage Lines

The PAOI contains some ephemeral drainage lines which flow for brief periods after good rains. There is a relatively large ephemeral drainage line located in the northern half of the PAOI. The priority species (PV and powerline) with a medium to high probability of occurring in the PAOI which could use this habitat are the following:

- Abdim's Stork
- Black-headed Heron
- Booted Eagle
- Common Buzzard
- Egyptian Goose
- Jackal Buzzard
- Lanner Falcon
- Pale Chanting Goshawk
- South African Shelduck
- Verreaux's Eagle
- Western Cattle Egret
- Hadada Ibis
- Helmeted Guineafowl
- Pied Crow
- Lappet-faced Vulture
- White-backed Vulture

6.5.4 Agriculture – Irrigated Fields

The northern section of the PAOI contain several irrigated fields (crops) that could attract foraging priority species to the area. The priority species (PV and powerline) with a medium to high probability of occurring in the PAOI which could use this habitat are the following:

- Abdim's Stork
- Black-headed Heron
- Black-winged Kite
- Common Buzzard
- Egyptian Goose
- Jackal Buzzard
- Kori Bustard
- Lanner Falcon
- Ludwig's Bustard
- Spotted Eagle-Owl
- Western Cattle Egret
- Hadada Ibis
- Helmeted Guineafowl
- Pied Crow

See Appendix 2 for photographic record of habitat features in the development area and immediate surroundings.

7 AVIFAUNA IN THE PAOI

7.1 South African Bird Atlas Project 2

The SABAP2 data, combined with the results of the pre-construction monitoring surveys, indicate that a total of 179 bird species could potentially occur within the broader area – Appendix 1 provides a comprehensive list of all the species. Of these, 60 species are classified as solar priority species and 50 as powerline sensitive species (see definition of priority species in Section 4). Nine (9) of these are South African Red List species. Of the solar priority species, 26 are likely to occur at the development area regularly. Of the powerline sensitive species, 25 are likely to occur at the development area regularly (Table 2).

Table 2 below lists all the priority species that are likely to occur **regularly** and the possible impacts on the respective species by the proposed solar energy and powerline infrastructure. The following abbreviations and acronyms are used:

- NT = Near threatened
- VU = Vulnerable
- EN = Endangered

7.1 Pre-construction surveys

Two pre-construction avifaunal surveys were conducted at the proposed project site. The surveys were conducted from 02 to 03 May 2022 and 11 to 12 September 2022. An Index of Kilometric Abundance (IKA = birds/km) was calculated for priority and non-priority species recorded during the drive transects. The results are presented in Figure 5 and Figure 6.

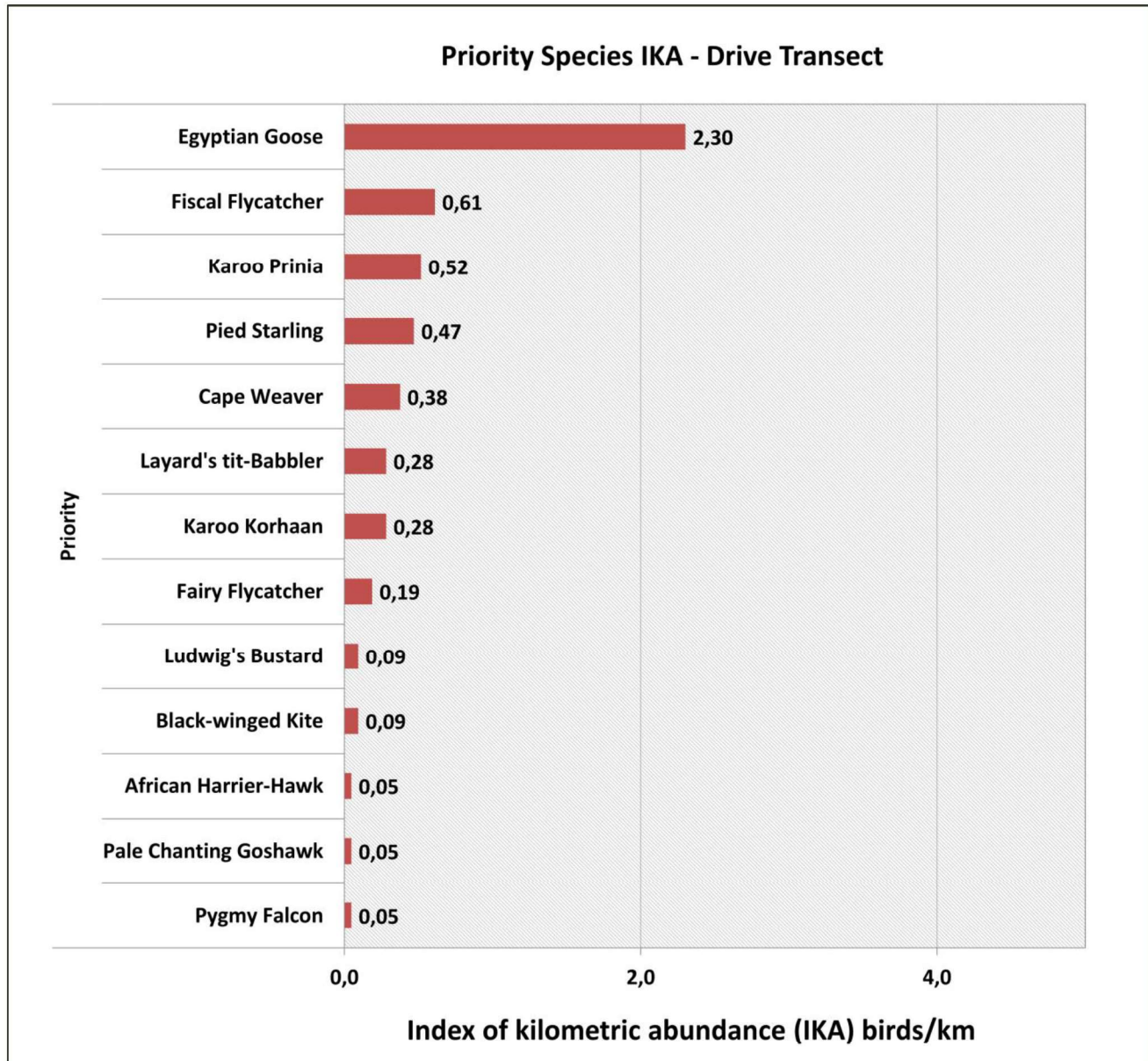


Figure 5: Index of kilometric abundance (IKA) for all priority species recorded by means of drive transects during the monitoring surveys in the development area.

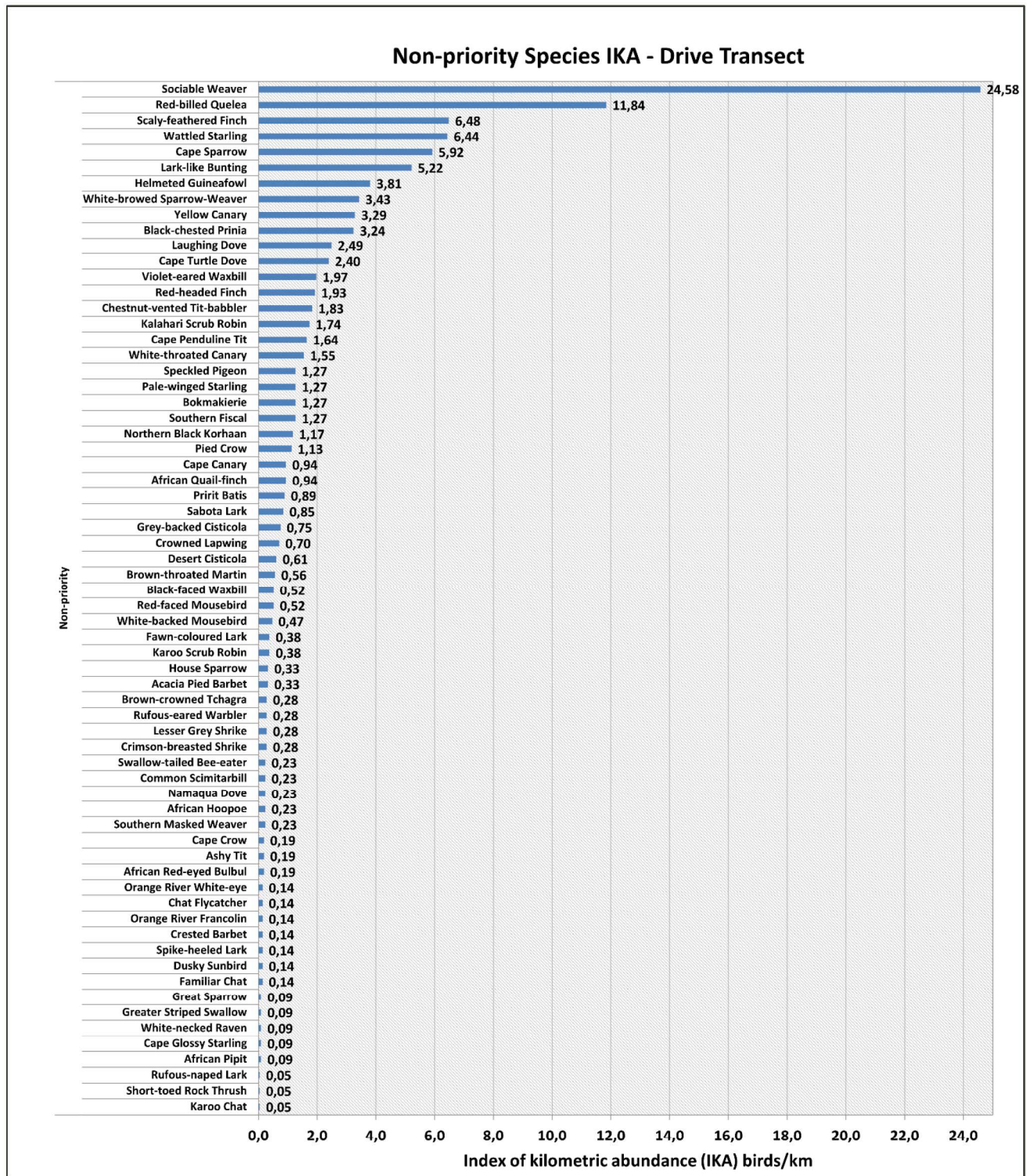


Figure 6: Index of kilometric abundance (IKA) for all non-priority species recorded by means of drive transects during the monitoring surveys in the development area.

The species count and composition data for the drive transects conducted during the two monitoring surveys are presented in Table 3 below:

Table 3: Drive transect species count and composition results

Species composition	Count
All Species	79
Priority Species	13 (16%)