3Foxes Biodiversity Solutions
ECOLOGICAL SPECIALIST SERVICES
Assessment/Management/Research

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Ecological Solutions for People & the Environment

Date: 10 December 2020

3Foxes Biodiversity Solutions
60 Forrest Way,
Glencairn,
7975.

To whom it may concern,

THE PROPOSED EXTENSION OF GRID CONNECTION INFRASTRUCTURE FOR THE GUNSTFONTEIN WIND FARM, NORTHERN CAPE PROVINCE (DEFF REFERENCE: 14/12/16/3/3/1/2228)

Simon Todd (in conjunction with Eric Hermann) conducted the Ecological and avifaunal Specialist Studies for the Basic Assessment Application related to the Grid Connection Infrastructure for the Gunstfontein Wind Farm (DEFF Ref: 14/12/16/3/3/1/2228). The draft BAR report was received by the Department of Environment, Forestry and Fisheries along with the application form on 04 September 2020. Following the draft BAR disclosure for public review and comment (04 September 2020 – 5 October 2020), minor refinements have been made by the proponent to the layout and location of the grid extension infrastructure based on technical considerations and consideration of environmental issues. As the specialist I have reviewed this refined layout and have determined it a minor adjustment of location only. In addition, the refined layout and location of the grid extension infrastructure remains within the 300m assessment corridor originally assessment by myself and therefore does not constitute a novel change.

This letter thereby serves to confirm that the refined layout related to the grid connection infrastructure (dated December 2020) has no material change on the assessment, findings, impacts (including nature, significance and mitigation measures) and recommendations of the specialist report. From an Ecological and Avifaunal Specialist viewpoint, the results are identical and the change in location has no material effect on the specialist assessment conducted for the project. The recommendations and findings of the report therefore apply without modification to the refined layout.

Signed: 

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BASIC ASSESSMENT FOR THE EXTENSION OF GRID CONNECTION INFRASTRUCTURE FOR THE GUNSTFONTEIN WIND FARM, NORTHERN CAPE PROVINCE

AVIFAUNAL SPECIALIST REPORT

Grey-backed Cisticola *Cisticola subruficapilla*

PRODUCED FOR SAVANNAH ENVIRONMENTAL (Pty) Ltd

BY

3Foxes Biodiversity Solutions

Simon.Todd@3foxes.co.za

Final Revision August 2020

EXECUTIVE SUMMARY

Gunstfontein Wind Farm (Pty) Ltd proposes the construction and operation of a grid connection solution, known as the "grid extension infrastructure" for the authorised Gunstfontein Wind Farm (DEA Ref: 14/12/16/3/3/2/826), near Sutherland, Northern Cape Province. The grid connection solution will include the development a double-circuit 132kV overhead power line to connect the Gunstfontein Wind Farm to the national grid, via the Hidden Valley substation. The proposed 132kV OHL extension will be an extension of the already authorised Gunstfontein Grid Connection (DEA Ref: 14/12/16/3/3/1/1619). Other associated infrastructure will also be required for the grid connection solution, such as access tracks/roads and laydown areas. A corridor 300m wide and approximately 7.5km long along with an assessment zone of 200m around the starting and terminating substation boundaries (collectively known as the grid corridor) is being assessed to allow for the optimisation of the grid (i.e. eventual micro siting) and associated infrastructure and to accommodate environmental sensitivities and other energy infrastructure currently under construction on the properties.

This specialist study details the avifaunal characteristics of the area affected by the proposed Gunstfontein Grid Connection Extension, and the possible impacts on the local avifauna. The impacts for the various phases of the development are assessed, including the pre-construction, construction, operation and decommissioning phases. A number of mitigation measures related to these impacts are recommended in order to reduce the likely impact of the proposed development. Proposed draft specific ecological objectives and mitigation measures for inclusion into the EMPr is also provided.

A verification field assessment and a review of the available avifaunal information for the area was conducted – including analysis of data gathered during recent site surveys of the grid corridor and surrounding area - in order to identify and characterise the avifaunal features. An approximate total of 140 bird species have been recorded within the project site and broader surrounds. Eleven (11) species are red-listed, twenty-six (26) species are listed as endemic/near-endemic and fifteen (15) species as biome-restricted. There are no known Important Bird Areas (IBAs) or wetlands of significant avifaunal importance within the vicinity (<50km) of the proposed grid development.

Of the eleven (11) red-listed species recorded in the broader area, seven (7) of these are listed as threatened, and four (4) as Near Threatened. The most important of these include Ludwig's Bustard *Neotis ludwigii* (Endangered), Martial Eagle *Polemaetus bellicosus* (Endangered), Verreaux's Eagle *Aquila verreauxii* (Vulnerable), Black Stork *Ciconia nigra* (Vulnerable), Lanner Falcon *Falco biarmicus* (Vulnerable), Southern Black Korhaan *Afrotis afra* (Vulnerable), and Karoo Korhaan *Eupodotis vigorsii* (Near Threatened). These species are all susceptible to collisions with power lines, but particularly Ludwig's Bustard.

The expected impacts of the proposed grid development include 1) minor habitat loss associated with the Central Mountains Shale Renosterveld vegetation type, 2) disturbance caused during the construction and maintenance phases, and 3) direct mortality of avifauna colliding with power lines, as well as possible electrocutions with power line infrastructure.

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The impacts on the avifauna would potentially be expected to be of high importance, but due to the relatively low frequency of occurrence of priority species throughout the site, the impacts are likely to be medium low and no high post-mitigation impacts are expected. The proposed grid connection extension route is considered viable from an avifaunal perspective for the following reasons: 1) the power line extension is relatively short (*ca*. 7.5km) and follows a relatively direct pathway between the Heuwels and Hidden Valley Substations, 2) the route intersects only one flight zone along a mountain ridge, and 3) the proposed grid connection corridor will follow a 132kV power line (currently under construction which will also be fitted with bird anti-collision devices, where required and applicable) for the entire length which may further reduce potential collision rates. There are no impacts associated with the grid connection extension that are considered to be of high significance and which cannot be mitigated to a medium to low level. Therefore, there are no fatal flaws from an avifaunal perspective that should prevent the development from proceeding.

The primary mitigation measures required to reduce the potential impacts on priority species include: 1) restrict habitat destruction and disturbance to within the footprint of the grid connection, and 2) regular monitoring of the power line to determine collision hotspots involving priority species (especially during favourable periods when nomadic species are more abundant), and 3) fitment of bird diverters where necessary on sections of the erected power lines where there are known flight paths, and where collisions and electrocutions risks may be higher.

Cumulative impacts associated with the development may be of moderate concern due to the increasing number of wind facility developments and associated grid connections proposed for the broader area. Considering that the avifauna that occur in the area are rather typical of the Succulent Karoo Biome, the overall cumulative avifaunal impact of the development is, however, considered likely to be low, provided that the recommended mitigation measures are strictly implemented.

<u>Impact statement</u>

The project site is considered to represent a broadly suitable environment for the location of the proposed Gunstfontein Grid Connection Extension. Considering that the broader project site supports a typical bioregional avifaunal assemblage, and that there are no known highly sensitive avifaunal areas, there are no impacts associated with the development that are considered to be of high residual significance and which cannot be mitigated to a low level. It is therefore the reasoned opinion of the specialist that the Gunstfontein Grid Connection Extension can be supported from an avifaunal perspective and therefore be authorised, subject to the implementation of the recommended mitigation measures.

Contents

COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS, AS AMENDED

Requirements of Appendix 6 – GN R326 2014 EIA Regulations, 7 April 2017	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i.the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	7-9
a) a declaration that the specialist is independent in a form as may be specified by the competent authority;	10-11
an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.1 & 2.2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4
the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.2
a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 3
an identification of any areas to be avoided, including buffers;	Section 3
a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3
a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.4
a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 4
any mitigation measures for inclusion in the EMPr;	Section 5 & 7
any conditions for inclusion in the environmental authorisation;	Section 7
any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7
a reasoned opinion- whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities and if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 6
a) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See Main Report
a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main Report
any other information requested by the competent authority.	
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

SHORT CV/SUMMARY OF EXPERTISE

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Ecological Solutions for People & the Environment

Simon Todd

Simon Todd is Director and principal scientist at 3Foxes Biodiversity Solutions and has over 20 years of experience in biodiversity measurement, management and assessment. He has provided specialist ecological input on more than 200 different developments distributed widely across the country. This includes input on the Wind and Solar SEA (REDZ) as well as the Eskom Grid Infrastructure (EGI) SEA and Karoo Shale Gas SEA. He is on the National Vegetation Map Committee as representative of the Nama and Succulent Karoo Biomes. Simon Todd is a recognised ecological expert and is a past chairman and current deputy chair of the Arid-Zone Ecology Forum. He is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Nama Karoo, Succulent Karoo, Thicket, Arid Grassland, Fynbos and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 2009 – Present – Sole Proprietor of Simon Todd Consulting, providing specialist ecological services for development and research.

- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute

A selection of recent work is as follows:

Strategic Environmental Assessments

- Co-Author. Chapter 7 - Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.
- Co-Author. Chapter 1 Scenarios and Activities – Shale Gas SEA. CSIR 2016.
- Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.
- Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.
- Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

Recent Specialist Ecological Studies in the Current Area

- Esizayo Wind Energy Facility, Roggeveld. WSP 2017.
- Maralla East & Maralla West WEFS, Roggeveld. WSP. 2017.
- Gunstfontein Wind Energy Facility, Sutherland. Savannah Environmental. 2016.
- Brandvalley Wind Energy Facility, Roggeveld. EOH. 2016.
- Kareebosch Wind Energy Facility, Roggeveld. Savannah Environmental 2015.
- Roggeveld Wind Energy Facility. 2013.
  Komsberg East & Komsberg West WEFs. Arcus Consulting. 2016

Eric Herrmann

Eric Herrmann is an avifaunal specialist with over 15 years of experience in biodiversity research and conservation in the Northern Cape. He completed a B.Tech Degree in Nature Conservation (1999) at the Cape Technikon, followed by a Masters in Conservation Ecology at the University of Stellenbosch (2004). He has worked as a research assistant for the Endangered Wildlife Trust (1999-2001) in the Kgalagadi Transfrontier Park, and then for the Percy FitzPatrick Institute of African Ornithology (University of Cape Town) as project manager of a field research centre near Kimberley (2003 to 2006). In 2006 he joined the provincial Department of Environment and Nature Conservation (DENC) in Kimberley as a faunal scientist until 2012. Since 2016 he has been working independently as an avifaunal specialist largely on wind and solar energy projects in the Western and Northern Cape.

Tertiary Education:

- 1994 - 1997 – National Diploma: Nature Conservation (cum laude), Cape Technikon
- 1998 - 1999 – B.Tech Degree: Nature Conservation (cum laude), Cape Technikon
- 2000 - 2004 – MFor: Conservation Ecology (cum Laude), University of Stellenbosch

Employment History

- 2016 - Present – Independent contractor, avifaunal specialist for renewable energy projects.
- 2006 - 2012 – Senior Conservation Scientist, Department of Environment and Nature Conservation, Kimberley.
- 2003 - 2006 – Research Assistant and Field Projects Manager, Percy Fitzpatrick Institute of African Ornithology, Cape Town
- 2001 - 2002 – Field Researcher, Deciduous Fruit Producers Trust, Stellenbosch.
- 1999 - 2001 – Research Assistant, Endangered Wildlife Trust, Johannesburg.

A selection of recent specialist work is as follows:

- Khunab Solar PV Facility, Upington. Avifaunal Specialist Report. Savannah Environmental. 2018/19.
- Allepad Solar PV Facility, Upington. Avifaunal Specialist Report. Savannah Environmental. 2018/19.
- Aggeneys Solar PV Facility, Aggeneys. Avifaunal Specialist Report. Savannah Environmental. 2018/19.
- Gaetsewe Solar PV Facility, Kathu. Avifaunal Specialist Report. Cape EAPrac 2018.
- Mogara Solar PV Facility, Kathu. Avifaunal Specialist Report. Cape EAPrac 2018.
- Kathu Hyperion Solar PV Facility, Kathu. Avifaunal Specialist Report. Cape EAPrac 2018.

SPECIALIST DECLARATION 1

I, ..Simon Todd....., as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;

I 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;
regard the information contained in this report as it relates to my specialist input/study to be true and correct, and 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 NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I have no vested interest in the proposed activity proceeding;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
all the particulars furnished by me in this specialist input/study are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: 

Name of Specialist: ____Simon Todd_____

Date: ____12 August 2020_____

SPECIALIST DECLARATION 2

I, ..Eric Herrmann....., as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

I act as the independent specialist in this application;
I 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;
regard the information contained in this report as it relates to my specialist input/study to be true and correct, and 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 NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I have no vested interest in the proposed activity proceeding;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
all the particulars furnished by me in this specialist input/study are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: 

Name of Specialist: ____Eric Herrmann_____

Date: ____12 August 2020_____

1 INTRODUCTION

Gunstfontein Wind Farm (Pty) Ltd proposes the construction and operation of a grid connection solution, known as the "grid extension infrastructure" for the authorised Gunstfontein Wind Farm (DEA Ref: 14/12/16/3/3/2/826), near Sutherland, Northern Cape Province. The grid connection solution will include the development of a double-circuit 132kV overhead power line (known as the Gunstfontein 132kV OHL extension double-circuit power line) to connect the Gunstfontein Wind Farm to the national grid, via the Hidden Valley substation. The proposed 132kV OHL extension will be an extension of the already authorised Gunstfontein Grid Connection (DEA Ref: 14/12/16/3/3/1/1619). Other associated infrastructure will also be required for the grid connection solution, such as access tracks/roads and laydown areas. A corridor 300m wide and approximately 7.5km long along with an assessment zone of 200m around the starting and terminating substation boundaries (collectively known as the grid corridor) is being assessed to allow for the optimisation of the grid (i.e. eventual micro siting) and associated infrastructure and to accommodate environmental sensitivities and other energy infrastructure currently under construction on the properties.

The 200MW Gunstfontein Wind Farm received an Environmental Authorisation in 2016, from the Department of Environmental Affairs (DEA) (DEA ref.: 14/12/16/3/3/2/826). A second Environmental Authorisation for the Gunstfontein Grid Connection (14/12/16/3/3/1/1619), including switching station, 132kV overhead powerline and ancillary infrastructure, was granted on 17 February 2017. The authorised grid connection infrastructure currently terminates at the Heuwels substation, however upon further investigation it has been identified that Heuwels substation will not have sufficient capacity to export the power from Gunstfontein Wind Farm. It is therefore necessary to by-pass Heuwels substation and extend the authorised grid connection to connect to the Hidden Valley substation located ~7.5km south of the Heuwels substation. This draft Basic Assessment Report focuses on the extension of the already authorised 132kV power line, required by Gunstfontein Wind Farm to evacuate the generated power to the national grid, at the identified grid connection point, i.e. the Hidden Valley Substation.

Savannah Environmental has been appointed to undertake the required application for environmental authorisation process for the above development. As part of the required studies, 3Foxes Biodiversity Solutions has been appointed to provide a specialist avifaunal assessment study of the grid connection extension corridor as part of the required application.

The purpose of the Gunstfontein Grid Connection Extension Avifaunal Specialist Report is to 1) describe the avian ecological features of the proposed grid connection corridor, 2) to provide a preliminary assessment of the avian ecological sensitivity of the grid connection

corridor, and 3) identify and assess the significance of the likely impacts on avifauna associated with the development of the grid connection corridor, and 4) to provide measures to avoid, minimize and mitigate project related impacts to the avifauna. A desktop review of the available literature for the area, supported by the findings of prior fieldwork in the assessment corridor and surrounding area, was undertaken in order to identify and characterise the local avifauna at the site. A confirmatory site visit took place on the 2nd and 7th of August 2020, in which the features mapped along the grid were verified in the field and the specific habitats of concern that had been identified previously or through the current sensitivity mapping were checked in the field to ensure that they had been ascribed the correct sensitivity and that no such features present had been overlooked. However, no active counts or surveys of avifauna were conducted during the trip as the majority of the site is under active construction of the wind farm infrastructure with high levels of noise and disturbance present.

This information is used to derive an avifaunal sensitivity map that presents the ecological constraints and opportunities for development of the grid connection corridor. The information and sensitivity map presented here provides an avifaunal baseline that has been used in the planning phase of the development to ensure that the potential negative avifaunal impacts associated with the development can be minimised. Impacts are assessed for the pre-construction, construction, operation, and decommissioning phases of the development. A number of avoidance and mitigation measures associated with each identified impact are recommended to reduce the likely impact of the development, which are also included in the Environmental Management Programme (EMPr) for the development. The full scope of study is detailed below.

SCOPE OF STUDY

The assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 982, as amended) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA).

The scope of the study includes the following activities

- a description of the avifauna that may be affected by the activity and the manner in which the avifauna may be affected by the proposed project.
- a description and evaluation of environmental issues and potential impacts on the avifauna (including using direct, indirect and cumulative impacts) that have been identified.
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts.
- an indication of the methodology used in determining the significance of potential impacts on the avifauna.

- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria:
    - the nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected;
    - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international;
    - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5-15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity), or permanent;
    - the probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (Impact will occur regardless of any preventable measures);
    - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight, or have no effect;
    - the significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high;
    - the status which will be described as either positive, negative or neutral;
    - the degree to which the impact can be reversed;
    - the degree to which the impact may cause irreplaceable loss of resources;
    - the degree to which the impact can be mitigated.

- a description and comparative assessment of all alternatives.
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the EMPr.
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- a description of any assumptions uncertainties and gaps in knowledge.
- an environmental impact statement which contains:
    - a summary of the key findings of the environmental impact assessment;
    - an assessment of positive and negative implications of the proposed activity;
    - a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations:

- Disclose any gaps in information or assumptions made.
- Identify recommendations for mitigation measures to minimise impacts.
- Outline additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the EMPr for avifaunal related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided, which will be separated into the following project phases:

- Pre-construction
- Construction
- Operational Phase
- Decommissioning Phase

RELEVANT ASPECTS OF THE DEVELOPMENT

A single power line alternative is considered in this assessment. The alignment of the corridor as assessed is a result of the proposed OHL being an extension of an already authorised 132kV OHL with the consequence that no alternative start points are possible. The end-point is the Hidden Valley substation, as this is the only substation in the vicinity with sufficient capacity to evacuate the power from the Gunstfontein Wind Farm. The proposed routing between the start- and end-points runs directly parallel to an already authorised 132kV OHL (currently under construction by Soetwater Wind Farm) in order to minimise the development corridor in the landscape. A more direct routing between the start- and end-point was initially considered, as this would have been shorter and more cost effective, however this would result in an additional disturbance corridor / servitude on the property, which is not preferred by the land owners. This option was therefore discounted and was not assessed further.

The proposed development for which application is made entails the following:

- A 132kV double circuit power line (~7.5km) extending from the already authorised 132kV Gunstfontein powerline, bypassing Heuwels Substation and linking up to the Hidden Valley Substation, which will be the end point of the proposed 132kV double-circuit power line grid connection.

- The proposed 132kV double-circuit power line grid connection extension will be located parallel and approximately 15m away from an existing powerline (under

construction by Soetwater Wind Farm) that connects the Heuwels and Hidden Valley substations (Figure 1).

- The full length of the assessed 300m wide corridor and 200m assessment area around each substation traverses four (4) affected properties, namely:
    - Portion 1 of the Farm Orange Fontein 203;
    - RE of the Farm Annex Orange Fontein 185;
    - RE of the Farm Leeuwe Hoek 183; and
    - The Farm De Hoop 202.
- The height of the power line towers of the 132kV double-circuit power line will be up to 32m and the servitude width of the power line will be up to 40m.
- Associated infrastructure will include laydown areas, access and service tracks.
- It is noted that the assessment corridor falls within the footprint of the authorised Karusa and Soetwater Wind Farms (currently under construction).

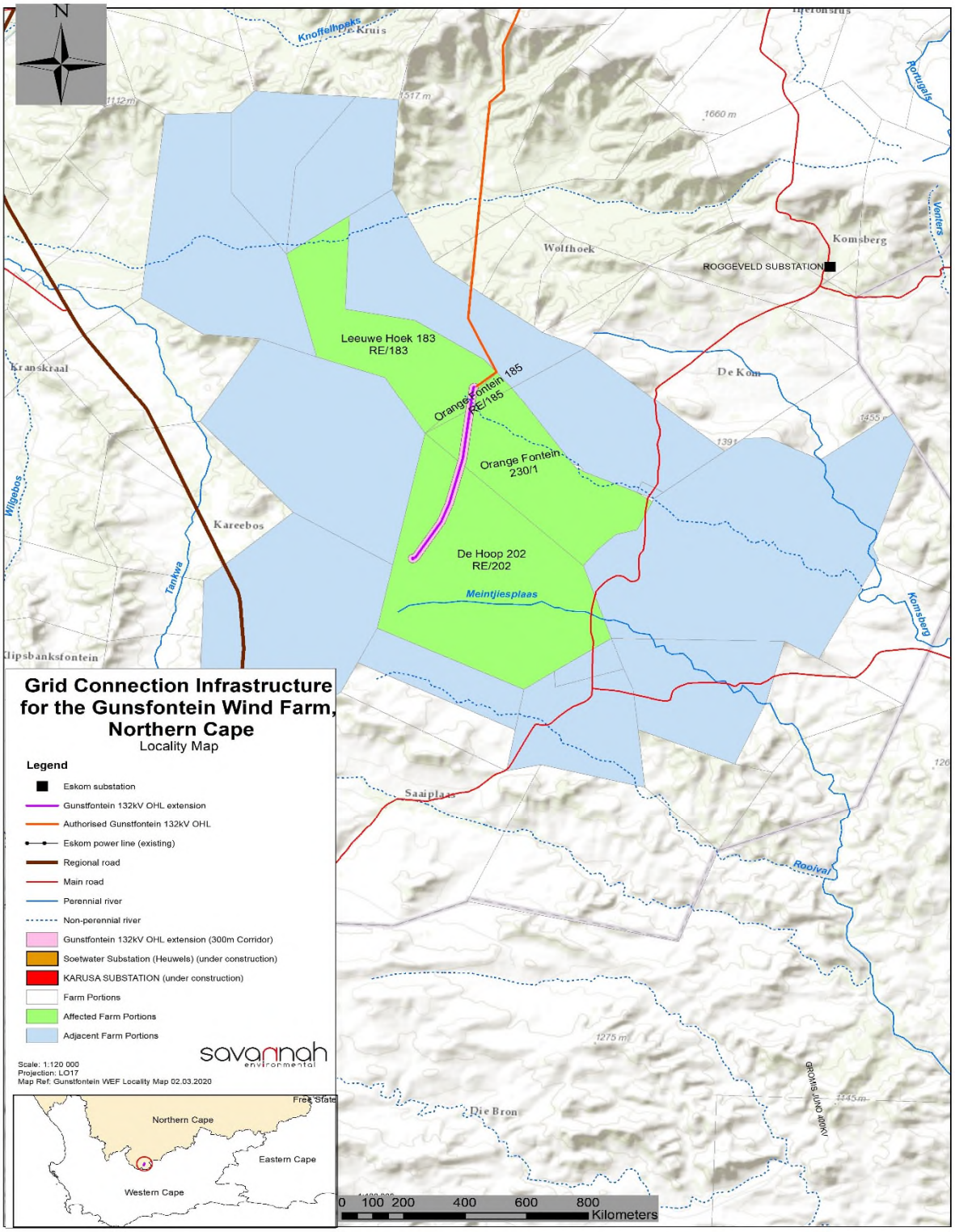

Figure 1. Layout map of the proposed Gunstfontein Grid Connection Extension showing the proposed power line route extension between the Heuwels and Hidden Valley substations.

2 METHODOLOGY

DATA SOURCING AND REVIEW

The assessment corridor and surrounding area has been extensively studied and sampled during long-term monitoring for the Karusa and Soetwater Wind Farms, as well as more recent surveys and pre-construction walkthroughs for the wind farms and for the Soetwater OHL between the Heuwels and Hidden Valley Substations. The assessment corridor for the Soetwater OHL overlaps with the current assessment corridor, and site surveys undertaken for the Soetwater OHL are directly applicable and relevant for the current assessment.

Given the wealth of recent field assessments previously undertaken within the assessment corridor and the current construction activity present, a detailed field assessment was not undertaken part of the current study. Sufficient recent field data already exists for the current study area. Hence apart from the habitat-level information collected on site, the study represents a desktop review of the available avifaunal information for the project site. Data sources from the literature consulted and used where necessary in the study include the following:

- The Southern African Bird Atlas Project 1 (SABAP1; Harrison *et al*., 1997), which obtained bird distribution data between 1987 and 1992, was consulted to determine the bird species likely to occur within the broader project site. The relevant quarter-degree grid cell (QDGC) that covers the broader area is 3220DC (17 cards, 98 species). More recent bird distribution data were also obtained from the second bird atlas project, which has been on-going since its inception in 2007 (SABAP 2; http://sabap2.adu.org.za/). SABAP2 employs a finer resolution using the pentad scale (5' latitude x 5' longitude), with the relevant pentad codes for the area being 3240_2035 (0 cards) and 3245_2035 (2 cards, 46 species). Most of the proposed Grid Connection Extension lies within the latter pentad. However, due to the overall poor coverage of these pentades, data from three neighbouring pentads were also considered, namely 3245_2040 (3 cards, 67 species), 3250_2035 (9 cards, 76 species) and 3245_2030 (9 cards, 83 species).
- The Pre-construction Bird Monitoring Report and Updated Avifaunal Assessment for the Three Phased Hidden Valley Wind Energy Facility (EWT, 2014)[1] was consulted to obtain additional information on flight paths and abundances of priority species. As were the specialist reports for the Soetwater OHL Basic Assessment, and the recent site-walkthroughs for Karusa WEF, Soetwater WEF and the Soetwater OHL.
- The Important Bird Areas of South Africa (IBA; Marnewick *et al*., 2015) was consulted to determine the location of the nearest IBAs to the project site.

[1] The Hidden Valley Wind Energy Facility is a cluster of three wind farms including the Karusa and Soetwater Wind Farms currently under construction.

- The data from the Coordinated Avifaunal Roadcounts (CAR; Young *et al*., 2003) were consulted to determine the location of the nearest CAR routes to the project site.
- The data from the Coordinated Waterbird Counts (CWAC; Taylor *et al*., 1999) were consulted to determine the location of the nearest CWAC sites to the project site.
- The conservation status, endemism and biology of all species considered likely to occur within the broader project site were determined from Hockey *et al.* (2005) and Taylor *et al.* (2015).
- The South African National Vegetation Map (Mucina & Rutherford, 2006) was consulted in order to determine the vegetation types and their conservation status that occur within the broader project site.
- The specialist's substantial knowledge of the area, arising from having undertaken numerous assessments in the region over several years.

The literature review revealed that there are no Important Bird Areas (IBAs), Coordinated Avifaunal Roadcounts (CAR) routes, or Coordinated Waterbird Counts (CWAC) wetlands within 50km of the project site.

A list was compiled of all the avifaunal species likely to occur within the broader study area, based on a combination of existing distributional data (SABAP1 and SABAP2) and personal observations. A short-list of priority bird species (including nationally and/or globally threatened, rare, endemic or range-restricted bird species) which could be affected by the proposed development was also compiled. These species will subsequently be considered as adequate surrogates for the local avifauna in general, and mitigation of impacts on these species will be considered likely to accommodate any less important bird populations that may also potentially be affected.

SENSITIVITY MAPPING & ASSESSMENT

An avifaunal sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature with mapping based on the satellite imagery of the project area. This includes delineating different habitat units identified on the satellite imagery and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of avifaunal species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low avifaunal sensitivity where there is likely to be a negligible impact on ecological processes and avifaunal biodiversity. Most types of development can proceed within these areas with little avifaunal impact.

- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact low. These areas usually comprise the bulk of avifaunal habitats within an area. Development within these areas can proceed with relatively little avifaunal impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high avifaunal impact is anticipated due to the high avifaunal biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for avifaunal species or provide important ecological services such as water flow regulation or seasonal feeding areas. Development within these areas is undesirable and should proceed with caution as it may not be possible to mitigate all impacts appropriately. In most cases, these are however not considered to represent no-go areas and some acceptable limit of development within these areas can be tolerated.
- **Very High** – Critical and unique avifaunal habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible. It is however sometimes unavoidable that roads and other linear features will need to traverse these features and such linear infrastructure is usually compatible with the maintenance of biodiversity within these features, provided that the appropriate mitigation and crossing places are identified.

SAMPLING LIMITATIONS AND ASSUMPTIONS

Due to the large number of studies and extended monitoring conducted for the wind farms within the affected area, the site has been well investigated in the past, with the result that the avifauna of the current affected area is well known and can be used to establish a reliable baseline for the site. The current study is however restricted largely to a desktop study, which may result in a number of limitations and assumptions associated with the findings of this report. There are however a number of other limiting factors and these could detract from the accuracy of the predicted results:

- The SABAP1 data for the relevant quarter degree squares covering the broader project site are now >22 years old (Harrison *et al*., 1997). Further, with only two (2) cards being submitted for the most relevant pentad that cover the project site during SABAP 2, there is some paucity in data with respect to species reporting rates. This was offset to some degree by incorporating the data from three neighbouring pentads with more reliable data (total of 21 cards submitted for three pentads). In an attempt to ensure a conservative approach with regards to the species included on the final avifaunal list (Annexure 1), the species list derived from the literature was obtained from an area somewhat larger than the study site, and thus likely includes a much wider array of species than what actually occurs at the site.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

SITE CONTEXT & AVIFAUNAL MICROHABITATS

According to the national vegetation map (Mucina & Rutherford, 2006), there is only one vegetation type traversed by the power line route (Figure 2), namely the Central Mountains Shale Renosterveld vegetation type. This vegetation type occurs in the Western and Northern Cape on the southern and southeastern slopes of the Klein Roggeveldberge and Komsberg, below the Komsberg section of the Great Escarpment, as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area. It is associated with clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones with land types mostly lb and Fc. Although this vegetation type is classified as Least Threatened, it has a very limited extent of 1236km^2 and is not formally conserved anywhere. Levels of transformation are however low and it is considered to be 99% intact. Although no endemic species are known to occur within this vegetation type, little is known about this Renosterveld type and it has been poorly sampled. Experience from this and other projects in the area indicate that this should be considered to be a relatively sensitive vegetation type with a relatively high abundance of species of conservation concern.

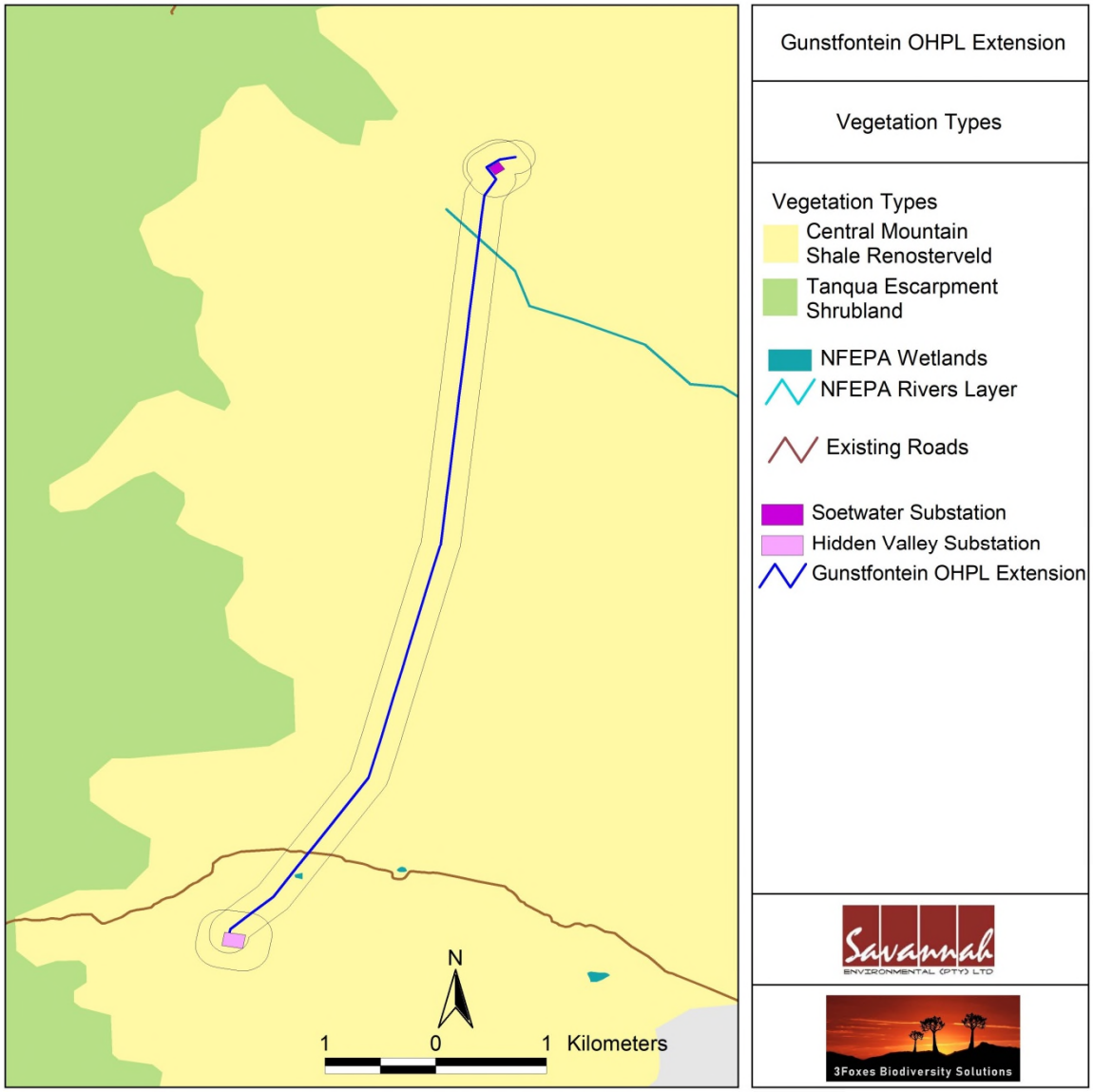

Figure 2. Broad-scale overview of the vegetation in and around the Gunstfontein Grid Connection Extension. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel *et al*., 2011).

Within the broader vegetation type a number of avifaunal microhabitats can be distinguished, based on their vegetation structure, topography, and food resources amongst others. There are five main microhabitats at the project site and surrounds, which include the predominant Renosterveld shrubland vegetation, mountain ridges and cliffs, small drainage line, farm dams and agricultural lands.

- *Predominant Renosterveld vegetation.* The predominant vegetation associated with the Central Mountains Shale Renosterveld covers the vast majority of the project site and surrounds, and is the main microhabitat for small passerines species. While the vegetation type lies within the Fynbos Biome, the avifauna is more characteristic of the nearby Succulent Karoo Biome, as key fynbos species are absence. The species typical of the predominate vegetation on site include, amongst others, Grey-backed Cisticola *Cisticola subruficapilla*, Karoo Prinia *Prinia maculosa,* Karoo Scrub robin *Cercotrichas coryphoeus,* Layard's Tit-babbler *Sylvia layardi*, Karoo Chat *Cercomela schlegelii,* Grey Tit *Melaniparus afer,* canaries, and sunbirds.

- *Mountain ridges and cliffs*. Exposed rocks and scree are characteristic of this microhabitat, with cliffs providing nesting sites for certain raptors (e.g. Jackal buzzard *Buteo rufofuscus*) and ravens. Rock-loving species are also usually more common in this habitat, and include African Rock Pipit Anthus *Anthus crenatus*, Long-billed Pipit *Anthus similis*, Ground Woodpecker *Geocolaptes olivaceus*, Cinnamon-breasted Warbler *Euryptila subcinnamomea* and Mountain Wheatear *Oenanthe monticola,* amongst others.

- *Small drainage lines and seepages.* Drainage lines can range drastically in vegetation structure within the region, from indistinct minor channels with slightly taller vegetation than the predominate vegetation, to sandy riverbeds with tall trees (e.g. *Acacia karoo*). At the project site only the former are present and are occasional within the grid corridor. These drainage lines are small and thus rarely contain standing water for any length of time. Occasionally associated with these drainage lines are seasonal seepages characterised by more open and short grassy areas. The drainage lines and seepages do not support a unique avifaunal assemblage though will attract birds from neighbouring habitats on occasion. It is possible that these could during favourable conditions be occasionally used as flight corridors by larger species, such as waterfowl.

- *Ephemeral farm dams.* A number of scattered small farms dams occur within and beyond the proposed grid corridor. These dams are ephemeral in nature and will thus primarily attract birds when inundated after heavy rains. Birds groups that may be attracted to these focal sites include various duck species, occasional waders, ibises and storks.

- *Agricultural lands*. Agricultural lands are generally cultivated seasonally and therefore will varying in their attractiveness to various bird species throughout the year. At least one large agricultural land borders the proposed grid corridor, near the southern end of the corridor at the Hidden Valley substation. Such lands may

attract large numbers of species such as Egyptian Goose *Alopochen aegyptiacus,* Spur-winged Goose *Plectropterus gambensis,* South African Shelduck *Tadorna cana,* and to a far lesser extent ibises, storks and possibly even Ludwig's Bustard *Neotis ludwigii* on occasion.

Figure 3. Looking south along the grid corridor towards the Hidden Valley substation, visible in the distance, showing the typical landscape of the affected area and the generally short stature of the Central Mountains Shale Renosterveld vegetation in the area. (Photo taken August 2020)

Figure 4. There are not many dams along the grid route which would attract birds, but this small farm dam occurs approximately 700m north of the Hidden Valley substation within the grid corridor and the power line adjacent to this area should be fitted with bird flight diverters.

GENERAL AVIFAUNA

An approximate total of 140 bird species are known to occur within the grid connection extension corridor and broader project site (Annexure 1). Seven (7) of these species are listed as threatened, and another four (4) are considered Near Threatened (Taylor *et al*., 2015). With regards to endemism, two (2) species are considered endemic and twenty-four (24) near-endemic to South Africa (BirdLife South Africa, 2019). Fifteen (15) species are considered biome-restricted (Marnewick *et al*., 2015).

The bird assemblage within the project site and surrounds is fairly typical of the Succulent Karoo Biome. A number of small passerines that are considered common within the predominant vegetation are endemic/near-endemic and biome-restricted (Table 1). Some of these species are nomadic, such as Black-headed Canary *Serinus alario* and Lark-like Bunting *Emberiza impetuani*, which may be absent in some years. Seemingly cryptic species such as Cinnamon-breasted Warbler may also occur on the project site. This species is not uncommon along the Great Escarpment some 15km to the north of the project site, and is usually restricted to rocky ridges and scree with vegetation cover. Other species of some importance include the Karoo Lark *Calendulauda albescens*, Cape Clapper Lark *Mirafra*

apiata, and Karoo Long-billed Lark *Certhilauda subcoronata.* While many of these and other species are endemic/near-endemic and biome-restricted, all of these species are widely distributed in the Karoo and Fynbos Biomes.

Table 1. Small passerines considered to be present at the project site, with endemism (Birdlife South Africa, 2019) and biome-restriction (Marnewick *et al*., 2015) statuses. SABAP1 provides the most relevant reporting rate for these species. Species marked with an asterisk (*) are typically nomadic within the region.

Species	Endemic/Near-endemic	Biome-restricted	SABAP1 reporting rate (%)
Bokmakierie			59
Bulbul, Cape	E	X	71
Bunting, Cape			
Bunting, Lark-like*			
Canary, Black-headed*	NE	X	24
Canary, White-throated			53
Canary, Yellow			59
Chat, Familiar			35
Cisticola, Grey-backed			47
Eremomela, Karoo	NE	X	
Flycatcher, Fairy	NE		
Lark, Cape Clapper	NE		12
Lark, Karoo	NE	X	6
Lark, Karoo Long-billed		X	18
Pipit, Long-billed			6
Prinia, Karoo	NE		53
Robin, Karoo Scrub			59
Starling, Pale-winged		X	18
Sunbird, Malachite			18
Sunbird, Southern Double-collared	NE		18
Tit-babbler (Warbler), Layard's	NE	X	6
Tit, Grey	NE		35
Warbler, Cinnamon-breasted	NE	X	
Wheatear, Mountain			41

RED-LISTED AND PRIORITY SPECIES

Red-listed and priority species are considered fundamental to this study, because of their susceptibility to power lines and associated infrastructures (Table 2). Species of particular concern include three Endangered species with high priority scores, namely Ludwig's Bustard*,* Martial Eagle *Polemaetus bellicosus* and Black Harrier *Circus maurus*. All three species occur at the project site (EWT, 2014), although bustards tend to be nomadic and may therefore be absent during unfavourable periods. Species of secondary concern which have also been recorded on site include Verreaux's Eagle *Aquila verreauxii,* Lanner Falcon *Falco biarmicus* and Black Stork (*Ciconia nigra).* Verreaux's Eagle is the most abundant of the large raptor species in the area, while the latter two species are significantly scarcer. Black Stork often frequent farm dams, not only singly but also in small congregations. The Vulnerable Southern Black Korhaan *Afrotis afra* and the Near-Threatened Karoo Korhaan *Eupodotis vigorsii* are found throughout the region and have also been recorded at the project site (EWT, 2014).

Table 2. Priority species identified in the project site and surrounds based on their conservation status (Taylor *et al*.,2015), regional endemism (Birdlife South Africa, 2019), and priority score (Retief *et al*., 2011).

Species	Cons. Status	Endemic/Near-endemic	Priority Score	SABAP1 reporting rate (%)	Susceptible to
Bustard, Ludwig's	EN		320	6	Collisions
Buzzard, Common (Steppe)			210	18	Collisions/disturbance
Buzzard, Jackal		NE	250	6	Collisions/disturbance
Crane, Blue	NT		320		Collisions
Eagle, Black-chested Snake			230		Collisions/disturbance
Eagle, Booted			230	6	Collisions/disturbance
Eagle, Martial	EN		350	6	Collisions/electrocution
Eagle, Verreaux's	VU		360	6	Collisions/electrocution
Falcon, Lanner	VU		300		Collisions/disturbance
Flamingo, Greater	NT		290		Collisions
Francolin, Grey-winged		SLS	190	6	Disturbance/habitat loss
Goshawk, Pale Chanting			200	41	Disturbance/habitat loss
Harrier, Black	EN	NE	345	12	Collisions/disturbance/habitat loss
Harrier-hawk, African			190		Disturbance/habitat loss
Kestrel, Rock				59	Disturbance/habitat loss
Kite, Black-winged			174	29	Disturbance/habitat loss

Korhaan, Karoo	NT		240		Collisions/disturbance/habitat loss
Korhaan, Southern Black	VU	E	270	18	Collisions/disturbance/habitat loss
Owl, Cape Eagle-			250		Disturbance/habitat loss
Owl, Spotted Eagle-			170	6	Disturbance/habitat loss
Pipit, African Rock	NT	SLS	200		Disturbance/habitat loss
Sparrowhawk, Rufous-breasted			170		Disturbance/habitat loss
Stork, Black	VU		330	6	Collisions/electrocutions

The Near-Threatened Blue Crane *Grus paradisea* and Greater Flamingo *Phoenicopterus ruber* are both rare in the region, although the former has been recorded during the pre-construction monitoring (EWT, 2014). According to SABAP2 records, Blue Crane has only been recorded in a few pentads within a 50km radius of the project site, while Greater Flamingo have been recorded in a number of pentads, particularly on the plateau of the Great Escarpment where they frequent large farm dams. Both species may however pass through the area *en route* between focal sites, with flamingos possibly commuting in small flocks. African Rock Pipit is not uncommon along the escarpment to the north of the site, and have also been recorded at the project site (EWT, 2014).

Species that are not red-listed, but that were frequently observed in the area during the pre-construction bird monitoring for the Soetwater WEF (EWT, 2014), include Jackal Buzzard, Rock Kestrel *Falco rupicolus*, and to a lesser extent Grey-winged Francolin *Scleroptila africanus,* Pale Chanting Goshawk *Melierax canorus,* and Booted Eagle *Aquila pennatus.*

In conclusion, the avifauna of the project site and broader area appears fairly typical of the Succulent Karoo Biome. However, due to the presence of a fair number of priority species, the sensitivity of the avifauna can be considered to be of medium significance.

CURRENT BASELINE & CUMULATIVE IMPACT

According to the map of DEA-registered projects as at December 2019, there are numerous renewable energy project applications in the broader area. The potential for cumulative impact of wind energy development with the associated grid connection infrastructure in the area is therefore a potential concern. The major footprint would be from the facilities themselves and the contribution of the current power line extension would be very low in comparison. As a result, the impact of the proposed power line extension on cumulative impacts in the area would be insignificant as the required extent of transformation would be low. The major concern would be with respect to the impacts on landscape connectivity

more locally. The location of the current proposed grid connection extension adjacent to the approved Soetwater (Heuwels) to Karusa (Hidden Valley) grid connection (Arcus, 2015), is certainly a mitigating circumstance which would serve to further reduce the cumulative impact associated with the current development. This will contribute towards reducing the potential for collisions with large raptors and terrestrial birds (e.g. bustards) since the grid connection extension corridor will mostly be routing adjacent to an established power line which is currently under construction and which would also be fitted with bird flight diverters.

AVIAN SENSITIVITY ASSESSMENT

Important avian microhabitats play an integral role within the landscape, providing nesting, foraging and reproductive benefits to the local avifauna. In order to ensure that the proposed development does not have a long term negative impact on the local avifauna, it is important to delineate these avian microhabitats within the broader project site. To this end an avian sensitivity map (Figure 5) was generated by integrating avian microhabitats present on the site.

The broader study area supports five main avifaunal microhabitats, which are referred to as the predominant vegetation, mountain ridges and cliffs, drainage lines and seepages, agricultural lands and ephemeral farm dams. The predominant vegetation is the most expansive habitat and supports a wide array of small passerines and ground-dwelling non-passerines, such as korhaan and francolin, and is therefore considered to be of Medium Sensitivity. During favourable conditions, focal habitats such as the drainage lines and seepages may support species which are more prone to power line collisions, such as waterfowl and in particular African Black Duck *Anas sparsa* though uncommon in the region, and are therefore considered to be of Medium-High sensitivity. Similarly, the man-made ephemeral farm dams may also support collision prone species such as waterfowl, ibises, and possibly Black Stork and Greater Flamingo, and are thus considered to be of Medium-High sensitivity. The agricultural lands are also considered to be of Medium-High sensitivity, as focal points for numerous large-bodied species during favourable conditions. Large aggregations of species such as South African Shelduck, Egyptian and Spur-winged Goose, and ibises, may be attracted, but also possibly Ludwig's Bustard and Blue Crane on rare occasions.

In addition to these areas of sensitivity, the proposed grid extension corridor also intersects a turbine exclusion zone identified during the pre-construction bird monitoring study (EWT, 2014). The point of intersection lies just to the north of the Hidden Valley substation, where the grid connection passes over mountain ridges. Raptors use the rising air currents over these ridges to foraging more efficiently, making them more susceptible to collisions with power lines and other infrastructure. The turbine exclusion zone was predicted by flight models, and the report stated that associated turbine infrastructure, including roads,

power lines and buildings, should avoid the exclusions zones as far as possible (EWT, 2014). This turbine exclusion zone is therefore considered to be of high sensitivity.

The development of the grid connection infrastructure is estimated to generate low impacts on the avifauna, provided suitable mitigation measures are employed during construction and operation of the proposed project. In terms of the sensitivity categories and the development, no pylons should be located in the Very High sensitivity areas, although it may be necessary for the service track to traverse these features. Pylons are considered acceptable in the High sensitivity areas, but specific mitigation such as the fitting of the bird flight diverters should take place in these areas where appropriate. Those parts of the route which are located close to existing roads should make use of the existing roads and new roads beneath the line should not be maintained after construction but rather rehabilitated.

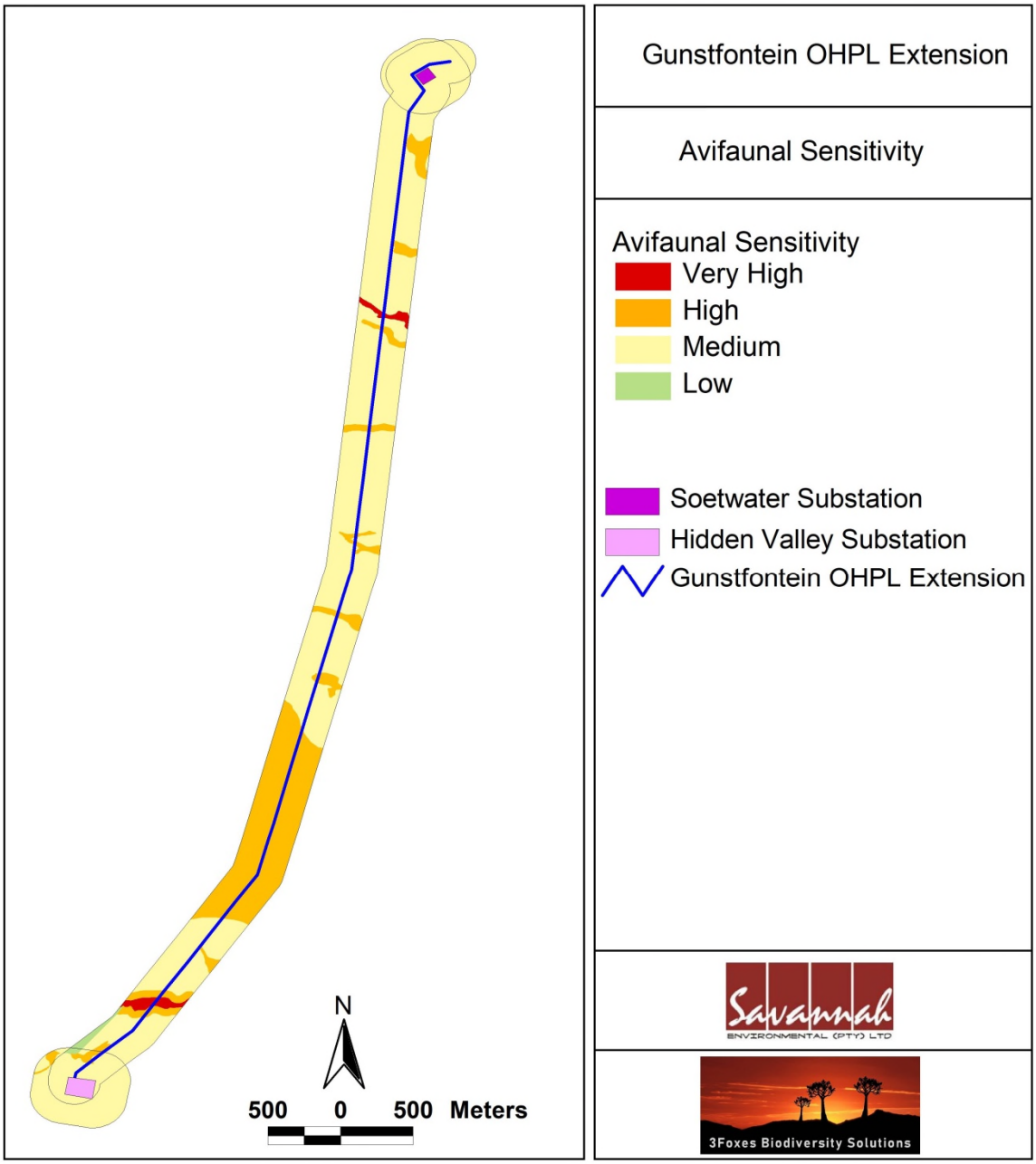

Figure 5. Avifaunal sensitivity map for the Gunstfontein Grid Connection Extension, showing the Heuwels (Soetwater) substation in the north and the Hidden Valley (Karusa) substation in the south.

4 IDENTIFICATION & NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the proposed grid connection extension are identified. In order to ensure that the impacts

identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the development are listed. The relevance and applicability of each potential impact to the current situation are then examined in more detail in the next section.

According to a position statement by Birdlife South Africa, the main concerns with grid connections related to energy facilities are the following:

- Collision and electrocution caused when perching on or flying into power line infrastructure.
- Habitat destruction and disturbance/exclusion of avifauna through construction (short-term) and maintenance (long-term) of new power line infrastructure.
- Habitat destruction and disturbance of birds caused by the construction and maintenance of new roads and other infrastructure.

The predominant habitat on the site represents typical vegetation of the broader area, with no features of concern which are expected to be severely impacted by the proposed grid connection extension. Of the eleven (11) red-listed species that are known to occur in the broader area, seven (7) of these are likely to be affected in some way by the power line extension, namely Ludwig's Bustard, Martial Eagle, Verreaux's Eagle, Black Harrier, Karoo Korhaan, Southern Black Korhaan and Black Stork. While the development may have an insignificant impact on most of the species, it may nevertheless possibly result in occasional direct collisions with the power line cables and electrocutions. Species are expected to be impacted to varying degrees based on their life-history strategies, abundance and general susceptibility to the threats posed by power lines, as well as the type of pylons/towers constructed and appropriate marking of power cables with bird diverters.

IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

In this section each of the potential impacts on avifauna associated with the construction and operation of the grid connection extension are explored in more detail with reference to the features and characteristics of the site and the likelihood that each impact would occur given the characteristics of the site and the extent and nature of the development. The major risk factors and contributing activities associated with the development are identified and briefly outlined and summarised below before the impacts are assessed.

Potential avifaunal impacts resulting from the proposed development of the Gunstfontein Grid Connection Extension Infrastructure would stem from a variety of different activities and risk factors associated with the pre-construction, construction and operational phases of the project including the following:

Pre-construction Phase

- Human presence and uncontrolled access to the site may result in negative impacts on the avifauna through poaching and uncontrolled collection of fauna and flora for traditional medicine or other purpose.
- Site clearing, and exploration activities for the grid connection may have a negative impact on avifaunal biodiversity if this is not conducted in a sensitive manner.

Construction Phase

- Vegetation clearing for the grid connection and associated infrastructure will impact the local avifauna directly through habitat loss. Vegetation clearing will therefore lead potentially to the loss of avifaunal species, habitats and ecosystems as birds are displaced from their habitat.
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance.
- Increased human presence can lead to poaching, illegal fauna collecting and other forms of disturbance such as fire.

Operational Phase

- The operation of the grid connection extension infrastructure will generate minor disturbance, particularly during maintenance of infrastructure, which may deter some avifauna from the area, especially red-listed avifaunal species which are less tolerant of disturbances.
- Mortality among the local avifauna may result due to direct collisions with power lines and electrocution with power line infrastructure (Lehman *et al*., 2007, Jenkins *et al*., 2010).

Cumulative Impacts

- The development of the grid connection infrastructure will contribute to cumulative impacts in the area and may potentially affect the ability to meet future conservation targets. However, the total footprint of the development would be less than 8ha, which is not considered to be a highly significant impact. It is however assessed as there are numerous other facilities and associated grid connections in the area and the cumulative impact of numerous power lines may generate a more significant impact overall.
- Transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. This is particularly a concern with regards to species and ecosystems with limited geographical distributions (Rudman *et al.*, 2017). However, the expected habitat transformation for the proposed grid connection is minimal.

- The erection of new power line corridors can also have a cumulative impact, which may only become discernible over many years. However, where new power lines follow the same route as existing lines (as would be the case with this proposed grid connection extension), the potential impacts can be reduced.

Project specific impacts on particular groups of avifauna are as follows:

Habitat loss and disturbance of small passerines

For the smaller passerine species the most important impacts will involve temporary displacement from the area encompassed by the grid connection extension footprint as a result of minor habitat destruction and disturbance during construction. While numerous species will be impacted, all of these species have large distribution ranges and due to the temporary nature of the impact, will therefore experience insignificant population declines in the area, and not regionally or nationally. Some of the most abundant species which may be impacted, and which are also common in neighbouring habitats, include primarily Grey-backed Cisticola, Karoo Scrub Robin, Karoo Prinia, Cape Clapper Lark, Grey Tit, amongst others. The loss of habitat and disturbance will not be permanent during the operational phase of the grid connection extension infrastructure. The impacts in general can be expected to be minimal as these smaller species are far less susceptible to the associated impacts of power lines than larger-bodied species.

Habitat loss, disturbance and collision risk of medium terrestrial birds and raptors

Small to medium-sized non-passerines that may be impacted to some extent due to habitat loss and displacement include resident raptors such as Jackal Buzzard, Booted Eagle, Pale Chanting Goshawk, Rock Kestrel and the terrestrial Southern Black Korhaan and Karoo Korhaan. While some of these species may be susceptible to collisions with power lines, this is not expected to have a major impact on most of these species. Their smaller size and hence better manoeuvrability, as well as sedentary lifestyle and knowledge of their environs, ensures that they have a much lower probability of colliding with power lines (Shaw 2013). Other groups of birds in this risk category include waterfowl, which are susceptible to collisions with power lines due to their fast flight (Bevanger 1994).

Habitat loss, disturbance and collision risk of large terrestrial birds and raptors

The group of primary concern is the medium to large non-passerines, which include the large terrestrial birds and diurnal raptors. Many of these are also red-listed, such as Ludwig's Bustard, Martial eagle, and Black Stork. Most of these species are susceptible to collisions with power lines owing to reduced ability to see the power lines and reduced manoeuvrability in flight to avoid collisions (Martin & Shaw, 2010; Jenkins *et al.*, 2010; Jenkin *et al*., 2011; Shaw, 2013). However, the only species which are highly susceptible include Ludwig's Bustard and Black Stork (Jenkins *et al.*, 2010). An additional threat faced

by the large raptors is electrocution when perched or attempting to perch on power line structures (Lehman *et al*., 2007), but this depends largely on the type of pylons or towers used. Electrocutions can further be avoided to a large extent by employing suitable mitigation methods. Disturbances during construction of the grid connection is also expected to have a negative impact by temporarily displacing birds from foraging habitat. Hence it is essential that all impact mitigations are employed to ensure minimal potential disturbance and mortalities.

5 ASSESSMENT OF IMPACTS

The various identified avifaunal impacts are assessed below for the proposed grid extension development. It is important to note that this is contingent on the layout as provided and the understanding that the final micro-siting of the overhead line (OHL) will take place within the assessment corridor. Any changes to the layout (significantly outside of the assessment corridor) or project description would potentially invalidate the assessment.

GUNSTFONTEIN GRID CONNECTION EXTENSION

The following is an assessment of the Gunstfontein Grid Connection Extension, for the planning and construction, operational and decommissioning phases of the development. The construction phase will result in limited direct loss of habitat due to some clearing of vegetation and avifaunal microhabitats along the grid connection corridor. Disturbances will be caused by increased traffic of vehicles along the corridor during construction. Potential collisions and electrocutions along the power line extension will be potential impacts during the operational phase, but may also contribute to the cumulative impacts of the project. The decommissioning phase of the project will also result in limited loss of habitat due to disturbance of vegetation and avifaunal microhabitats along the grid connection corridor. Disturbances will also be caused by increased traffic of vehicles along the grid connection extension corridor during the decommissioning phase.

Planning & Construction Phase

Impact Nature: Direct Avifaunal Impacts During Construction – habitat loss and disturbance		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (5)	Low to Moderate (4)
Probability	Highly likely (4)	Probable (3)
Significance	Medium (32)	Low (21)

Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	Although there will be some habitat loss that cannot be well mitigated, impacts on avifauna will be transient and of low magnitude during construction.	
Mitigation	• Pre-construction walk-through of the power line route to identify areas of avifaunal sensitivity and where bird diverters should be attached. • The design of the proposed power line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, taking into account the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al*., 2017). • Where necessary, deterrent devices such as bird guards should be mounted on relevant parts of the pylons to further reduce the possibility of electrocutions. • The power line should be marked with bird diverters along all high risk sections in order to make the lines as visible as possible to collision-susceptible species. Recommended bird diverters such as brightly coloured 'aviation' balls, thickened wire spirals, or flapping devices that increase the visibility of the lines should be fitted where considered necessary (collision hot-spots). These should be identified during the preconstruction walk-through. • Impact near to important habitats such as drainage lines and farm dams, which may serve as focal sites for various bird species, must be minimised. • The potential to 'stagger' the position of the power line pylons in relation to neighbouring power line poles/pylons should be investigated (taking other environmental and technical considerations into account), as this may assist in increasing the visibility of power lines to large flying birds such as bustards, which may occasionally fly through the area. • All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, francolin), and owls, which are often persecuted out of superstition. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. • The use of laydown areas within the footprint of the development should be used where feasible, to avoid habitat loss and disturbance to adjoining areas. • Any avifauna threatened by the construction activities should be removed to safety by the Environmental Control Officer (ECO) or appropriately qualified site Environmental Officer (EO). • If lights are to be used at night for ensuring that infrastructure on site is lit, this should be done with downward-directed low-UV type lights (such as most HPS bulbs), which do not attract insects and their avian predators., so as to minimise disturbance to birds flying over the site at night.	

	• All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night. • If any active raptor nests of priority species are discovered during the pre-construction walkthrough or during the construction phase, construction activities must be planned and managed in such a way to ensure that there is no direct disturbance to the nest or its immediate surroundings. If there are active nests near construction areas, these should be reported to the ECO and should be monitored until the birds have finished nesting and the fledglings have left the nest. • If holes or trenches need to be dug for pylons, these should not be left open and unattended for extended periods (> 1 week) of time as terrestrial avifauna or their flightless young may become entrapped therein. Holes should only be dug when they are required and should be used and filled shortly thereafter, alternately, excavated areas should be checked frequently for trapped fauna/ avifauna that require assistance to exit the excavated area.
Cumulative Impacts	The Gunstfontein Grid Connection Extension development will contribute to cumulative impacts on avifaunal habitat loss (minimal) and fragmentation, as well as collision risk with power line infrastructure in the area.
Residual Risks	The loss of habitat associated with the grid connection corridor is an unavoidable consequence of the power line construction, and remains a residual impact even after mitigation and avoidance of more sensitive areas. The total residual impact of habitat loss would however be low. Although the use of power line structures that are considered safe for large birds will contribute to reducing the potential impacts of the power line, future collisions with power lines will remain a risk. This can be reduced further by 'staggering' the pylons in relation to neighbouring pylons during construction (subject to other environmental and technical considerations), rather than aligning the pylons of adjacent power lines, so that the profile of the combined power lines will be more visible to flying birds.

Operational Phase

Impact Nature: Direct Avifaunal Impacts During Operation – collisions, electrocution and disturbance		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Likely (4)	Probable (3)
Significance	Medium (44)	Low (27)
Status	Negative	Negative

Reversibility	Low	Medium
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	To a large extent, although bird flappers and other bird diverters are not 100% effective in reducing bird collisions and electrocutions, hence there would still be residual impact.	
Mitigation	• Regular monitoring of power lines should be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird diverters (i.e. that have not already been marked at construction). Monitoring should be undertaken at least once a month for the first year of operation of the infrastructure. • Any movements by vehicle and personnel should be limited to within the footprint of the grid connection corridor and associated infrastructure, especially during routine maintenance. • Any raptor nests that are discovered on the power line structures should be reported to the Environmental Officer, while utmost care should be taken to not disturb these nests during routine maintenance procedures.	
Cumulative Impacts	The development will contribute to cumulative impacts on avifaunal habitat loss as well as collision and electrocution risk with power line infrastructure in the area.	
Residual Risks	Deterrent devices such as bird guards to reduce electrocutions, and flight diverters to reduce the risk of collisions with power lines are not 100% effective and some residual impact is likely to occur.	

Decommissioning Phase Impacts

The decommissioning phase will result in disturbance and loss of avifaunal microhabitats due to removal and clearing of the power line and associated infrastructure. Disturbances will be caused by increased traffic of vehicles, and particularly heavy machinery used for clearing the infrastructure.

Impact Nature: Avifaunal impacts due to decommissioning activities – some habitat disturbance/loss and disturbance due to traffic and presence of personnel.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (4)	Low to Moderate (3)
Probability	Highly Likely (4)	High Likely (4)
Significance	Low (28)	Low (24)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	The disturbance impact can be mitigated to an extent as it will be transient and have no	

	long term impact.
Mitigation	• All infrastructure should be removed from the development site and disposed of in the appropriate manner. • All waste produced during decommissioning must be disposed of at a designated waste management facility, unless it can be appropriately re-used or recycled. • Environmental induction for all personnel on site to ensure that basic environmental principles are adhered to, and awareness about not harming or hunting terrestrial species (e.g. bustards, korhaans, and francolin), and owls, which are often persecuted out of fear or superstition. • This induction should also include awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, and remaining within demarcated decommissioning areas. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed in undisturbed natural areas outside of the decommissioning area. • All vehicles should adhere to a low speed limit (40km/h on site) to avoid collisions with susceptible species such as nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls) which sometimes forage or rest along roads. • Any avifauna threatened by the activities should be removed to safety by the ECO or appropriately qualified environmental officer. • If holes or trenches need to be dug, these should not be left open and unattended for extended periods of time as terrestrial avifauna or their flightless young may become entrapped in them. Holes should only be dug when they are required and should be used and filled shortly thereafter, or alternately monitored frequently to release any fauna that become entrapped. • No activity should occur near to active raptor nests of priority species should these be discovered prior to or during the decommissioning phase. If there are active nests of priority species near the decommissioning areas, these should be reported to the ECO and should be monitored until the birds have finished nesting and the fledglings left the nest. • All disturbed and cleared areas should be re-vegetated with indigenous perennial shrubs and grasses from the local area.
Cumulative Impacts	There are no cumulative impacts associated with the decommissioning of the project site.
Residual Risks	Disturbance during the decommissioning phase is an unavoidable consequence, but will have low residual impact with implementation of the mitigations. Although the sensitivity of the affected habitat ranges from Medium to Very High, the overall residual impact on avifaunal habitat loss remains low as the habitat can be readily rehabilitated due to small footprint of the pylon infrastructure.

Cumulative Impacts

The following are the cumulative impacts that are assessed as being a likely consequence of the development of the Gunstfontein Grid Connection Extension. These are assessed in

context of the extent of the current site, other developments in the area as well as general habitat loss and transformation resulting from other activities in the area. The potential long-term impact of the grid connection extension during the operational phase of the project is also considered a cumulative impact.

Impact Nature: Impact on avifaunal habitats, migration routes and nesting areas due to cumulative loss and fragmentation of habitat, as well collisions and electrocutions along the grid connection (dealt with specifically under Operational Impacts).		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low to Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	Low (18)	Medium (33)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated	Impacts can be mitigated to some degree, but the majority of the long-term impact results from the presence of the grid connection and other developments in the area which cannot be well mitigated.	
Mitigation: • Ensure that monitoring is sufficiently frequent to detect collisions reliably and that any areas where regular collisions occur are fitted with flight diverters.		

6 CONCLUSION & RECOMMENDATIONS

The avifauna of the project site and surrounds is typical of the Succulent Karoo Biome. The diversity and density of birds is generally low, but may increase during favourable years when there are influxes of nomadic species. Of the eleven (11) red-listed species known to occur within the broader area, only seven (7) of these are expected to occur at the project site with some certainty. The proposed Gunstfontein Grid Connection Extension will mainly traverse extensive habitat which is considered to be of Medium avifaunal sensitivity, while focal sites such as drainage lines, farm dams and the turbine exclusion zone are of Medium-High sensitivity. Impacts on avifauna within the grid connection corridor are therefore likely to be medium-low with implemented mitigation measures, and no high post-mitigation impacts are likely.

The expected impacts of the proposed grid connection will include the following: 1) some habitat loss and fragmentation associated with the Central Mountain Shale Renosterveld, 2) limited disturbance and displacement caused during the construction and maintenance phases, and 3) direct mortality of avifauna colliding with the power lines, as well as possible electrocutions with power line infrastructure, and 4) cumulative habitat loss at a broader scale from renewable energy developments in the area. Mostly large non-passerine species, several of which are red-listed, may be impacted by the minor and temporary loss of foraging habitat and disturbances, and potential collisions with the power line structures and electrocutions. However, given the extensive national ranges of these species, the impact of the development would be minimal and a long-term impact unlikely provided mitigation measures are taken.

Several mitigation measures can be implemented during the construction and operational phase of the proposed grid connection to reduce the impacts on the avifauna. During the construction phase, displacement and disturbance of avifauna can be reduced by restricting habitat loss and disturbance strictly to within the footprint of the development corridor. During the first year of the operational phase regular (monthly) monitoring along the grid connection must be undertaken to identify areas of high collision risk. With the implementation of the mitigation measures, the impact of the proposed grid connection can be reduced to an acceptable level and as such there are no fatal flaws associated with the development that should prevent it from proceeding.

Cumulative impacts in the area are a concern due to the proliferation of wind energy developments. In terms of habitat loss, the affected vegetation type is still approximately 99% intact, while it has an extensive range within the bioregion. In terms of potential losses to landscape connectivity, the site is not considered to lie within an area that is considered a likely avifaunal movement corridor or along an important ecological gradient, and as such, the overall cumulative impact of the development is considered likely to be low.

The proposed route for the Gunstfontein Grid Connection Extension is therefore considered favourable. There are no known impacts associated with the development that are considered to be of high significance and which cannot be mitigated to a low level. Therefore, based on the results of this assessment, there are no reasons to indicate that the grid connection should not be authorised.

Avifaunal Impact Statement:

The proposed Gunstfontein Grid Connection Extension mostly traverses widespread habitat which supports a typical bioregional avifaunal assemblage with a relatively low species diversity and abundance in most years. Considering that there are no known breeding and roosting sites and only limited flight paths of priority species within the immediate vicinity,

there are no impacts associated with the development of the Gunstfontein Grid Connection Extension that are considered to be of high residual significance and which cannot be mitigated to a low level. Consequently, it is therefore the reasoned opinion of the specialist that the Gunstfontein Grid Connection Extension can therefore be authorised, subject to the implementation of the recommended mitigation measures.

7 ACTIVITIES FOR INCLUSION IN DRAFT EMPR

An Environmental Management Programme (EMPr) provides a link between the predicted impacts and mitigation measures recommended within the Basic Assessment / EIA and the implementation and operational activities of a project. As the construction and operation of the Gunstfontein Grid Connection Extension development may impact the environment, activities which pose a threat should be managed and mitigated so that unnecessary or preventable environmental impacts do not result. The primary objective of the EMPr is to detail actions required to address the impacts identified in the EIA during the establishment, operation and rehabilitation of the proposed infrastructure. The EMPr provides an elaboration of how to implement the mitigation measures documented in the EIA. As such the purpose of the EMPr can be outlined as follows:

- To outline mitigation measures and environmental specifications which are required to be implemented for the planning, establishment, rehabilitation and operation/maintenance phases of the project in order to minimise and manage the extent of environmental impacts.

- To ensure that the establishment and operation phases of the grid connection do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.

- To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.

- To propose mechanisms for monitoring compliance, and preventing long-term or permanent environmental degradation.

- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the EIA process

Below are the avifaunal-orientated measures that should be implemented as part of the EMPr for the development to reduce the significance or extent of the above impacts to avifauna.

CONSTRUCTION PHASE ACTIVITIES

Objective: Limit disturbance and loss of avifaunal microhabitats during construction			
Project component/s	All infrastructure and activities which result in disturbance and loss of intact vegetation: • Vegetation clearing for the establishment of the grid connection corridor • Vegetation clearing for construction camps & other temporary infrastructure • Vegetation clearing for access roads. • Human presence. • Operation of heavy machinery.		
Potential Impact	Disturbance and loss of avifaunal microhabitats, leading to displacement and loss of resident avifaunal species.		
Activity/risk source	• Habitat transformation during construction. • Presence of construction crews. • Operation of heavy vehicles.		
Mitigation: Target/Objective	• Low footprint and low impact on avifaunal habitats. • Low disturbance of avifauna during construction. • Low disturbance and impact on red-listed avifaunal species.		
Mitigation: Action/control		Responsibility	Timeframe
• Pre-construction environmental induction for all construction personnel regarding basic environmental principles.		ECO	Pre-construction
• The use of laydown areas within the footprint of the development should be used where feasible, to avoid habitat loss and disturbance to adjoining areas. • All construction vehicles should adhere to clearly defined and demarcated roads. • All construction vehicles should adhere to a low speed limit (40km/h on site) to avoid collisions with susceptible species such as nocturnal and crepuscular species, as well as reduce dust. • Where holes or trenches are to be dug, these should not be left open and unmonitored for extended periods (>1 week) of time as terrestrial avifauna may become entrapped therein. • No construction activity should occur near to active raptor nests should these be discovered prior to or during the construction phase.		Contractor	Construction
• ECO to monitor and enforce ban on hunting and collecting of avifauna or their products (e.g. eggs). • Any avifauna threatened or injured by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.		ECO	Construction

• If any active raptor nests of priority species are discovered during the pre-construction walkthrough or during the construction phase, construction activities must be planned and managed in such a way to ensure that there is no direct disturbance to the nest or its immediate surroundings. If there are active nests near construction areas, these should be reported to the ECO and should be monitored until the birds have finished nesting and the fledglings have left the nest.		

Performance Indicator	• Avifaunal microhabitat loss restricted to footprint of the grid connection corridor. • Low disturbance and impact on red-listed avifaunal species. • Low mortality of avifauna due to construction machinery and activities. • No disturbance of breeding raptors (i.e. no nest abandonment due to disturbance). • No poaching or collecting of avifauna or their products (e.g. eggs or nestlings) by construction personnel. • Removal to safety of entrapped/injured avifauna encountered during construction.
Monitoring	ECO to monitor construction to ensure that: • Vegetation is cleared only within footprint areas during construction. • No birds or eggs are disturbed or removed by construction personnel. • Any raptor nests (especially of red-listed species) discovered on site or nearby, are monitored regularly until the post-fledging period.

OPERATION PHASE ACTIVITIES

OBJECTIVE: Limit direct and indirect impacts and disturbances of avifauna during the operation phase	
Project component/s	All activities which result in disturbance of avifauna, including: • Avifaunal collisions with power line • Avifaunal electrocutions with power line components • Human presence • Vehicle traffic
Potential Impact	Mortality and disturbance of avifauna within the footprint of the grid connection corridor due to collisions with power lines and electrocutions, and disturbance due to presence of personnel and vehicle traffic.
Activity/risk source	• Avifaunal collisions with power lines and electrocutions. • Presence of operational phase personnel. • Presence of personnel during power line maintenance activities.
Mitigation: Target/Objective	Low disturbance and impact of avifauna, and low collision and electrocution rates of avifauna with power line infrastructure during operational phase.

Mitigation: Action/control	Responsibility	Timeframe
• All incidents of collision with power line and electrocution should be recorded as meticulously as possible, including data related to the species involved, the exact location of each incident along the grid connection corridor, and suspected cause of death (collision or electrocution).	Environmental Officer	Operation
• The power line should be monitored on a monthly basis during the first year after construction to determine potential areas of high collision rates, especially involving red-listed species (e.g. Ludwig's Bustard). Bird diverters should be fitted to the power line in areas where high collisions rates are detected. • Any movements by vehicle and personnel should be limited to within the footprint of grid connection corridor and other associated infrastructure, especially during routine maintenance procedures. • All vehicles accessing the site should adhere to a low speed limit on site (40km/h max) to avoid collisions with susceptible species such as nocturnal and crepuscular species. • If birds nesting on infrastructure cannot be tolerated due to operational risks, birds should be prevented from accessing nesting sites using exclusion methods. An avifaunal specialist should be consulted for advice on mitigation, and if the problems persists.	Contractors	Operation

Performance Indicator	• Low mortality rates of avifauna due to collisions with power line and electrocutions. • No disturbance of breeding raptors (i.e. no nest abandonment due to disturbance). • No disturbance of red-listed avifaunal species perched or foraging in the vicinity of the grid connection corridor. • No poaching or collecting of avifauna or their products (e.g. eggs or nestlings) by maintenance personnel. • Removal to safety of injured avifauna encountered during routine maintenance. • Low impact on nocturnal and crepuscular species along roads. • Low impact on large raptors and terrestrial birds (e.g. bustards) along the power line corridor.
Monitoring	Annual monitoring for compliance during the operational phase. All avifaunal mortality incidents related to collisions and electrocutions or other causes to be noted.

DECOMMISSIONING PHASE ACTIVITIES

Objective: Limit disturbance and loss of avifaunal microhabitats during decommissioning.			
Project component/s	All infrastructure and activities which result in transformation and loss of intact or rehabilitated avifauna microhabitats: • Removal and clearing of the power line and other infrastructure. • Removal and clearing of camps & other temporary infrastructure. • Removal of access roads.		
Potential Impact	Disturbance and loss of avifaunal microhabitats, leading to displacement and loss of resident avifaunal species.		
Activity/risk source	• Clearing and removal of the power line and other grid connection infrastructure. • Clearing and removal of camps and other temporary infrastructure. • Removal of access roads. • Presence of decommissioning crews. • Operation of heavy vehicles.		
Mitigation: Target/Objective	Low disturbance and impact on avifauna and avifaunal habitats. Low disturbance and impact on red-listed avifaunal species.		
Mitigation: Action/control		Responsibility	Timeframe
• The use of laydown areas within the footprint of the grid connection corridor should be practised where feasible, to avoid habitat loss and disturbance to adjoining areas. • The removal and clearing of the power line and other associated infrastructure (buildings, reservoirs, ponds, fencing etc) should be done in such a manner that does not cause destruction and pollution of rehabilitated habitats on site or adjoining natural areas. • All vehicles should adhere to clearly defined and demarcated roads. • All vehicles on site should adhere to a low speed limit (40km/h) to avoid collisions with susceptible species such nocturnal and crepuscular species, as well as reduce dust. • If holes or trenches are to be dug, these should not be left open and unmonitored for extended periods (>1 week) of time as ground-dwelling avifauna may become entrapped therein. • No decommissioning activity should occur near to active nests of priority species, should these be discovered prior to or during the decommissioning phase.		Contractor	Decommissioning

• Environmental induction for all personnel regarding basic environmental principles. • ECO to monitor and enforce ban on hunting and collecting of avifauna or their products (e.g. eggs and nestlings). • Any avifauna threatened or injured by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.	ECO	Decommissioning

Performance Indicator	• Avifaunal microhabitat loss restricted to a minimum within the grid connection corridor. • Low disturbance of avifauna within the grid connection corridor and adjacent areas.
Monitoring	ECO to monitor decommissioning activities to ensure that: • Vegetation clearing is limited as far as possible within footprint and adjoining areas during decommissioning. • No birds or eggs are disturbed or removed by personnel. • Any nests of priority species discovered on site or nearby, should be buffered from disturbance if birds are breeding and monitoring should be implemented to identify when decommissioning within the affected area may continue.

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Annex 1. List of Avifauna

A consolidated avifaunal list for the Gunstfontein Grid Connection Extension project site and surrounds, including conservation status (Taylor *et al.*, 2015), regional endemism (BirdLife South Africa, 2019), biome-restriction (Taylor *et al*., 2015), and SABAP1 and SABAP2 reporting rates (%). Codes for conservation status are: EN=Endangered; V = Vulnerable; NT = Near-threatened, and codes for endemism: E=Endemic, NE=Near-endemic.

Species	Conservation Status	Endemic/ Near-endemic	Biome-restricted	SABAP1 Reporting Rate (%)	SABAP2 Reporting Rate (%)			
				3220DC	3245_2035	3245_2040	3250_2035	3245_2030
Number of cards submitted				**17**	**2**	**3**	**9**	**9**
Number of species recorded				**98**	**46**	**67**	**76**	**83**
Avocet, Pied				6		33		
Barbet, Acacia Pied				29			11	
Batis, Pririt				12				22
Bee-eater, European				12				11
Bishop, Southern Red						33	Ad hoc	
Bokmakierie				59	100	100	89	100
Bulbul, Cape		E	X	71			11	22
Bunting, Cape					50	100	44	44
Bunting, Lark-like						33		56
Bustard, Ludwig's	EN		X	6				
Buzzard, Common (Steppe)				18				11
Buzzard, Jackal		NE		6		67	56	33
Canary, Black-headed		NE	X	24	50	67	11	67
Canary, Cape							22	
Canary, White-throated				53	100	67	11	44
Canary, Yellow				59	100	67	44	89
Chat, Anteating				18	50	100	11	11

Chat, Familiar				35	50	33	78	33
Chat, Karoo			X	71		33	11	100
Chat, Sickle-winged		NE	X	24		33	22	44
Chat, Tractrac			X			33		
Cisticola, Grey-backed				47	50	100	11	89
Coot, Red-knobbed				6	50		Ad hoc	22
Cormorant, Reed					50			
Cormorant, White-breasted					50			
Crane, Blue	NT							
Crombec, Long-billed				12				11
Crow, Cape				18				Ad hoc
Crow, Pied				29		67	78	33
Dove, Cape Turtle (Ring-necked)				59	50	67	22	33
Dove, Laughing				29		33	33	11
Dove, Namaqua						33	11	11
Dove, Red-eyed								11
Duck, African Black				12			11	
Duck, Maccoa								
Duck, Yellow-billed				24	50		11	
Eagle, Black-chested Snake								
Eagle, Booted				6		33		
Eagle, Martial	EN			6			22	11
Eagle, Verreaux's	VU			6		67		33
Egret, Western Cattle				6				
Eremomela, Karoo		NE	X					56
Eremomela, Yellow-bellied				12		67		
Falcon, Lanner	VU							
Fiscal, Southern (Common)				88	50	100	89	67
Flamingo, Greater	NT							
Flycatcher, Fairy		NE					11	22
Flycatcher, Fiscal		NE		6	50		11	11
Francolin, Grey-winged		SLS		6		33		

Goose, Egyptian				41	50	100	78	33
Goose, Spur-winged					50	67	44	
Goshawk, Pale Chanting				41			22	67
Grebe, Little					50			11
Greenshank, Common				6		33		
Guineafowl, Helmeted				6			100	
Harrier, Black	EN	NE		12				22
Heron, Black-headed				12		33		
Heron, Grey				12	50			11
Honeyguide, Lesser							11	
Hoopoe, African				6				
Ibis, African Sacred				12	50		22	22
Ibis, Hadeda				18	100	67	78	22
Kestrel, Rock				59		67	56	44
Kite, Black-winged				29				
Korhaan, Karoo	NT		X				11	
Korhaan, Southern Black	VU	E		18		33		
Lapwing, Blacksmith				29	100		22	
Lapwing, Crowned				6		33	22	
Lark, Cape Clapper		NE		12		33		11
Lark, Karoo		NE	X	6		100		78
Lark, Karoo Long-billed			X	18		100	11	67
Lark, Large-billed		NE		41	50	67	22	67
Lark, Red-capped				12	50	67	11	
Lark, Spike-heeled				24			11	33
Martin, Brown-throated				24	50			11
Martin, Rock				47	50	100	56	56
Moorhen, Common						33		
Mousebird, Red-faced							11	
Mousebird, White-backed				29	50	100	56	11
Nightjar, Rufous-cheeked							11	
Owl, Cape Eagle-								

Owl, Spotted Eagle-				6			100	
Penduline-tit, Cape						33		11
Pigeon, Speckled				35	50		56	33
Pipit, African				12		67	11	22
Pipit, African Rock	NT	SLS						
Pipit, Long-billed				6				11
Plover, Kittlitz's					50	33		
Plover, Three-banded				24	100	67	11	22
Prinia, Karoo		NE		53		67	33	89
Raven, White-necked				18		33	22	33
Robin-chat, Cape				18			89	22
Robin, Karoo Scrub				59	50	100	11	56
Sandgrouse, Namaqua				6	50	33	33	11
Sandpiper, Wood				6				
Shelduck, South African				53	100	100	78	22
Shoveler, Cape					50			
Sparrow, Cape				71	100	100	78	56
Sparrow, House				29	50		56	11
Sparrow, Southern Grey-headed							11	
Sparrowhawk, Rufous-breasted						Ad hoc	22	
Spoonbill, African				18	50			22
Spurfowl, Cape		NE	X	35		100	56	33
Starling, Common					50		67	11
Starling, Pale-winged			X	18				11
Starling, Pied		SLS		59	100	100	100	33
Starling, Wattled				6			11	11
Stilt, Black-winged							Ad hoc	
Stint, Little					50			
Stonechat, African						33		
Stork, Black	VU			6				11
Sunbird, Dusky								22
Sunbird, Malachite				18		67	22	67

Sunbird, Southern Double-collared		NE		18			22	67
Swallow, Barn				18				11
Swallow, Greater Striped				18		33	44	22
Swift, African Black				6	50			
Swift, Alpine				6	50			
Swift, Common				6				
Swift, Little							11	22
Swift, White-rumped				6			22	22
Teal, Cape				6	50	33		11
Thick-knee, Spotted							11	
Thrush, Karoo		NE					44	
Thrush, Olive							22	
Tit-babbler (Warbler), Chestnut-vented				18		33		11
Tit-babbler (Warbler), Layard's		NE	X	6				56
Tit, Grey		NE		35		33		22
Wagtail, Cape				71	100	67	44	44
Warbler, Cinnamon-breasted		NE	X					
Warbler, Lesser Swamp						33		
Warbler, Namaqua		NE	X	18		33	11	22
Warbler, Rufous-eared				18		33		33
Waxbill, Common				24		67	11	22
Weaver, Cape		NE		18	50	100	56	33
Weaver, Southern Masked				47		67	44	22
Wheatear, Capped				12	50	33		
Wheatear, Mountain				41		100	22	67
White-eye, Cape		NE					11	
Woodpecker, Ground		SLS		6				