# PROPOSED ROODE PAN 150 -20 MW PHOTOVOLTAIC SOLAR ENERGY FACILITY-AVIFAUNAL SPECIALIST STUDY-SCOPING PHASE

JULY 2018

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## Professional registration and experience

The Natural Scientific Professions Act of 2003 aims to "Provide for the establishment of the South African Council of Natural Scientific Professions (SACNASP) and for the registration of professional, candidate and certified natural scientists; and to provide for matters connected therewith." "Only a registered person may practice in a consulting capacity" – Natural Scientific Professions Act of 2003 (20(1)-pg 14)

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## Declaration of independence

The specialist investigators declare that:

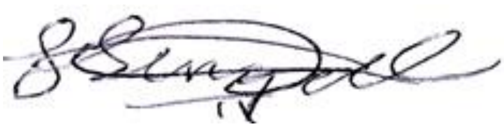
- We act as independent specialists for this project.
- We consider ourselves bound by the rules and ethics of the South African Council for Natural Scientific Professions.
- We do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2006.
- We will not be affected by the outcome of the environmental process, of which this report forms part of.
- We do not have any influence over the decisions made by the governing authorities.
- We do not object to or endorse the proposed developments, but aim to present facts and our best scientific and professional opinion with regard to the impacts of the development.
- We undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2006.

## Terms and Liabilities

- This report is based on a short term investigation using the available information and data related to the site to be affected. No long term investigation or monitoring was conducted.
- The Precautionary Principle has been applied throughout this investigation.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist investigator reserves the right to amend this report, recommendations and conclusions at any stage should additional information become available, particularly from Interested and Affected Parties.

- Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist investigator as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

Signed on the 31st July 2018by Luke Strugnell in his capacity as specialist investigator.



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## EXECUTIVE SUMMARY

Ecocompliance was appointed by Solar Capital Pty Ltd (herein referred to as Solar Capital) as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed photovoltaic solar energy facility (PVSEF) and associated infrastructure located on Portion of Farm Roode Pan 150. The site is located approximately 2km from Orania town in the Northern Cape Province. Ecological Logistics was appointed to conduct an avifaunal scoping report by Ecocompliance.

The proposed project is envisaged to make use of the photovoltaic (PV) technology with a maximum output of approximately 20MW which will be connected to the existing Orania Substation located approximately 2km from the site boundary. The study area is located within the jurisdiction of the Pixley ka Seme District Municipality and Thembelihle Local Municipality.

The western border of the study site is in close proximity to the R369 connecting Hopetown and Petrusville (see locality Map). The study area is considered to be highly desirable for the establishment of a solar facility based on several key factors such as solar resource, climatic conditions, extent of the site, orographic conditions, availability of land, and the site's close proximity to Orania, Hopetown and Petrusville as a potential labour source. A 75kV overhead power line will be used to evacuate power from the facility directly into the Eskom electricity network, however that will be subject to a separate EIA process.

A broader study area of approximately **2467ha** is being considered within which the facility is to be constructed, although the actual development footprint of the proposed facility would be smaller in extent, depending on the findings of the specialist**.** Therefore, the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid any identified environmental sensitivities.

The overall aim of the design and layout of the facility is to maximise electricity production through exposure to the solar radiation, while minimising infrastructure, operation and maintenance costs, and social and environmental impacts. The use of solar energy for power generation can be described as a non-consumptive use of natural resources which emits zero greenhouse gas emissions. The generation of renewable energy contributes to South Africa's electricity generating market which has been dominated by coal-based power generation.

Typically a development of this type could be expected to impact on birds through destruction and alteration of habitat, disturbance of birds and barrier effects, collision of birds with panels and other solar infrastructure, collision and electrocution on associated overhead power lines, nesting on or other utilisation of infrastructure, and altered runoff patterns.

The results of this scoping study have revealed that impact on avifauna is certainly possible in this project. The fact that the site is located adjacent to an IBA means that mitigation will be required to reduce the impact of the project to acceptable levels on avifauna. This study was tricky to complete since no site visit was done. It is therefore imperative that a site specific avifaunal walk down be completed to give further input into the operational EMP and to provide input into the micro-sighting of the PV panels and other infrastructure. If this is done the impacts can be mitigated to acceptable levels.

# 1. INTRODUCTION

Ecocompliance was appointed by Solar Capital Pty Ltd (herein referred to as Solar Capital) as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed photovoltaic solar energy facility (PVSEF) and associated infrastructure located on Portion of Farm Roode Pan 150. The site is located approximately 2km from Orania town in the Northern Cape Province. Ecological Logistics was appointed to conduct an avifaunal scoping report by Ecocompliance.

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All of these impacts will be assessed and discussed further in this report.

## 1.1. Terms of reference

The following impacts need to be assessed in this study.

1. Habitat Destruction caused by the construction of the PVSEF
2. Foraging and Breeding areas impacted on by the PVSEF
3. Types of Birds that maybe present in the area and the impact on these species

### 1.2. Assumptions and Limitations

This study made the assumption that the sources of information discussed below are reliable, but the following factors may potentially detract from the accuracy of the predicted results.

- The Atlas of Southern African Birds (Harrison et al. 1997) data is quite old now (covering the period 1986-1997), and bird distribution patterns fluctuate continuously according to availability of food and nesting substrate, and environmental conditions. While SABAP 2 data were used this is not yet complete. Various other inaccuracies could exist in this atlas data; for a full discussion of these see Harrison et al. (1997).
- Our experience to date of the interactions between birds and solar energy in SA is limited, since the findings of operational phase bird monitoring at built solar facilities in SA are not yet widely available. We therefore need to draw what we can from international experience, and then adapt that knowledge to local circumstances. This study was conducted at a time of significant uncertainty with regard to the impact of solar facilities on birds. Several large facilities have recently been constructed in the USA, and information emerging shows that bird impacts may be considerable, but the mechanisms of these impacts are not yet fully understood. In South Africa a number of solar facilities have already been authorized and built, with relatively little attention given to the impacts on birds. There is a need for this to change, and the BirdLife South Africa best practice guidelines are likely to recommend considerably more thorough study of these issues at proposed sites.
- This study is a desktop study only as requested by Ecocompliance. Therefore, no first hand data collection was possible. This is not ideal and as such a precautious approach has been followed below.

### 1.3. Information sources

The following data sources and reports were used in varying levels of detail for this study:

- Bird distribution data from the South African Bird Atlas Projects 1 and 2 (SABAP 1 and SABAP 2) were obtained to ascertain which bird species occur in the study area (Harrison *et al.* 1997, SABAP 2 2013).
- The conservation status of all bird species occurring in the study area was determined using The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor, 2014).
- International literature on avian interactions with solar energy facilities.
- The Important Bird Area (IBA) programme of Birdlife South Africa was consulted.
- The Birdlife South Africa guidelines (Smit, *et al*, 2012) were used as a basis for the project design. Note that these guidelines are undergoing a revision at the time of writing this report.
- The vegetation of the study area was assessed in terms of bird habitat (Bredenkamp, G., Granger, J.E. & van Rooyen, N. 1996).

## 2. APPROACH AND METHODOLOGY

This study followed the following broad approach:

- A literature review was completed and the general discussion on solar energy and avifauna is presented below.
- The various data sets listed in Section 1.3 above were obtained and examined.
- The potential impacts of the proposed facility were identified and discussed.
- Lastly, due to the uncertainty around the likelihood of impacts of the proposed development on relevant bird species, a cautious approach to the development of recommendations has been taken.

### 2.1. Background to interactions between solar energy facilities and birds

As there are many similarities, the information for Concentrated Solar Power (CSP) will be used to help understand Photovoltaic (PV) solar plants and relevant differences will be highlighted where applicable.

An important paper entitled "Avian mortality at a solar energy power plant" (McCrary, McKernan, Schreiber, Wagner & Sciarrotta 1986) describes the results of these authors' weekly monitoring over a two year period at Solar One, a concentrating solar power plant in California. The main results of this study are summarized below:

- Forty visits (one week apart) to the facility over a two year period revealed 70 bird carcasses involving 26 species. It was estimated that between 10 and 30% of carcasses were removed by scavengers in between visits, so the actual number of mortalities may have been slightly higher. It is important to note that extensive agricultural lands and evaporation ponds (53ha) were situated adjacent to the facility, which probably resulted in a higher abundance of many bird species than would otherwise have been the case.
- Fifty seven (81%) of the birds died through collision with infrastructure, mostly (>75%) colliding with the heliostats. Species killed in this manner included water birds, small raptors, gulls, doves, sparrows and warblers.
- Thirteen (19%) of the birds died through burning in the standby points (points in mid-air where subsets of mirrors are focused onto before focusing onto the central receiver – unique to CSP technology). Species killed in this manner were mostly swallows and swifts.

Although the current proposed facility at Orania is a photovoltaic (PV) facility, many of the principles of bird interaction with CSP and these technologies are similar. For example, whilst CSP consists of an array of mirrors or heliostats, PV consists of an array of PV panels – but both forms of panels could be mistaken by birds for water sources, or attract birds closer (the so called 'lake' effect), or be collision risks in a similar manner to the windows of buildings. The main difference in bird terms are the standby or focal points involved with the CSP technology, which are not present in a PV project.

In addition to the above mentioned study some additional information was found relating to the Ivanpah Solar Electric Generating System, in California. Avian monitoring surveys were conducted at this facility from 29th

October 2013 to 21st March 2014 in accordance with the facilities Avian and Bat Monitoring and Management Plan (Harvey and Associates, 2014).

During this monitoring effort the following was found:

- A total of 91 avian fatalities and 5 injured birds were recorded.( With respect to foraging guilds, obligate and facultative granivores (i.e., birds that eat seeds most or all of the time) accounted for 43.8% of all detections, followed by insectivores (16.7%), carnivores (14.6%), nectarivores (10.4%), and waterbirds (4.2%).
- Of these, 24 fatalities and 3 injured birds, showed signs of flux (Damage caused by the concentrated solar energy on a CSP) damage.
- Evidence of collision from the heliostats was observed in the case of 14 detections (14.6%).
- The cause of the remaining injury or mortality (57.3%) could not be confirmed.
- Overall the estimated number of fatalities from the project and non-project related causes for the period of 29th October 2013 to 21 March 2014 comes to 401 (or 80 estimated bird mortalities per month).
- Subsequent monitoring for two months in April and May 2014 yielded mortality figures of 101 and 82 birds respectively.

The following species were affected in the above study (Harvey and Associates, 2014).

| Common Name | Scientific Name | Species Code* | No. of Injuries | No. of Fatalities |
|---|---|---|---|---|
| **Birds** | | | | |
| Mourning Dove | *Zenaida macroura* | MODO | | 19 |
| Unidentifiable feather spot | | UNKN | | 8 |
| Yellow-rumped Warbler | *Setophaga coronata* | YRWA | | 8 |
| Anna's Hummingbird | *Calypte anna* | ANHU | | 7 |
| Greater Roadrunner | *Geococcyx californianus* | GRRO | | 6 |
| American Kestrel | *Falco sparverius* | AMKE | | 4 |
| Brewer's Blackbird | *Euphagus cyanocephalus* | BRBL | | 4 |
| Western Meadowlark | *Sturnella neglecta* | WEME | | 3 |
| American Pipit | *Anthus rubescens* | AMPI | | 3 |
| Costa's Hummingbird | *Calypte costae* | COHU | | 3 |
| Great-tailed Grackle | *Quiscalus mexicanus* | GTGR | 1 | 3 |
| American Coot | *Fulica americana* | AMCO | | 2 |
| Unknown Blackbird | | Blackbird sp. | | 2 |
| House Finch | *Haemorhous mexicanus* | HOFI | | 2 |
| Northern Flicker | *Colaptes auratus* | NOFL | | 2 |
| Rock Pigeon | *Columba livia* | ROPI | | 2 |
| Black-and-white Warbler | *Mniotilta varia* | BWWA | | 1 |
| Black-throated Sparrow | *Amphispiza bilineata* | BTSP | | 1 |
| Cactus Wren | *Campylorhynchus brunneicapillus* | CACW | | 1 |
| Common Yellowthroat | *Geothlypis trichas* | COYE | | 1 |
| Horned Lark | *Eremophila alpestris* | HOLA | | 1 |
| Loggerhead Shrike | *Lanius ludovicianus* | LOSH | | 1 |
| Savannah Sparrow | *Passerculus sandwichensis* | SASP | | 1 |
| Say's Phoebe | *Sayornis saya* | SAPH | | 1 |
| Spotted Sandpiper | *Actitis macularius* | SPSA | | 1 |

| | | | | |
|---|---|---|---|---|
| Townsend's Warbler | *Setophaga townsendi* | TOWA | | 1 |
| Western Tanager | *Piranga ludoviciana* | WETA | | 1 |
| White-crowned Sparrow | *Zonotrichia leucophrys* | WCSP | | 1 |
| White-throated Swift | *Aeronautes saxatalis* | WTSW | | 1 |
| Common Loon | *Gavia immer* | COLO | 1 | |
| Common Raven | *Corvus corax* | CORA | 2 | |
| Double-crested Cormorant | *Phalacrocorax auritus* | DCCO | 1 | |

As can be seen above the most commonly affected species was the Mourning Dove, followed by Yellow-rumped Warbler. Anna's Hummingbird, Greater Roadrunner and American Kestrel were also impacted along with the rest of the species presented in the above table. While this information from the USA is of limited use in South Africa, it does help us to understand the bird families affected and give us a starting point on what type of birds seem to be affected by solar energy facilities.

Smallwood (2014) testified at the California Energy Commission on the bird impact at Ivanpah and based on the above information he calculated the annual mortality at Ivanpah to be potentially as high as 28 380 birds per annum, once scavenger removal and detection biases were accounted for.

In quarterly reports of the California Valley Solar Ranch (Harvey & Associates, 2014a and 2014b), 152 avian mortalities were reported for the period of 16$^{th}$ November 2013- 15$^{th}$ February 2014 and 54 for the period 16$^{th}$ February 2014-15$^{th}$ May 2014. Of these 90% were based on feather spots and as such no indication of cause of death could be found. These figures give an unadjusted (for searcher efficiency and scavenger removal) number of 1 030 mortalities per year. This is a likely underestimate due to the lack of adjustment for searcher efficiency and scavenger removal.

A recent comprehensive review of the impact of sheet glass and avian mortalities in the USA estimated between 365 and 988 million birds killed annually by collisions (Loss *et al,* 2014). It is therefore safe to assume that PV panels could pose a similar risk to avifauna in South Africa.

In addition to the above the so called "lake effect", whereby the solar panels of PV facilities attract birds to the site when they mistakenly identify it as a water body, could result in birds colliding with the panels or getting stranded on site as many water birds cannot take off from dry land. This would result in them being victims of predation. The unusually high number of water bird mortalities at the Desert Sunlight PV facility (44%) seems to support this hypothesis (Kagan, *et al*, 2014).

In terms of the Orania site the above information shows the varied amount of mortalities for different sites. There is the potential for the solar development to kill large numbers of birds, this will be dealt with in detail below.

**Collision and electrocution of birds on overhead power lines**

Infrastructure associated with solar energy facilities also has the potential to impact on birds, in some cases perhaps more than the solar facilities themselves. Overhead power lines pose a collision and possibly an electrocution threat to certain bird species (depending on the pole top configuration). Furthermore, the construction and maintenance of the power lines will result in some disturbance and habitat destruction. New access roads, substations and offices constructed will also have a disturbance and habitat destruction impact.

Collision with power lines is one of the biggest single threats facing birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001). Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. The Red data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions.

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). The larger bird species are most affected since they are most capable of bridging critical clearances on hardware. Examples of these larger birds that occur in the study area would be the two vulture species.

Although powerline infrastructure is not in the scope of this project it is important to highlight the risk and as such the above information is presented.

**Electrocution of birds on substations or switching stations**

Similarly to above, birds are vulnerable to electrocution in substations on the infrastructure. Species likely to frequent these areas are typically the less sensitive, non-threatened species such as crows.

**Disturbance of birds and displacement effects**

Construction of a facility of this nature requires a significant amount of machinery and labour to be present on site for a period of time. For the more shy, sensitive species this is likely to disturb them and displace them from the area at least temporarily. In addition, species commuting around the area may avoid the site once operational and fly longer distances than usual as a result. For some species this may have critical energy implications.

In a USA study of the Ivanpah solar plant, avian point count surveys were conducted at 80 survey points, including 40 points in the heliostat array and 40 points in the desert habitat surrounding the solar facility. Estimated avian densities were 2.1 birds/hectare in the heliostat units and 10.2 birds/hectare in the desert habitat. This clearly shows that the transformed habitat under the solar arrays is not as preferred by avifauna as the surrounding desert habitat. (Harvey, *et al,* 2014).

In a further study comparing solar PV facilities with managed grasslands of airports in the USA, DeVault *et al.* (2014) found that the species diversity in the PV arrays was reduced compared to the grasslands (37 vs 46). This supports the view that solar development will have an impact on avifauna abundance on a local scale.

**Habitat destruction**

During the construction of a facility such as that proposed, it is inevitable that a certain amount of natural vegetation is removed or altered. This reduces the amount of habitat available to birds for feeding, roosting and breeding. As discussed above in this study, this may be most important for smaller species with small territories in the case of this facility, since their entire territory may be removed. This is also critically important for species already under habitat pressure. Observation of constructed PV facilities elsewhere in SA has shown that habitat destruction on site is practically 100%, since the vegetation is fully removed, and seemingly maintained in that state (perhaps to lower fire risk).

### Nesting and other utilization of facility by birds

Various bird species are relatively quick to seize a new opportunity for perching, roosting or nesting. In this landscape this is particularly relevant as it is so devoid of tall trees. It is likely then that birds will use certain parts of the proposed facility once commissioned. Whilst this could be viewed as a positive impact for birds, it typically creates operational problems for the facility, which require management actions such as nest management.

It is likely that some small species will us the PV panels for shade and this will create a new microhabitat on the site. This should not adversely affect the operation of the equipment however and should also not lead to direct mortalities by these small species.

### Altered runoff patterns

This interaction is a little speculative, as no information in this regard exists at this stage. However, it is likely that altering the nature of the sites surface from natural vegetation to infrastructure, roads, gravel, and possible paving – will alter the way in which water moves on the site after rainfall. If this is not carefully managed this could cause soil erosion and thereby alter even more bird habitat than necessary. Increased runoff could also create moister conditions on or near the site thereby attracting more birds to the area and increasing the likelihood of other impacts.

### Waste water treatment works

The direct mortality impacts of collision with and electrocution on infrastructure, mentioned above, are likely to be more significant if high numbers of birds frequent the site. In order for this to happen there needs to be an attractant, and in this semi-arid region there is no better attractant than surface water. If any water works are built on the site, this may need to be managed carefully to restrict bird access to the water.

## 2.2. Description of the proposed PVSEF

Infrastructure associated with the facility will include:

- Photovoltaic solar panels with a generating capacity of 75MW
- Foundations to support the PV panels;
- An on-site substation, with a direct link to the existing Orania Substation via an overhead powerline (subject to a separate EIA process)
- Cabling between the project components, to be laid underground where practical;
- Internal access roads; and
- Workshop area for maintenance and storage.

A map showing the general area is presented below in Figure 1.

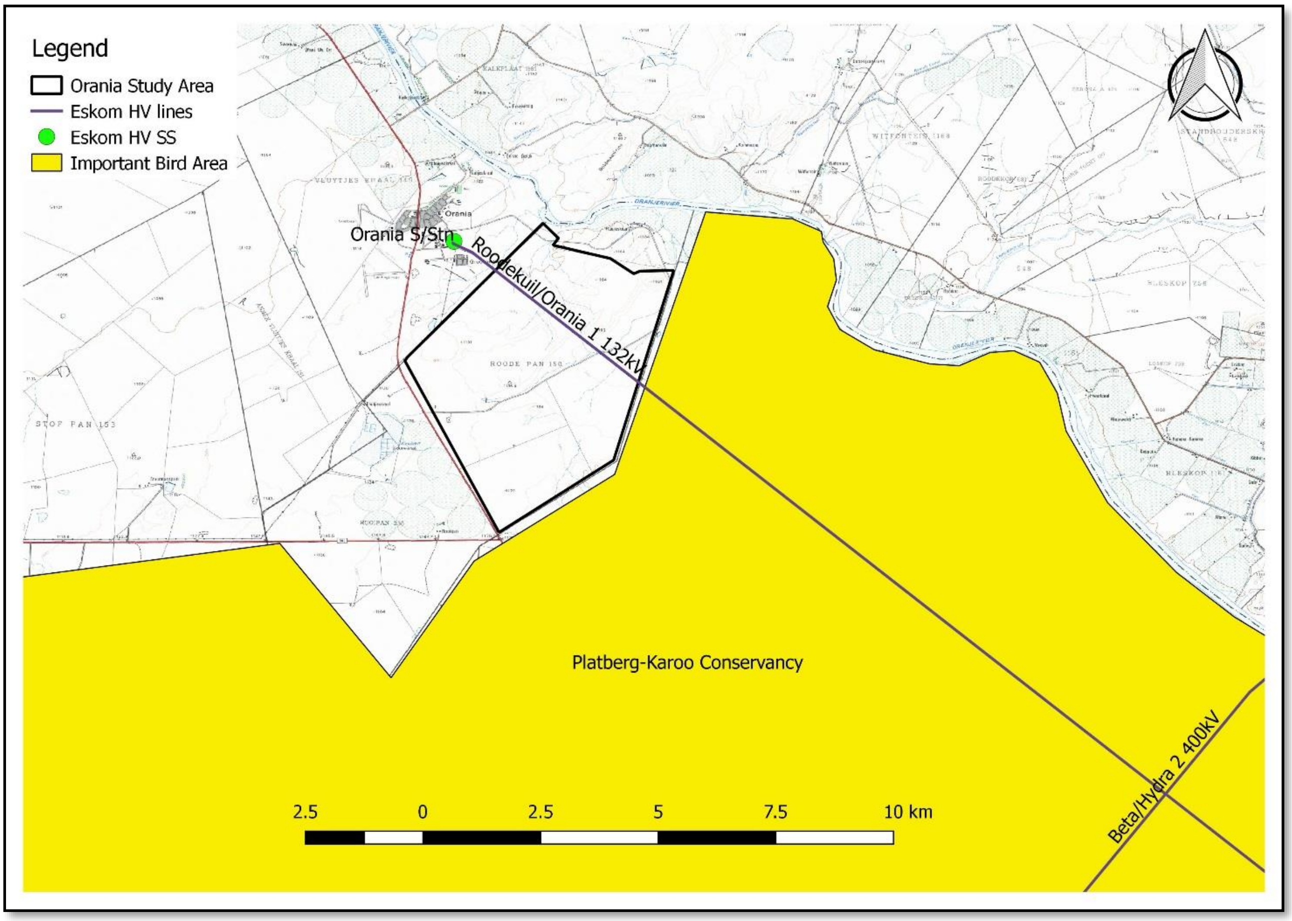


**Figure 1-** General Overview of the proposed PVSEF energy facility.

## 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

### 3.1. Vegetation of the study area

While this report is an avifaunal specialist report, vegetation and micro habitats are also extremely important in determining avifaunal abundances and likelihood of occurrences and generally characterizing the site. The study area falls into various different vegetation types as presented below in Figure 2.

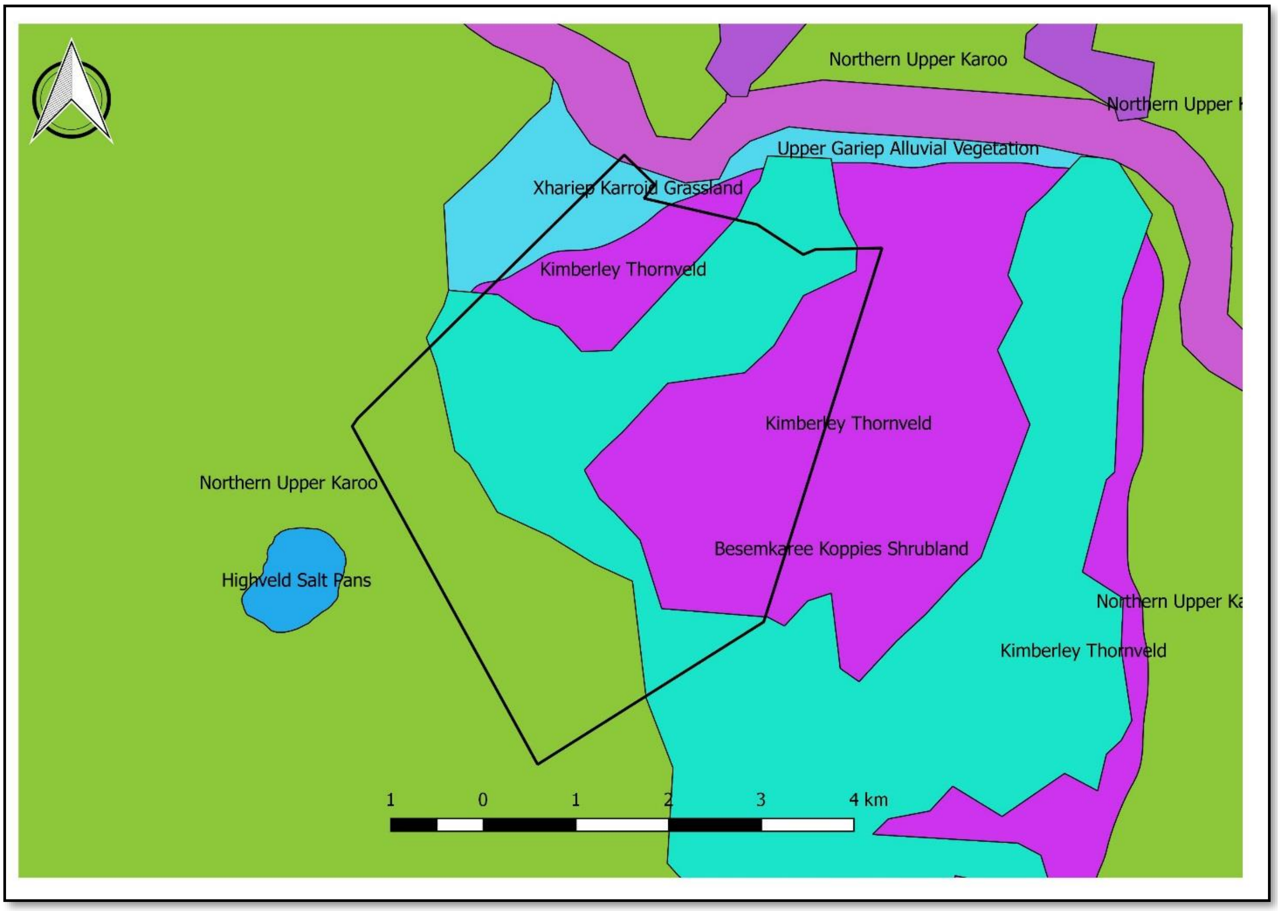


**Figure 2-** Vegetation map of the PVSEF site.

As can be seen the vegetation is predominantly grassland and shrubland as would be expected in this area of the country. There is some Karoo vegetation on the western side and north eastern side of the site and this will be important as Karoo bird species may occur on the study site. The highveld salt pans to the west of the site are also important for certain bird species. The most sensitive area would be around the Orange river to the north and east of the site as this would be very attractive habitat for birds.

### 3.2. Bird micro habitats

Although no site visit has been done certain micro-habitats are clearly visible from Google Earth.

The most sensitive of these would be the Orange river area and associated riverine vegetation. This would be a very attractive micro-habitat to avifauna. A wide variety of species would use this riverine habitat. Of importance the river and associated habitat would also be an attractant for avifauna causing them to fly over the site to reach it. This is important for our findings below.

In addition to the river, the large number of centre pivot irrigated fields would be the next most sensitive and attractive habitat for avifauna. Many bird species use agricultural lands (especially if irrigated) as habitat and once again the fact that these occur all around the site would mean there would be a lot of flight activity between the various fields.

There is also evidence of salt pans on and near site and once again these will be an attractive habitat for avifauna, especially should they contain water during the rainy season.

### 3.3. Bird presence in the study area

The bird presence in the study area was assessed using the following data sources:

#### 3.3.1. SABAP1 and SABAP2 data

The first Southern African Bird Atlas Project (SABAP 1 – Harrison *et al*. 1997) and the second atlas project (SABAP 2 – www.sabap2.adu.org.za) recorded 265 birds occurring in the study area. The full combined list is available in Appendix 1. Of these 265 species 22 are Red data species. Of the 22 Red data species 8 are listed as regionally Endangered, 6 are regionally Vulnerable and 8 are regionally Near threatened (Taylor, 2014). The list of Red data bird species recorded in the study area by SABAP1 and 2 is presented below in Table 1:

**Table 1-**Red data bird species from combined SABAP 1 and 2 data. EN= Endangered, VU= Vulnerable, NT= Near Threatened. Red data status from Taylor, 2014.

| **Common Name** | | ***Taxonomic Name*** | **Regional status** | **Preferred micro-habitat** | **Likelihood of occurrence on site** |
|---|---|---|---|---|---|
| Black | Harrier | *Circus maurus* | EN | Dry grassland, Karoo scrub and agricultural fields | Possible |
| Cape | Vulture | *Gyps coprotheres* | EN | Wide range of habitats, follows food availability | Possible |
| Lappet-faced | Vulture | *Torgos tracheliotus* | EN | Open woodland in arid and semi arid regions | Unlikely |
| Ludwig's | Bustard | *Neotis ludwigii* | EN | Semi-arid dwarf shrubland of succulent Karoo, Nama Karoo and Namib | Possible |
| Martial | Eagle | *Polemaetus bellicosus* | EN | Open woodland in flat country | Possible |
| Tawny | Eagle | *Aquila rapax* | EN | Lightly wooded savanna | Possible |
| White-backed | Vulture | *Gyps africanus* | EN | Lightly wooded arid savanna | Possible |
| Yellow-billed | Stork | *Mycteria ibis* | EN | Wetlands, rivers, dams, pans, flood plains, marshes, small pools | Possible |
| Black | Stork | *Ciconia nigra* | VU | Dams, pans, flood plains, shallows of rivers, etc | Possible |
| Caspian | Tern | *Sterna caspia* | VU | Large water bodies, prefers saline pans | Unlikely |
| Lanner | Falcon | *Falco biarmicus* | VU | Open grassland and open woodland and agricultural areas | Possible |
| Secretarybird | Secretarybird | *Sagittarius serpentarius* | VU | Open grassland with scattered trees | Possible |
| Southern Black | Korhaan | *Afrotis afra* | VU | Renosterveld and strandveld, also Karoo | Unlikely |
| Verreaux's | Eagle | *Aquila verreauxii* | VU | Mountainous and rocky areas with cliffs | Unlikely |
| Abdim's | Stork | *Ciconia abdimii* | NT | Grassland, savanna woodland, pan edges, pastures and cultivated land | Possible |

| | | | | | |
|---|---|---|---|---|---|
| Agulhas Long-billed | Lark | *Certhilauda brevirostris* | NT | Fallow and recently ploughed fields, sparse shrubland | Possible |
| Blue | Crane | *Anthropoides paradiseus* | NT | Open grassland, agricultural fields | Possible |
| European | Roller | *Coracias garrulus* | NT | Savanna, Acacia woodlands | Possible |
| Greater | Flamingo | *Phoenicopterus ruber* | NT | Large Eutrophic shallow saltpans, sewerage works | Possible |
| Karoo | Korhaan | *Eupodotis vigorsii* | NT | Dwarf shrubland of succulent Karoo. Stony ground, fallow fields | Possible |
| Kori | Bustard | *Ardeotis kori* | NT | Dry open savanna, dry grassy pan edges, occasionally dense woodlands | Possible |
| Lesser | Flamingo | *Phoenicopterus minor* | NT | Open eutrophic shallow wetlands and saltpans, sewerage works and saltworks | Possible |

The species presented in Table 1 can be classified into the following ecological groups: raptors (eagles, harriers falcons, vultures); large terrestrials (cranes, storks, bustards, korhaans, Secetarybird, flamingoes); small passerines (larks, pipits).

Almost all of the above Red data species could potentially occur on the site.

### 3.3.2. Important Bird Areas (IBA).

The proposed site falls adjacent to an IBA (IBA SA037), as can be seen in Figure 1 above.

This IBA is the Platberg–Karoo Conservancy and it covers the entire districts of De Aar, Philipstown and Hanover, including suburban towns. This IBA is 1 246 330 ha in extent.

The following information relates to the birds in this IBA: "*This IBA contributes significantly to the conservation of large terrestrial birds and raptors. These include Blue Crane* Anthropoides paradiseus*, Ludwig's Bustard* Neotis ludwigii*, Kori Bustard* Ardeotis kori*, Blue Korhaan* Eupodotis caerulescens*, Black Stork* Ciconia nigra*, Secretarybird* Sagittarius serpentarius*, Martial Eagle* Polemaetus bellicosus*, Verreauxs' Eagle* Aquila verreauxii *and Tawny Eagle* A. rapax*.*

*A total of 289 bird species are known to occur here. At the time of the IBA's assessment, its 214 pentads had been poorly atlased for SABAP2.*

*Blue Crane numbers appear to be stable (R Visagie pers. comm., Camina 2014). The population size of Ludwig's Bustard in the eastern Karoo appears to be slightly higher than the first estimates (Jenkins et al. 2011, Shaw 2013). There is some evidence for a decrease in the populations of Blue Korhaan and Karoo Korhaan* Eupodotis vigorsii*.*

*In summer, close to 10% of the global population of Lesser Kestrels* Falco naumanni *roost in this IBA. Amur Falcons* F. amurensis *are also abundant and forage and roost with Lesser Kestrels. This IBA is seasonally important for White Stork* Ciconia ciconia*, and CARs indicate high numbers of this species during outbreaks of brown locusts* Locustana pardalina *and armoured ground crickets* Acanthoplus discoidalis." (Birdlife SA, 2015).

Of particular interest is the threats listed in this IBA with reference to renewable energy: "*Renewable energy developments are a new threat. Thirteen wind and solar developments have been approved for development within this IBA. All the large trigger species are highly susceptible to collisions with wind turbines, as are large flocks of Lesser Kestrels and Amur Falcons. All the trigger species are predicted to be moderately susceptible to the various impacts of solar-energy facilities.*

*Numerous existing and new power lines are significant threats to trigger species. Power lines kill substantial numbers of all large terrestrial bird species in the Karoo, including threatened species (Jenkins et al. 2011, Shaw 2013). The planned Eskom central corridor for future power-line developments includes the northern half of this IBA. There is currently no completely effective mitigation method to prevent collisions*." (Birdlife SA, 2015).

While the study site does not fall within this IBA, being adjacent to it means that care should be taken to mitigate any impacts associated with the project.

Although this impact assessment focuses on Red data species, the non-Red data species are also taken into account, albeit in less detail. An argument could be made that if the non-threatened species are not adequately considered in impact assessment they may make it onto the Red data list with time. Whilst this view holds merit, it is simply not feasible to give all species the same attention, priority must be given to those already threatened. Further, it is believed that the above Red data species are in many cases good surrogates for a suite of more common species. Mitigation efforts focused on the Red data species will therefore assist in mitigating impacts on the common species too.

## 4. IDENTIFICATION OF POTENTIAL IMPACTS

### 4.1. Identification of impacts

The various potential impacts that could occur as a result of the proposed facility have been identified and discussed below.

#### 4.1.1. Direct impacts on species

**Collision and electrocution of birds on overhead power line**

From the technical details that are available at this stage of the project it would seem as if very minimal additional overhead cabling will be required. This is very advantageous for avifauna considering it is one of the highest risk aspects of a project such as this. As such this impact is not discussed further and no quantification of this impact has been done. If the details of the project change a suitably qualified avifaunal specialist must re-assess this impact.

**Electrocution of birds in substations/switching stations**

This impact is possible, but is likely to be of low significance, as threatened species are less likely to frequent these areas. Mitigation is complex at these structures since there are many ways in which birds could get electrocuted. It is therefore recommended that mitigation be applied reactively once the site is operational, only if a problem is detected.

**Disturbance of birds and barrier effects**

The disturbance of avifauna during the construction (and thereafter during maintenance and operation) of the facility and associated infrastructure is likely to occur. Disturbance could also contribute to a habitat fragmentation effect during the operational phase of this project, since certain bird species will be displaced from the site, and forced to find alternative territories. This could be particularly relevant for small species whose entire territory may be taken up by the development.

The Agulhas Long-billed Lark (Near-threatened) is the species of most concern with regards to disturbance.

An avifaunal walk down and Avifaunal input into a site specific EMP will be required to mitigate the risk of disturbance to avifauna in this area.

**Collision of birds with panels and other infrastructure**

There is a chance that birds will collide with the PV panels, as they do with the windows of buildings. This could be during the normal course of their daily activities or when they are attracted to the panels, perhaps mistaking them for water sources, the so called “lake effect”. It is important to stress that this impact will probably only become significant when large numbers of birds are in the vicinity of the facility. For this reason, the more sensitive species in terms of this impact are likely to be the gregarious, flocking species which are mostly not threatened species in this study area. This is a new impact, the likes of which has not been seen in South Africa to date.

It is recommended that post construction monitoring be implemented by the operator to monitor the impact of collisions of avifauna. A suitably qualified avifaunal specialist must be consulted for mitigation measures if required.

**Nesting and other use of infrastructure by birds**

Certain species, in particular crows and possibly small raptors, are likely to use some of the facility infrastructure for nesting (in the case of crows), perching and roosting. Nesting is particularly problematic, as it may make maintenance difficult for staff, and also poses a fire risk since nests present abundant fuel for fires. This will require management on site, preferably through the operational Environmental Management Plan (EMP). As with electrocutions in substation yards, the exact location of this impact is very difficult to predict at this stage and should be managed as and when it occurs in consultation with a bird specialist.

### 4.1.2 Impacts on habitats and ecological processes

**Habitat destruction associated with the construction of the facility**

During the construction and maintenance phases of this project, a certain amount of habitat destruction and disturbance will take place. The nature of the proposed facility means that the majority of the site will be transformed. This is a significant impact in terms of habitat loss on the local site. Figure 3 below shows a typical example of a PV facility.

**Figure 3-** Typical PV Solar facility showing total habitat transformation.

This is perhaps the most significant impact of the project, however without a fieldwork assessment it is difficult to know how significant this will be. This can be further quantified and mitigated by a site specific avifaunal walk down.

#### Altered run off patterns

Depending on how the vegetation beneath the PV array is managed, this could create a new micro habitat for birds. It is likely that water used to wash the panels will fall to the ground and will effectively increase the amount of moisture, thereby stimulating plant growth. This could attract certain bird species to the site, particularly in winter when green vegetation is scarce in the area. Alternatively, erosion of the site by water runoff could be a concern. It is likely that these aspects would be discussed in more detail in the botanical specialist study. A better understanding of this aspect can be acquired through detailed on site avifaunal monitoring, as proposed elsewhere in this report.

#### Water treatment works

Although not an impact in itself, the way in which water is treated and managed on site is a potential aggravating factor for other impacts. Most of the direct impacts described above rely on birds congregating in numbers or regularly frequenting the site in order for the impact to have a high likelihood of occurring. In this arid environment, it is likely that any new surface water sources will do exactly that, attract and concentrate various bird species on site, thereby increasing the risk of direct impacts. It is recommended that this issue be discussed more during the site specific EMP when more detail is available.

### 4.2. Comparison of alternatives

No macro alternatives have been provided for assessment for this project. Within the proposed site, options do exist for influencing the micro siting of infrastructure. Since no site visit has been undertaken it would be imperative that an avifaunal walk down be done on the PV site when this has been surveyed and marked. Input must be given from the avifaunal specialist into micro siting of panels to minimize avifaunal impact.

## 5. CONCLUSION

The results of this scoping study have revealed that impact on avifauna is certainly possible in this project. The fact that the site is located adjacent to an IBA means that mitigation will be required to reduce the impact of the project to acceptable levels on avifauna. This study was tricky to complete since no site visit was done. It is therefore imperative that a site specific avifaunal walk down be completed to give further input into the operational EMP and to provide input into the micro-sighting of the PV panels and other infrastructure. If this is done the impacts can be mitigated to acceptable levels.

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## APPENDIX 1- FULL South African Bird Atlas Project 1 AND 2 BIRD LIST

| Common Name | Taxonomic name | SABAP 1 | SABAP 2 |
|---|---|---|---|
| Avocet, Pied | *Recurvirostra avosetta* | X | X |
| Barbet, Acacia Pied | *Tricholaema leucomelas* | X | X |
| Barbet, Crested | *Trachyphonus vaillantii* | | X |
| Batis, Pririt | *Batis pririt* | X | X |
| Bee-eater, European | *Merops apiaster* | X | X |
| Bee-eater, Swallow-tailed | *Merops hirundineus* | X | X |
| Bee-eater, White-fronted | *Merops bullockoides* | X | X |
| Bishop, Southern Red | *Euplectes orix* | X | X |
| Bishop, Yellow-crowned | *Euplectes afer* | X | X |
| Bokmakierie, Bokmakierie | *Telophorus zeylonus* | X | X |
| Brubru, Brubru | *Nilaus afer* | X | X |
| Bulbul, African Red-eyed | *Pycnonotus nigricans* | X | X |
| Bunting, Cape | *Emberiza capensis* | X | X |
| Bunting, Cinnamon-breasted | *Emberiza tahapisi* | X | X |
| Bunting, Lark-like | *Emberiza impetuani* | X | X |
| Bustard, Kori | *Ardeotis kori* | X | X |
| Bustard, Ludwig's | *Neotis ludwigii* | X | X |
| Buzzard, Jackal | *Buteo rufofuscus* | X | X |
| Buzzard, Steppe | *Buteo vulpinus* | X | X |
| Canary, Black-headed | *Serinus alario* | X | |
| Canary, Black-throated | *Crithagra atrogularis* | X | X |
| Canary, White-throated | *Crithagra albogularis* | X | X |
| Canary, Yellow | *Crithagra flaviventris* | X | X |
| Canary, Yellow-fronted | *Crithagra mozambicus* | X | |
| Chat, Anteating | *Myrmecocichla formicivora* | X | X |
| Chat, Familiar | *Cercomela familiaris* | X | X |
| Chat, Karoo | *Cercomela schlegelii* | X | X |
| Chat, Sickle-winged | *Cercomela sinuata* | X | X |
| Cisticola, Cloud | *Cisticola textrix* | | X |
| Cisticola, Desert | *Cisticola aridulus* | X | X |
| Cisticola, Grey-backed | *Cisticola subruficapilla* | X | X |
| Cisticola, Levaillant's | *Cisticola tinniens* | X | X |
| Cisticola, Zitting | *Cisticola juncidis* | X | X |
| Cliff-swallow, South African | *Hirundo spilodera* | X | X |
| Coot, Red-knobbed | *Fulica cristata* | X | X |
| Cormorant, Reed | *Phalacrocorax africanus* | X | X |
| Cormorant, White-breasted | *Phalacrocorax carbo* | X | X |
| Courser, Burchell's | *Cursorius rufus* | X | X |
| Courser, Double-banded | *Rhinoptilus africanus* | X | X |
| Courser, Temminck's | *Cursorius temminckii* | X | |
| Crane, Blue | *Anthropoides paradiseus* | X | X |
| Crombec, Long-billed | *Sylvietta rufescens* | X | X |

| | | | |
|---|---|---|---|
| Crow, Cape | *Corvus capensis* | X | |
| Crow, Pied | *Corvus albus* | X | X |
| Cuckoo, Diderick | *Chrysococcyx caprius* | X | X |
| Cuckoo, Klaas's | *Chrysococcyx klaas* | | X |
| Darter, African | *Anhinga rufa* | X | X |
| Dove, Laughing | *Streptopelia senegalensis* | X | X |
| Dove, Namaqua | *Oena capensis* | X | X |
| Dove, Red-eyed | *Streptopelia semitorquata* | X | X |
| Dove, Rock | *Columba livia* | X | X |
| Drongo, Fork-tailed | *Dicrurus adsimilis* | X | X |
| Duck, African Black | *Anas sparsa* | X | X |
| Duck, White-faced | *Dendrocygna viduata* | X | X |
| Duck, Yellow-billed | *Anas undulata* | X | X |
| Eagle, Booted | *Aquila pennatus* | X | |
| Eagle, Martial | *Polemaetus bellicosus* | X | X |
| Eagle, Tawny | *Aquila rapax* | X | |
| Eagle, Verreaux's | *Aquila verreauxii* | X | X |
| Eagle-owl, Spotted | *Bubo africanus* | X | X |
| Egret, Cattle | *Bubulcus ibis* | X | X |
| Egret, Great | *Egretta alba* | X | X |
| Egret, Little | *Egretta garzetta* | X | X |
| Egret, Yellow-billed | *Egretta intermedia* | | X |
| Eremomela, Yellow-bellied | *Eremomela icteropygialis* | X | X |
| Falcon, Lanner | *Falco biarmicus* | X | X |
| Falcon, Peregrine | *Falco peregrinus* | | X |
| Finch, Red-headed | *Amadina erythrocephala* | X | X |
| Finch, Scaly-feathered | *Sporopipes squamifrons* | X | X |
| Firefinch, Red-billed | *Lagonosticta senegala* | X | X |
| Fiscal, Common (Southern) | *Lanius collaris* | X | X |
| Fish-eagle, African | *Haliaeetus vocifer* | X | X |
| Flamingo, Greater | *Phoenicopterus ruber* | | X |
| Flamingo, Lesser | *Phoenicopterus minor* | | X |
| Flycatcher, Chat | *Bradornis infuscatus* | X | X |
| Flycatcher, Fairy | *Stenostira scita* | X | X |
| Flycatcher, Fiscal | *Sigelus silens* | X | X |
| Flycatcher, Spotted | *Muscicapa striata* | X | X |
| Francolin, Orange River | *Scleroptila levaillantoides* | | X |
| Goose, Egyptian | *Alopochen aegyptiacus* | X | X |
| Goose, Spur-winged | *Plectropterus gambensis* | X | X |
| Goshawk, Gabar | *Melierax gabar* | X | X |
| Goshawk, Southern Pale Chanting | *Melierax canorus* | X | X |
| Grebe, Great Crested | *Podiceps cristatus* | | X |
| Grebe, Little | *Tachybaptus ruficollis* | | X |
| Greenshank, Common | *Tringa nebularia* | X | X |

| | | | |
|---|---|---|---|
| Guineafowl, Helmeted | *Numida meleagris* | X | X |
| Gull, Grey-headed | *Larus cirrocephalus* | | X |
| Hamerkop, Hamerkop | *Scopus umbretta* | X | X |
| Harrier, Black | *Circus maurus* | X | |
| Harrier-Hawk, African | *Polyboroides typus* | | X |
| Heron, Black-headed | *Ardea melanocephala* | X | X |
| Heron, Goliath | *Ardea goliath* | X | X |
| Heron, Grey | *Ardea cinerea* | X | X |
| Heron, Purple | *Ardea purpurea* | | X |
| Honeyguide, Greater | *Indicator indicator* | | X |
| Hoopoe, African | *Upupa africana* | X | X |
| Hornbill, African Grey | *Tockus nasutus* | | X |
| House-martin, Common | *Delichon urbicum* | | X |
| Ibis, African Sacred | *Threskiornis aethiopicus* | X | X |
| Ibis, Glossy | *Plegadis falcinellus* | | X |
| Ibis, Hadeda | *Bostrychia hagedash* | X | X |
| Indigobird, Village | *Vidua chalybeata* | X | X |
| Kestrel, Greater | *Falco rupicoloides* | X | X |
| Kestrel, Lesser | *Falco naumanni* | X | X |
| Kestrel, Rock | *Falco rupicolus* | X | X |
| Kingfisher, Brown-hooded | *Halcyon albiventris* | | X |
| Kingfisher, Giant | *Megaceryle maximus* | X | X |
| Kingfisher, Malachite | *Alcedo cristata* | X | X |
| Kingfisher, Pied | *Ceryle rudis* | X | X |
| Kite, Black | *Milvus migrans* | X | |
| Kite, Black-shouldered | *Elanus caeruleus* | X | X |
| Kite, Yellow-billed | *Milvus aegyptius* | X | |
| Korhaan, Black | *Eupodotis afra* | X | |
| Korhaan, Blue | *Eupodotis caerulescens* | X | X |
| Korhaan, Karoo | *Eupodotis vigorsii* | X | X |
| Korhaan, Northern Black | *Afrotis afraoides* | | X |
| Korhaan, Southern Black | *Afrotis afra* | | X |
| Lapwing, Blacksmith | *Vanellus armatus* | X | X |
| Lapwing, Crowned | *Vanellus coronatus* | X | X |
| Lark, Agulhas Clapper | *Mirafra marjoriae* | X | |
| Lark, Agulhas Long-billed | *Certhilauda brevirostris* | X | |
| Lark, Benguela Long-billed | *Certhilauda benguelensis* | X | |
| Lark, Cape Clapper | *Mirafra apiata* | X | |
| Lark, Cape Long-billed | *Certhilauda curvirostris* | X | |
| Lark, Clapper | *Mirafra apiata* | X | |
| Lark, Eastern Clapper | *Mirafra fasciolata* | X | X |
| Lark, Eastern Long-billed | *Certhilauda semitorquata* | X | X |
| Lark, Fawn-coloured | *Calendulauda africanoides* | X | X |
| Lark, Karoo Long-billed | *Certhilauda subcoronata* | X | X |

| | | | |
|---|---|---|---|
| Lark, Large-billed | *Galerida magnirostris* | X | |
| Lark, Longbilled | *Mirafra curvirostris* | X | |
| Lark, Pink-billed | *Spizocorys conirostris* | X | X |
| Lark, Red-capped | *Calandrella cinerea* | X | X |
| Lark, Rufous-naped | *Mirafra africana* | X | |
| Lark, Sabota | *Calendulauda sabota* | X | X |
| Lark, Spike-heeled | *Chersomanes albofasciata* | X | X |
| Longclaw, Cape | *Macronyx capensis* | X | X |
| Martin, Brown-throated | *Riparia paludicola* | X | X |
| Martin, Rock | *Hirundo fuligula* | X | X |
| Martin, Sand | *Riparia riparia* | | X |
| Masked-weaver, Southern | *Ploceus velatus* | X | X |
| Moorhen, Common | *Gallinula chloropus* | X | X |
| Mousebird, Red-faced | *Urocolius indicus* | X | X |
| Mousebird, White-backed | *Colius colius* | X | X |
| Myna, Common | *Acridotheres tristis* | | X |
| Neddicky, Neddicky | *Cisticola fulvicapilla* | X | X |
| Night-Heron, Black-crowned | *Nycticorax nycticorax* | X | X |
| Nightjar, European | *Caprimulgus europaeus* | X | |
| Nightjar, Fiery-necked | *Caprimulgus pectoralis* | X | |
| Nightjar, Rufous-cheeked | *Caprimulgus rufigena* | X | X |
| Oriole, Eurasian Golden | *Oriolus oriolus* | X | |
| Ostrich, Common | *Struthio camelus* | X | X |
| Owl, Barn | *Tyto alba* | X | X |
| Palm-swift, African | *Cypsiurus parvus* | X | X |
| Paradise-flycatcher, African | *Terpsiphone viridis* | X | X |
| Penduline-tit, Cape | *Anthoscopus minutus* | X | X |
| Pigeon, Speckled | *Columba guinea* | X | X |
| Pipit, African | *Anthus cinnamomeus* | X | X |
| Pipit, African Rock | *Anthus crenatus* | X | X |
| Pipit, Buffy | *Anthus vaalensis* | X | |
| Pipit, Plain-backed | *Anthus leucophrys* | | X |
| Plover, Chestnut-banded | *Charadrius pallidus* | X | |
| Plover, Common Ringed | *Charadrius hiaticula* | X | X |
| Plover, Kittlitz's | *Charadrius pecuarius* | X | X |
| Plover, Three-banded | *Charadrius tricollaris* | X | X |
| Prinia, Black-chested | *Prinia flavicans* | X | X |
| Prinia, Drakensberg | *Prinia hypoxantha* | X | |
| Prinia, Karoo | *Prinia maculosa* | X | X |
| Prinia, Spotted | *Prinia hypoxantha* | X | |
| Pytilia, Green-winged | *Pytilia melba* | | X |
| Quail, Common | *Coturnix coturnix* | X | X |
| Quailfinch, African | *Ortygospiza atricollis* | X | X |
| Quelea, Red-billed | *Quelea quelea* | X | X |

| | | | |
|---|---|---|---|
| Reed-warbler, African | *Acrocephalus baeticatus* | | X |
| Reed-warbler, Great | *Acrocephalus arundinaceus* | | X |
| Robin-chat, Cape | *Cossypha caffra* | X | X |
| Rock-thrush, Short-toed | *Monticola brevipes* | X | X |
| Roller, European | *Coracias garrulus* | X | |
| Ruff, Ruff | *Philomachus pugnax* | X | X |
| Rush-warbler, Little | *Bradypterus baboecala* | | X |
| Sandgrouse, Namaqua | *Pterocles namaqua* | X | X |
| Sandpiper, Common | *Actitis hypoleucos* | X | X |
| Sandpiper, Curlew | *Calidris ferruginea* | X | |
| Sandpiper, Marsh | *Tringa stagnatilis* | X | X |
| Sandpiper, Wood | *Tringa glareola* | X | X |
| Scimitarbill, Common | *Rhinopomastus cyanomelas* | X | X |
| Scrub-robin, Kalahari | *Cercotrichas paena* | X | X |
| Scrub-robin, Karoo | *Cercotrichas coryphoeus* | X | X |
| Secretarybird, Secretarybird | *Sagittarius serpentarius* | X | X |
| Shelduck, South African | *Tadorna cana* | X | X |
| Shoveler, Cape | *Anas smithii* | X | X |
| Shrike, Crimson-breasted | *Laniarius atrococcineus* | X | |
| Shrike, Lesser Grey | *Lanius minor* | X | X |
| Shrike, Red-backed | *Lanius collurio* | X | X |
| Snake-eagle, Black-chested | *Circaetus pectoralis* | X | X |
| Snipe, African | *Gallinago nigripennis* | X | |
| Sparrow, Cape | *Passer melanurus* | X | X |
| Sparrow, Grey-headed | *Passer diffusus* | X | |
| Sparrow, House | *Passer domesticus* | X | X |
| Sparrow, Northern Grey-headed | *Passer griseus* | X | |
| Sparrow, Southern Grey-headed | *Passer diffusus* | X | X |
| Sparrow-weaver, White-browed | *Plocepasser mahali* | X | X |
| Sparrowlark, Grey-backed | *Eremopterix verticalis* | X | X |
| Spoonbill, African | *Platalea alba* | X | X |
| Spurfowl, Swainson's | *Pternistis swainsonii* | | X |
| Starling, Cape Glossy | *Lamprotornis nitens* | X | X |
| Starling, Common | *Sturnus vulgaris* | | X |
| Starling, Pale-winged | *Onychognathus nabouroup* | X | X |
| Starling, Pied | *Spreo bicolor* | X | X |
| Starling, Red-winged | *Onychognathus morio* | X | X |
| Starling, Wattled | *Creatophora cinerea* | X | X |
| Stilt, Black-winged | *Himantopus himantopus* | X | X |
| Stint, Little | *Calidris minuta* | X | X |
| Stonechat, African | *Saxicola torquatus* | X | X |
| Stork, Abdim's | *Ciconia abdimii* | | X |
| Stork, Black | *Ciconia nigra* | X | |
| Stork, White | *Ciconia ciconia* | X | X |

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|---|---|---|---|
| Stork, Yellow-billed | *Mycteria ibis* | X | |
| Sunbird, Dusky | *Cinnyris fuscus* | X | X |
| Sunbird, Malachite | *Nectarinia famosa* | X | |
| Swallow, Barn | *Hirundo rustica* | X | X |
| Swallow, Greater Striped | *Hirundo cucullata* | X | X |
| Swallow, Pearl-breasted | *Hirundo dimidiata* | | X |
| Swallow, Red-breasted | *Hirundo semirufa* | X | X |
| Swallow, White-throated | *Hirundo albigularis* | X | X |
| Swamp-warbler, Lesser | *Acrocephalus gracilirostris* | X | X |
| Swift, African Black | *Apus barbatus* | | X |
| Swift, Alpine | *Tachymarptis melba* | X | X |
| Swift, Common | *Apus apus* | X | X |
| Swift, Little | *Apus affinis* | X | X |
| Swift, White-rumped | *Apus caffer* | X | X |
| Tchagra, Brown-crowned | *Tchagra australis* | X | |
| Teal, Cape | *Anas capensis* | X | X |
| Teal, Red-billed | *Anas erythrorhyncha* | X | X |
| Tern, Caspian | *Sterna caspia* | | X |
| Tern, White-winged | *Chlidonias leucopterus* | X | |
| Thick-knee, Spotted | *Burhinus capensis* | X | X |
| Thrush, Karoo | *Turdus smithi* | X | X |
| Thrush, Olive | *Turdus olivaceus* | X | X |
| Thrush, Olive | *Turdus olivaceus* | X | |
| Tit, Ashy | *Parus cinerascens* | X | X |
| Tit-babbler, Chestnut-vented | *Parisoma subcaeruleum* | X | X |
| Tit-babbler, Layard's | *Parisoma layardi* | X | X |
| Turtle-dove, Cape | *Streptopelia capicola* | X | X |
| Vulture, Cape | *Gyps coprotheres* | X | |
| Vulture, Lappet-faced | *Torgos tracheliotus* | X | |
| Vulture, White-backed | *Gyps africanus* | X | |
| Wagtail, African Pied | *Motacilla aguimp* | X | X |
| Wagtail, Cape | *Motacilla capensis* | X | X |
| Warbler, Namaqua | *Phragmacia substriata* | X | X |
| Warbler, Rufous-eared | *Malcorus pectoralis* | X | X |
| Warbler, Willow | *Phylloscopus trochilus* | X | X |
| Waxbill, Black-faced | *Estrilda erythronotos* | X | |
| Waxbill, Common | *Estrilda astrild* | X | X |
| Weaver, Sociable | *Philetairus socius* | X | |
| Wheatear, Capped | *Oenanthe pileata* | X | X |
| Wheatear, Mountain | *Oenanthe monticola* | X | X |
| White-eye, Cape | *Zosterops pallidus* | X | |
| White-eye, Cape | *Zosterops virens* | X | X |
| White-eye, Orange River | *Zosterops pallidus* | X | X |
| Whydah, Pin-tailed | *Vidua macroura* | X | X |

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|---|---|---|---|
| Wood-hoopoe, Green | *Phoeniculus purpureus* | | X |
| Woodpecker, Cardinal | *Dendropicos fuscescens* | X | X |
| Woodpecker, Golden-tailed | *Campethera abingoni* | | X |