Proposed SAR Rooikop 88kV Powerline Deviation, Ekurhuleni Metropolitan Municipality, Gauteng Province

Avifauna Impact Assessment Report

MBONENI
ECOLOGICAL SERVICES

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Executive Summary

Introduction and Background

The proposed Eskom SAR Rooikop deviation is located in Ward 40 of the City of Ekurhuleni Metropolitan Municipality, in Gauteng Province. The SAR Rooikop line is an 88kV line that fees the SAR Rooikop 88kV Traction Substation, from Germiston South 88/33kV Substation, and is 1.96 km long. The line faulted, between structure 1 and 3, wherein these towers are in a wetland. The Eskom CNC are unable to access the faulted area, due to the ground being muddy and inaccessible, rendering the substation inactive as there is no electricity supply from the line.

Due to these challenges, Eskom proposes the 486 88kV SAR Rooikop deviation. The proposed deviation will entail the following:

- The project will involve dismantling of conductors and structures, from structure 1 to structure 3;
- Installation of 2x20m Steel Monopole structure, along the new servitude and 14 stays.

Mboneni Ecological Services (Pty) Ltd was appointed by Nsovo Environmental Consulting to undertake an Avifauna Impact Assessment as part of the Environmental Impact Assessment (EIA) process in order to assess the impacts that the proposed development will have on the receiving environment. The objective of this study was to identify sensitive and priority Avifauna species and their habitats on the study area.

Study Area

The proposed SAR Rooikop deviation route is situated on Portion 64, Remainder of portion 25 and Remainder of portion 4, of Farm ROODEKOP 139 IR, City of Ekurhuleni Metropolitan Municipality, Gauteng province.

Regional Vegetation

The entire project route falls within the Grassland biome and this Biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa. This Biome is found mainly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal Province and the Eastern Cape Province. Grasslands are dominated by a single layer of grasses. Trees are absent, except in a few localised habitats and geophytes are often abundant. The project site as falls within the Vulnerable Carletonville Dolomite Grassland vegetation type.

Methodology

Survey methodology included a comprehensive desktop review, utilising available provincial and national ecological data, relevant literature, GIS databases, topographical maps and

aerial photography. This was then supplemented through a ground-truthing phase, where pertinent areas associated with the project area were visited during field survey undertaken on the 01st of May 2024. The survey focused on avifauna species. Several Red Listed Data avifaunal species pertaining to the project area were identified during the desktop review and their habitat suitability was assessed through the ground-truthing phase of the survey.

Results and Discussion

An assessment of the micro habitat available to avifauna in the study area revealed that the area is predominantly wetlands and also urbanized with informal settlements.

Exotic trees often provide roosting and nesting habitat for various bird species, and as such their importance for avifauna should not be under-estimated. Exotic trees provide perching, roosting and nesting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl, Herons and Hadeda ibises. Although stands of *Eucalyptus* spp are invader species, these stands have become important refuges for certain species of raptors including Eagles and Buzzards. Birds such as Lesser Kestrel and Falcons make use of large *Eucalyptus* trees, where they roost in large numbers. Nests identified on the study area should not be unnecessarily destroyed.

Pans: The study area contains pans/dams, mostly associated with the non-perennial river. Common species that could use pans and dams include Red-knobbed Coot, Black-headed Heron, African Darter, Blacksmith Lapwing, and Egyptian Goose. Red Data species recorded by SABAP2 in the relevant pentads that may use the dams are Greater Flamingo and Maccoa Duck, both of which were recorded in high numbers.

The **wetlands and river** on site are considered important attractants to various bird species. Bird species such as herons, bishops, weavers, cisticolas and warblers will breed in the reeds growing on the banks of the rivers and will also feed on insects that live within the reeds. Many of these bird species make use of the thorny nature of these trees to build their nests. Water bodies represent sensitive areas because they provide habitat for a wide variety of terrestrial and aquatic species, particularly avifauna. Wetlands are of particular importance for birds in the study area, as the area is largely urbanized, however these are highly polluted. Several more common water dependent species e.g., Red-knobbed Coot, Black-headed Heron, African Darter, White-faced Duck, Yellow-billed Duck, Blacksmith Lapwing, African Sacred Ibis and Egyptian Goose are known to utilise these habitat units.

Forty-Nine (49) bird species were recorded during the field survey. Species recorded were common and widespread and typical of grassland biome. No Red Data bird species associated with the study route were recorded.

The impacts that could be associated with a project of this nature are: collision of birds on certain sections of the line, particularly in wetland areas; electrocution of large birds perched on the poles; Destruction of habitat, and disturbance of birds. The mitigation measures are shown in **Table 8** in this report.

Mortality due to collisions of birds with the overhead powerlines

Although all birds have the potential to be affected by collisions, species groups most at risk of collision impacts are those with heavier bodies and relatively small wingspan, making them less movable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese and these bird species are mostly heavy-bodied species, with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Collisions are probably the biggest single threat posed by transmission lines to birds in southern Africa. Several factors are thought to influence birds' collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration.

The proposed powerline could pose a limited collision threat to Red Data species. The biggest threat and also a possibility of collisions at pans, dams and wetlands which could affect Maccoa Duck and Greater Flamingo and a variety of non-threatened waterbirds (Hadeda Ibis, Black-shouldered Kite, Egyptian Goose etc). In order to mitigate these impacts, areas where bird collisions are likely to be high could be ameliorated by marking the lines with bird devices such as "bird diverters" and "flappers" to increase the visibility of the lines.

Mortality of birds due to electrocution on the powerlines

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution risk is strongly influenced by the power line voltage of the and design of the pole structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks.

The risk of electrocution is strongly influenced by the power line voltage and the pole structure design, which mainly affects larger, perching species such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Due to the large size of the clearances on most overhead lines of above 88kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components. Other types of electrocutions happen by means of so-called "bird streamers". This happens when a bird, especially when taking off, excretes and thereby causing a short-circuit through the fluidity excreta. This method of electrocution is however a rare phenomenon. Most of these species (vultures, eagles, storks) are uncommon to rare in the study area and the impact is more likely to occur to other species that are prone towards roosting on the pylons such as the Black-headed Heron and Egyptian Goose. "Bird streamers" should be eliminated by fitting the poles with bird guards/spikes above the conductors.

Electrocution is possible on 88kV power lines such as those proposed, but is largely dependent on the exact pole structure used. It should be possible to ensure that zero electrocutions take place on the overhead power line. For the purpose of this study, it is assumed that a steel monopole structure will be used and the design of the pylon is an

important consideration in preventing bird electrocutions. The height of the towers should allow for unrestricted movement of terrestrial birds between successive pylons. Electrocution of large birds perched on the poles could be a risk and should be mitigated by using the Eskom Bird Perch on all pole tops on the lines. This will provide safe perching area well above the dangerous hardware. The impact of electrocution is seen as being of low significance should the steel monopole be used. The steel monopole is generally a safe design for birds and the fitment of the standard bird perch further increases this safety.

It is therefore recommended from an avifaunal perspective that a "bird friendly" pylon design be used which poses little electrocution risk.

Habitat destruction and Disturbances due to powerlines

Habitat destruction and alteration will take place during the construction phase of power lines, and this happens with the clearing of the site itself and any associated infrastructures. The servitude also has to be maintained free of any natural vegetation, amongst other reasons to minimize the risk of fire. The destruction or alteration of natural habitat has an impact on birds breeding, foraging and roosting in close proximity to the site.

The significance of habitat destruction is influenced by a number of factors, including: size of area to be affected; sensitivity of receiving habitat; uniqueness of the habitat; degree of habitat specialisation of the bird species utilising the habitat; and the conservation status and sensitivity of the species using the habitat.

The construction and operational activities can impact on birds through disturbance, mainly during bird breeding activities and the activities of concern include heavy earth moving general vehicular movement and any other activities which result in noise or increased human activity in an area. The disturbance of non-breeding birds may simply require them to move further away or adjust their activities during the disturbance. This may be either temporary or permanent. Disturbance of breeding birds may result in lower breeding productivity, failed breeding in the relevant season, and temporary or permanent abandonment of a breeding site. All of these reduce the recruitment of young birds to the population and can have significant implications for Red Listed species in particular, many of which are slow to reach breeding age and breed in small numbers.

Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. These activities could have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude, through destruction of habitat.

The construction of a power line can be highly disturbing to birds breeding in the vicinity of the construction activities. Many birds are highly susceptible to disturbance, and should this disturbance take place during a critical time in the breeding cycle, for example when the eggs have not hatched or just prior to the chick fledging, it could lead to temporary or permanent abandonment of the nest or premature fledging. In both instances, the consequences are

almost invariably fatal for the eggs or the fledgling. Such a sequence of events can have far reaching implications for certain large, rare species that only breed once a year or once every two years.

Terrestrial Sensitivity

The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring EA. The higher the sensitivity rating of the features on the proposed site as identified by the screening tool report, the more rigorous the assessment and reporting requirements. bird species sensitive to solar energy developments.

Based on the DFFE environmental screening tool report generated for the report, the Animal Combined Sensitivity Theme is indicated as a combination of Medium and High sensitivity in areas that are said to contain the following Sensitivity Feature(s).

- *High Aves-Circus ranivorus* (African Marsh Harrier)
- *Medium Aves-Tyto capensis* (African Grass-Owl)

The site verification was conducted concurrently with the Avifauna impact assessment and during the survey, it was concluded that the sections of the proposed deviation route which crosses the Wetland are considered High in terms of Sensitivity.

Conclusion and Recommendations

A Walk-through survey of the approved and final Powerline route and tower positions is recommended in order to evaluate the servitude and pole positions in terms of the natural environment. Should any nests or breeding sites be found during this process, suitable recommendations should be provided and the EMP must be amended. Mitigation measures to reduce any potential direct and acute impact on avifaunal species, must be enforced and implemented. Certain areas will require marking with anti-collision marking devices and this is due to the historical presence of some collision of sensitive species in the area. Moreover, the steel monopole design must be used to mitigate against electrocutions. Standard EMP principles must be followed to mitigate for the impact of habitat destruction and disturbance on avifauna and should this be done; the project may proceed with mitigatable impacts on avifauna. The impacts associated with the proposed powerline deviation, such as collisions, electrocution, habitat destruction and disturbances, can be mitigated to a satisfactory level.

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List of Abbreviations

ADU	Animal Demography Unit
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GPS	Global Positioning System
GIS	Geographic information system
QDS	Quarter degree Squares
GDARDE	Gauteng Department of Agriculture, Rural Development and Environment
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
PRECIS	Pretoria Computer Information Systems
PAOI	Project Area of Influence
SAAB	South African Association of Botanists
SAIEES	South African Institute of Ecologists and Environmental Scientists
SABAP	South African Bird Atlas Project
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species

Declaration of Independence

I, Avhafarei Phamphe, declare that I –

- act as the independent specialist;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations 2014;
- 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;
- there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake that the report adheres to Appendix 6 of GN No. R 982 of 4 December 2014 (as amended), and
- will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Avhafarei Phamphe:

- Holds a M. Sc in Botany from the University of the Pretoria;
- Is registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Pr.Sci.Nat) Ecological Science, (Registration No.: 400349/12), with expertise in floral and faunal ecology;
- Has been actively involved in the environmental consultancy field for over 18 years;
- Is a Professional Member of South African Institute of Ecologists and Environmental Scientists (SAIEES) and
- Is a member of the South African Association of Botanists (SAAB).

Avhafarei Phamphe

Name of Specialist

Mboneni Ecological Services (Pty) Ltd

Name of Company

14 May 2024

Date

Signature

1 INTRODUCTION AND BACKGROUND

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2 STUDY AREA

The proposed SAR Rooikop deviation route is situated on Portion 64, Remainder of portion 25 and Remainder of portion 4 of Farm Roodekop 139 IR, City of Ekurhuleni Metropolitan Municipality, Gauteng province (**Figures 1** and **2**). A collage of photographs taken within the project route in indicated in **Figure 3** below.

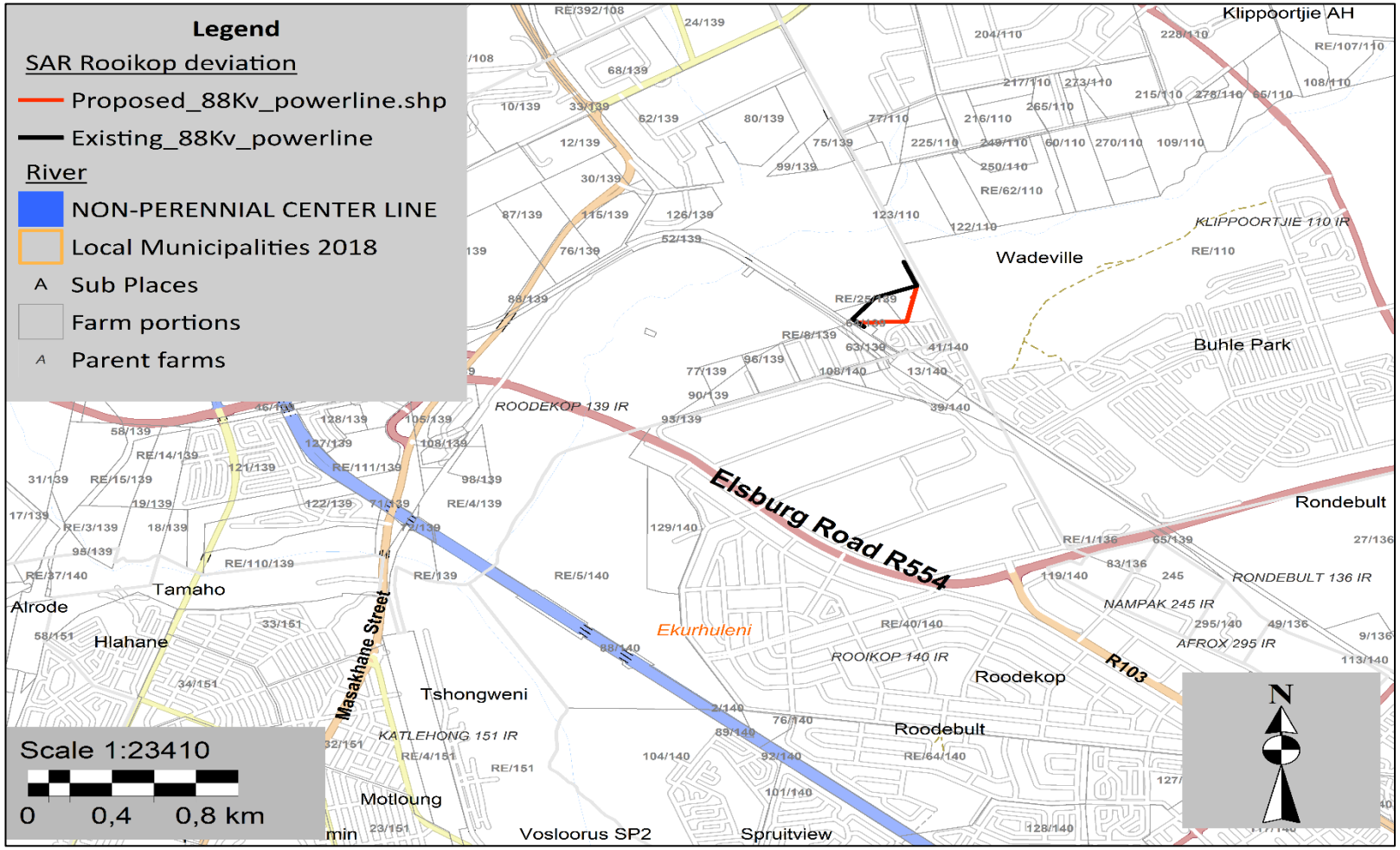

Figure 1. Locality Map

Figure 2. Google Earth Map of the project site

Figure 3. A collage of photographs taken along proposed deviation route

3 RELEVANT LEGISLATION AND GUIDELINES

The following legislations are relevant to this project:

- Transvaal Nature Conservation Ordinance, 1983 (Act No. 12 of 1983);
- The Constitution, 1996 (Act No. 108 of 1996) – Section 24;
- The white paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- National Environmental Management Act, 1998 (Act No. 107 of 1998);
- National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004);
- National Environmental Management: Protected Areas Act (Act No. 57 of 2003);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened or Protected Species regulations;
- African-Eurasian Migratory Waterbird Agreement (AEWA);
- Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa (2017);
- National Biodiversity Assessment (2018);
- National Protected Areas Expansion Strategy (NPAES);
- 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) and
- 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).

4 LIMITATIONS, GAPS AND ASSUMPTIONS

The following constraints/limitations were applicable to this assessment:

- The field survey was conducted on the 01st of May 2024, and is considered sufficient from a seasonal perspective and no additional season assessment is deemed required. A site visit which was conducted therefore appear to be sufficient to address the objectives of this study.
- Weather condition during the survey was favourable for recording avifaunal species.

- The information presented in this document only has reference to the investigated study area and cannot be applied to any other area without prior investigation.
- The focus of the study was primarily on the potential impacts of powerline on priority species. Priority species are defined as species which could potentially be impacted by powerline collisions or electrocutions, based on specific morphological and/or behavioural characteristics.
- The assessment of impacts is based on the baseline environment as it currently exists in the study area.
- The focus of the survey remains a habitat survey that concentrates on the possibility that species of particular conservation priority occur on the site or not.
- The potential of future similar developments in the same geographical area, which could lead to cumulative impacts cannot be meaningfully anticipated.
- The SABAP2 data is not regarded as a satisfactory indicator of the avifauna which could occur at the proposed development site, and it was therefore further augmented by data collected during the on-site surveys to date.
- In order to obtain a comprehensive understanding of the dynamics of the bird and fauna communities on the study area, as well as the status of endemic, rare or threatened species, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints such long-term studies are not feasible and were based on instantaneous sampling bouts.
- Though every effort was made to cover as much of the project site as possible, it is therefore possible that some bird species that are present within the project site were not recorded during the field survey due to their secretive behaviour.
- The conclusions drawn in this survey are based on experience and knowledge of the specialist on the species found on the proposed development site and similar species in different parts of South Africa. However, bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.
- The impact descriptions and assessment are based on the author’s understanding of the proposed development based on the site visit and information provided.
- Since ecological and avifaunal impact studies deal with dynamic natural systems additional information may come to light at a later stage and this Specialist can thus not accept responsibility for conclusions and mitigation measures made in good faith-based information gathered or databases consulted at the time of the investigation.

5 APPROACH AND METHODOLOGY

5.1 Avifauna

The flora assessment consisted of two complementary approaches:

- A desktop analysis, which included literature review, previous biodiversity reports, local knowledge, topographical maps, and Google Earth imagery; and
- Site visit was conducted on the 01st of May 2024.

The online databases of the Southern African Bird Atlas Project (SABAP 2), DFFE Screening report, and previous biodiversity reports were consulted as a means to determine which Red Listed bird species were previously recorded from the project area. The conservation status of all bird species occurring in the aforementioned quarter degree squares was determined with the use of The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al*. 2015).

The following information sources were consulted to conduct this study:

- Bird distribution data of the SABAP 2 was obtained from the University of Cape Town, to ascertain which species occur within the broader area *i.e.,* within a block consisting of 1 pentad (grid cell) (2615_2810) within which the proposed project site is situated. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8 × 7.6 km (**Figure 4**)
- The national threatened status of all priority species was determined with the use of the most recent edition of the Red Data Book of Birds of South Africa (Taylor *et al*. 2015), and the latest authoritative summary of southern African bird biology (Hockey *et al.* 2005).
- Coordinated Avifaunal Road counts (CAR) – The Coordinated Avifaunal Road counts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/ADU project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). Presently it monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method.
- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is done through a programme of regular mid-summer and mid-winter censuses at several wetlands.
- The global threatened status of all priority species was determined by consulting the (2021.3) International Union for Conservation of Nature (IUCN) Red List of Threatened Species (http://www.iucnredlist.org/).
- A classification of the habitat in the Project Site was obtained from the Atlas of Southern African Birds 1 (SABAP 1) (Harrison et al. 1997) and the National Vegetation Map (2018)

from the South African National Biodiversity Institute (SANBI) website (Mucina & Rutherford 2006 & http://bgisviewer.sanbi.org). The Project Site is the area covered by the land parcels where Project will be located.

- The Important Bird Areas of Southern Africa (Marnewick *et al*. 2015) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- Satellite imagery (Google Earth ©2024) was used to view the Project Site on a landscape level and to help identify sensitive bird habitat.
- Priority species were defined as follows:
  - ✓ South African Red Data species: High conservation significance
  - ✓ South African endemics and near-endemics: High conservation significance Raptors: High conservation significance.
  - ✓ Raptors are at the top of the food chain and play a key role in their ecosystems. When populations of birds of prey go down, then the numbers of their prey species go up, creating an imbalance in the ecosystem.
  - ✓ Waterbirds: Evidence indicate that waterbirds may be particularly susceptible to collisions with solar arrays due to the so-called lake effect, caused by the reflection of the sun of the smooth surface of solar panels.
- The SANBI BGIS map viewer was used to determine the locality of the proposed site relative to National Protected Areas and National Protected Areas Expansion Strategy (NPAES) focus areas.
- The Department of Forestry, Fisheries and the Environment (DFFE) National Screening Tool was used to determine the assigned avian sensitivity of the Project Site.
- The following sources were used to determine the investigation protocol that is required for the site:
  - ✓ Procedures for the Assessment and Minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of NEMA when applying for Environmental Authorisation (Gazetted October 2020); o Guidelines for the Implementation of the Terrestrial Flora & Terrestrial Fauna Species Protocols for EIAs in South Africa produced by the SANBI on behalf of the Department of Environment, Forestry and Fisheries (2020); and
  - ✓ The BirdLife South Africa (BLSA) Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa by Jenkins, A.R., Ralston-Patton, Smit- Robinson, A.H. 2017 (hereafter referred to as the Solar Guidelines).

During the site visit, these lists were audited based on confirmed sightings of Red Listed bird species and the evaluation of suitable habitat for Red Listed bird species potentially present.

The study site, including the adjoining properties within 50 m, were surveyed on foot during random transect walks and all sightings were documented.

Birds were identified through visual identification by using a 10 x 50 Voyager binocular, by call, and from feathers. Where necessary, identifications were verified using field guides such as Sasol birds of Southern Africa (Sinclair *et al.* 2002) and the Chamberlain Guide to Birding Gauteng (Marais & Peacock, 2008).

Walked Transects, Driven Transect and Incidental Observations of Priority Species methodologies were utilised during the field survey.

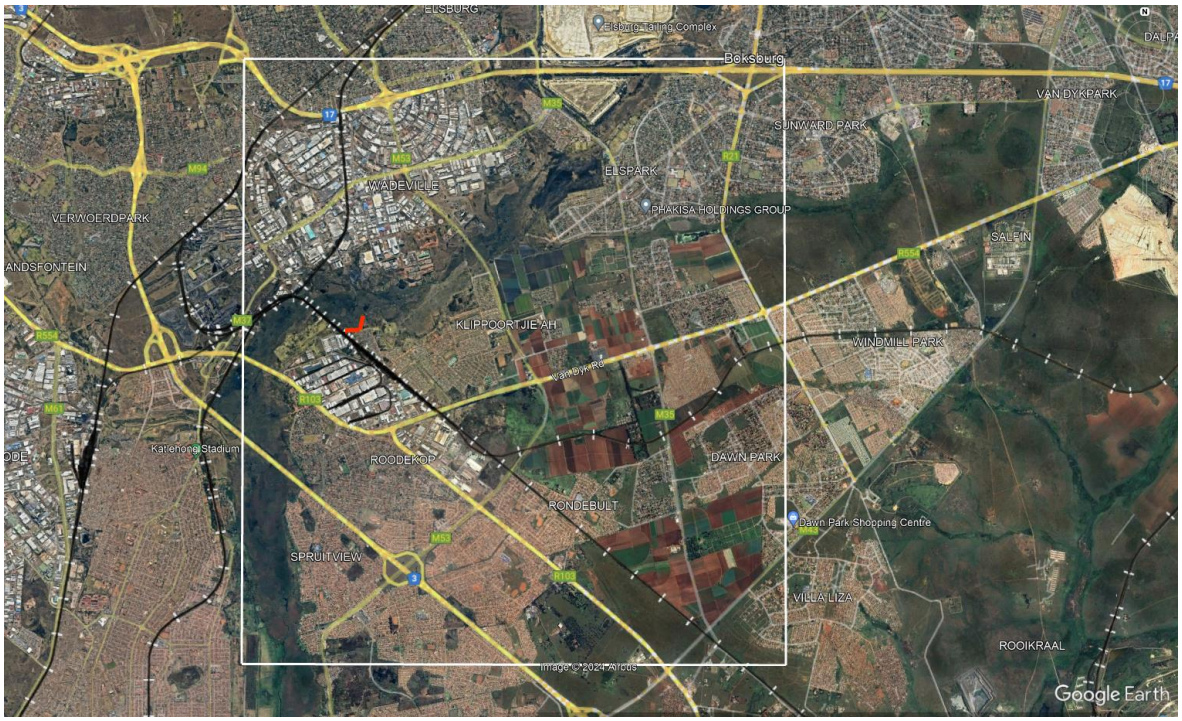

Figure 4. Area covered by the 1 SABAP2 pentad outlined in white (*i.e.*, the broader area).

6 REGIONAL VEGETATION

The entire project route falls within the Grassland biome and this Biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa (Driver *et al*. 2004). This Biome is found mainly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal Province and the Eastern Cape Province. Grasslands are dominated by a single layer of grasses. Trees are absent, except in a few localised habitats and geophytes are often abundant (Low and Rebelo, 1996). Mucina and Rutherford (2018) classified the project site as falling within the Carletonville Dolomite Grassland vegetation type, as indicated in **Figure 5**.

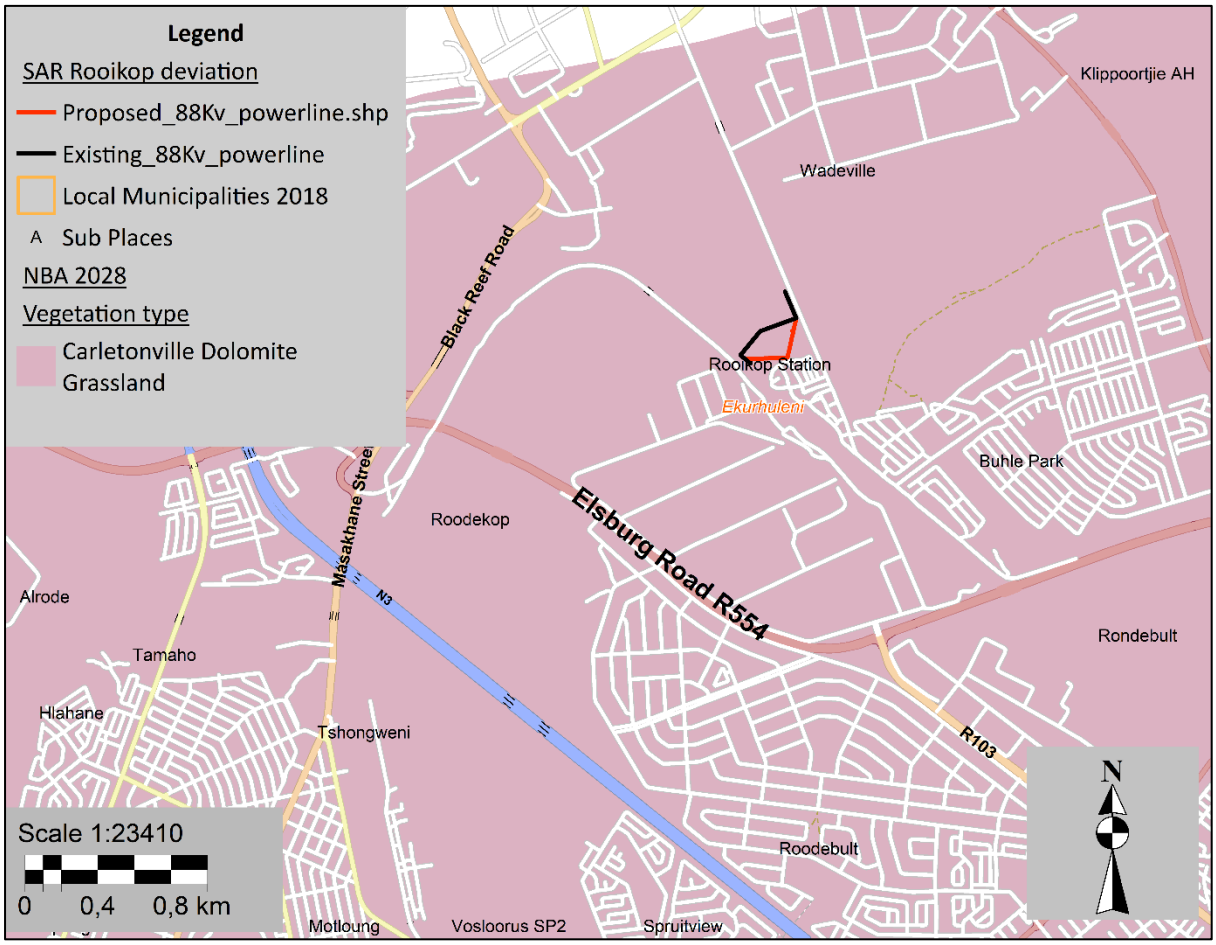

Figure 5. Vegetation type within the project route

The description of the vegetation types follows below:

6.1 Carletonville Dolomite Grassland

Carletonville Dolomite Grassland vegetation type is found in North-West (mainly) and Gauteng Provinces and marginally into the Free State Province: In the region of Potchefstroom, Ventersdorp and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province (Mucina and Rutherford, 2006).

The conservation status of this vegetation type is classified as **Vulnerable**, with a national conservation target of 24%. %. Small extent conserved in statutory (Sterkfontein Caves—part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter is already transformed for cultivation, by urban sprawl or

by mining activity as well as the building of the Boskop and Klerkskraal Dams (Mucina and Rutherford, 2006).

7 PROTECTED AND CONSERVATION AREAS

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The proposed development route does not fall within any of the formally Protected areas, with Rondebult Nature Reserve (SAPAD, 2023) (**Figure 6**), situated South-East of the area.

According to National Protected Areas Expansion Strategy (NPAES) (DEA, 2016), its goal is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The proposed development route falls within the NPAES Priority focus areas (**Figure 7**).

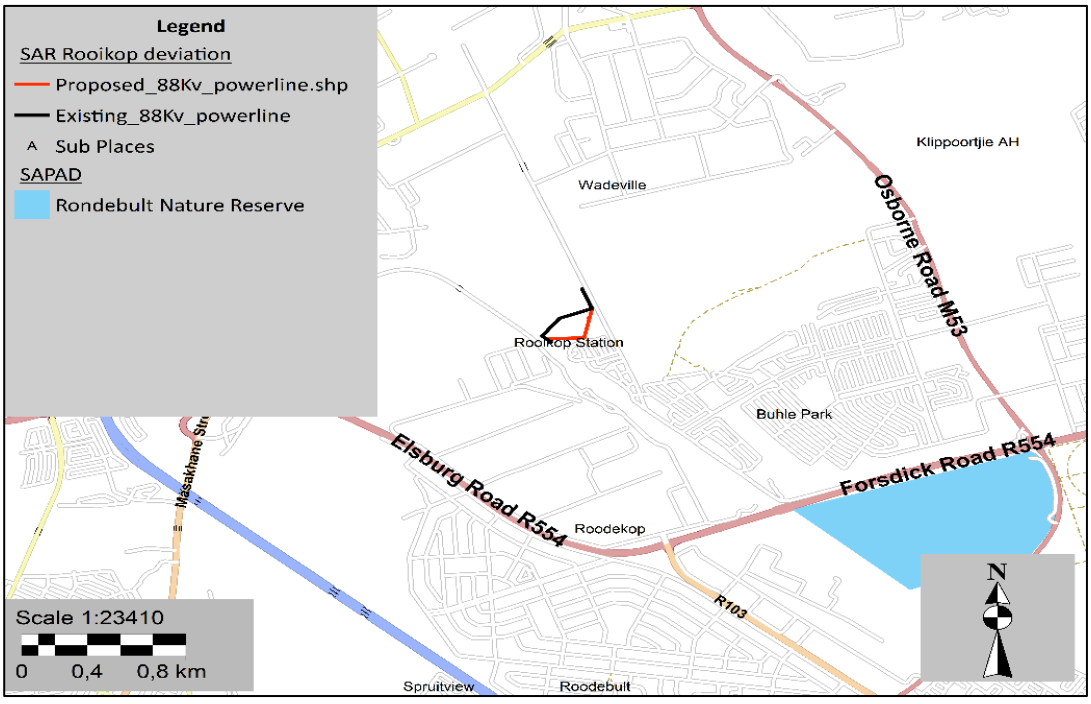

Figure 6. Protected Area in relation to the project route

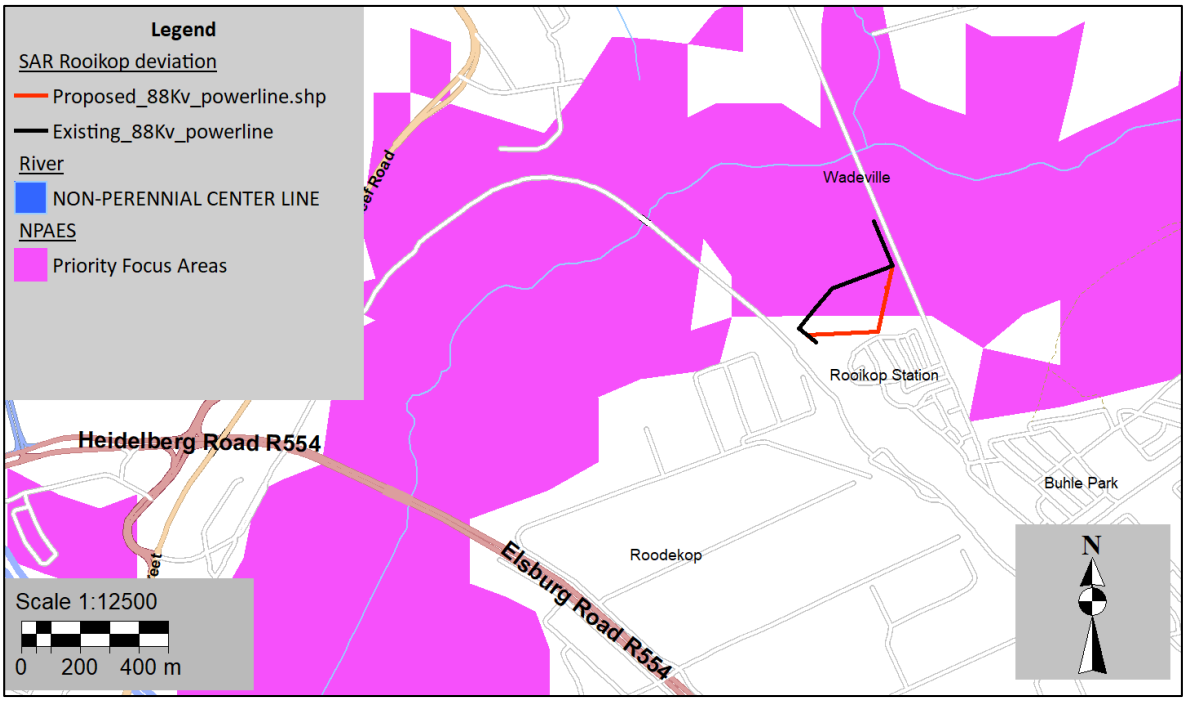

Figure 7. The project route falls within a NPAES Priority Focus area

8 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project aims to:

1. Identify Freshwater Ecosystem Priority Areas (FEPAs) to meet national biodiversity goals for freshwater ecosystems; and
2. Develop a basis for enabling effective implementation of measures to protect FEPAs, including free-flowing rivers (Nel *et al*. 2011).

In order to conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (*i.e*., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al*. 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals. River FEPAs are sub-quaternary catchments with good condition rivers (A or B Ecological Category) that achieve biodiversity targets for ecosystems and threatened or near-threatened fish species. These rivers should remain in good condition to contribute to the biodiversity targets for the country (Nel *et al*. 2011). All streams, rivers, wetlands are deemed legally sensitive

environments in terms of National Water Act (NWA) and National Environmental Management Act (NEMA) and are automatically regarded as highly sensitive areas where they provide ecological connectivity and have at least remnant natural vegetation.

The project powerline route traverses through the NFEPA wetland but not along any of the NFEPA rivers (**Figure 8**).

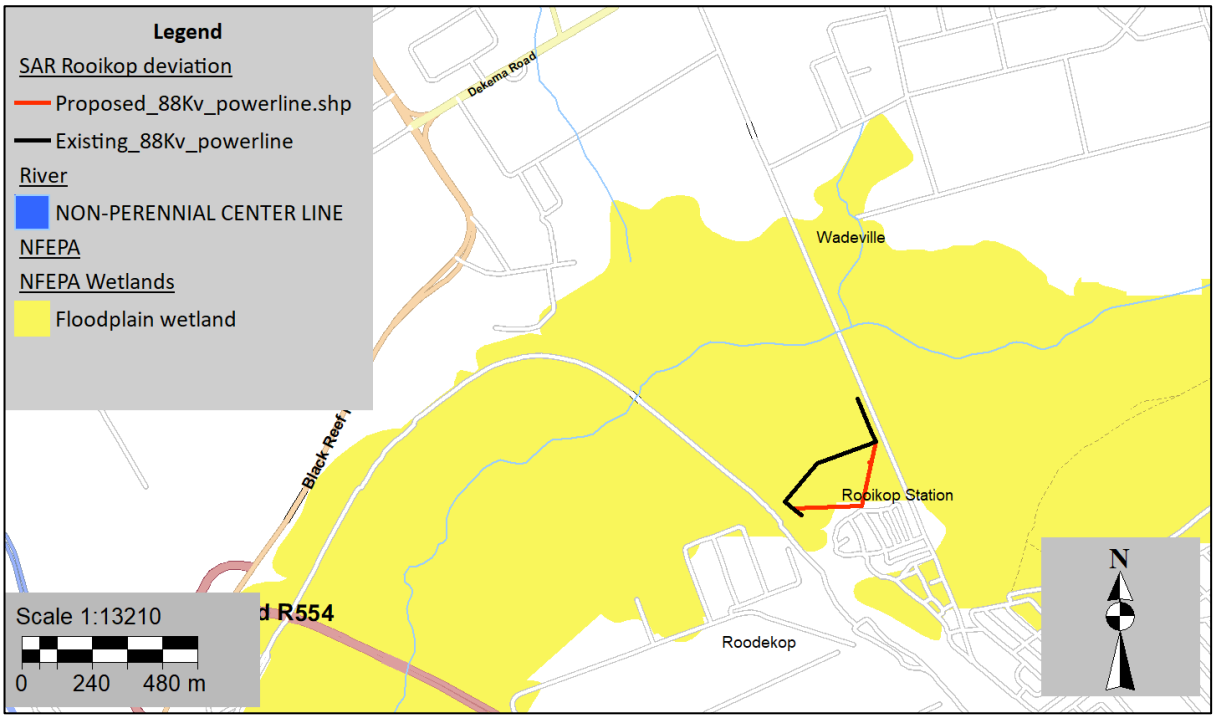

Figure 8. NFEPA wetlands and NFEPA river in relation to the project route

9 RESULTS AND DISCUSSION

9.1 Avifauna

9.1.1 Desktop survey results

The Important Bird and Biodiversity Areas (IBA) Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types (Barnes, 2000). As shown in **Figure 9** below, the project route does not fall within any of the IBAs and the nearest IBA is Suikerbosrand Nature Reserve IBA, situated South of the project area.

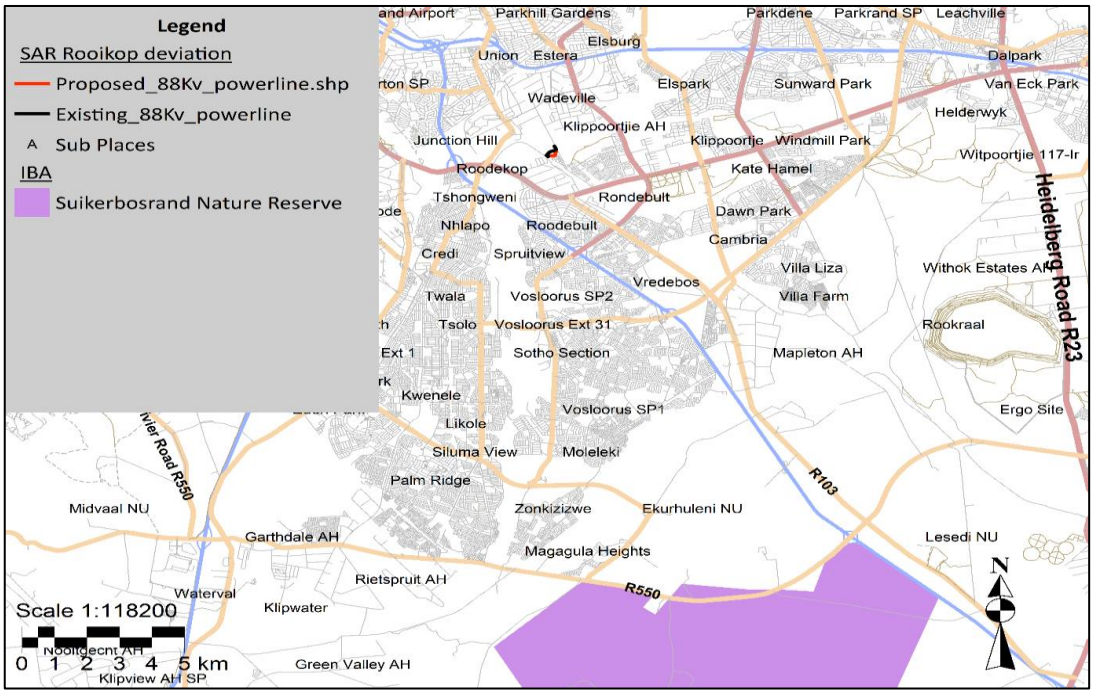

Figure 9. Magaliesberg IBA in relation to the project route

The online database of the Southern African Bird Atlas Project (SABAP), GDARDE, DFFE Screening report and SANBI were queried for a list of bird species confirmed to occur in the relevant pentad (mapping unit) that the project area is located in, namely 2628AC (2615_2810). Taylor *et al*. (2015) was consulted for the most current conservation status of each species of conservation concern on the list (**Table 1**). According to the information sourced from GADRDE “we have data for mainly birds in and around pans and wetlands that are of concern – within 5-10km from site. No breeding sites are known to occur within the project site”:

Table 1. Red listed bird species which could potentially occur on the project area

Common Name	Species	Red List Category
African Grass-Owl	*Tyto capensis*	Vulnerable
African Marsh-Harrier	*Circus ranivorus*	Endangered
Blue Crane	*Anthropoides paradiseus*	Near Threatened
Cape Vulture	*Gyps coprotheres*	Endangered
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened
Martial Eagle	*Polemaetus bellicosus*	Endangered
Secretarybird	*Sagittarius serpentarius*	Vulnerable
Greater Flamingo	*Phoenicopterus roseus*	Near Threatened
Lesser Flamingo	*Phoenicopterus minor*	Near Threatened
Maccoa Duck	*Oxyura maccoa*	Near Threatened
Lanner Falcon	*Falco biarmicus*	Vulnerable
Black Stork	*Ciconia nigra*	Vulnerable
Yellow-billed Stork	*Mycteria ibis*	Endangered
Saddle-billed Stork	*Ephippiorhynchus senegalensis*	Endangered
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable
Greater Painted-snipe	*Rostratula benghalensis*	Near Threatened
Red-footed Falcon	*Falco vespertinus*	Near Threatened
European Roller	*Coracias garrulus*	Near Threatened
White-bellied Korhaan	*Eupodotis senegalensis*	Vulnerable
Black-winged Pratincole	*Glareola nordmanni*	Near Threatened
Abdim's Stork	*Ciconia abdimii*	Near Threatened
Marabou Stork	*Leptoptilos crumeniferus*	Near Threatened

9.1.2 Field work results and discussion

Within the vegetation type found in the study area and immediate surrounding areas, three major bird micro-habitat systems were identified, namely exotic trees, pans and wetlands & river.

Exotic trees often provide roosting and nesting habitat for various bird species, and as such their importance for avifauna should not be under-estimated. Exotic trees provide perching, roosting and nesting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl, Herons and Hadeda ibises. Although stands of *Eucalyptus* spp are invader species, these stands have become important refuges for certain species of raptors including Eagles and Buzzards. Birds such as Lesser Kestrel and Falcons make use of large *Eucalyptus* trees, where they roost in large numbers. Nests identified on the study area should not be unnecessarily destroyed.

Pans: The study area contains pans/dams, mostly associated with the non-perennial river. Common species that could use pans and dams include Red-knobbed Coot, Black-headed Heron, African Darter, Blacksmith Lapwing, and Egyptian Goose. Red Data species recorded by SABAP2 in the relevant pentads that may use the dams are Greater Flamingo and Maccoa Duck, both of which were recorded in high numbers.

The **wetlands and river** on site are considered important attractants to various bird species. Bird species such as herons, bishops, weavers, cisticolas and warblers will breed in the reeds growing on the banks of the rivers and will also feed on insects that live within the reeds. Many of these bird species make use of the thorny nature of these trees to build their nests. Water bodies represent sensitive areas because they provide habitat for a wide variety of terrestrial and aquatic species, particularly avifauna. Wetlands are of particular importance for birds in the study area, as the area is largely urbanized, however these are highly polluted. Several more common water dependent species e.g., Red-knobbed Coot, Black-headed Heron, African Darter, White-faced Duck, Yellow-billed Duck, Blacksmith Lapwing, African Sacred Ibis and Egyptian Goose are known to utilise these habitat units.

Forty-Nine (49) bird species (**Table 2**) were recorded during the field survey. Species recorded were common and widespread and typical of grassland biome. No Red Data bird species associated with the study route were recorded. Bird species recorded within the project route are shown in **Figures 10-15.**

Table 2. Bird species recorded within the project site

Common name	Scientific name	Conservation status
Cattle Egret	*Bubulcus ibis*	Least concern
Hadeda Ibis	*Bostrychia hagedash*	Least concern
African Darter	*Anhinga rufa*	Least concern
Black-headed Heron	*Ardea cinerea*	Least concern
Reed Cormorant	*Phalacrocorax africanus*	Least concern
White-breasted Cormorant	*Phalacrocorax carbo*	Least concern
Glossy Ibis	*Plegadis falcinellus*	Least concern
African Sacred Ibis	*Threskiornis aethiopicus*	Least concern
Black-shouldered Kite (Black-winged Kite)	*Elanus caerulus*	Least concern
Blacksmith Lapwing (Plover)	*Vanellus armatus*	Least concern
Crowned lapwing (Plover)	*Vanellus coronatus*	Least concern
African Wattled Lapwing	*Vanellus senegallus*	Least concern
Speckled Pigeon	*Columba guinea*	Least concern
Rock Dove (Feral Pigeon)	*Columba livia*	Least concern
Laughing Dove	*Streptopelia senegalensis*	Least concern
Common (Indian) Myna	*Acridotheres zeylonus*	Introduced species
House Sparrow	*Passer domesticus*	Least concern
Thick-billed Weaver	*Amblyospiza albifrons*	Least concern
Egyptian Goose	*Alopochen aegyptiaca*	Least concern
African Hoopoe	*Upupa africana*	Least concern
Swainson's Spurfowl	*Pternistis swainsonii*	Least concern

Common name	Scientific name	Conservation status
Pied Crow	*Corvus albus*	Least concern
Crested Barbet	*Trachyphonus vaillantiii*	Least concern
Common Fiscal (Shrike)	*Lanius collaris*	Least concern
Red-eyed Dove	*Streptopelia semitorquata*	Least concern
Rattling Cisticola	*Cisticola chiniana*	Least concern
Zitting Cisticola	*Cisticola juncidis*	Least concern
Karoo Thrush	*Turdus smithi*	Least concern
Dark-capped Bulbul	*Pycnonotus tricolor*	Least concern
Cape Robin-Chat	*Cossypha caffra*	Least concern
Cape Glossy-Starling	*Lamprotornis nitens*	Least concern
Levaillant's cisticola	*Cisticola tinniens*	Least concern
Cape Wagtail	*Motacilla capensis*	Least concern
Southern-masked Weaver	*Ploceus velannus*	Least concern
Southern red Bishop	*Euplectes orix*	Least concern
Village Weaver	*Ploceus cucullatus*	Least concern
Orange-breasted waxbill	*Amandava subflava*	Least concern
African Snipe	*Gallinago nigripennis*	Least concern
Marsh Owl	*Asio capensis*	Least concern
Great Reed Warbler	*Acrocephalus arundinaceus*	Least concern
Purple Gallinule	*Porphyrio martinica*	Least concern
White-backed Duck	*Thalassornis leuconotus*	Least concern
White-faced Whistling Duck	*Dendrocygna viduata*	Least concern
Yellow-crowned Bishop	*Euplectes afer*	Least concern
Yellow-billed Duck	*Anas undulata*	Least concern
Red-knobbed Coot	*Fulica cristata*	Least concern
Common Moorhen	*Gallinula chloropus*	Least concern
Cape Wagtail	*Motacilla capensis*	Least concern
Little Swift	*Apus affinis*	Least concern

Figure 10. African Sacred ibis on site

Figure 11. Blacksmith Lapwing on site

Figure 12. Hadeda ibis on site

Figure 13. Crowned Lapwing on site

Figure 14. Pied Crow on site

Figure 15. Common Moorhen on site

9.1.3 Mortality due to collisions of birds with the overhead powerlines

Although all birds have the potential to be affected by collisions, species groups most at risk of collision impacts are those with heavier bodies and relatively small wingspan, making them less movable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese and these bird species are mostly heavy-bodied species, with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Collisions are probably the biggest single threat posed by transmission lines to birds in southern Africa. Several factors are thought to influence birds' collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. (Van Rooyen, 2004).

The proposed powerline could pose a limited collision threat to Red Data species. The biggest threat and also a possibility of collisions at pans, dams and wetlands which could potentially affect Maccoa Duck and Greater Flamingo and a variety of non-threatened waterbirds (Hadeda Ibis, Black-shouldered Kite, Egyptian Goose etc).
In order to mitigate these impacts, areas where bird collisions are likely to be high could be ameliorated by marking the lines with bird devices such as "bird diverters" and "flappers" to increase the visibility of the lines.

9.1.4 Mortality of birds due to electrocution on the powerlines

According to van Rooyen (2004), electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution risk is strongly influenced by the power line voltage of the and design of the pole structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks.

The risk of electrocution is strongly influenced by the power line voltage and the pole structure design, which mainly affects larger, perching species such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Due to the large size of the clearances on most overhead lines of above 132kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components. Other types of electrocutions happen by means of so-called “bird streamers”. This happens when a bird, especially when taking off, excretes and thereby causing a short-circuit through the fluidity excreta (Van Rooyen & Taylor, 1999). This method of electrocution is however a rare phenomenon. Most of these species (vultures, eagles, storks) are uncommon to rare in the study area and the impact is more likely to occur to other species that are prone towards roosting on the pylons such as the Black-headed Heron and Egyptian Goose. “Bird streamers” should be eliminated by fitting the poles with bird guards/spikes above the conductors.

Electrocution is possible on 88kV power lines such as those proposed, but is largely dependent on the exact pole structure used. It should be possible to ensure that zero electrocutions take place on the overhead power line. For the purpose of this study, it is assumed that a steel monopole structure will be used and the design of the pylon is an important consideration in preventing bird electrocutions. The height of the towers should allow for unrestricted movement of terrestrial birds between successive pylons. Electrocution of large birds perched on the poles could be a risk and should be mitigated by using the Eskom Bird Perch on all pole tops on the lines. This will provide safe perching area well above the dangerous hardware. The impact of electrocution is seen as being of low significance should the steel monopole be used. The steel monopole is generally a safe design for birds and the fitment of the standard bird perch further increases this safety.

It is therefore recommended from an avifaunal perspective that a "bird friendly" pylon design be used which poses little electrocution risk.

9.1.5 Habitat destruction and Disturbances due to powerlines

Habitat destruction and alteration will take place during the construction phase of power lines, and this happens with the clearing of the site itself and any associated infrastructures. The

servitude also has to be maintained free of any natural vegetation, amongst other reasons to minimize the risk of fire. The destruction or alteration of natural habitat has an impact on birds breeding, foraging and roosting in close proximity to the site.

The significance of habitat destruction is influenced by a number of factors, including: size of area to be affected; sensitivity of receiving habitat; uniqueness of the habitat; degree of habitat specialisation of the bird species utilising the habitat; and the conservation status and sensitivity of the species using the habitat.

The construction and operational activities can impact on birds through disturbance, mainly during bird breeding activities and the activities of concern include heavy earth moving general vehicular movement and any other activities which result in noise or increased human activity in an area. The disturbance of non-breeding birds may simply require them to move further away or adjust their activities during the disturbance. This may be either temporary or permanent. Disturbance of breeding birds may result in lower breeding productivity, failed breeding in the relevant season, and temporary or permanent abandonment of a breeding site. All of these reduce the recruitment of young birds to the population and can have significant implications for Red Listed species in particular, many of which are slow to reach breeding age and breed in small numbers.

Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. These activities could have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude, through destruction of habitat.

The construction of a power line can be highly disturbing to birds breeding in the vicinity of the construction activities. Many birds are highly susceptible to disturbance, and should this disturbance take place during a critical time in the breeding cycle, for example when the eggs have not hatched or just prior to the chick fledging, it could lead to temporary or permanent abandonment of the nest or premature fledging. In both instances, the consequences are almost invariably fatal for the eggs or the fledgling. Such a sequence of events can have far reaching implications for certain large, rare species that only breed once a year or once every two years.

There are positive interactions between overhead powerlines and avifauna as well (van Rooyen, 2004):

- Power lines have proven to be partially beneficial to many birds, including species such as Martial Eagles, Tawny Eagles, African White-backed Vultures, and even occasionally Verreaux’s Eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce.

- Pylons can provide a safe nesting and perching sites away from predators. Some Lesser kestrel colonies have been shown to use overhead lines almost exclusively as perching sites. This species has been recorded from the region and has been considered during the survey. Large colonies are not thought to occur within the area, however. Existing overhead wires and towers were noted to be utilised by a small raptor such as Black-winged Kite (**Figure 16**);
- Pylons can also provide nesting sites within areas devoid of tall trees. This has enabled certain species to expand their range. Large trees were absent throughout the survey area and therefore this is of relevance.

Figure 16. Black-winged Kite on site

A shorter route would be preferred that is located in close proximity to the existing human settlements. Studies have shown that migratory birds become familiar with the powerline patterns within an area and therefore learn to avoid them (van Rooyen, 2009).

9.1.6 Potential occurrence of Red Data bird species

Table 3 below indicates the preferred habitat, together with the probability of occurrence. The probability of occurrence is based on the availability of suitable habitat, known distribution, overall abundance, food availability, disturbance factors, anthropogenic change and the preferred habitats of the species. Only bird species which have higher probability of occurrence on the study area are discussed in the table below.

Table 3. Probability of Occurrence of Red listed bird species which could potentially occur within the project site

Common Name	Species	Red List Category	Suitable Habitat	Probability of occurrence
African Grass-Owl	*Tyto capensis*	Vulnerable	This species occurs predominately in rank grass, typically but not always at fairly high altitudes. It breeds mainly in permanent and seasonal vleis, which it vacates while hunting or during post-breeding. Prefers permanent or seasonal vleis and vacates the latter when these dried up or are burnt	Medium
African Marsh-Harrier	*Circus ranivorus*	Endangered	It generally favours inland and coastal wetlands.	Medium
Blue Crane	*Anthropoides paradiseus*	Near Threatened	This crane breeds in dry grasslands at high elevations where there is less disturbance. They may roost and breed in wetlands if available and some individuals prefer to nest in arable and pastureland.	Low
Cape Vulture	*Gyps coprotheres*	Endangered	It can occupy a variety of habitat types, although it especially favours subsistence farming communal grazing areas, where there is plenty of livestock to feed on.	Low
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened	It generally prefers narrow rivers, streams and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes	Medium
Martial Eagle	*Polemaetus bellicosus*	Endangered	Occurs in a variety of habitats but seem to prefer arid and mesic savannah but is also commonly found at forest edges and in open shrubland	Low
Secretarybird	*Sagittarius serpentarius*	Vulnerable	Prefers open grassland with scattered trees, shrubland, open *Acacia* and *Combretum* savannah. Restricted to large conservation areas in the region. Avoids densely wooded areas, rocky hills and mountainous areas	Low
Greater Flamingo	*Phoenicopterus roseus*	Near Threatened	This species inhabits relatively shallow water bodies, including saline lagoons, salt pans, estuaries, and large saline or alkaline lakes.	Medium
Lesser Flamingo	*Phoenicopterus minor*	Near Threatened	It generally favours open, eutrophic and shallow wetlands, coastal mudflats, salt works and sewage treatment plants; it exclusively breeds on salt pans and saline lakes	Medium
Maccoa Duck	*Oxyura maccoa*	Near Threatened	Prefers permanent wetlands that have rich concentrations of bottom-dwelling (benthic) invertebrates.	Medium

Common Name	Species	Red List Category	Suitable Habitat	Probability of occurrence
Lanner Falcon	*Falco biarmicus*	Vulnerable	Inhabits a wide variety of habitats, from lowland deserts to forested mountains.	Medium-High
Black Stork	*Ciconia nigra*	Vulnerable	It can occupy almost any type of wetland, such as pans, rivers, flood plains, ponds, lagoons, dams, swamp forests, mangrove swamps, estuaries, tidal mudflats and patches of short grass close to water.	Medium
Yellow-billed Stork	*Mycteria ibis*	Endangered	It generally prefers wetlands, such as pans, flood plains, marshes, streams, flooded grassland and small pools, occasionally moving into mudflats and estuaries.	Medium
Saddle-billed Stork	*Ephippiorhynchus senegalensis*	Endangered	It generally prefers freshwater marshes, rivers through open savanna, lake shores, pans and flood plains.	Low
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable	It generally prefers mountains and other rocky habitats with cliffs.	Low
Greater Painted-snipe	*Rostratula benghalensis*	Near Threatened	It generally prefers dams, pans and marshy river flood plains, or any waterside habitat with mud and vegetation.	Low
Red-footed Falcon	*Falco vespertinus*	Near Threatened	It generally prefers open habitats with scattered trees, such as open grassy woodland, wetlands, forest fringes and croplands, although it often roosts in stands of alien trees (especially *Eucalyptus*) in the suburbs of small towns.	Low
European Roller	*Coracias garrulus*	Near Threatened	It is locally common in northern and central Namibia, Botswana, Zimbabwe, Mozambique and north-eastern and central South Africa. It generally prefers savanna, such as broad-leaved and *Acacia* woodland.	Low
White-bellied Korhaan	*Eupodotis senegalensis*	Vulnerable	It generally prefers fairly tall, dense sour or mixed grassland, either open or lightly wooded, occasionally moving into cultivated or burnt land.	Low
Black-winged Pratincole	*Glareola nordmanni*	Near Threatened	It generally prefers open seasonally wet grassland, edges of pans and cultivated land.	Low
Abdim's Stork	*Ciconia abdimii*	Near Threatened	It generally prefers savanna woodland, grassland, pastures, pan edges, cultivated land and suburban areas.	Low
Marabou Stork	*Leptoptilos crumeniferus*	Near Threatened	It generally prefers open semi-arid habitats and wetlands, such as pans, dams and rivers.	Low

10 TERRESTRIAL ECOLOGICAL SENSITIVITY ANALYSIS OF THE STUDY AREA

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “low”, “medium”, “high” and “very high” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for confirmed areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below (**Table 4**).

Table 4. A description of the different screening tool sensitivity ratings

Sensitivity rating	Description of sensitivity rating
Very high	Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 is considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under the CR, EN, or VU D criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.
High	Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat. For birds, species distribution models (SDMs) and SABAP2 data (http://sabap2.birdmap.africa/) were combined to delineate the ‘high’ sensitivity areas (
Medium	Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
Low	Areas where no SCC are known or expected to occur.

10.1 Sensitivity Assessment

The evaluation of the terrestrial biodiversity, fauna, flora and vegetation importance of the project site was evaluated according to the procedures for the assessment and reporting of impacts on terrestrial biodiversity, terrestrial fauna and species and flora, for activities requiring environmental authorisation as published under the national Environmental Management Act, 1998 (Act No. 107 of 1998): *Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24 (5)a and (h) of the National Environmental Management Act, 1998, when applying for environmental authorisation (G 42946 – GN 9) and SANBI's Species Protocols for Environmental Impact Assessment in South Africa.*

The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring Environmental Authorisation. The higher the sensitivity rating of the features on the proposed site as identified by the screening tool report, the more rigorous the assessment and reporting requirements.

Based on the DFFE environmental screening tool report generated for this study, the Animal Combined Sensitivity Theme is indicated as a combination of Medium and High sensitivity (**Figure 17**), in areas that are said to contain the following Sensitivity Feature(s).

- *High Aves-Circus ranivorus* (African Marsh Harrier)
- *Medium Aves-Tyto capensis* (African Grass-Owl)

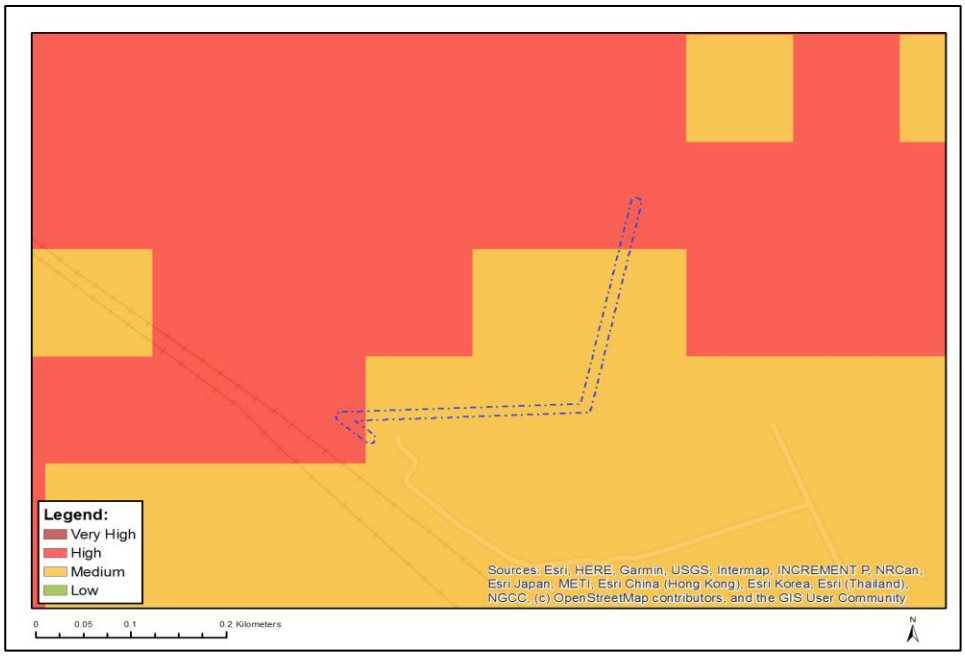

Figure 17. Map of relative Animal species Theme Sensitivity

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (**Table 5**). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings. The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 5. Criteria for establishing Site Ecological importance and description of criteria

Criteria	Description
Conservation Importance (CI)	The importance of a site for supporting biodiversity features of conservation concern present e.g., populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes
Functional Integrity (FI)	A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR) (SEI = BI + RR)	

The method used to assess site sensitivity has been described in **Table 5** above. **Tables 6** and **7** below provides a summary of how each site was assessed.

Table 6. Evaluation of Site Ecological Importance (SEI) of habitat, SCC and Project Area of Influence (PAOI)

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	SEI
Wetlands	Medium	High	Low	BI = Medium RR =Low (=High)
	> 50% of receptor contains natural habitat with potential to support SCC.	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitats patches.	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	

Table 7. Guidance for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

Site Ecological Importance	Interpreting in relation to the proposed development activities
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

The site verification was conducted concurrently with the Avifauna impact assessment and during the survey, it was concluded that the sections of the proposed deviation route which crosses the Wetland are considered to be High in terms of Sensitivity.

11 ENVIRONMENTAL IMPACT ASSESSMENT

11.1 Methodology

The impacts and the proposed management thereof are first discussed on a qualitative level and thereafter quantitatively assessed by evaluating the duration, extent, magnitude, probability and ultimately the significance of the impacts (refer to methodology provided below). The assessment considers impacts before and after mitigation measures.

The duration of the impact

Score	Duration	Description
1	Short term	0 – 1 years
2	Short to medium term	2 – 5 years
3	Medium term	5 – 15 years
4	Medium to long term	15+ years
5	Permanent	Permanent

The extent (spatial scale) of the impact

Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world

The magnitude (severe or beneficial) of the impact

Score	Severe/beneficial effect	Description
0	None	No effect – No disturbance/benefit
2	Slight	2 Little effect – negligible disturbance/benefit
4	Slight to moderate	Effects observable – environmental impacts reversible with time
6	Moderate	Effects observable – impacts reversible with rehabilitation
8	Moderate to high	Extensive effects – irreversible alteration to the environment
10	High	Extensive permanent effects with irreversible alteration

The probability of the impact

Score	Rating	Description
1	Very Improbable	Probably won't occur
2	Improbable	Low likelihood of occurring
3	Probable	Distinct possibility of occurring
4	Highly Probable	Very likely to occur
5	Definite	Will occur, regardless of any intervention

Significance of the impact, Degree of Irreversibility, Degree of loss of Resource are rated as follows:

Significance Rating	Description
Low (score of 1-29)	Impact will not significantly change fauna biodiversity and requires no significant mitigation measures.
Moderate (score of 30-60)	Impact will change fauna biodiversity and requires some mitigation measures.
High (Score of 61-100)	Impact will significantly change fauna biodiversity and significant mitigation measures and management is required. Potential fatal flaw.

The Significance = (Magnitude + Spatial Scale + Duration) x Probability

11.1.1 Assessment of Environmental Impacts and Suggested Mitigation Measures

Only the ecological issues identified during the appraisal of the receiving environment and potential impacts are assessed below (**Table 8**). Mitigation measures are provided to prevent (first priority), reduce or remediate adverse environmental impacts.

The pre/construction phases of the proposed development are anticipated to have direct and irreversible impacts on floral habitat, especially within the areas with watercourses. Site clearing along the watercourses will potentially result in permanent removal of floral habitat and therefore the disturbance and clearing of vegetation must be limited to Tower positions only.

Based on the results of the field survey, it is evident that the project site provides suitable habitat to a number of water-dependant avifauna species. Although it is assumed that the majority of avifauna species will move to nearby areas as a result of disturbance, many SCC avifauna species have a specific habitat requirement and the destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their demise.

The servitude for the powerline will require periodic maintenance to abate fire risks and to control shrubs and trees. This maintenance will displace individuals that utilise these areas. Maintenance of the servitude must remain within the designated servitude only and no indiscriminate habitat destruction outside of the designated area should be allowed.

Increased levels of noise, disturbance and human activity during construction may be detrimental to avifauna. The risk of illegal hunting/poaching/trapping of avifauna for various uses is likely. Many species would however become habituated to the existing activities and would return to normal activity after some time. The operational phase of the development will be permanent. Potential impacts on local avifaunal species as a result of disturbance/displacement has been assessed as not significant at a local scale.

The impact of fatalities from collision with the powerline by avifaunal species is then regarded as the most significant medium to long-term impact. The development of the powerline will require the clearing of a servitude as a safety factor, which will include removal of trees and shrubs that occur beneath or close to the overhead line. This will result in displacement of species. Each tower footprint will also be impacted through habitat destruction, but this is thought to be of lesser significance and of a short term. The actual overhead powerline and associated towers are thought to not have a significant long-term impact as most of the habitat impacted during the construction phase will be either reinstated as part of a rehabilitation plan, or the vegetation will naturally reinstate. This means that avifauna will be temporarily displaced, but will return back into the area once disturbance impacts (mainly limited to the construction phase) are completed. In order to rate the impact of electrocutions an assumption was made with regard to structural design of the Eskom power line poles. It is assumed that a

steel monopole is generally a safe design for birds and the fitment of the standard bird perch further increases this safety and this the impact of electrocution is seen as low.

The potential impacts associated with the pre-construction, construction and operational activities are discussed in **Table 8** below.

11.1.1.1 Pre-construction / Construction Phases

Activities associated with the pre-construction and construction phases, include the following:

- Vegetation clearance of the site.

Potential impacts to avifauna during the pre-/and construction phases, include the following:

- Destruction of indigenous flora (wetlands) during site establishment;
- Potential loss of a riparian vegetation/watercourses;
- Loss/displacement of avifauna species potentially present on site;
- Disturbance of local avifauna populations due to construction activities; and
- Loss of avifauna habitat due to vegetation clearance.

11.1.1.2 Operational Phase

Activities associated with the operational phase, include the following:

- Vegetation management activities; and
- Avifauna management activities.

Potential impacts associated with the operational phase, include the following:

- Collision of birds with overhead cables;
- Electrocution of birds;
- Disturbance of local faunal communities; and
- Loss of habitat due to operational activities.

Table 8: Potential impacts and recommended mitigation measures with significance rating before and after mitigation

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
Pre-Construction Phases											
Loss of avifaunal habitat, species and avifaunal SCC	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• Vegetation clearance should be limited to what is absolutely necessary. • The mitigation measures proposed by the vegetation specialist must be strictly enforced. • Construction workers must also be trained in awareness of priority species in the event that a ground-based nest is discovered. • During the site-pegging phase of surface infrastructure,	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						any avifaunal SCC that will be affected by surface infrastructure must be noted and recorded. Should the species (likely its nest) need to be removed, the relevant permits must be applied for from the GDARDE or from the DFFE prior to construction. • Construction activities must be restricted to the servitude, and the footprint of the construction area must not be expanded unnecessarily. • Mitigation for habitat destruction					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						includes the establishment and monitoring of an Environmental Management Plan (EMP) by an onsite ECO during construction. • Minimise loss of indigenous vegetation where possible through refining the final development footprint, optimising the design within study area while avoiding sensitive Freshwater Habitat where possible. • If avian SCC nests are located, a qualified avifaunal specialist					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						should be consulted to determine the best management options. If nests are known to have nestlings or eggs within, these should be allowed to fledge prior to the nest removal. • Design of infrastructure should be environmentally sound and all construction equipment to be utilised must be a good working condition, and all possible precautions taken to prevent potential avifaunal collisions or electrocution					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						s, and mechanical spills and/or leaks. • No dumping of litter, rubble or cleared vegetation on site should be allowed. As such it is advised vegetation cuttings (especially AIP) to be carefully collected and disposed of at a separate waste facility. • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line and avifaunal recolonization. In the					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil. • No hunting/trapping or collecting of avifaunal species is allowed. • The development footprint should be demarcated, and it should be ensured that no development related activities take place outside of the demarcated					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						footprint. This final footprint area should be reviewed by an avifaunal specialist to ensure no detrimental impacts to avifaunal assemblages occur. • Any structures which may act as perching sites for birds should be installed with antiperching spikes. • Anti-collision devices should be installed along the entire length of the powerline. These must be Eskom approved anti-collision devices that are durable					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						as the area is prone to strong winds. Anti-collision devices must be installed as soon as the wires are strung. The devices must be installed 5m apart and alternate between a light and dark colour in order to increase the visibility of the earth wires.					
Disturbance of bird roosts and breeding sites	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• In terms of Tower infrastructure, commencement of construction should be, if possible, limited to the months of December, January, February, March, April, May, September, October,	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						November (latest) to minimise dust effects and subsequent destruction of the avifaunal habitats, especially during foraging and breeding season. • Mitigation for disturbance includes the establishment and monitoring of an EMP by an onsite ECO during construction.					
Displacement of priority species due to disturbance associated with construction activities	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• Construction activity should be restricted to the immediate footprint of the infrastructure. • Access to the remainder of the site should be strictly	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						controlled to prevent unnecessary disturbance of priority species. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.					
Operational phases											
Collision of birds with infrastructures	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• Mitigation for collisions involves routing the line correctly as well as installing anti-collision marking devices to the line where necessary. • Only a bird friendly pylon structure is permissible for the construction of the new proposed power line.	Short to medium term (2)	Site specific (1)	Improbable (2)	Slight (2)	10 (low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						This will ensure that large birds can perch and roost safely on the hardware. • Fitment of devices on the earth wires to make the lines more visible • All construction and maintenance activities should be carried out according to generally accepted environmental best practices. • The bird flight diverters should be installed on the whole line, for the full span length on the earthwire (according to Eskom guidelines – five metres					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively. These devices must be installed as soon as the conductors are strung.					
Electrocution of birds	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• During operational phase, any nest found on the lines should be managed in accordance with Eskom Distribution Nest Management Guidelines and relevant provincial and national legislation. • In order to prevent the electrocution of any birds,	Short to medium term (2)	Site specific (1)	Improbable (2)	Slight (2)	10 (low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						on the poles, all poles should be fitted with a standard type, Eskom approved "bird perch" at the top of the pole. This will provide ample safe perching space for any birds well clear of the dangerous hardware.					
Loss of avifaunal habitat, species and SCC	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• All vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities. • Continuous monitoring (monthly) should be undertaken, and a record of potential bird	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						electrocutions or collisions should be kept and reported to the to or by the ECO. Mitigation measures should be updated annually depending on monitoring results					
Rehabilitation/landscaping of the site after construction activities	Medium to long term (4)	Site specific (1)	Probable (3)	Slight to moderate (4)	27 (Low) Status (-ve)	• Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction • The plant material to be used for rehabilitation should be similar to what is found in the	Permanent (5)	Regional (3)	Highly Probable (4)	High (10)	72 (High) Status (+ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						surrounding area. • When rehabilitating the construction footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated or improved, so that avifaunal species that were displaced by vegetation clearing and construction activities are able to recolonize the rehabilitated area. • Indigenous plants naturally growing within the project area,					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						but that would be otherwise destroyed during clearing for development purposes, should be incorporated into rehabilitation areas. • All disturbed areas can be re-vegetated with an indigenous grass mix to re-establish a protective grass strip within the power line servitude to minimize soil erosion and dust emission.					

11.1.2 Cumulative impacts

Cumulative impacts can be identified by combining the potential environmental implications of the proposed project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

- The cumulative impacts of power lines on birds through electrocution and collisions are significant nationally. This particular area already has several existing distribution power lines. No effort should be spared to ensure that the new power line is built bird friendly and results in no additional impact on birds in the area.
- Habitat loss due to construction of the power line would result in cumulative impacts on listed vegetation types and this would also increase habitat fragmentation and potentially result in a loss of broad-scale landscape connectivity.
- Destruction of nesting habitat displaces the affected species eventually leading to loss of those species.
- Powerlines represent the largest proportion of established aerial infrastructure throughout the country and collision impacts are of national concern. Fitment of devices on the earth wires to make the lines more visible is reducing this impact at the national level.

11.1.3 Decommissioning

Post to the economic lifespan of the SAR Rooikop project, decommissioning and rehabilitation will comply with the appropriate environmental legislation and best practices at that time.

12 CONCLUSION AND RECOMMENDATIONS

This avifaunal impact report has characterised the avifaunal assemblage of the study area by examining bird atlas data for the area, and through the site visit, in which birds were identified along the project site. Habitat type is a critical factor in determining the species assemblages of birds and priority bird species in a particular area, and a number of different habitat types have been identified on the site, a number of which are associated with particular assemblages of bird species. Wetland areas have been identified as the most sensitive avifaunal habitats in the study area.

Anthropogenic impacts, mainly in the form of urbanisation and industrialisation, have largely transformed the landscape resulting in a negative impact on avifaunal diversity and abundance. The construction of the proposed power deviation line will result in various impacts of medium to high significance to the birds occurring in the vicinity of the new infrastructure, which can be reduced through the application of mitigation measures. Given the presence of existing habitat degradation and disturbance, it is anticipated that the proposed power line deviation route can be constructed within the study area with acceptable levels of impact on the resident avifauna subject to the following recommendations:

- A "bird friendly" pylon design should be used which poses little electrocution and collision risks.
- Power line marking will be required to mitigate for the collision impact, since the project route contains wetlands, dams and waterbodies.
- Construction activity should be restricted to the immediate footprint of the infrastructure.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of avifaunal species.
- The recommendations of the ecological and botanical specialist studies must be strictly executed, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned.
- Furthermore, the environmental good practices should be applied, such as ensuring strict control of staff, vehicles and machinery on site and limiting the creation of new roads as far as possible.

In order to minimize the impacts of collisions of avifauna, it is therefore recommended from an avifaunal perspective that a "bird friendly" pylon design be used which poses little electrocution risk. With regards to habitat destruction, the recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned.

A Walk-through survey of the approved and final Powerline route and tower positions is recommended in order to evaluate the servitude and pole positions in terms of the natural

environment. Should any nests or breeding sites be found during this process, suitable recommendations should be provided and the EMP must be amended. Mitigation measures to reduce any potential direct and acute impact on avifaunal species, must be enforced and implemented. Certain areas will require marking with anti-collision marking devices and this is due to the historical presence of some collision of sensitive species in the area. Moreover, the steel monopole design must be used to mitigate against electrocutions. Standard EMP principles must be followed to mitigate for the impact of habitat destruction and disturbance on avifauna and should this be done; the project may proceed with mitigatable impacts on avifauna. The impacts associated with the proposed powerline deviation, such as collisions, electrocution, habitat destruction and disturbances, can be mitigated to a satisfactory level.

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Appendix A: Structure of the Report

The Terrestrial Biodiversity Specialist Assessment was conducted in accordance with the Terrestrial Biodiversity Protocol (2020). This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on Terrestrial biodiversity for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the EIA Regulations 2014, GN R. 982 (as amended), published under NEMA.

The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by DFFE's national web-based environmental screening tool screening tool. The screening tool identified the site footprint as falling within an area of "Low Sensitivity" for Terrestrial biodiversity theme. The screening tool identified the site footprint as falling within an area of "High" and "Medium" sensitivity for terrestrial animal and plant species diversity, respectively. Table indicates how the assessment complied with the requirements of the Terrestrial Biodiversity Protocol, with reference to specific sections in this report.

Requirement of GN 648 of 10 May 2019 VERY HIGH SENSITIVITY RATING – for Animal Features	**Fulfilment**
The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page xv and Appendix B
A signed statement of independence by the specialist;	Page xv
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Chapter 4
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 5
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Chapter 4
A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Not Applicable to this project
Additional environmental impacts expected from the proposed development;	Chapter 11
Any direct, indirect and cumulative impacts of the proposed development;	Chapter 11
The degree to which impacts and risks can be mitigated;	Chapter 11
The degree to which the impacts and risks can be reversed;	Chapter 11
The degree to which the impacts and risks can cause loss of irreplaceable resources	Chapter 11
Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 11 and Table 8
A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	Not Applicable to this report
A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Executive summary and Chapter 12
Any conditions to which this statement is subjected	Chapters 9,10,11 and 12

Appendix B: Biodiversity Specialist CV

AVHAFAREI PHAMPHE

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Linden
2195
Contact Details: 082 783 6724
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Educational Qualification

University of Pretoria – MSc. Botany.
University of Venda – University Education Diploma (Biological Science))
University of Venda - Bachelor of Science Honours (Botany)
University of Venda – Bachelor of Science (Botany & Chemistry)

Professional Registrations

- South African Council of Natural Scientific Professions (SACNASP) (Ecological Science- 400349/12)
- South African Institute of Ecologists and Environmental scientists (SAIEES)
- South African Green Industries Council (SAGIC AIS)
- South African Association of Botanists (SAAB)

Project Experience (Selected Projects)

- Proposed upgrading of Olifantspoort and Ebenezer Water Supply Schemes, Phase 1, within the Jurisdiction of Capricorn and Mopani District Municipalities, Limpopo Province.
- Proposed Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP-2A): Water Transfer Infrastructure
- Proposed Vaal Gamagara Regional Water Supply Phase 2: Upgrading of the existing Scheme
- Terrestrial ecological assessment report. Nketoana Regional Bulk Water Scheme Project Free State province.
- Terrestrial ecological assessment report. Proposed Surface Water Developments for Augmentation of the Western Cape Water Supply System
- Terrestrial ecological assessment report. Eskom Emkhiweni Substation and 400KV Line from Emkhiweni Substation to Silimela, Limpopo and Mpumalanga Provinces
- Botanical survey at Eskom Skaapvlei substation included in the West Coast Group of Battery Energy Storage System (BESS) project, Western Cape province
- Botanical Survey at Eskom Paleisheuwel Substation in the West Coast. Group of Battery Energy Storage System (BESS) Project in Western Cape
- Proposed Matjhabeng Solar PV with Battery Energy Storage Systems Project: Phase 1 and Phase 2 Sites
- Proposed Turffontein sewer upgrade
- Proposed Greater Orange Farm water upgrade
- Proposed sewer pipe replacement in Lorentzville, City of Johannesburg
- Proposed Lanseria outfall sewer
- Proposed desludging and lining of dam 02 within the Northern Wastewater Treatment Works, in Johannesburg, Gauteng province
- Proposed uMkhomazi water project phase 1 – Raw water component

- Proposed roads and stormwater infrastructure for Soshanguve Block L
- Proposed stormwater and sewer infrastructure for the uMhlanga Ridgeside development
- Proposed High altitude training Centre in Belfast
- Flora and fauna assessment, Proposed BG3 pipeline, Vaal River.
- Terrestrial ecological assessment report. New wastewater treatment works at Lanseria, City of Johannesburg.
- Terrestrial ecological assessment report. Proposed 100ml Bronberg reservoir and associated infrastructure
- Ecological Assessment; Proposed Ncwabeni Off-Channel Storage Dam
- Flora and Fauna assessment in Bankfontein farms, Breyten, Mpumalanga
- Flora and Fauna assessment in Vaalbank, Carolina, Mpumalanga.
- Flora and fauna assessment Proposed hydropower plant within Rand Water's hydraulic network at Zoekfontein site.
- Proposed upgrade of O6 pipeline
- Proposed construction of BG3 pipeline near Vaal River
- Proposed construction of S4 pipeline.
- Proposed construction of B16 pipeline.
- Terrestrial ecological assessment report. Proposed Foxwood Dam, Eastern Cape province
- Monitoring reporting for *Warburgia salutaris* in Ithala Game Reserve
- Status report for Black and White rhino in Ithala Game Reserve
- Recovery plan for *Protea comptonii* for Ithala Game Reserve
- Fire monitoring report for Ithala Game Reserve, Vryheid hill nature reserve and Pongola bush nature reserve
- Mechanical removal of *Dichrostachys cinerea* in Ithala game reserve

Work Experience

1. Independent Biodiversity Specialist

June 2020 to present

- Vegetation Surveys
- Fauna surveys
- Development of biodiversity sector plans
- Interpreting conservation plans to inform local and regional planning
- Alien Plant Management Plans
- Search, Rescue and Relocation Plans
- Walk-through surveys
- Development of management plans for important species and habitats
- Undertaking environmental audits

2. Nemai Consulting (Pty) Ltd- Senior Biodiversity Specialist

May 2010-May 2020

- Compile flora and fauna reports
- Compile rehabilitation plans.
- Compile Basic Assessments reports and Environmental Management Programmes.
- Scientific data collection.
- Compile scientific flora and flora reports
- Involved in Public Participation Process

- Project management
- Compile Biodiversity Sector Plans
- Acted as an Environmental Control Officers

3. Digby Wells and Associates- Flora and Fauna Specialist

January 2008-April 2010

- Compile flora and fauna reports
- Compile rehabilitation plans.

4. Ezemvelo KZN Wildlife- Ecologist

March 2004-December 2007

- fire management and reporting,
- GIS mapping,
- Monitoring of endangered species,
- Liaise with neighbouring communities and schools about environmental education,
- Handling budget for the research station,
- Annual game count census,
- Involved in integrated management plans,
- Elephant management plan.
- Compile rehabilitation plans.

5. South African National Biodiversity Institute- Agricultural Development Technician

January 2004-February 2004

- Herbarium database
- Herbarium specimens filling
- Data Quality Controller,

6. South African National Biodiversity Institute- Volunteer and Ad Hoc

January 2002-December 2003

- PRECIS database,
- Mounting of specimens,
- Filing,
- Data quality control

7. University of Pretoria-Zoology Department- African National Biodiversity Institute- Volunteer and Ad Hoc

July 2001-September 2001

- Filing,
- Data quality control

Courses/workshops/conferences attended

- Biodiversity Offset training October 2019, organized by SANBI and DEFF
- Alien invasive plants workshop, 2016
- South African Association of Botanists conference in Drakensville, hosted by the university of KwaZulu Natal, January 2013
- South African association of botanist's conference in Rhodes university (Grahamstown 2001)
- South African association of botanists' conference in Pretoria university (2002)
- Distance course (01-03 June 2004)
- Financial policies and procedures (08-10 June 2004)
- Population modeling course (01-04 November 2004)
- Vegetation monitoring (22-24 November 2004)

- Vulture monitoring workshop (19-21 January 2005)
- Grassland ecology course (08-10 March 2005)
- Introduction to geographic information systems (18-26 April 2005)
- Waste management course (13-15 March 2006)
- Elephants of the red volta: earth watch expedition in Ghana (1-18 July 2006)
- 21st international conference of society for conservation biology in nelson Mandela metropolitan university in port Elizabeth (1-5 July 2007)
- Wetlands workshop, organized by GDARD, 2010

Scientific paper reviewed

- J.P. VAN DER LINDEN, D.P. FERREIRA, S.J. SIEBERT, G.J. BREDENKAMP AND F. SIEBERT. 2007. Vegetation dynamics of the woody layer of Zululand coastal thornveld, KwaZulu-Natal.

References

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