# PROPOSED NORTHAM PV SITE– AVIFAUNAL BASELINE & IMPACT ASSESSMENT

## Northam, Limpopo Province

April 2021

**CLIENT**


**Prepared by:**

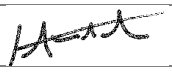
**The Biodiversity Company**

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

| | |
|---|---|
| Report Name | **PROPOSED NORTHAM PV SITE– AVIFAUNAL BASELINE & IMPACT ASSESSMENT** |
| Reference | **Northam PV site** |
| Submitted to | savannah environmental |
| Report Writer (Fauna) | **Tyron Clark**  <br>Tyron Clark (Pr. Sci. Nat. 121338) has more than 10 years of experience conducting biodiversity assessments in a number of African countries, affording him good experience in variety of development types. He attained his MSC in Zoological science from the University of the Witwatersrand. His research interests centre on biogeography and ecological niche modelling. Tyron has completed courses in wetland delineation and management hosted by the University of the Free State. |
| Reviewer | **Andrew Husted**  <br>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant. |
| Declaration | The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science. |

Roosting White-breasted Cormorants

**DECLARATION**

I, Tyron Clark, declare that:

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

Tyron Clark (Pr. Sci. Nat. 121338)

Terrestrial Ecologist

The Biodiversity Company

April 2021

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# 1 Introduction

The Biodiversity Company was appointed to undertake an avifaunal baseline and impact assessment for the proposed development of a photovoltaic system at Northam Platinum Limited's Zondereinde Mine (NHM). The proposed study area is located within NHM's Zondereinde Mine Area, approximately 35 km south of the town of Thabazimbi and 18 km northwest of the town of Northam, between the R510 in the west and the R511 in the east, within the jurisdiction of the Thabazimbi Local Municipality, which forms part of the Waterberg District (Figure 1-2). The wider study area was assessed to evaluate alternatives. The proposed project area falls on Portion 2 of the Farm Zondereinde 384 ("Project Area").

The project was undertaken as per the requirements of the National Environmental Management Act (NEMA) No. 107 of 1198): Environmental Impact Assessment Regulations, 2014 as amended. Specifically, the requirements of the specialist report as per the requirements of Appendix 6.

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) and GN 1150 (30 October 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity for the project area as "very high sensitivity".

***Figure 1-1 View across the project area***

## 1.1 Document Structure

The table below provides the Specialists' reports structure for compliance with Appendix 6 of Government Notice No. 326 of 07 April 2017 as published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998),)

| GNR 326 | Description | Section |
|---|---|---|
| **Appendix 6 (a)** | A specialist report prepared in terms of these Regulations must contain—<br>details of—<br>i. the specialist who prepared the report; and<br>ii. the expertise of that specialist to compile a specialist report including a curriculum vitae; | Page i |
| **Appendix 6 (b)** | A declaration that the specialist is independent in a form as may be specified by the competent authority; | Page ii |

| | | |
|---|---|---|
| **Appendix 6 (c)** | An indication of the scope of, and the purpose for which, the report was prepared; | Section 2 |
| **Appendix 6 (cA)** | An indication of the quality and age of base data used for the specialist report; | Section 6 & 7.1 |
| **Appendix 6 (cB)** | A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change; | Section 9 |
| **Appendix 6 (d)** | The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment; | Section 5.2 |
| **Appendix 6 (e)** | A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used; | Section 5 |
| **Appendix 6 (f)** | Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a, site plan identifying site alternatives; | Section 8 |
| **Appendix 6 (g)** | An identification of any areas to be avoided, including buffers; | Section 8 |
| **Appendix 6 (h)** | A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers; | Section 8 |
| **Appendix 6 (i)** | A description of any assumptions made and any uncertainties or gaps in knowledge; | Section 4 |
| **Appendix 6 (j)** | A description of the findings and potential implications of such findings on the impact of the proposed activity [including identified alternatives on the environment] or activities; | Section 7 |
| **Appendix 6 (k)** | Any mitigation measures for inclusion in the EMPr; | Section 9.2 |
| **Appendix 6 (l)** | Any conditions for inclusion in the environmental authorisation; | Section 9.2 |
| **Appendix 6 (m)** | Any monitoring requirements for inclusion in the EMPr or environmental authorisation; | None |
| **Appendix 6 (n)** | A reasoned opinion—<br>i. [as to] whether the proposed activity, activities or portions thereof should be authorised;<br>(iA) regarding the acceptability of the proposed activity or activities; and<br>ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan; | Section 10.1 |
| **Appendix 6 (o)** | A description of any consultation process that was undertaken during the course of preparing the specialist report; | None |
| **Appendix 6 (p)** | A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and | None |
| **Appendix 6 (q)** | Any other information requested by the competent authority. | None |

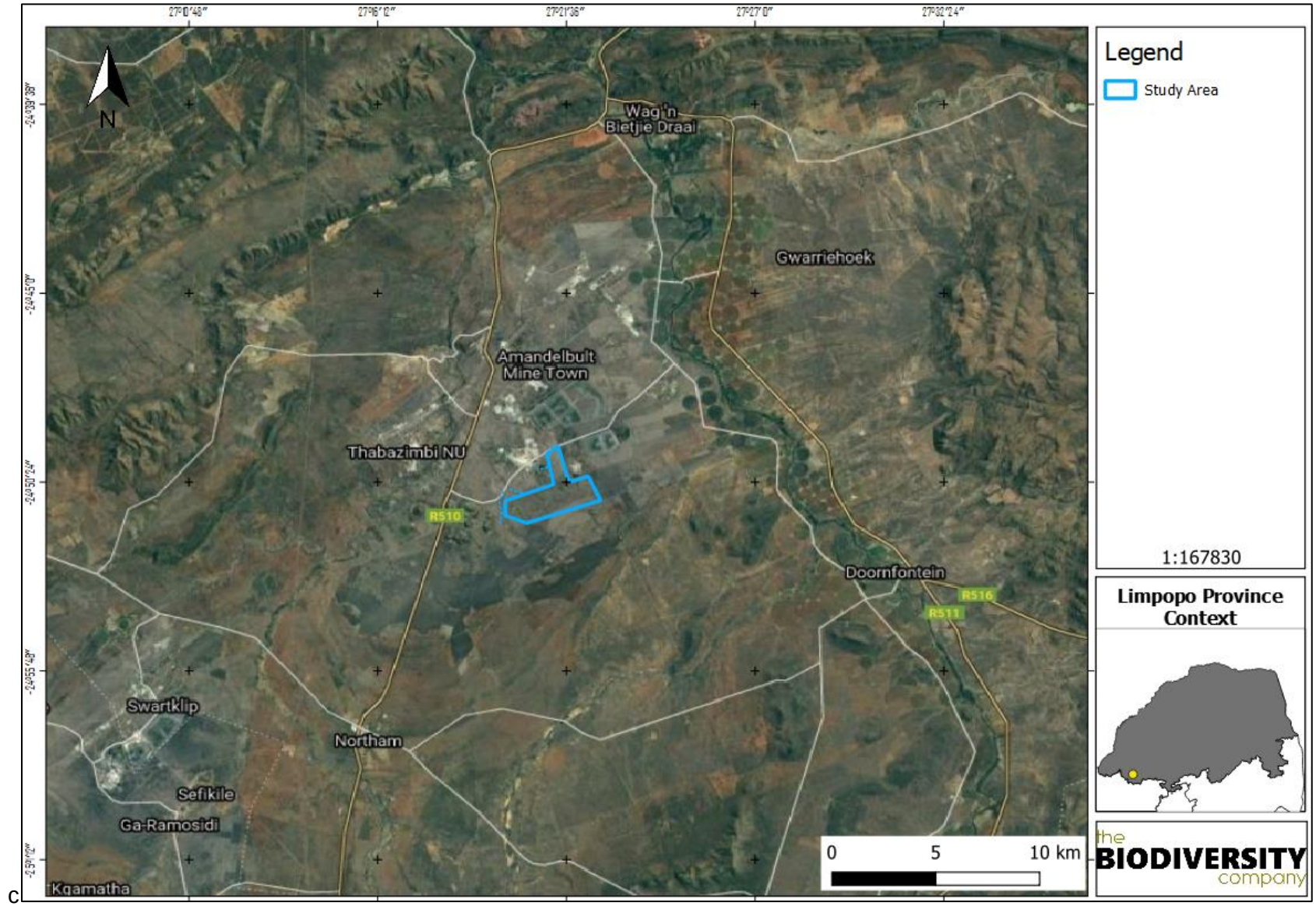


***Figure 1-2 Location of the project area***

## 2 Terms of Reference

The Terms of Reference (ToR) included the following:

- Description of the baseline avifaunal community;
- Identification of present or potentially occurring species of conservation concern (SCC);
- Sensitivity assessment and map to identify sensitive areas in the project area; and
- Impact assessment and mitigation measures to prevent or reduce the possible impacts.

## 3 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project with regards to avifauna. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 3-1).

***Table 3-1 A list of key legislative requirements relevant to these studies in the Gauteng***

| Region | Legislation and Guidelines |
|---|---|
| International | Convention on Biological Diversity (CBD, 1993) |
| | The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973) |
| | The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979) |
| National | Constitution of the Republic of South Africa (Act No. 108 of 1996) |
| | NEMA |
| | *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998*, GNR 320 of Government Gazette 43310 (March 2020) |
| | *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998*, GNR 1150 of Government Gazette 43855 (October 2020) |
| | The National Environmental Management: Protected Areas Act (Act No. 57 of 2003) |
| | The National Environmental Management: :Biodiversity Act (Act No. 10 of 2004) (NEMBA), Threatened or Protected Species Regulations |
| | The National Environmental Management: Waste Act, 2008 (Act 59 of 2008); |
| | The Environment Conservation Act (Act No. 73 of 1989) |
| | National Protected Areas Expansion Strategy (NPAES) |
| | Natural Scientific Professions Act (Act No. 27 of 2003) |
| | National Biodiversity Framework (NBF, 2009) |
| | National Spatial Biodiversity Assessment (NSBA) |
| | National Heritage Resources Act, 1999 (Act 25 of 1999) |
| | Alien and Invasive Species Regulations and Alien and Invasive Species List 2020, published under NEMBA |
| | South Africa's National Biodiversity Strategy and Action Plan (NBSAP) |
| | Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) |
| | White Paper on Biodiversity |
| | South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa*. South African National Biodiversity Institute, Pretoria. Version 1.2020. |

# 4 Limitations

The following limitations should be noted for the assessment:

- Only a single season survey was conducted for the respective studies, which constituted a late summer season survey. The time of this survey is considered suitable for an adequate avifauna survey;
- Access was only arranged for survey work within the project area; and
- The impact assessment residual ratings are based on the appropriate placement of the 20ha infrastructure footprint within the project area and not the development of the entire and much larger study area.

# 5 Methodologies

## 5.1 Desktop Assessment

The following resources were consulted during the desktop assessment and for the compilation of the expected species list:

- Hockey et al. (2005), Roberts Birds of Southern Africa (seventh end.). Primary source for species identification, geographic range and life history information;
- Sinclair and Ryan (2010), Birds of Africa. Secondary source for identification;
- South African Bird Atlas Project (SABAP 2). Full protocol atlassing data from relevant pentads used to construct expected species list. These included the nine pentads within QDS 2427BD namely; 2445_2715, 2445_2720, 2445_2725, 2450_2715, 2450_2720, 2450_2725, 2455_2715, 2455_2720 and 2455_2725; and
- Taylor et al. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Used for conservation status, nomenclature and taxonomical ordering.

## 5.2 Fieldwork

Fieldwork was conducted from 29 - 31 March 2021. Sampling consisted of standardized point counts as well as incidental observations. Standardized point counts (following Buckland et al. 1993) were conducted to gather data on the species composition and relative abundance of species within the various habitats within the project area. Each point count run over a 5 min period. The horizontal detection limit was set at 200 m. At each point, the observer documented the date, start time and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying), flight direction and general notes on habitat and nesting suitability for SCC. To supplement the species inventory with cryptic and illusive species that may not have been detected within the rigid point count protocol, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, river scanning, spotlighting, road cruising and looking for nests of SCC.

## 5.3 Data analysis

Point count data was arranged into a matrix with point count samples in rows and species in columns. The table formed the basis of the various subsequent statistical analyses. This data was first used to generate a species accumulation curve to assess sampling adequacy. Random accumulation was assumed over 100 permutations. To distinguish similarities / differences in the species composition between the four identified avifaunal habitats, the matrix was converted into a Bray-Curtis dissimilarity matrix and used to generate a two-axis non-metric multidimensional scaling (NMDS) ordination. Thirdly,

raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Shannon's Diversity Index H was the metric used to estimate diversity. All statistical analyses were performed in the R statistical environment.

## 5.4 Sensitivity Assessment

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 5-1 and Table 5-2, respectively.

***Table 5-1 Summary of Conservation Importance (CI) criteria***

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

***Table 5-2 Summary of Functional Integrity (FI) criteria***

| Functional Integrity | Fulfilling Criteria |
|---|---|
| **Very High** | Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types.<br>High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches.<br>No or minimal current negative ecological impacts, with no signs of major past disturbance. |
| **High** | Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.<br>Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches.<br>Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential. |

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

BI can be derived from a simple matrix of CI and FI, as provided in Table 5-3

***Table 5-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)***

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

The fulfilling criteria to evaluate Resource Resilience (RR) are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 5-4.

***Table 5-4 Summary of Resource Resilience (RR) criteria***

| **Resilience** | **Fulfilling Criteria** |
|---|---|
| **Very High** | Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed. |
| **High** | Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed. |
| **Medium** | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. |
| **Low** | Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed. |
| **Very Low** | Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed. |

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

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

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

Interpretation of the SEI in the context of the proposed development activities is provided in Table 5-6.

***Table 5-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities***

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

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

## 5.5 Impact Assessment Method

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah Environmental (Pty) Ltd (Savannah). The assessment of the impact considers the following, the:

- Nature of the impact, which shall include a description of what causes the effect; what will be affected; and how it will be affected;
- Extent of the impact, indicating whether the impact will be local or regional;
- Duration of the impact, very short-term duration (0-1 year), short-term duration (2-5 years), medium-term (5-15 years), long-term (> 15 years) or permanent;
- Probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable, probable, highly probable or definite;

- Severity/beneficial scale, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit); severe/beneficial (long-term impact that could be mitigated/long-term benefit); moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit); slight; or have no effect;

- Significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high;

- Status which will be described as either positive, negative or neutral;

- Degree to which the impact can be reversed;

- Degree to which the impact may cause irreplaceable loss of resources; and

- Degree to which the impact can be mitigated.

# 6 Background

## 6.1 Project Description

The following information is an extract from the project description as provided by Savannah (2021). The Northam PV development is located within a 30km radius of two solar developments with an approved Environmental Authorisation. The Solar PV facility will have a contracted capacity of 10MW; and will use fixed tilt, single or double axis tracking PV technology to harness the solar resource on the project site. A development area of up to 20ha in extent will be occupied by the PV panels and associated infrastructure.

The purpose of the proposed project is to generate electricity for exclusive use by the Zondereinde Mine, following which any excess power produced will be distributed to the national grid, if applicable. The construction of the PV facility aims to reduce the Zondereinde Mine's dependency on direct supply from the Eskom's national grid for operation activities, while simultaneously decreasing the mine's carbon footprint.

In order to evacuate the generated power to the Zondereinde Mine, a grid connection needs to be established. An overhead power line will be established to connect the on-site substation on the Northam solar PV facility site to the existing substation at the Zondereinde Metallurgical Complex. The overhead power line will run for 500m from the PV site to the side of the Eskom yard and will be at a minimum height of 5.5m. The power line is designed to have a capacity of 33kV, but will be operated at 6.6kV.

The infrastructure associated with the solar PV facility will include the following:

- Solar PV array comprising PV modules and mounting structures;

- Inverters and transformers;

- Cabling between the project components;

- On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid;

- Combined gatehouse, site offices and storage facility;

- A 33kV over-head power line for distribution of the generated power which will be connected to the existing substation at the Zondereinde Metallurgical Complex;
- Temporary laydown areas; and
- Access paved road, internal gravel roads and fencing around the development area.

Table 6-1 below provides the details of the Northam PV development, including the main infrastructure components and services that will be required during the project life cycle.

***Table 6-1 Details of the Northam PV and associated infrastructure***

| Component | Description / Dimensions |
|---|---|
| **District Municipality** | Waterberg District Municipality |
| **Local Municipality** | Thabazimbi Local Municipality |
| **Ward Number (s)** | Ward 5 |
| **Nearest town(s)** | Northam (~18km) |
| **Farm name(s) and number(s) of properties affected by the Solar Facility** | Portion 2 of the Farm Zondereinde 384 (T0KQ00000000038400002). |
| **Portion number(s) of properties affected by the Solar Facility** | |
| **SG 21 Digit Code (s)** | |
| **Current zoning** | Agricultural |
| **Site Coordinates (centre of development area)** | 24°50'9.05"S<br>27°21'27.77"E |
| **Total extent of the Affected Properties, also referred to as the study area** | ~126ha |
| **Total extent of the Development area** | Up to 20ha |
| **Total extent of the Development footprint** | Up to 20ha |
| **Contracted capacity of the facility** | Up to 10MW |
| **Technology** | Fixed tilt, single or double axis tracking photovoltaic (PV) panel technology. |
| **PV panels** | » Height: ~3.5m from ground level (installed).<br>» Constructed over an area of up to 15ha.<br>» Between 80 000 – 110 000 panels required. |
| **On-site Facility Substation** | » Located within the development area and close to the site access point.<br>» On-site substation to facilitate the connection between the Solar PV Facility and the mine electrical distribution system as needed. |
| **Access gravel roads and internal roads** | » Direct access to the study area is provided by the existing Mine Road, which is connected to the R510.<br>» A 6m wide main paved access road will be constructed, to provide direct access to the project area.<br>» A network of 5m wide (with a total length of 8km) gravel internal access roads will be constructed to provide access to the various components of the Northam PV development. |
| **Laydown area** | » Up to 3ha (Temporary Laydown Area). |
| **Other infrastructure** | » Inverters and transformers<br>» Cabling between project components<br>» Combined gatehouse<br>» Site offices<br>» Storage facility |
| **Services required** | » *Waste* – waste generated from the construction activities will be handled in accordance with the Zondereinde Mine Waste Management Plan; and collected by a private contractor and disposed of at a licensed waste disposal site off site. |

| | |
|---|---|
| | » *Sanitation* – since the project is located within the Zondereinde Mine Area, it is proposed that contractors utilise the existing toilet facilities available at the Mine. Alternatively, chemical toilets will be placed close to the project area. These facilities will be maintained and serviced regularly by an appropriate waste contractor.<br>» *Water supply* – during construction, water will be required for concrete, washing of solar panels and associated equipment, dust suppression, potable water for construction workers, etc. Once the facility is operational, water will be required for various purposes, such as washing of the solar panels. This water will be sourced from municipal supply via the existing mine supply network; or from groundwater abstraction, utilising the already authorised boreholes at the Zondereinde Mine.<br>» *Electricity supply* – Construction power will be sourced via a temporary overhead power line from the existing mine substation at the metallurgical complex, which is adjacent to the site. Power generated by the solar power plant will be transferred to the metallurgical complex via an overhead line to the existing substation, designed for 33kV and operated at 6,6kV at a minimum height of 5,5m. |

## 6.2 Prevailing Land Use

Presently, the project area is comprised of natural woodland / bush and grassland with surrounding platinum mines and croplands (Figure 6-1).

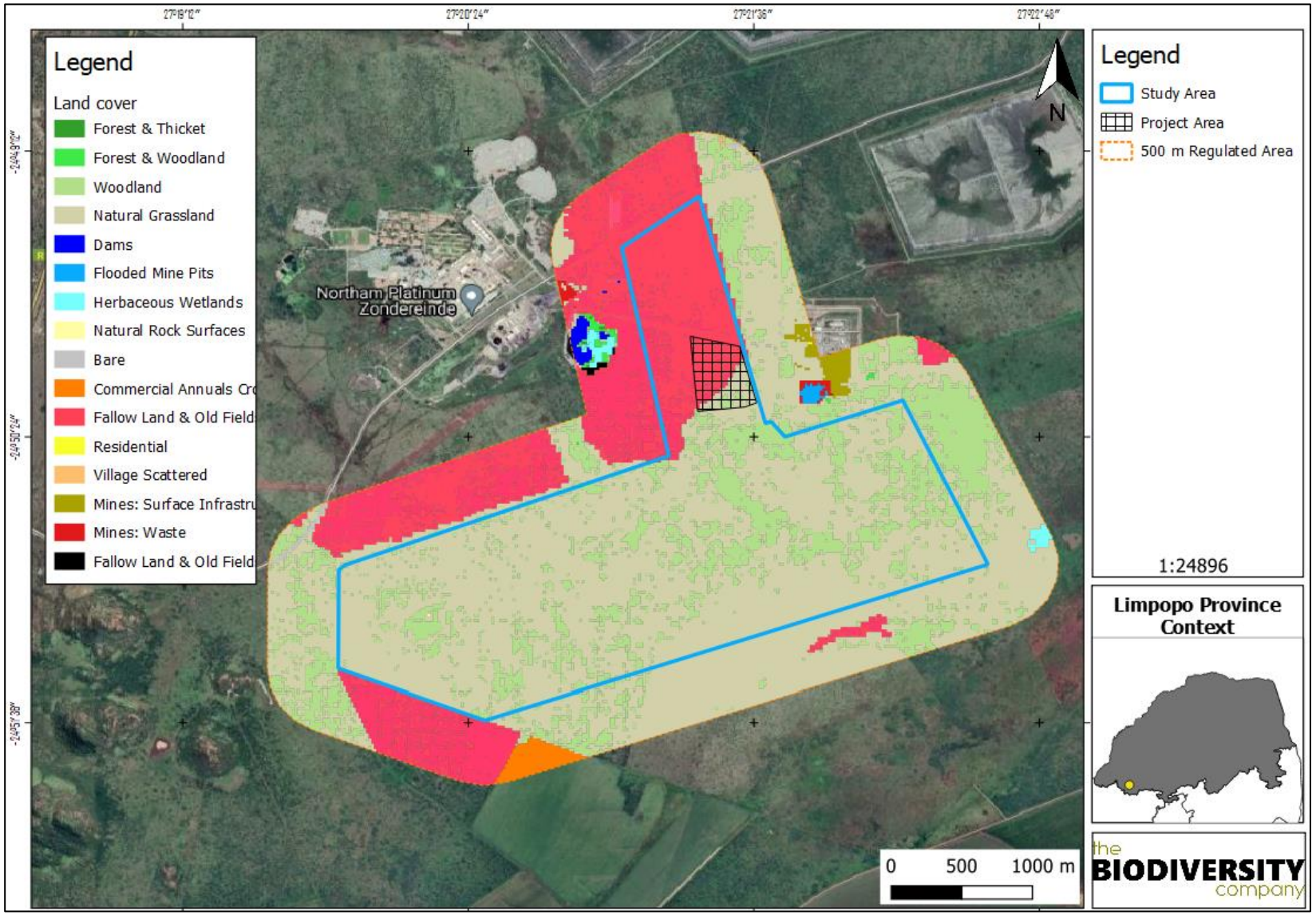


***Figure 6-1 Landcover within the AOI***

## 6.3 Limpopo Conservation Plan V2

The Limpopo Conservation Plan, Version 2 (LCPv2), was completed in 2018 for the LEDET (Desmet *et al.,* 2018). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet *et al.,* 2018). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- CBA1;
- CBA2;
- ESA1;
- ESA2;
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Remaining (NNR).

CBAs are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state, to ensure the continued existence and functioning of species and ecosystems and delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet *et al.,* 2018).

ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services (SANBI, 2017). ESAs may be terrestrial or aquatic.

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Desmet *et al.,* 2018).

Areas with NNR are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Desmet *et al.,* 2018).

The project area is classified as Other Natural Areas (Figure 6-2).


***Figure 6-2 Limpopo Conservation Plan V2 coverage for the study area***

# 7 Results

## 7.1 Regional Context

### 7.1.1 National Environmental Screening Tool

The avifaunal sensitivity theme highlights all watercourses in the region as being of High sensitivity while most fallow croplands are designated as Moderate, presumably on account of their importance for Yellow-throated Sandgrouse. Although the project area does not overlay any of these Moderate sensitivity croplands, it does overlay one of the High sensitivity watercourses. This watercourse is the large dam near the mine offices and its immediate surrounds. Watercourses and their associated rank / riparian vegetation are likely to support most of the region's conservation important avifauna and provide much needed refuge, water and movement corridors in an otherwise arid, rapidly transforming landscape. The National Environmental Screening Tool is a web-based application hosted by the Department of Environmental Affairs, Forestry and Fisheries that allows developers to screen their prospective site for environmental sensitives. Importantly, this tool now serves as the first step in the environmental authorisation process, as laid out in the gazetted assessment protocols for each environmental theme. Guidance towards achieving these protocols for terrestrial biodiversity is provided in the Species Environmental Assessment Guideline (SANBI, 2020) which, in turn, relies on the results of the Screening Tool to inform the level of assessment required. The Screening Tool provides an avifaunal sensitivity theme for solar PV facilities where the electricity output is 20MW or more and its application is therefore not compulsory for the project.

### 7.1.2 Important Bird Areas

The project area is situated within the Northern Turf Thornveld (SA009) national Important Bird Area (IBA), as designated by Birdlife South Africa (2021). This a triangular IBA situated just south of Thabazimbi, bounded to the east by the Crocodile River, to the west by the Bierspruit and to the south by the railway line. This IBA is recognised for supporting the core of the remaining South African resident population of Yellow-throated Sandgrouse (*Pterocles gutturalis*). The species frequents open fallow croplands in the area. This habitat is, however, lacking, at present, within the project area. Other SCC are known to occur, which are discussed in greater detail in Section 7.2.7.

### 7.1.3 Controlled Waterbird Counts

The nearest Controlled Waterbird Count (CWAC) site is Vaalkop Dam (25202728). This large dam, which falls within a nature reserve, is counted regularly. Most notably the site is known to support RAMSAR qualifying numbers of White-breasted Cormorant (*Phalacrocorax carbo*), Great Crested Grebe (*Podiceps cristatus*), Black-winged Pratincole (*Glareola nordmanni*), Caspian Tern (*Sterna caspia*) and Whiskered Tern (*Chlidonias hybrid*).

### 7.1.4 South African Bird Atlas Project 2

A total of 297 bird species have been recorded during SABAP2 surveys, within the nine pentads that make up QDS 2427 BD covering the AOI (SABAP2, 2021). Based on the high number of full protocol card submissions, this inventory is considered a very accurate and representative portrayal of the regional diversity within the region, as defined by the QDS. Consequently, this list was used as the basis for the project's species probability list, as presented in Appendix C-1.

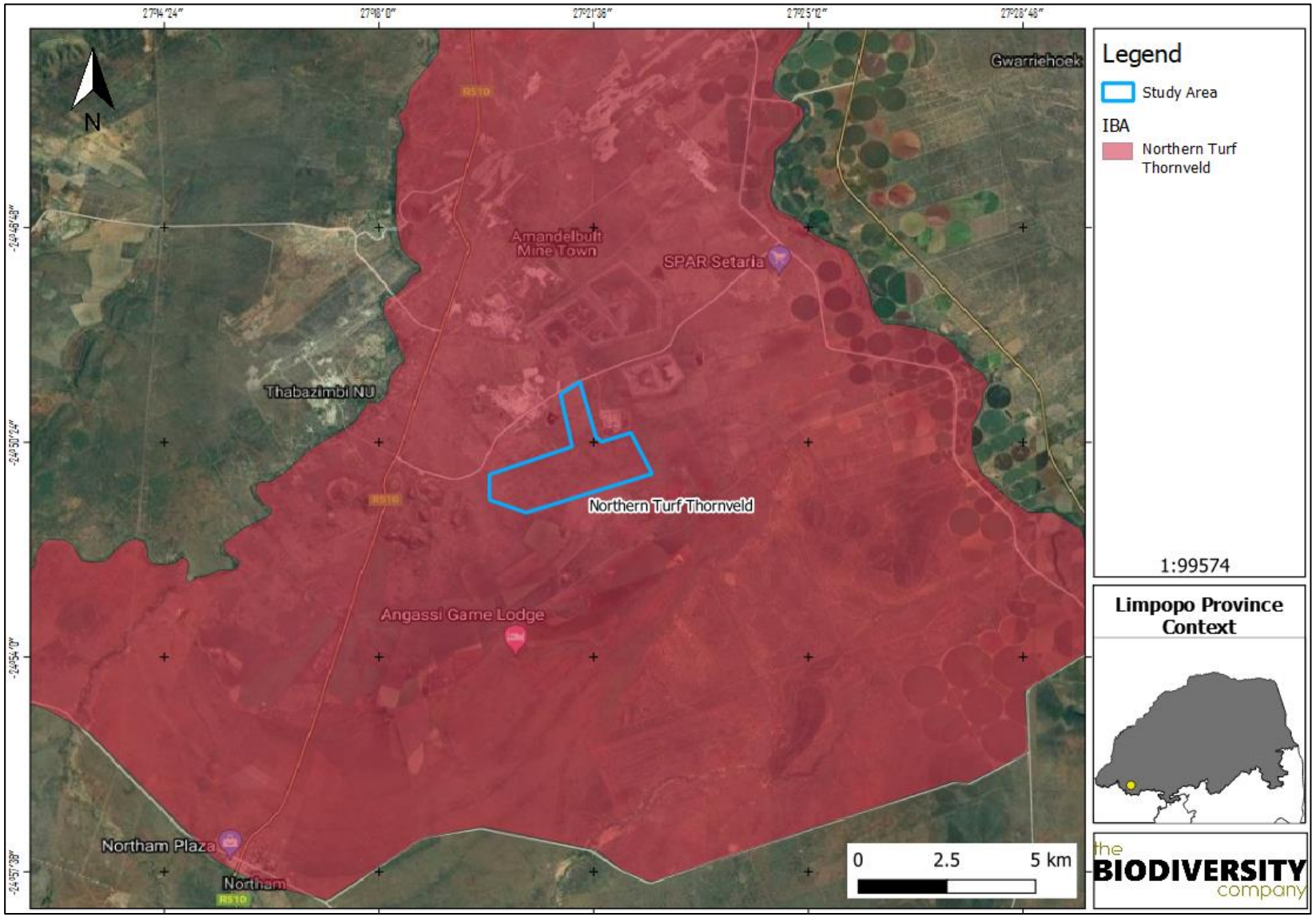


***Figure 7-1 Study area in relation to Important Bird Areas***

## 7.2 Local Context

### 7.2.1 Expected Site Diversity

Four main avifaunal habitat types were identified within the AOI, namely Flat Black Turf Thornveld (FBTT), Rocky Black Turf Thornveld (RBTT), Wetlands (W) and Transformed Grassland (TG). Most of the AOI area is comprised of FBTT, interspersed with a few patches of RBTT (which in this assessment includes both the low-lying igneous rocky outcrops and the larger Koppies). Unlike the former, which is characterised by relatively homogenous and cattle- impacted thornveld, the latter supports a richer vegetation diversity with a higher microhabitat structural diversity. Wetlands tend to occur on the margins of the AOI (just outside of the project area), including a channelled valley-bottom to the south and west and a large dam near the mine offices (which is fed by a seep wetland). The TG occurs mainly to the north of the AOI, closer to the mining operations, and consists of previously disturbed thornveld.

Of the approximately 300 regionally occurring species, some 247 species are considered highly likely to occur on a regular basis. A further 30 species are likely to occur sporadically, while the remaining 20 species are only likely to occur very rarely or not at all. However, when considering seasonal variation in species assemblages and local movements, the actual number of species likely to be encountered on any one day in the AOI is likely to be < 120 species. This represents moderate to high diversity in the South African context.

### 7.2.2 Observed Site Diversity

During the three-day size visit, a total of 102 bird species were recorded within the AOI. Of these, 58 were recorded during the standardised point counts (n=38), while the remaining species were detected incidentally (while moving between point counts). Images of some of these species, as taken on site, are shown in Figure 7-2.

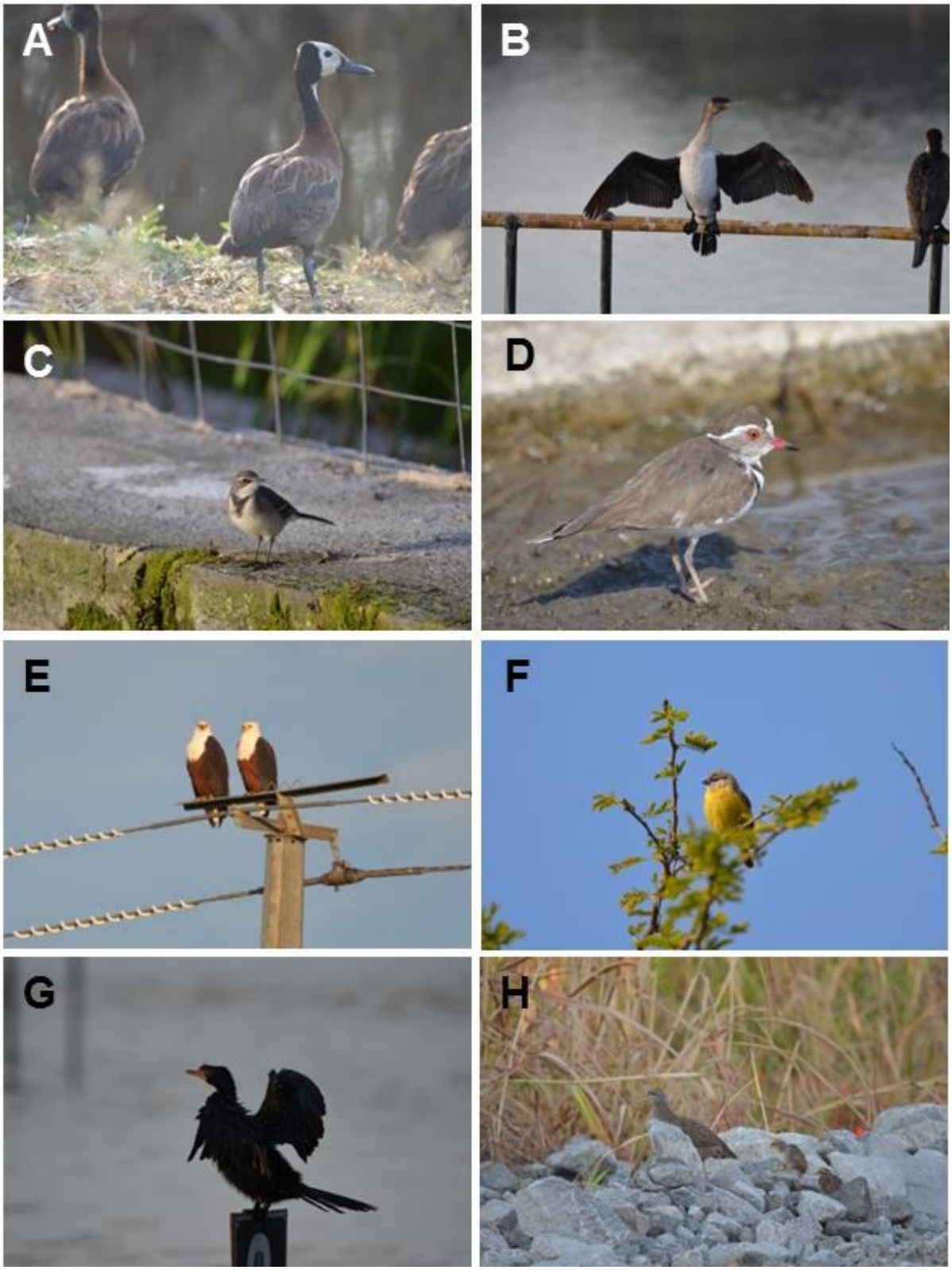


***Figure 7-2 Some of the birds observed within the project area***

A) White-faced Whistling Duck, B) White-breasted Cormorant, C) Cape Wagtail, D) Three-banded Plover, E) African Fish Eagle, F) Cape Penduline Tit, G) Reed Cormorant, H) Natal Spurfowl and chicks

### 7.2.3 Sampling Adequacy

A species accumulation curve (Figure 7-3) generated for the point counts within the AOI suggests adequate sampling effort. The curve reached an asymptote (as defined by a straight-line tangent to the curve with a gradient of one) at 23 point count samples. This means that after 23 samples, less than one bird would be observed for every subsequent sample thereafter.

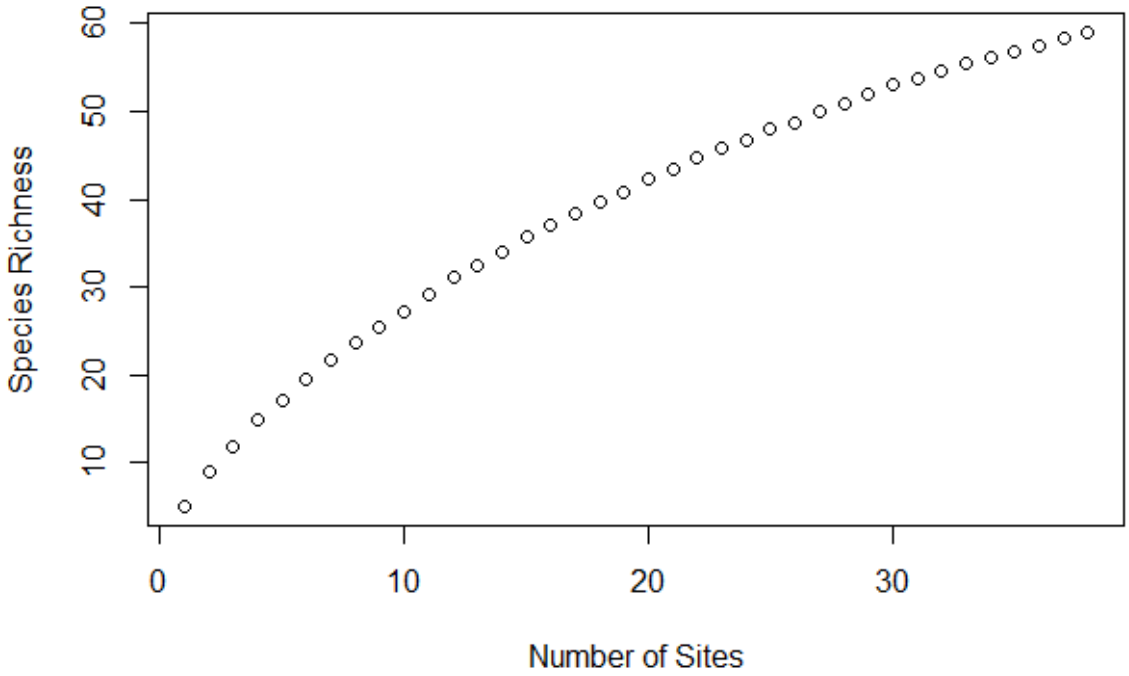


***Figure 7-3 Species accumulation curve for the point counts within the project area***

### 7.2.4 Habitat Diversity

A summary of the point count data for each of the main avifaunal habitats within each area is given in Table 7-1, together with their respective diversity, as indicated by Shannon's H. From this table it is apparent that the highest avian diversity was observed in the FBTT, followed by W, TG and lastly RBTT. However, the high diversity in the FBTT is likely an artefact of the inherently uneven sample sizes between habitats. As most of the project area comprises FBTT habitat, this habitat type accounted for the majority of the samples and therefore appeared more diverse. In reality, the RBTT and Wetland habitats are likely the most diverse habitat types due to their higher microhabitat diversity, structural complexity and resource diversity.

***Table 7-1 Comparison of the diversity between the main habitats***

| Habitat | Shannon's H |
|---|---|
| **FBTT** | 2.82 |
| **W** | 2.54 |
| **TG** | 2.33 |
| **RBTT** | 1.84 |

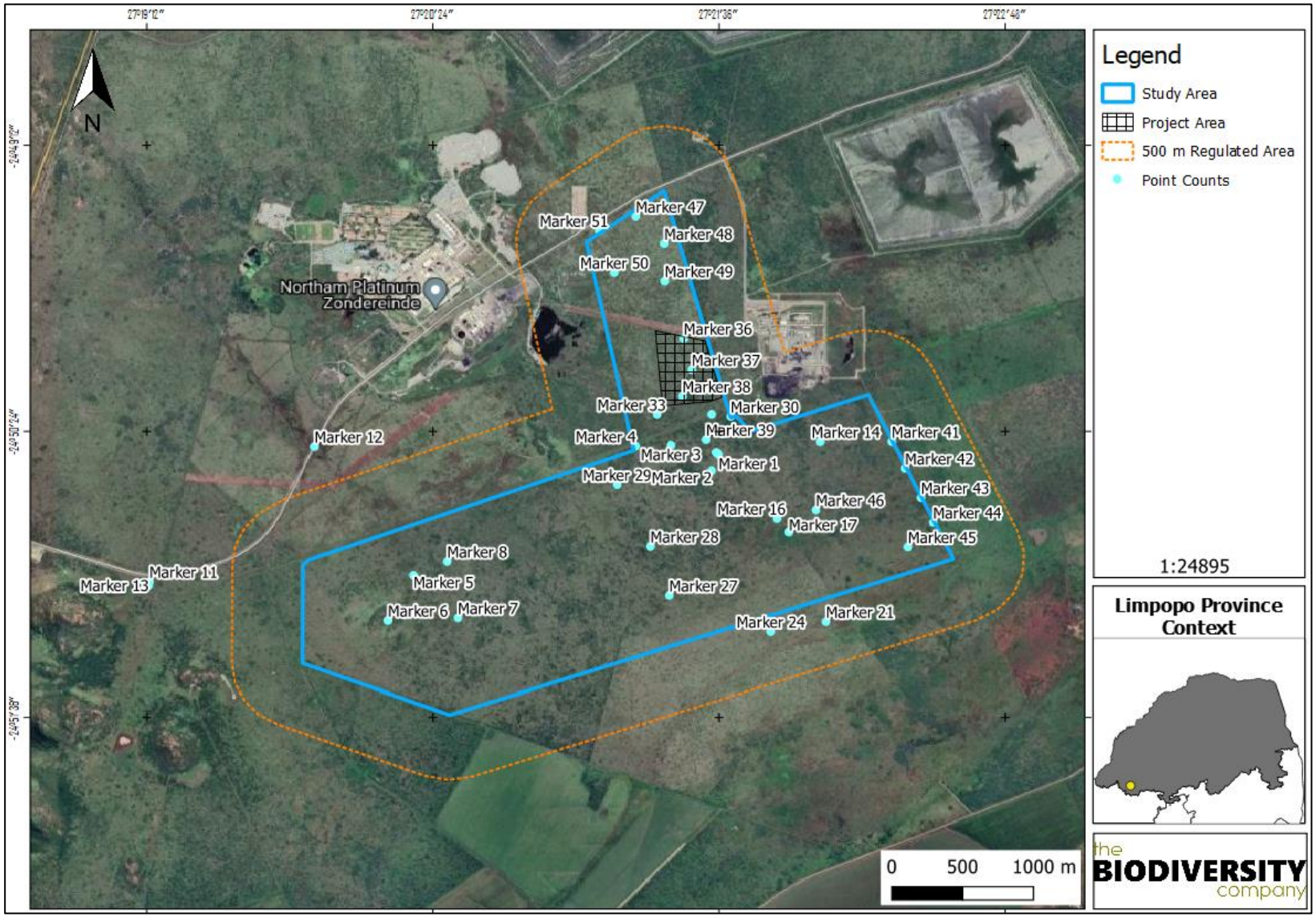


***Figure 7-4 Avifaunal point count localities***

### 7.2.5 Habitat Uniqueness

The non-metric multidimensional scaling (NMDS) ordination shown in Figure 7-5 provides a visual representation of the difference / similarity in the species composition between the four habitat types. Mostly noticeable is that the RBTT and W habitats have a considerably tighter grouping (smaller ellipses) than the other habitats. This reveals that the samples within these habitats did not vary greatly in terms of species composition. This makes sense, given their small, patchy and insular nature. In contrast, samples within the much larger, broad open FBTT and GT habitats varied much more as the chance of encountering different bird parties with different species compositions increased. The RBTT and TG species assemblages differed the most from each other. The ordination suggests that no one habitat supported an entirely unique species assemblage. However, based on the site visit and experience from other projects in the region, the RBTT habitat likely supports the most unique and diverse avifaunal assemblage.

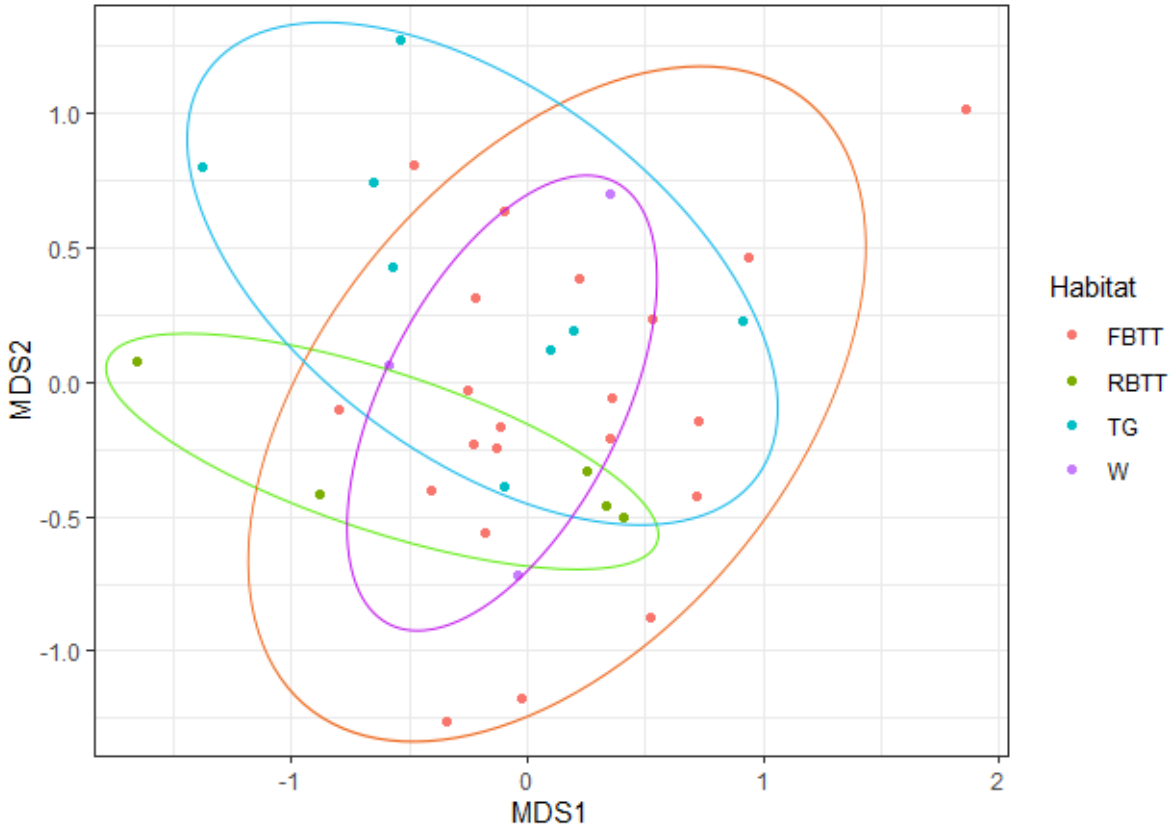


***Figure 7-5 Non-metric multidimensional scaling ordination contrasting the avifaunal species assemblages within the project area***

### 7.2.6 Habitat Assemblages

Table 7-2 provides a summary of the relative abundance and frequency of each species within each habitat. The table is sorted from highest to lowest overall frequency. Overall, the top ten most frequently detected birds were Cape Turtle (Ring-necked) Dove (*Streptopelia capicola*), Magpie Shrike (*Urolestes melanoleucus*), Laughing Dove (*Spilopelia senegalensis*), Chinspot Batis (*Batis molitor*), Black-chested Prinia (*Prinia flavicans*), Swainson's Spurfowl (*Pternistis swainsonii*), European Bee-eater (*Merops apiaster*), Southern Masked Weaver (*Ploceus velatus*), White-browed Scrub Robin (*Cercotrichas leucophrys*) and Black-throated Canary (*Crithagra atrogularis*).

The FBTT supported a typical compliment of common and widespread bushveld birds. Species that characterise this habitat include Magpie Shrike (*Urolestes melanoleucus*) Red-billed Quelea (*Quelea quelea*), Barn Swallow (*Hirundo rustica*), Fork-tailed Drongo (*Dicrurus adsimilis*), African Quail-finch

(*Ortygospiza atricollis*), Crimson-breasted Shrike (*Laniarius atrococcineus*), Chestnut-vented Tit-Babbler (*Sylvia subcoerulea*) and Lesser Honeyguide (*Indicator minor*). The TG supported a similar compliment of species but included more hardy and commensal species, such as Western Cattle Egret (*Bubulcus ibis*), Southern Fiscal (*Lanius collaris*), Cape Sparrow (*Passer melanurus*) and House Sparrow (*Passer domesticus*). The W habitat supported a distinct compliment of waterbirds, being characterised by species such as Yellow-fronted Canary (*Crithagra mozambica*), Reed Cormorant (*Microcarbo africanus*), White-breasted Cormorant (*Phalacrocorax lucidus*), African Darter (*Anhinga rufa*), White-faced Whistling Duck (*Dendrocygna viduata*), Little Grebe (*Tachybaptus ruficollis*), Purple Heron (*Ardea purpurea*), and Grey Heron (*Ardea cinerea*). The RBTT supported a unique assemblage compared to the surrounding FBTT and TG. Species that characterised this habitat included Spotted Flycatcher (*Muscicapa striata*), African Grey Hornbill (*Lophocerus nasutus*), Southern Yellow-billed Hornbill (*Tockus leucomelas*) and Shaft-tailed Whydah (*Vidua regia*).

***Table 7-2 Summary of the relative abundance and frequency of avifauna in each habitat***

| Common Name | Scientific Name | FBTT | | RBTT | | TG | | W | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RA | F | RA | F | RA | F | RA | F | RA | F |
| Cape Turtle (Ring-necked) Dove | Streptopelia capicola | 23 | 12 | 9 | 3 | 4 | 3 | 10 | 3 | 46 | 21 |
| Magpie Shrike | Urolestes melanoleucus | 25 | 10 | 0 | 0 | 5 | 3 | 0 | 0 | 30 | 13 |
| Laughing Dove | Spilopelia senegalensis | 15 | 9 | 0 | 0 | 3 | 2 | 4 | 1 | 22 | 12 |
| Chinspot Batis | Batis molitor | 7 | 5 | 1 | 1 | 3 | 2 | 0 | 0 | 11 | 8 |
| Black-chested Prinia | Prinia flavicans | 10 | 7 | 0 | 0 | 0 | 0 | 2 | 1 | 12 | 8 |
| Swainson's Spurfowl | Pternistis swainsonii | 4 | 3 | 3 | 2 | 1 | 1 | 3 | 1 | 11 | 7 |
| European Bee-eater | Merops apiaster | 67 | 4 | 1 | 1 | 0 | 0 | 2 | 1 | 70 | 6 |
| Southern Masked Weaver | Ploceus velatus | 25 | 3 | 18 | 3 | 0 | 0 | 0 | 0 | 43 | 6 |
| White-browed Scrub Robin | Cercotrichas leucophrys | 3 | 2 | 0 | 0 | 3 | 3 | 1 | 1 | 7 | 6 |
| Black-throated Canary | Crithagra atrogularis | 4 | 3 | 0 | 0 | 2 | 2 | 0 | 0 | 6 | 5 |
| Little Swift | Apus affinis | 62 | 2 | 0 | 0 | 34 | 3 | 0 | 0 | 96 | 5 |
| Blue Waxbill | Uraeginthus angolensis | 5 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 10 | 5 |
| Crested Francolin | Dendroperdix sephaena | 5 | 3 | 0 | 0 | 2 | 1 | 0 | 0 | 7 | 4 |
| Helmeted Guineafowl | Numida meleagris | 29 | 3 | 0 | 0 | 0 | 0 | 18 | 1 | 47 | 4 |
| Grey-backed Camaroptera | Camaroptera brevicaudata | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 |
| Burnt-necked Eremomela | Eremomela usticollis | 4 | 2 | 0 | 0 | 5 | 1 | 0 | 0 | 9 | 3 |
| Natal Spurfowl | Pternistis natalensis | 6 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 7 | 3 |
| Crimson-breasted Shrike | Laniarius atrococcineus | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| Long-billed Crombec | Sylvietta rufescens | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 3 | 2 |
| Fork-tailed Drongo | Dicrurus adsimilis | 4 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 6 | 2 |
| Western Cattle Egret | Bubulcus ibis | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 5 | 2 |
| Grey Go-away-bird | Corythaixoides concolor | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Egyptian Goose | Alopochen aegyptiaca | 3 | 1 | 0 | 0 | 0 | 0 | 4 | 1 | 7 | 2 |
| Bronze Mannikin | Lonchura cucullata | 2 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 4 | 2 |
| Red-faced Mousebird | Urocolius indicus | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | 2 |
| Tawny-flanked Prinia | Prinia subflava | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 4 | 2 |
| Chestnut-vented Tit-Babbler (Warbler) | Sylvia subcoerulea | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Common Waxbill | Estrilda astrild | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 6 | 2 |
| African Quail-finch | Ortygospiza atricollis | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| Barn Swallow | Hirundo rustica | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow-fronted Canary | Crithagra mozambica | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1 |
| Reed Cormorant | Microcarbo africanus | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 4 | 1 |
| White-breasted Cormorant | Phalacrocorax lucidus | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1 | 15 | 1 |
| Bearded Woodpecker | Chloropicus namaquus | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| African Darter | Anhinga rufa | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 8 | 1 |
| Namaqua Dove | Oena capensis | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Red-eyed Dove | Streptopelia semitorquata | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| White-faced Whistling Duck | Dendrocygna viduata | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 6 | 1 |
| Yellow-billed (Intermediate) Egret | Ardea intermedia | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 5 | 1 |
| Southern (Common) Fiscal | Lanius collaris | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| Spotted Flycatcher | Muscicapa striata | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| Little Grebe | Tachybaptus ruficollis | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 1 | 55 | 1 |
| Purple Heron | Ardea purpurea | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1 |
| African Black Duck | Anas sparsa | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Grey Heron | Ardea cinerea | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 3 | 1 |
| African Grey Hornbill | Lophocerus nasutus | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Southern Yellow-billed Hornbill | Tockus leucomelas | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| Black-winged Kite | Elanus caeruleus | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 4 | 1 |
| Common Moorhen | Gallinula chloropus | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 3 | 1 |
| Speckled Pigeon | Columba guinea | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 4 | 1 |
| Lesser Honeyguide | Indicator minor | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Brubru | Nilaus afer | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Cape Sparrow | Passer melanurus | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 1 |
| House Sparrow | Passer domesticus | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| Cape Wagtail | Motacilla capensis | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| Shaft-tailed Whydah | Vidua regia | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| Red-billed Quelea | Quelea quelea | 20 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 1 |
| Red-billed Teal | Anas erythrorhyncha | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1 |

### 7.2.7 Species of Conservation Concern

#### 7.2.7.1 Red-listed Species

A total of 17 SCC (Table 7-3) have been recorded during SABAP2 surveys within the nine pentads covering QDS 2629BD (SABAP2, 2021). Most of these species are likely to occur within the project area. Exceptions include Yellow-billed Stork (*Mycteria ibis*), Black-winged Pratincole (*Glareola nordmanni*), Lesser Flamingo (*Phoeniconaias minor*) and Greater Flamingo (*Phoenicopterus roseus*), whose presence is precluded by a lack of suitable wading habitat.

No SCC were detected within the AOI during the site visit. However, Cape Vulture (*Gyps coprotheres*) was detected on a previous survey by TBC in the AOI. Other SCC raptors considered likely to occur include Lappet-faced Vulture (*Torgos tracheliotos*), Martial Eagle (*Polemaetus bellicosus*), Secretarybird (*Sagittarius serpentarius*), Verreaux's Eagle (*Aquila verreauxii*) and Lanner Falcon (*Falco biarmicus*). Of these, suitable nesting habitat exists for Secretarybird (*Sagittarius serpentarius*), Verreaux's Eagle (*Aquila verreauxii*) and Lanner Falcon (*Falco biarmicus*). Secretarybird is considered marginally likely to breed in some of the low, wide-crowned thorn trees in the FBTT habitat, while the larger Koppies in the RBTT habitat represent possible, albeit suboptimal, breeding habitat for Lanner Falcon (which are a cliff-nesting species) However, no nests of SCC raptors were observed during the site vistit, despite intense scanning from a good vantage point on the top of the Koppie.

One of the key target species for this assessment was Yellow-throated Sandgrouse (*Pterocles gutturalis*), due to the site's position within the core of the South African resident breeding population's range, as defined by the small Northern Black Turf Thornveld IBA. However, the species frequents shortly cropped open grassland and, particularly, fallow croplands in this area, a habitat that was distinctly lacking within the project area. Instead, the project area was comprised of a dense tangle of previously cattle impacted, underutilised and moribund grassland between a dense thornveld which, in places, resembled woodland. Consequently, this species is considered moderately likely to occur, but unlikely to breed within the project area, in its current state.

European Roller (*Coracias garrulus*) may visit the project during summer to forage, as it is a non-breeding migrant. Although small flocks of Abdim's Stork (*Ciconia abdimii*) may forage on site they, like the Marabou Stork (*Leptoptilos crumenifer*) which is only likely to pass over the site enroute to larger reserves, are unlikely to breed within the project area. The dam near the mine office may very occasionally be visited by African Finfoot (*Podica senegalensis*) and Greater Painted-snipe (*Rostratula benghalensis*).

***Table 7-3 List of present and potentially occurring SCC avifauna.***

| Common Name | Scientific Name | LO | Status |
|---|---|---|---|
| Cape Vulture | *Gyps coprotheres* | 2 | **EN, EN** |
| Lappet-faced Vulture | *Torgos tracheliotos* | 2 | **EN, EN** |
| Yellow-billed Stork | *Mycteria ibis* | 4 | **EN, LC** |
| Martial Eagle | *Polemaetus bellicosus* | 2 | **EN, VU** |
| Secretarybird | *Sagittarius serpentarius* | 2 | **VU, VU** |
| Verreaux's Eagle | *Aquila verreauxii* | 2 | **VU, LC** |
| Lanner Falcon | *Falco biarmicus* | 2 | **VU, LC** |
| African Finfoot | *Podica senegalensis* | 3 | **VU, LC** |
| Black-winged Pratincole | *Glareola nordmanni* | 4 | **NT, NT** |
| Lesser Flamingo | *Phoeniconaias minor* | 4 | **NT, NT** |
| European Roller | *Coracias garrulus* | 3 | **NT, LC** |
| Yellow-throated Sandgrouse | *Pterocles gutturalis* | 3 | **NT, LC** |
| Greater Painted-snipe | *Rostratula benghalensis* | 2 | **NT, LC** |
| Greater Flamingo | *Phoenicopterus roseus* | 4 | **NT, LC** |
| Abdim's Stork | *Ciconia abdimii* | 3 | **NT, LC** |
| Marabou Stork | *Leptoptilos crumenifer* | 3 | **NT, LC** |
| Curlew Sandpiper | Calidris ferruginea | 3 | **LC, NT** |

#### 7.2.7.2 Species Congregations and Flyways

The AOI was not found to support any globally significant congregations of water birds or other birdlife. The dam near the mine offices was, however, found to support a significant flock of White-breasted Cormorant (*Phalacrocorax lucidus*), which are likely breeding residents; and a significant flock of breeding African Darter (*Anhinga rufa*). Although dwarfed by the globally important Vaalkop Dam populations, these breeding congregations should be considered important on a subregional to IBA scale. The AOI is not situated in any globally recognised avifaunal flyway.

### 7.2.8 Collision Prone Species

The proposed solar PV may pose a collision risk to avifauna. However, the current body of scientific research on this topic is scant. Since the effects of PV solar farms on birds were investigated, several monitoring studies have reported evidence of bird mortalities within and immediately surrounding PV farms. Several causes for these mortalities have been put forward but perhaps the widely cited are collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich and Ennen 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. Mixed views have been presented on the significance of collisions as an impact, with a definitive answer precluded by a lack of long-term data. Currently the consensus is that collisions due to the lake effect is unlikely and that other impacts associated with the construction and operation of solar facilities (e.g. habitat loss, collision with fences, electrocution on transmission lines, increased predation pressure as birds attempt to forage beneath solar panels and struggle to escape) may be of greater overall consequence to avifauna (Birdlife, 2012). Nevertheless, given the paucity of empirical research on this topic, the precautionary principle is adopted here, and the potential for collision and (to a lesser intensity electrocution) considered possible.

For the purposes of this project, a subset of collision prone species have been identified. These species are listed in Table 7-4, along with their likelihood of occurrence (LO), conservation status and representation among pentads (%). The representation among pentads (%) provides a rough indication of the residency or commonness of these species, one of several factors which may increase their susceptibility to collision. Species are ranked in this table from highest to lowest pentad representation.

Species considered particularly prone to collision based on in-field count data, body size and flight patterns include Helmeted Guineafowl (*Numida meleagris*), Natal Spurfowl (*Pternistis natalensis*), Egyptian Goose (*Alopochen aegyptiaca*), Reed Cormorant (*Microcarbo africanus*), White-breasted Cormorant (*Phalacrocorax lucidus*), African Darter (*Anhinga rufa*) and Western Cattle Egret (*Bubulcus ibis*).

***Table 7-4 List of collision and electrocution prone species***

| Common Name | Scientific Name | LO | Status | Pentads (%) |
|---|---|---|---|---|
| Helmeted Guineafowl | *Numida meleagris* | 1 | LC,LC | 100 |
| Natal Spurfowl | *Pternistis natalensis* | 2 | LC,LC | 89 |
| Brown-hooded Kingfisher | *Halcyon albiventris* | 2 | LC,LC | 89 |
| Egyptian Goose | *Alopochen aegyptiaca* | 1 | LC,LC | 78 |
| Western Cattle Egret | *Bubulcus ibis* | 1 | LC,LC | 78 |
| Blacksmith Lapwing | *Vanellus armatus* | 1 | LC,LC | 67 |
| African Wattled Lapwing | *Vanellus senegallus* | 1 | LC,LC | 67 |
| Reed Cormorant | *Microcarbo africanus* | 1 | LC,LC | 67 |
| White-breasted Cormorant | *Phalacrocorax lucidus* | 1 | LC,LC | 67 |
| Grey Heron | *Ardea cinerea* | 1 | LC,LC | 67 |
| Black-headed Heron | *Ardea melanocephala* | 1 | LC,LC | 67 |
| Hamerkop | *Scopus umbretta* | 1 | LC,LC | 67 |
| Hadeda Ibis | *Bostrychia hagedash* | 1 | LC,LC | 67 |
| Malachite Kingfisher | *Corythornis cristatus* | 2 | LC,LC | 56 |
| Woodland Kingfisher | *Halcyon senegalensis* | 2 | LC,LC | 56 |
| Giant Kingfisher | *Megaceryle maxima* | 2 | LC,LC | 56 |

| Common Name | Scientific Name | LO | Status | Pentads (%) |
|---|---|---|---|---|
| Pied Kingfisher | *Ceryle rudis* | 1 | LC,LC | 56 |
| Yellow-throated Sandgrouse | *Pterocles gutturalis* | 3 | NT, LC | 56 |
| Wood Sandpiper | *Tringa glareola* | 3 | LC,LC | 56 |
| Spotted Thick-knee | *Burhinus capensis* | 2 | LC,LC | 56 |
| Little Grebe | *Tachybaptus ruficollis* | 1 | LC,LC | 56 |
| African Darter | *Anhinga rufa* | 1 | LC,LC | 56 |
| Little Egret | *Egretta garzetta* | 2 | LC,LC | 56 |
| Green-backed (Striated) Heron | *Butorides striata* | 1 | LC,LC | 56 |
| Red-crested Korhaan | *Lophotis ruficrista* | 2 | LC,LC | 44 |
| Common Moorhen | *Gallinula chloropus* | 1 | LC,LC | 44 |
| Red-knobbed Coot | *Fulica cristata* | 1 | LC,LC | 44 |
| Marsh Sandpiper | *Tringa stagnatilis* | 3 | LC,LC | 44 |
| Ruff | *Calidris pugnax* | 3 | LC,LC | 44 |
| Great Egret | *Ardea alba* | 2 | LC,LC | 44 |
| Squacco Heron | *Ardeola ralloides* | 1 | LC,LC | 44 |
| Glossy Ibis | *Plegadis falcinellus* | 1 | LC,LC | 44 |
| African Sacred Ibis | *Threskiornis aethiopicus* | 1 | LC,LC | 44 |
| African Spoonbill | *Platalea alba* | 2 | LC,LC | 44 |
| Yellow-billed Stork | *Mycteria ibis* | 4 | EN, LC | 44 |
| Abdim's Stork | *Ciconia abdimii* | 3 | NT, LC | 44 |
| Knob-billed Duck | *Sarkidiornis melanotos* | 3 | LC,LC | 33 |
| Cape Teal | *Anas capensis* | 2 | LC,LC | 33 |
| Yellow-billed Duck | *Anas undulata* | 1 | LC,LC | 33 |
| Common Greenshank | *Tringa nebularia* | 2 | LC,LC | 33 |
| African Jacana | *Actophilornis africanus* | 2 | LC,LC | 33 |
| Goliath Heron | *Ardea goliath* | 2 | LC,LC | 33 |
| Purple Heron | *Ardea purpurea* | 1 | LC,LC | 33 |
| White Stork | *Ciconia ciconia* | 3 | LC,LC | 33 |
| Hottentot Teal | *Spatula hottentota* | 2 | LC,LC | 22 |
| Double-banded Sandgrouse | *Pterocles bicinctus* | 2 | LC,LC | 22 |
| Black-crowned Night Heron | *Nycticorax nycticorax* | 2 | LC,LC | 22 |
| Little Bittern | *Ixobrychus minutus* | 4 | LC,LC | 22 |
| Yellow-billed Kite | *Milvus aegyptius* | 3 | LC,LC | 22 |
| Northern Black Korhaan | *Afrotis afraoides* | 3 | LC,LC | 11 |
| African Finfoot | *Podica senegalensis* | 3 | VU, LC | 11 |
| Curlew Sandpiper | *Calidris ferruginea* | 3 | LC, NT | 11 |
| Greater Painted-snipe | *Rostratula benghalensis* | 2 | NT, LC | 11 |
| Black Heron | *Egretta ardesiaca* | 2 | LC,LC | 11 |

# 8 Sensitivity Assessement

Areas of avifaunal sensitivity within the AOI are presented in Figure 8-1. These areas were based on a combination of selected wetland delineation data, as deemed important for avifauna and abundance data on congregations of collision prone species. The wetland / watercourse areas deemed important for avifauna were assigned a very high importance and sensitivity. This is because wetland species account for the bulk of the regionally occurring SCC and are widely accepted in the literature as being most susceptible to collision with solar panels. These wetlands also supported by far the highest species richness and abundance of avifauna within the entire project area; and the highest abundances of collision prone species.

To account for this, the heatmap model on abundances of collision prone species was polygonised and split into three sensitivity classes namely high, moderate and moderate-low; and combined with selected watercourse spatial data and buffers to arrive at the sensitivity maps provided below. Additionally, data from terrestrial biodiversity assessment was used for habitat sensitivities.

Overall, all watercourses and modelled hotspots of collision prone species were designated Very High sensitivity, the koppies were assigned a High sensitivity and the flat rocky outcrops a Medium Sensitivity. All other areas comprising mainly FBTT were assigned a Low sensitivity. The project area overlaps an area designated Medium sensitivity.

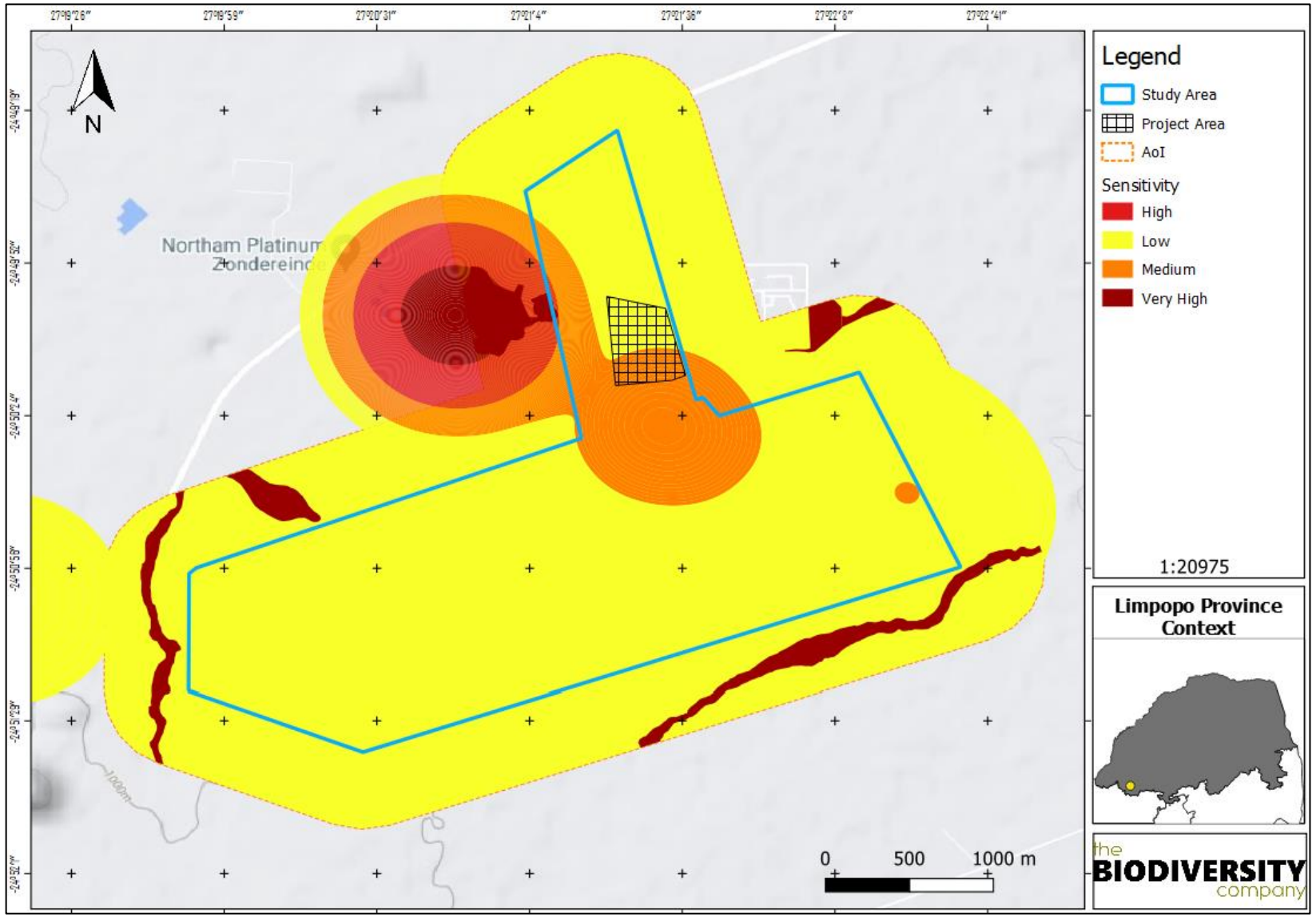


***Figure 8-1 Avifaunal sensitivity map***

# 9 Impact Assessment

## 9.1 Existing Impacts

The following existing impacts were observed:

- NHM mining operations in the vicinity;
- Electrical transmission lines;
- A bird death observed at the dam, currently unsure if stochastic natural causes or due to toxin accumulation;
- Historical agricultural land-use;
- Intense past cattle grazing practices which has led to a dense moribund grassland, heavily encroached by weedy annuals;
- Roads and associated vehicle traffic; and
- Fences posing restrictive and entrapment risks.


***Figure 9-1 Existing impacts***
A) Restrictive barriers and entrapment through fence, B) waterbird deaths, C) mining, dams and powerlines

## 9.2 Anticipated Impacts

The anticipated impacts during the construction, operation and decommissioning phases of the proposed project are presented in the tables to follow, along with the prescribed mitigation and residual impact rating.

***Table 9-1 Habitat loss, degradation, and fragmentation***

| ***Nature: Habitat loss (construction, operation, and decommissioning)*** | | |
|---|---|---|
| **Habitat loss, degradation and fragmentation** | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Moderate (3) | Low (2) |
| ***Duration*** | Long term (4) | Long term (4) |
| ***Magnitude*** | High (8) | Moderate (6) |
| ***Probability*** | Definite (5) | Probable (3) |
| ***Significance*** | **High (75)** | **Medium (36)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Low | Moderate |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:*** | | |
| • Avoid placing solar panels and associated infrastructure within the areas demarcated as being of High. Devevelopment in Moderate avifaunal sensitivity areas must be mitigated.<br>• Rehabilitate all areas that were redundantly disturbed by the construction of the project immediately after construction.<br>• Develop and implement an Alien and Invasive Plant Control Plan.<br>• Develop, budget for and implement a project decommissioning rehabilitation plan to re-instate the black turf thornveld following decommissioning.<br>• Use the sensitivity spatial layers provided to appropriately position the surface infrastructure, to avoid High sensitive avifaunal habitat.<br>• Demarcate these High sensitvity areas on the ground during construction and signpost them as *"environmentally sensitive areas keep out"*. | | |
| ***Residual Impacts:*** | | |
| Despite the implementation of the mitigation measures, development of the PV plant within the project area and its associated infrastructure will invariably result in the loss of a significant area of avifaunal habitat. This impact would permanently alter the natural thornveld habitat. However, it must be noted that this habitat has been altered by intense livestock grazing. | | |

***Table 9-2 Collision and electrocution***

| ***Nature: Infrastructure-induced mortality (operation)*** | | |
|---|---|---|
| **Collision and electrocution** | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Moderate (3) | Moderate (3) |
| ***Duration*** | Long term (4) | Long term (4) |
| ***Magnitude*** | High (8) | Moderate (6) |
| ***Probability*** | Definite (5) | Highly probable (4) |
| ***Significance*** | **High (75)** | **Medium (52)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | High | High |
| ***Irreplaceable loss of resources?*** | Yes | No |
| ***Can impacts be mitigated?*** | Yes | |

| ***Mitigation:*** |
|---|
| • The design of the proposed PV facility must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2015).<br>• All exposed electrically charged components must be covered (insulated) to reduce electrocution risk.<br>• All power cables within the project area should be thoroughly insulated and preferably buried in demarcated corridors.<br>• White strips should be placed along the edges of the panels, to help reduce similarity to water and deter birds and insects following Horvath et al. (2010).<br>• Install bird deterrent devices around panels to limit collision risk.<br>• Fit the entire length of the powerline between the plant and the main road, especially nearer the dam, wetlands and koppies with bird flappers to minimise collision risk.<br>• BESS must be covered in non-reflective surfaces and protected against thermal discharge and the risk of veld fires as a result. |
| ***Residual Impacts:*** |
| Despite the implementation of the mitigation measures, there will still always be a collision and electrocution risk associated with a solar plant, however, it will be reduced to a Moderate significance. This is because the large dam will always attract flocks of waterfowl. |

### *Table 9-3 Direct loss of SCC nests*

| ***Nature: Loss of key SCC avifauna sources*** | | |
|---|---|---|
| **Direct loss of SCC nests** | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Moderate (3) | Low (2) |
| ***Duration*** | Long term (4) | Short term (2) |
| ***Magnitude*** | Moderate (6) | Minor (2) |
| ***Probability*** | Probable (3) | Improbable (2) |
| ***Significance*** | **Medium (39)** | **Low (12)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Moderate | High |
| ***Irreplaceable loss of resources?*** | Yes | No |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:*** | | |
| • If any overlooked nests of raptors or large terrestrial birds are found during construction, halt construction activities and call an avifaunal specialist immediately for advice on the way forward.<br>• Avoid all areas of Very High and High avifaunal sensitivity. | | |
| ***Residual Impacts:*** | | |
| No residual impact anticipated, as no SCC nests were encountered within the project area. | | |

### *Table 9-4 Sensory disturbance and extirpation of SCC*

| ***Nature: Sensory disturbance*** | | |
|---|---|---|
| **Sensory disturbance and extirpation of SCC** | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Moderate (3) | Low (2) |
| ***Duration*** | Long term (4) | Long term (4) |
| ***Magnitude*** | Moderate (6) | Low (4) |
| ***Probability*** | Highly probable (4) | Improbable (2) |
| ***Significance*** | **Medium (52)** | **Low (20)** |

| | | |
|---|---|---|
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Moderate | Moderate |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:*** | | |
| • Attempt as far as possible to conduct most of the high intensity construction activities during winter, to minimize avifauna disturbance during sensitive life stages (such as lekking, courting, nesting and fledging).<br>• Keep lighting to a minimum and fit external lighting with downward facing hoods.<br>• Demarcate natural areas beyond the surface infrastructure footprint and restrict access of personnel into these areas, through education and signposting.<br>• All construction and maintenance motor vehicle operators should undergo an environmental induction, including the need to comply with speed limit (40km/h), to respect all forms of wildlife.<br>• Speed limits must still be enforced to ensure that road killings and erosion is limited.<br>• Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons (July-September). | | |
| ***Residual Impacts:*** | | |
| Although dust, noise and human activity during construction is unavoidable, much can be done to reduce the effect of these sensory disturbance impacts on avifauna by adopting temporal avoidance strategies by simply avoiding intense construction activities during spring and summer. During operation, the residual impacts associated with sensory disturbance should drop to a Low significance. | | |

***Table 9-5 Effects on resident SCC breeding populations***

| ***Nature: Cumulative loss of SCC avifauna in the area*** | | |
|---|---|---|
| **Effects on resident SCC breeding populations** | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Low (2) | Very low (1) |
| ***Duration*** | Long term (4) | Long term (4) |
| ***Magnitude*** | Low (4) | Low (4) |
| ***Probability*** | Probable (3) | Probable (3) |
| ***Significance*** | **Medium (30)** | **Low (27)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Moderate | High |
| ***Irreplaceable loss of resources?*** | Yes | No |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:*** | | |
| • Rehabilitate or manage all non-developed areas within the study area, to support a far more open black turf thornveld through appropriate fire and grazing veld management strategies.<br>• Rehabilitated following decommissioning to re-instate open black turf thornveld. | | |
| ***Residual Impacts:*** | | |
| This impact will only slightly add (ca. 20 ha) to the cumulative loss of habitat in the core breeding range of the South African resident population of Yellow-throated Sandgrouse due to mining and industry related developments. This impact may be reversed if the site is rehabilitated following decommissioning to re-instate open black turf thornveld. | | |

# 10 Conclusion

During the brief site visit, a total of 102 species were observed within the study area, through a combination of 38 point counts and incidental observations conducted over three days. Of the four habitats, the highest avian diversity was observed in the Flat Black Turf Thornveld (FBTT), followed by Wetland (W), Transformed Grassland (TG) and lastly Rocky Black Turf Thornveld (RBTT). However, the high diversity in the FBTT is likely an artefact of the inherently uneven sample sizes between the habitats due to the scarcity of rocky and wetland habitat on site. In reality the RBTT and W habitats are likely the most diverse and unique due to their higher microhabitat diversity, structural complexity and resource diversity.

Although no SCC were observed during the site visit, Cape Vulture was observed on a previous survey (dated October 2019) in the vicinity and as many as 16 other regionally occurring species have the potential to occur in the study area. Of these only Secretarybird and Lanner Falcon are considered marginally likely to breed within the project area based on habitat suitability.

In terms of avifaunal sensitivity, all watercourses and modelled hotspots of collision prone species in the study area were designated Very High sensitivity, the koppies were assigned a High sensitivity and the flat rocky outcrops a Medium Sensitivity. All other areas comprising mainly FBTT were assigned a Low sensitivity.

Five impacts to avifauna are anticipated due to the establishment PV plant, discussed below.

*Habitat loss* was assigned a residual risk of Medium, on account of the high likelihood of the development and long-term nature of the project. However, the small extent of footprint area (ca. 20 ha), coupled with the prescribed mitigation, reduces the overall significance of this impact. Of greatest importance in this regard are the developers avoid all areas of Very, High and, where possible, moderate avifaunal sensitivity.

*Collision and electrocution* were also assigned a Medium significance, as it is likely an unavoidable risk. However, this impact can be effectively reduced by designing the proposed PV and BESS in a manner endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa and installing flappers on the existing transmission line, especially near watercourses.

*Direct loss of SCC nests and sensory disturbance / extirpation of SCC* is deemed to have a Low residual risk on account of the general lack of SCC nests and individuals on site and the effective mitigation which can be implemented to reduce disturbances to any potentially occurring SCC.

*Cumulative effects on resident SCC breeding populations*, particularly Yellow-throated Sandgrouse. This was a key target species for this survey due to the site's position within the core of the South African resident breeding population's range, as defined by the small Northern Black Turf Thornveld IBA. However, the species frequents shortly cropped open grassland and, particularly, fallow croplands in this area, a habitat that was distinctly lacking within the project area. Instead, the project area comprises of a dense tangle of previously cattle impacted, underutilised and moribund grassland between a dense thornveld which, in places, resembled woodland. Consequently, this species is considered moderately likely to occur, but unlikely to breed within the project area, in its current state. This impact may be reversed and potentially even converted into a net gain for the species, if all remaining non

disturbed areas within the study area are rehabilitated / managed to support a far more open black turf thornveld through appropriate fire and grazing veld management strategies.

## 10.1 Impact Statement

The main expected impacts of the proposed project will include the following:

- Habitat loss, degradation and fragmentation;
- Collision and electrocution;
- Direct loss of scc nests;
- Sensory disturbance and extirpation of scc; and
- Effects on resident scc breeding populations.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Of greatest importance in this regard are the developers avoid all areas of Very High and High sensivity. Development within Medium sensivity areas must be mitigated. Despite the implementation of the mitigation measures, there will still always be a collision and electrocution risk associated with a solar plant, this is because the large dam will always attract flocks of waterfowl. Although dust, noise and human activity during construction is unavoidable, much can be done to reduce the effect of these sensory disturbance impacts on avifauna with temporal avoidance strategies, by simply avoiding intense construction activities during spring and summer.This impact will only slightly add (ca. 20 ha) to the cumulative loss of habitat in the core breeding range of the South African resident population of Yellow-throated Sandgrouse as a result of mining and industry related developments. This impact may be reversed if the site is rehabilitated following decommissioning to re-instate open black turf thornveld.

Considering the abovementioned information, no fatal flaws are evident for the proposed project. It is the opinions of the specialists that the project may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented.

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# 12 Appendix

## 12.1 Appendix A – Present and potentially occurring avifauna

| Common Name | Scientific Name | LO | Status | CP | Residency | Endemism | 2445_2715 | 2445_2720 | 2445_2725 | 2450_2715 | 2450_2720 | 2450_2725 | 2455_2715 | 2455_2720 | 2455_2725 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Ostrich | *Struthio camelus* | 5 | LC,LC | | 0 | 0 | x | x | x | x | | | x | x | x |
| Crested Francolin | *Dendroperdix sephaena* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Natal Spurfowl | *Pternistis natalensis* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | x | x | x | | x |
| Swainson's Spurfowl | *Pternistis swainsonii* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Common Quail | *Coturnix coturnix* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | |
| Harlequin Quail | *Coturnix delegorguei* | 4 | LC,LC | | 0 | 0 | | x | | | | | | | |
| Indian Peafowl | *Pavo cristatus* | 5 | LC,LC | | I | 0 | x | | | | | | | | |
| Helmeted Guineafowl | *Numida meleagris* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | x | x | x | x | x |
| White-faced Whistling Duck | *Dendrocygna viduata* | 1 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | |
| Egyptian Goose | *Alopochen aegyptiaca* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | x |
| Spur-winged Goose | *Plectropterus gambensis* | 1 | LC,LC | | 0 | 0 | | x | x | | | x | x | | |
| Knob-billed Duck | *Sarkidiornis melanotos* | 3 | LC,LC | x | 0 | 0 | | x | x | | | x | | | |
| Cape Teal | *Anas capensis* | 2 | LC,LC | x | 0 | 0 | x | x | | | | | x | | |
| African Black Duck | *Anas sparsa* | 2 | LC,LC | | 0 | 0 | x | x | | x | | x | | | |
| Yellow-billed Duck | *Anas undulata* | 1 | LC,LC | x | 0 | 0 | x | x | | | | | x | | |
| Cape Shoveler | *Spatula smithii* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | |
| Red-billed Teal | *Anas erythrorhyncha* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | | x | | |
| Hottentot Teal | *Spatula hottentota* | 2 | LC,LC | x | 0 | 0 | x | x | | | | | | | |
| Southern Pochard | *Netta erythrophthalma* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | |
| Greater Honeyguide | *Indicator indicator* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | x |
| Lesser Honeyguide | *Indicator minor* | 1 | LC,LC | | 0 | 0 | x | | | x | | | x | | x |
| Bennett's Woodpecker | *Campethera bennettii* | 3 | LC,LC | | 0 | 0 | | | | | | | | | x |
| Golden-tailed Woodpecker | *Campethera abingoni* | 2 | LC,LC | | 0 | 0 | x | x | | | x | x | x | x | x |
| Cardinal Woodpecker | *Dendropicos fuscescens* | 2 | LC,LC | | 0 | 0 | x | | | | | x | x | x | x |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bearded Woodpecker | *Chloropicus namaquus* | 2 | LC,LC | | 0 | 0 | x | x | | | | | x | | x |
| Yellow-fronted Tinkerbird | *Pogoniulus chrysoconus* | 2 | LC,LC | | 0 | 0 | x | | | | | x | x | | x |
| Acacia Pied Barbet | *Tricholaema leucomelas* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | | x | x | |
| Black-collared Barbet | *Lybius torquatus* | 1 | LC,LC | | 0 | 0 | x | | | x | | x | | | x |
| Crested Barbet | *Trachyphonus vaillantii* | 2 | LC,LC | | 0 | 0 | x | | x | x | | x | x | x | x |
| Southern Red-billed Hornbill | *Tockus rufirostris* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Southern Yellow-billed Hornbill | *Tockus leucomelas* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| African Grey Hornbill | *Lophocerus nasutus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| African Hoopoe | *Upupa africana* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | x | x |
| Green Wood-hoopoe | *Phoeniculus purpureus* | 2 | LC,LC | | 0 | 0 | x | | x | | | x | x | | x |
| Common Scimitarbill | *Rhinopomastus cyanomelas* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | |
| European Roller | *Coracias garrulus* | 3 | NT, LC | | 0 | 0 | | | x | | | | | | |
| Lilac-breasted Roller | *Coracias caudatus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Purple Roller | *Coracias naevius* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Malachite Kingfisher | *Corythornis cristatus* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| Woodland Kingfisher | *Halcyon senegalensis* | 2 | LC,LC | x | 0 | 0 | x | | x | x | | x | x | | |
| Brown-hooded Kingfisher | *Halcyon albiventris* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | x | x |
| Giant Kingfisher | *Megaceryle maxima* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| Pied Kingfisher | *Ceryle rudis* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| White-fronted Bee-eater | *Merops bullockoides* | 2 | LC,LC | | 0 | 0 | x | x | x | | x | x | | | |
| Little Bee-eater | *Merops pusillus* | 2 | LC,LC | | 0 | 0 | x | x | x | | | | | | |
| Blue-cheeked Bee-eater | *Merops persicus* | 4 | LC,LC | | 0 | 0 | | x | x | | | | | | |
| European Bee-eater | *Merops apiaster* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Southern Carmine Bee-eater | *Merops nubicoides* | 4 | LC,LC | | 0 | 0 | | | x | | | | | | |
| White-backed Mousebird | *Colius colius* | 4 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Speckled Mousebird | *Colius striatus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Red-faced Mousebird | *Urocolius indicus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Jacobin Cuckoo | *Clamator jacobinus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | | x | | |
| Levaillant's Cuckoo | *Clamator levaillantii* | 2 | LC,LC | | 0 | 0 | x | | x | x | | | x | | |
| Great Spotted Cuckoo | *Clamator glandarius* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Red-chested Cuckoo | *Cuculus solitarius* | 2 | LC,LC | | 0 | 0 | x | x | | x | | | x | | x |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Black Cuckoo | *Cuculus clamosus* | 2 | LC,LC | | 0 | 0 | x | x | | x | | | x | | x |
| African Cuckoo | *Cuculus gularis* | 4 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Klaas's Cuckoo | *Chrysococcyx klaas* | 2 | LC,LC | | 0 | 0 | x | x | | | | | x | | |
| Diederik Cuckoo | *Chrysococcyx caprius* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Burchell's Coucal | *Centropus burchellii* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | |
| Meyer's Parrot | *Poicephalus meyeri* | 2 | LC,LC | | 0 | 0 | x | | | | | | x | x | x |
| African Palm Swift | *Cypsiurus parvus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Alpine Swift | *Tachymarptis melba* | 2 | LC,LC | | 0 | 0 | x | | x | | x | | x | | |
| African Black Swift | *Apus barbatus* | 2 | LC,LC | | 0 | 0 | | | | | | | x | | |
| Little Swift | *Apus affinis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Horus Swift | *Apus horus* | 4 | LC,LC | | 0 | 0 | | x | | | | | | | |
| White-rumped Swift | *Apus caffer* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Grey Go-away-bird | *Corythaixoides concolor* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Western Barn Owl | *Tyto alba* | 2 | LC,LC | | 0 | 0 | x | | x | x | x | | | | |
| African Scops Owl | *Otus senegalensis* | 4 | LC,LC | | 0 | 0 | | | x | | | | | | |
| Southern White-faced Owl | *Ptilopsis granti* | 2 | LC,LC | | 0 | 0 | | | | | | | | | x |
| Spotted Eagle-owl | *Bubo africanus* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |
| Verreaux's Eagle-Owl | *Bubo lacteus* | 3 | LC,LC | | 0 | 0 | | | | x | | | | | |
| Pearl-spotted Owlet | *Glaucidium perlatum* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Marsh Owl | *Asio capensis* | 2 | LC,LC | | 0 | 0 | x | x | x | | | | x | | |
| Fiery-necked Nightjar | *Caprimulgus pectoralis* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | x |
| Freckled Nightjar | *Caprimulgus tristigma* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Rock Dove | *Columba livia* | 1 | LC,LC | | 0 | 0 | x | | x | | | | x | | |
| Speckled Pigeon | *Columba guinea* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Laughing Dove | *Spilopelia senegalensis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Cape Turtle (Ring-necked) Dove | *Streptopelia capicola* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Red-eyed Dove | *Streptopelia semitorquata* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Emerald-spotted Wood Dove | *Turtur chalcospilos* | 2 | LC,LC | | 0 | 0 | x | | | | | x | | | x |
| Namaqua Dove | *Oena capensis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Red-crested Korhaan | *Lophotis ruficrista* | 2 | LC,LC | x | 0 | 0 | x | | | | | | x | x | x |
| Northern Black Korhaan | *Afrotis afraoides* | 3 | LC,LC | x | 0 | 0 | | | | | | | x | | |

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| African Finfoot | *Podica senegalensis* | 3 | VU, LC | x | 0 | 0 | x | | | | | | | | |
| Black Crake | *Amaurornis flavirostra* | 1 | LC,LC | | 0 | 0 | x | x | | | | x | x | | |
| African (Purple) Swamphen | *Porphyrio madagascariensis* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | x |
| Common Moorhen | *Gallinula chloropus* | 1 | LC,LC | x | 0 | 0 | x | x | | | | x | x | | |
| Red-knobbed Coot | *Fulica cristata* | 1 | LC,LC | x | 0 | 0 | x | x | | | | x | x | | |
| Yellow-throated Sandgrouse | *Pterocles gutturalis* | 3 | NT, LC | x | 0 | 0 | x | x | x | | x | x | | | |
| Double-banded Sandgrouse | *Pterocles bicinctus* | 2 | LC,LC | x | 0 | 0 | x | | | x | | | | | |
| Marsh Sandpiper | *Tringa stagnatilis* | 3 | LC,LC | x | 0 | 0 | x | x | x | | | | x | | |
| Common Greenshank | *Tringa nebularia* | 2 | LC,LC | x | 0 | 0 | | x | x | | | | x | | |
| Wood Sandpiper | *Tringa glareola* | 3 | LC,LC | x | 0 | 0 | x | x | x | | | x | x | | |
| Common Sandpiper | *Actitis hypoleucos* | 2 | LC,LC | | 0 | 0 | x | | x | | | | | | x |
| Little Stint | *Calidris minuta* | 2 | LC,LC | | 0 | 0 | x | x | x | | | | x | | x |
| Curlew Sandpiper | *Calidris ferruginea* | 3 | LC, NT | x | 0 | 0 | x | | | | | | | | |
| Ruff | *Calidris pugnax* | 3 | LC,LC | x | 0 | 0 | x | x | x | | | | x | | |
| Greater Painted-snipe | *Rostratula benghalensis* | 2 | NT, LC | x | 0 | 0 | | x | | | | | | | |
| African Jacana | *Actophilornis africanus* | 2 | LC,LC | x | 0 | 0 | x | x | | | | x | | | |
| Spotted Thick-knee | *Burhinus capensis* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | | | | | x |
| Black-winged Stilt | *Himantopus himantopus* | 2 | LC,LC | | 0 | 0 | x | x | x | | | | x | | x |
| Pied Avocet | *Recurvirostra avosetta* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | x |
| Kittlitz's Plover | *Charadrius pecuarius* | 2 | LC,LC | | 0 | 0 | x | x | | x | | | | | x |
| Three-banded Plover | *Charadrius tricollaris* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Blacksmith Lapwing | *Vanellus armatus* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| African Wattled Lapwing | *Vanellus senegallus* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| Crowned Lapwing | *Vanellus coronatus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Bronze-winged Courser | *Rhinoptilus chalcopterus* | 3 | LC,LC | | 0 | 0 | | x | | x | | | | | |
| Temminck's Courser | *Cursorius temminckii* | 2 | LC,LC | | 0 | 0 | x | x | | | x | x | | | |
| Black-winged Pratincole | *Glareola nordmanni* | 4 | NT, NT | | 0 | 0 | | | x | | | | | | x |
| Black-winged Kite | *Elanus caeruleus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | |
| African Fish Eagle | *Haliaeetus vocifer* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |

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| Cape Vulture | *Gyps coprotheres* | 2 | EN, EN | | 0 | 0 | x | x | | x | | | x | | x |
| Lappet-faced Vulture | *Torgos tracheliotos* | 2 | EN, EN | | 0 | 0 | x | | | | | | | | x |
| Black-chested Snake Eagle | *Circaetus pectoralis* | 1 | LC,LC | | 0 | 0 | | x | x | x | x | x | | | x |
| Brown Snake Eagle | *Circaetus cinereus* | 2 | LC,LC | | 0 | 0 | x | x | | | | | x | | x |
| Lizard Buzzard | *Kaupifalco monogrammicus* | 3 | LC,LC | | 0 | 0 | | | x | | | | | | x |
| Pale Chanting Goshawk | *Melierax canorus* | 3 | LC,LC | | 0 | 0 | | | | x | | | | | x |
| Gabar Goshawk | *Micronisus gabar* | 1 | LC,LC | | 0 | 0 | x | x | x | | x | | | | x |
| Shikra | *Accipiter badius* | 2 | LC,LC | | 0 | 0 | | x | | x | | | | | x |
| Little Sparrowhawk | *Accipiter minullus* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Common (Steppe) Buzzard | *Buteo buteo* | 2 | LC,LC | | 0 | 0 | | x | x | x | | x | x | | x |
| Jackal Buzzard | *Buteo rufofuscus* | 3 | LC,LC | | 0 | NE | | | x | | | | | | x |
| Lesser Spotted Eagle | *Clanga pomarina* | 3 | LC,LC | | 0 | 0 | | | | | | | | | x |
| Verreaux's Eagle | *Aquila verreauxii* | 2 | VU, LC | | 0 | 0 | | | | x | | | | | x |
| African Hawk Eagle | *Aquila spilogaster* | 2 | LC,LC | | 0 | 0 | | | | x | | | | | x |
| Martial Eagle | *Polemaetus bellicosus* | 2 | EN, VU | | 0 | 0 | x | x | | | | | | | x |
| Long-crested Eagle | *Lophaetus occipitalis* | 4 | LC,LC | | 0 | 0 | | | | | | x | | | x |
| Secretarybird | *Sagittarius serpentarius* | 2 | VU, VU | | 0 | 0 | | | | x | | | | | x |
| Lesser Kestrel | *Falco naumanni* | 2 | LC,LC | | 0 | 0 | | | | x | x | | | | |
| Rock Kestrel | *Falco rupicolus* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |
| Greater Kestrel | *Falco rupicoloides* | 2 | LC,LC | | 0 | 0 | x | | | x | x | | | | |
| Amur Falcon | *Falco amurensis* | 3 | LC,LC | | 0 | 0 | | x | x | | | | | | |
| Lanner Falcon | *Falco biarmicus* | 2 | VU, LC | | 0 | 0 | | | x | x | | | x | | x |
| Little Grebe | *Tachybaptus ruficollis* | 1 | LC,LC | x | 0 | 0 | x | x | x | | | x | x | | |
| African Darter | *Anhinga rufa* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| Reed Cormorant | *Microcarbo africanus* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| White-breasted Cormorant | *Phalacrocorax lucidus* | 1 | LC,LC | x | 0 | 0 | x | x | x | | | x | x | x | |
| Black Heron | *Egretta ardesiaca* | 2 | LC,LC | x | 0 | 0 | | x | | | | | | | |
| Little Egret | *Egretta garzetta* | 2 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| Yellow-billed (Intermediate) Egret | *Ardea intermedia* | 1 | LC,LC | | 0 | 0 | x | x | | | | | x | | x |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Great Egret | *Ardea alba* | 2 | LC,LC | x | 0 | 0 | x | x | | | | x | x | | |
| Grey Heron | *Ardea cinerea* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| Black-headed Heron | *Ardea melanocephala* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| Goliath Heron | *Ardea goliath* | 2 | LC,LC | x | 0 | 0 | x | x | | | | x | | | |
| Purple Heron | *Ardea purpurea* | 1 | LC,LC | x | 0 | 0 | x | x | | | | x | | | |
| Western Cattle Egret | *Bubulcus ibis* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | x | x | x | | |
| Squacco Heron | *Ardeola ralloides* | 1 | LC,LC | x | 0 | 0 | x | x | x | | | x | | | |
| Green-backed (Striated) Heron | *Butorides striata* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | | | |
| Black-crowned Night Heron | *Nycticorax nycticorax* | 2 | LC,LC | x | 0 | 0 | x | x | | | | | | | |
| Little Bittern | *Ixobrychus minutus* | 4 | LC,LC | x | 0 | 0 | x | x | | | | | | | |
| Hamerkop | *Scopus umbretta* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| Greater Flamingo | *Phoenicopterus roseus* | 4 | NT, LC | | 0 | 0 | | x | | | | | | | x |
| Lesser Flamingo | *Phoeniconaias minor* | 4 | NT, NT | | 0 | 0 | | x | | | | | | | x |
| Glossy Ibis | *Plegadis falcinellus* | 1 | LC,LC | x | 0 | 0 | | x | x | | | x | x | | |
| Hadeda Ibis | *Bostrychia hagedash* | 1 | LC,LC | x | 0 | 0 | x | x | x | x | | x | x | | |
| African Sacred Ibis | *Threskiornis aethiopicus* | 1 | LC,LC | x | 0 | 0 | x | x | x | | | | x | | |
| African Spoonbill | *Platalea alba* | 2 | LC,LC | x | 0 | 0 | x | x | x | | | | x | | |
| Yellow-billed Stork | *Mycteria ibis* | 4 | EN, LC | x | 0 | 0 | x | x | x | | | | x | | |
| Abdim's Stork | *Ciconia abdimii* | 3 | NT, LC | x | 0 | 0 | | x | x | | | x | x | | |
| White Stork | *Ciconia ciconia* | 3 | LC,LC | x | 0 | 0 | | x | x | | | x | | | |
| Marabou Stork | *Leptoptilos crumenifer* | 3 | NT, LC | | 0 | 0 | x | x | x | | x | | x | | x |
| Black-headed Oriole | *Oriolus larvatus* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | x |
| Fork-tailed Drongo | *Dicrurus adsimilis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| African Paradise Flycatcher | *Terpsiphone viridis* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | x |
| Brubru | *Nilaus afer* | 1 | LC,LC | | 0 | 0 | x | x | | x | x | x | x | x | x |
| Black-backed Puffback | *Dryoscopus cubla* | 1 | LC,LC | | 0 | 0 | x | | | x | | x | x | | x |
| Black-crowned Tchagra | *Tchagra senegalus* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Brown-crowned Tchagra | *Tchagra australis* | 2 | LC,LC | | 0 | 0 | x | | x | x | | x | x | x | x |
| Southern Boubou | *Laniarius ferrugineus* | 2 | LC,LC | | 0 | 0 | x | | x | x | | x | x | | x |

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| Crimson-breasted Shrike | *Laniarius atrococcineus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Orange-breasted Bush-shrike | *Chlorophoneus sulfureopectus* | 1 | LC,LC | | 0 | 0 | x | | x | | | x | | | x |
| Grey-headed Bush-shrike | *Malaconotus blanchoti* | 2 | LC,LC | | 0 | 0 | x | | | | | x | | | x |
| White-crested Helmet-shrike | *Prionops plumatus* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |
| Chinspot Batis | *Batis molitor* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Pied Crow | *Corvus albus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | |
| Red-backed Shrike | *Lanius collurio* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | | x | | x |
| Lesser Grey Shrike | *Lanius minor* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Southern (Common) Fiscal | *Lanius collaris* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | |
| Magpie Shrike | *Urolestes melanoleucus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Southern White-crowned Shrike | *Eurocephalus anguitimens* | 2 | LC,LC | | 0 | 0 | | | x | | | x | x | | |
| Cape Penduline-tit | *Anthoscopus minutus* | 1 | LC,LC | | 0 | 0 | | x | | | | | | | |
| Southern Black Tit | *Melaniparus niger* | 2 | LC,LC | | 0 | 0 | x | | x | | x | x | x | | x |
| Ashy Tit | *Melaniparus cinerascens* | 2 | LC,LC | | 0 | 0 | x | | | x | x | | x | | |
| Brown-throated Martin | *Riparia paludicola* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | | | |
| Barn Swallow | *Hirundo rustica* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| White-throated Swallow | *Hirundo albigularis* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | | | | |
| Pearl-breasted Swallow | *Hirundo dimidiata* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | |
| Greater Striped Swallow | *Cecropis cucullata* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | | x | | x |
| Lesser Striped Swallow | *Cecropis abyssinica* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Red-breasted Swallow | *Cecropis semirufa* | 2 | LC,LC | | 0 | 0 | | | x | | | x | x | | |
| Rock Martin | *Ptyonoprogne fuligula* | 1 | LC,LC | | 0 | 0 | x | x | | x | | x | x | | |
| Common House Martin | *Delichon urbicum* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |
| Dark-capped Bulbul | *Pycnonotus tricolor* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| African Red-eyed Bulbul | *Pycnonotus nigricans* | 4 | LC,LC | | 0 | 0 | x | x | | | | x | | | |
| Yellow-bellied Greenbul | *Chlorocichla flaviventris* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | x |
| Fairy Flycatcher | *Stenostira scita* | 4 | LC,LC | | 0 | NE | x | | | | | | x | | |
| Long-billed Crombec | *Sylvietta rufescens* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Yellow-bellied Eremomela | *Eremomela icteropygialis* | 2 | LC,LC | | 0 | 0 | x | x | | | | | | | x |
| Burnt-necked Eremomela | *Eremomela usticollis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Little Rush Warbler | *Bradypterus baboecala* | 2 | LC,LC | | 0 | 0 | x | x | | | | x | | | |
| African Reed Warbler | *Acrocephalus baeticatus* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |

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| Lesser Swamp Warbler | *Acrocephalus gracilirostris* | 1 | LC,LC | | 0 | 0 | x | x | | | | x | | | |
| Willow Warbler | *Phylloscopus trochilus* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | x |
| Southern Pied Babbler | *Turdoides bicolor* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Arrow-marked Babbler | *Turdoides jardineii* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Chestnut-vented Tit-Babbler (Warbler) | *Sylvia subcoerulea* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Cape White-eye | *Zosterops virens* | 2 | LC,LC | | 0 | NE | x | x | x | x | | | | | x |
| Lazy Cisticola | *Cisticola aberrans* | 3 | LC,LC | | 0 | 0 | | | | x | | | | | |
| Rattling Cisticola | *Cisticola chiniana* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Levaillant's Cisticola | *Cisticola tinniens* | 3 | LC,LC | | 0 | 0 | | | x | | | x | | | |
| Neddicky | *Cisticola fulvicapilla* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Zitting Cisticola | *Cisticola juncidis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Desert Cisticola | *Cisticola aridulus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | |
| Wing-snapping Cisticola | *Cisticola ayresii* | 3 | LC,LC | | 0 | 0 | | | | | | | x | | |
| Tawny-flanked Prinia | *Prinia subflava* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Black-chested Prinia | *Prinia flavicans* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Bar-throated Apalis | *Apalis thoracica* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | | | | |
| Grey-backed Camaroptera | *Camaroptera brevicaudata* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Barred Wren-warbler | *Calamonastes fasciolatus* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Rufous-naped Lark | *Mirafra africana* | 2 | LC,LC | | 0 | 0 | | x | x | | | x | x | | |
| Sabota Lark | *Calendulauda sabota* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Black-eared Sparrow-Lark | *Eremopterix australis* | 2 | LC,LC | | 0 | NE | x | | x | | x | | | | |
| Groundscraper Thrush | *Turdus litsitsirupa* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | x |
| Kurrichane Thrush | *Turdus libonyana* | 2 | LC,LC | | 0 | 0 | x | x | | | | x | x | | x |
| Karoo Thrush | *Turdus smithi* | 2 | LC,LC | | 0 | NE | x | x | | | | | | | |
| Pale Flycatcher | *Melaenornis pallidus* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Marico Flycatcher | *Melaenornis mariquensis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Southern Black Flycatcher | *Melaenornis pammelaina* | 2 | LC,LC | | 0 | 0 | x | | | | | x | x | | x |
| Fiscal Flycatcher | *Melaenornis silens* | 2 | LC,LC | | 0 | NE | x | x | | x | | x | x | | |
| Spotted Flycatcher | *Muscicapa striata* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | | x | | x |
| Grey Tit-flycatcher | *Myioparus plumbeus* | 2 | LC,LC | | 0 | 0 | x | | | | | x | x | | x |
| Cape Robin-chat | *Cossypha caffra* | 2 | LC,LC | | 0 | 0 | | | | | | x | | | |
| White-throated Robin-chat | *Cossypha humeralis* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White-browed Scrub Robin | *Cercotrichas leucophrys* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Kalahari Scrub Robin | *Cercotrichas paena* | 1 | LC,LC | | 0 | 0 | | x | x | x | | | x | | x |
| African Stonechat | *Saxicola torquatus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | |
| Familiar Chat | *Oenathe familiaris* | 2 | LC,LC | | 0 | 0 | x | | | x | | | x | | x |
| Mocking Cliff Chat | *Thamnolaea cinnamomeiventris* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Red-winged Starling | *Onychognathus morio* | 2 | LC,LC | | 0 | 0 | x | x | x | | | | x | | |
| Cape Glossy (Cape) Starling | *Lamprotornis nitens* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Burchell's Starling | *Lamprotornis australis* | 2 | LC,LC | | 0 | 0 | x | | x | | x | x | x | x | x |
| Violet-backed Starling | *Cinnyricinclus leucogaster* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | x |
| Wattled Starling | *Creatophora cinerea* | 2 | LC,LC | | 0 | 0 | x | x | x | | x | x | x | | x |
| Common Myna | *Acridotheres tristis* | 1 | LC,LC | | I | 0 | x | x | x | x | x | x | x | | x |
| Red-billed Oxpecker | *Buphagus erythrorynchus* | 2 | LC,LC | | 0 | 0 | x | | x | x | x | | | | x |
| Amethyst Sunbird | *Chalcomitra amethystina* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | |
| White-bellied Sunbird | *Cinnyris talatala* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Marico Sunbird | *Cinnyris mariquensis* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Red-billed Buffalo Weaver | *Bubalornis niger* | 3 | LC,LC | | 0 | 0 | | x | | x | x | x | x | x | x |
| Scaly-feathered Finch (Weaver) | *Sporopipes squamifrons* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| White-browed Sparrow-weaver | *Plocepasser mahali* | 2 | LC,LC | | 0 | 0 | | | | x | | | x | | |
| Lesser Masked Weaver | *Ploceus intermedius* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Southern Masked Weaver | *Ploceus velatus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Village Weaver | *Ploceus cucullatus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Red-headed Weaver | *Anaplectes rubriceps* | 3 | LC,LC | | 0 | 0 | | | | | | x | | | x |
| Red-billed Quelea | *Quelea quelea* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Yellow-crowned Bishop | *Euplectes afer* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | |
| Southern Red Bishop | *Euplectes orix* | 1 | LC,LC | | 0 | 0 | x | x | | x | | x | x | | |
| White-winged Widowbird | *Euplectes albonotatus* | 3 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | x |
| Long-tailed Widowbird | *Euplectes progne* | 2 | LC,LC | | 0 | 0 | | | | x | | | | | |
| Thick-billed Weaver | *Amblyospiza albifrons* | 2 | LC,LC | | 0 | 0 | x | | | | | | | | |
| Orange-breasted Waxbill | *Amandava subflava* | 2 | LC,LC | | 0 | 0 | x | x | x | | | x | | | |
| African Quail-finch | *Ortygospiza atricollis* | 1 | LC,LC | | 0 | 0 | | x | x | x | | x | | | |
| Cut-throat Finch | *Amadina fasciata* | 3 | LC,LC | | 0 | 0 | | x | | | | x | x | | |
| Black-faced Waxbill | *Estrilda erythronotos* | 2 | LC,LC | | 0 | 0 | x | x | | x | | x | x | | x |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Waxbill | *Estrilda astrild* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | |
| Violet-eared Waxbill | *Uraeginthus granatinus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | | x | x | x |
| Blue Waxbill | *Uraeginthus angolensis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Green-winged Pytilia | *Pytilia melba* | 2 | LC,LC | | 0 | 0 | x | x | | x | x | x | x | x | x |
| Red-billed Firefinch | *Lagonosticta senegala* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| African Firefinch | *Lagonosticta rubricata* | 2 | LC,LC | | 0 | 0 | x | | | | | | x | | x |
| Jameson's Firefinch | *Lagonosticta rhodopareia* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | x | x |
| Bronze Mannikin | *Lonchura cucullata* | 1 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Pin-tailed Whydah | *Vidua macroura* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | |
| Long-tailed Paradise Whydah | *Vidua paradisaea* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | x |
| Shaft-tailed Whydah | *Vidua regia* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | | x | | x |
| Village Indigobird | *Vidua chalybeata* | 2 | LC,LC | | 0 | 0 | x | | x | x | x | | x | | |
| Dusky Indigobird | *Vidua funerea* | 3 | LC,LC | | 0 | 0 | | | | | | | x | | |
| Purple Indigobird | *Vidua purpurascens* | 2 | LC,LC | | 0 | 0 | x | | | x | | | | | |
| Cuckoo Finch | *Anomalospiza imberbis* | 4 | LC,LC | | 0 | 0 | | x | | | | | | | |
| House Sparrow | *Passer domesticus* | 2 | LC,LC | | I | 0 | x | x | | x | | x | x | | |
| Great Sparrow | *Passer motitensis* | 3 | LC,LC | | 0 | 0 | | x | x | x | | | x | | |
| Cape Sparrow | *Passer melanurus* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | |
| Southern Grey-headed Sparrow | *Passer diffusus* | 2 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | x | x |
| Yellow-throated Petronia | *Gymnoris superciliaris* | 4 | LC,LC | | 0 | 0 | | | | | | | | | x |
| African Pied Wagtail | *Motacilla aguimp* | 4 | LC,LC | | 0 | 0 | x | x | | | | | | | |
| Cape Wagtail | *Motacilla capensis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | | x | x | | |
| African Pipit | *Anthus cinnamomeus* | 1 | LC,LC | | 0 | 0 | x | x | x | | | x | x | | |
| Yellow-fronted Canary | *Crithagra mozambica* | 1 | LC,LC | | 0 | 0 | x | | x | | | x | | | x |
| Black-throated Canary | *Crithagra atrogularis* | 1 | LC,LC | | 0 | 0 | x | x | x | x | x | x | x | | |
| Cinnamon-breasted Bunting | *Emberiza tahapisi* | 2 | LC,LC | | 0 | 0 | x | x | x | | x | x | | | |
| Golden-breasted Bunting | *Emberiza flaviventris* | 2 | LC,LC | | 0 | 0 | x | x | x | x | | | x | x | x |
| Yellow-billed Kite | *Milvus aegyptius* | 3 | LC,LC | x | 0 | 0 | | | | | | x | x | | |