AVIFAUNAL SPECIALIST ASSESSMENT REPORT FOR THE PROPOSED DE AAR 2 SOUTH GRID CONNECTION AND SWITCHING STATION NEAR DE AAR, NORTHERN CAPE PROVINCE

On behalf of

Mulilo De Aar 2 South (Pty) Ltd

December 2020

Prepared By:

Arcus Consultancy Services South Africa (Pty) Limited

Office 607 Cube Workspace
Icon Building
Cnr Long Street and Hans Strijdom Avenue
Cape Town
8001

T +27 (0) 21 412 1529 l **E** AshlinB@arcusconsulting.co.za
W www.arcusconsulting.co.za

Registered in South Africa No. 2015/416206/07

TABLE OF CONTENTS

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	*Attached*
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	*Attached*
(c) an indication of the scope of, and the purpose for which, the report was prepared;	*1.3*
(cA) an indication of the quality and age of base data used for the specialist report;	*Appendix I*
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	*4*
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	*2, 3*
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	*Appendix I*
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	*4*
(g) an identification of any areas to be avoided, including buffers;	*3*
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	*Figure 4*
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	*1.4*
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	*4*
(k) any mitigation measures for inclusion in the EMPr;	*4*
(l) any conditions for inclusion in the environmental authorisation;	*4*
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	*4*
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	*5,6*
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(p) any other information requested by the competent authority	
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.	*Appendix I*

1 INTRODUCTION

1.1 Background

Mulilo De Aar 2 South (Pty) Ltd is proposing the construction of one up to 400 kV grid connection route from the approved wind farm to Eskom Hydra Substation, 10 km south-east of De Aar (Figure 1).

Two routes were assessed and environmental authorisation is being sought for one route. Route 1 is 23 km in length, to connect the authorised De Aar 2 South Wind Energy Facility (DA2S WEF) to the Eskom Hydra Substation. Route 2 deviates from this to connect the authorised De Aar 2 South Wind Energy Facility (DA2S WEF) to the Eskom Hydra Substation via an approved solar substation. The grid connection is for up to 400 kV. The proposed project will include a 400 kV switching station (100m x 100m) to be located within an area authorised for such infrastructure on the DA2S WEF site and as part of the DA2S WEF authorisation. The proposed transmission line would consist of the following infrastructures:

- Grid line infrastructure including foundations and insulators;
- Existing access roads and tracks; and
- Line and servitude clearances to meet the statutory requirements.

The objectives of this study are to identify and assess all potential impacts of the proposed development on the avifauna in the area and to provide recommended mitigation measures for all identified impacts.

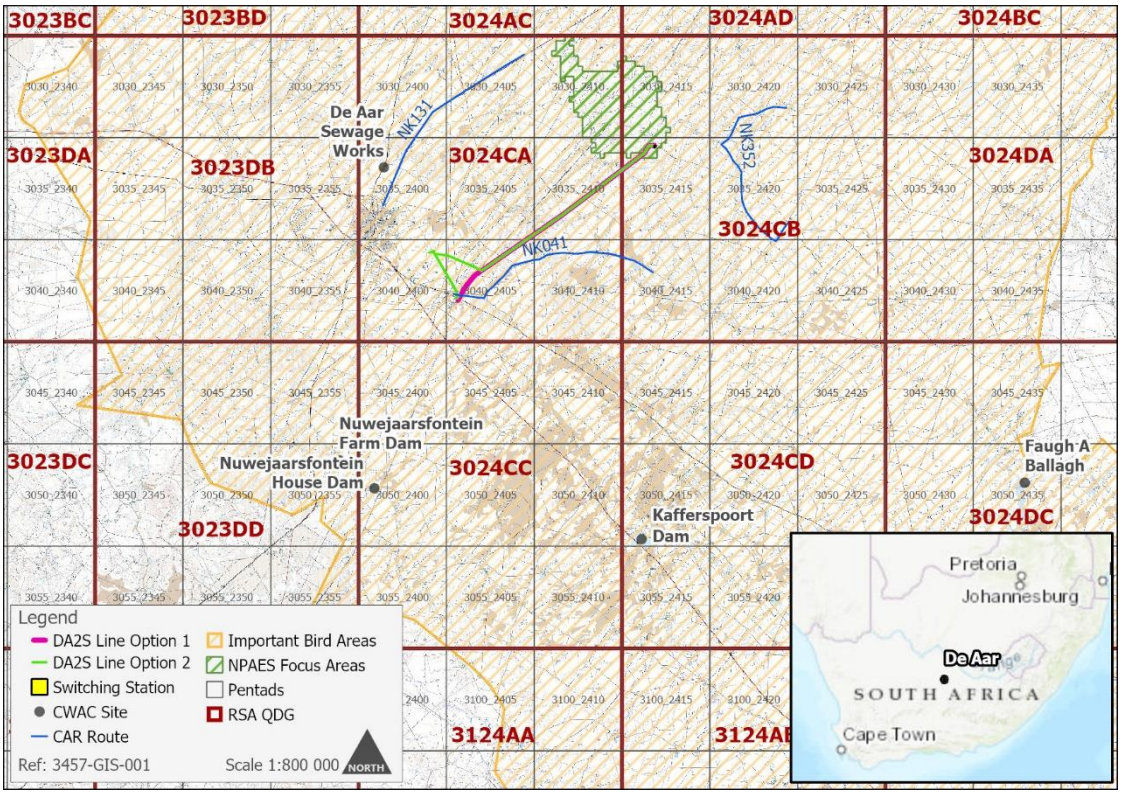

Figure 1: The location of grid connection infrastructure associated with the current assessment displayed with contextual features and relevant grid squares used in database queries. The purple and green lines represent the proposed components.

1.2 Assessment Philosophy

This assessment has been conducted according to the EIA Regulations, 2014, as amended and adheres to the precautionary principle and risk-averse approach applicable to projects that pose a risk to biodiversity and ecosystems.

1.3 Scope of Study

The scope of the study included the following activities:

- A description of the avifaunal status quo, including a description of avifaunal microhabitats available on and around the project site;
- The results from the site visit and desk-based study;
- A description of potential predicted impacts to avifauna as well as a significance rating and impact assessment; and
- Design recommendations and/or methods of mitigation which may be required to reduce the potential impacts of the project on avifauna.

1.4 Assumptions and Limitations

The following assumptions and limitations were identified for this study:

- The likely potential impacts on species identified in this survey are based on the experience of these and similar species in different parts of South Africa. Bird behaviour may vary across geographical locations;
- The pentads in and around the project site have not been thoroughly assessed by the Southern African Bird Atlas Project 2 (SABAP2), with only a single card having been submitted for some of the pentads examined. While reporting rates for each species were therefore not considered to be a useful reflection of density these data were useful for generating a species list of the area, to overcome this limitation a wider search (of nine pentads) was conducted and data was supplemented by interrogating additional studies in the area as well as a site visit. This complies with the precautionary approach prescribed the National Environmental Management Act, 1998, Act No. 107 of 1998;
- Important Bird Area (IBA) criteria assessment for the Platberg-Karoo Conservancy was conducted in 1998 and populations of important species may have changed since the assessment; and
- Co-ordinated Avifaunal Road counts (CAR) and Co-ordinated Waterbird Counts (CWAC) sites are counted irregularly and this information is potentially out-dated.

2 METHODOLOGY

Various data sources were consulted to determine the potential avifaunal species that could occur on the site, these are described in more detail in Appendix I. The applicable legislation is outlined in Appendix II. The methodology used to assess the impacts follows Hacking (2001)[1] outlined in Appendix III. In addition to the desk-top study a five-day site walkthrough was conducted between 10 and 14 February 2020.

3 RESULTS

The conditions during the site visit were excellent for the site walk-through as the area had received a good amount of rainfall allowing the extent of features such as temporary wetlands, vleis, drainage lines, seeps and water-filled depressions to be more easily appreciated. The rainfall also resulted in Ludwig's Bustard and Kori Bustard being present on the study site, as they often exhibit local movements in response to rainfall events. This

[1] Hacking, T. 2001. An innovative approach to structuring environmental impact assessment reports; Part 2: Ranking the significance of environmental aspects and impacts. Geotechnical News, 19(3) 56-59.

allowed for a better understanding of the utilisation of the site by these important and collision prone species. A Verreaux's Eagle nest was observed on the cliffs (-30.595564, 24.265331) near the existing transmission line during the site visit, and is assumed to still be in use as a pair of Verreaux's Eagle was seen perched on the pylon nearest the nest (Figure 2).

Figure 2: Verreaux's Eagle nest located on a cliff near the existing transmission line, with a pair of eagles perched on the pylon.

3.1 Description of the Affected Environment

Vegetation and micro habitats are very important in determining avifaunal abundances and likelihood of occurrences. Two broad vegetation types occur in the study area[2], namely the Northern Upper Karoo (NKu3) and Besemkaree Koppies Shrubland (Gh4, Figure 1). Northern Upper Karoo occurs in the lowland areas of the study site and dominated by dwarf karoo shrubs, scattered grasses and occasional low trees, while Besemkaree Koppies Shrubland occurs on the slopes of koppies and covering the tops of tafelbergs and plateaux. The abundant grasses, dwarf small-leaved shrubs and taller shrubs typical of Besemkaree Koppies Shrubland and increased structure provided by woody species such as *Searsia* and *Euclea* bush clumps offers habitat for a different suite of bird species to those in the lowland plains, these are mainly small bird species such as tit-babblers, bulbuls, chats and wheatears. According to the National Parks Area Expansion Strategy (NPAES), there is only a small area in the northeast of the study area that has been identified as priority areas for inclusion in future protected areas (Figure 3). Multiple existing power lines already cross this area and a large portion of the land is covered by the existing Longyuan Mulilo De Aar 2 North (D2N WEF, Figure 3). As medium to long term lease agreements are in place between land owners and developers it is unlikely that this area will be incorporated into National Parks in the foreseeable future. The proposed development is unlikely to have a negative impact on the conservation objectives in the area.

3.2 Avifaunal Microhabitats of the Study Area

Microhabitats occur at a smaller spatial scale than vegetation types and are shaped by factors including vegetation type, topography, land use, food sources and man-made factors (e.g. the introduction of livestock and alien vegetation as well as the construction of infrastructure). Investigation of the project site revealed the following bird micro habitats either on or within approximately 2 km of the project site.

[2] Mucina, L. and Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland, in Strelitzia 19. South African National Biodiversity Institute, Pretoria.

3.2.1 Lowland Plains

The dwarf karoo shrubs and scattered grasses found on the lowland plains provide habitat for open-country species such as korhaans, bustards, coursers, larks, cisticolas, Blue Cranes and potentially Secretarybirds amongst others. These areas support a relatively high diversity of endemic species and many large-bodied, ground-dwelling species that are particularly vulnerable to collision with power lines.

3.2.2 Cultivated Vegetation

Very few small, isolated patches of cultivated land are present within 2 km of the project site, with fields around a farmhouse in the north of the proposed route potentially attracting species vulnerable to collisions such as Blue Crane, korhaans, bustards and geese.

3.2.3 Rivers, Drainage Lines and Dams

Perennial rivers, dams, seasonally inundated areas and various drainage lines occur across the project site and are important features as they have a different vegetation composition to surrounding areas and provide habitat for various birds such as the teals, ducks, Hamerkop, darter and kingfishers. Storks favour wet areas, as do Geese and Ibises. Floodplain areas surrounding meandering rivers are often utilised by Blue Cranes while incised or eroded sand banks provide nesting opportunities to birds such as kingfishers and bee-eaters. Furthermore, any stream, river or drainage line may represent an important flight path for many bird species. Some small farm dams are present on the project site and provide foraging areas for various waterbird species vulnerable to power line collision as well as potential roosting sites for Blue Crane. Erosion control berms in watershed areas can also temporarily impound water and create areas that could attract birds during the wet season (summer).

3.2.4 Rocky Ridges, Slopes and Outcrops

The slopes and ridges are important for various raptors, e.g. Rock Kestrel, Jackal Buzzard and Verreaux's Eagle, that may use the slopes for soaring and to gain lift. Rocky outcrops and cliffs may be important nesting habitat for various raptors, most importantly Verreaux's Eagle, which is likely to spend time hunting along rocky outcrops and ridges. Rocky ridges and outcrops are also home to Rock Hyrax ('Dassie') an important prey species of Verreaux's Eagle, which will hunt regularly in these areas. The endemic African Rock Pipit and Layard's Tit-babbler are also found on the rocky slopes in the project area. Raptor species utilising these features for nesting or foraging are at risk of displacement and collision with power lines. A Verreaux's Eagle pair utilising a nest located near the proposed route is at high risk of disturbance and displacement from construction activities should they occur during the breeding season (winter). The pair was seen perched near the nest during the site visit and it is therefore highly likely that the nest is still active.

3.2.5 Plateaux

The slopes and flat areas at higher elevations on the project site are dominated by abundant grasses, dwarf small-leaved shrubs and taller shrubs typical of Besemkaree Koppies Shrubland. The increased structure provided by woody species such as *Searsia* and *Euclea* bush clumps as well as scattered rocks offer habitats for a different suite of bird species to those in the lowland plains. Similarly, an increase in topological complexity introduces variation in slope and aspect and therefore the available microhabitats for different species. African Rock Pipit, Layard's Tit-babbler, Short-toed Rock Thrush and Mountain Wheatear were amongst those species seen or heard on the plateau in the north-east of the project site during the site visit.

3.2.6 Power Lines

Several existing overhead power lines occur on the site and the proposed power line runs adjacent to an existing power line for the majority of its route (Figure 3). Power lines offer a man-made habitat to multiple species of birds as various raptor species, e.g. Rock Kestrel and Martial Eagle utilise transmission towers as roosts or nesting sites, particularly in areas where large trees are uncommon. The activities associated with the construction of new lines next to existing lines could lead to temporary displacement of breeding eagles, resulting in breeding failure in a particular season, or even permanent abandonment of a breeding territory. No active raptor nests were recorded on the adjacent power line during the field survey. A single large nest, possibly a Martial Eagle nest was observed however it appeared to be abandoned as there was no evidence of recent breeding activity.

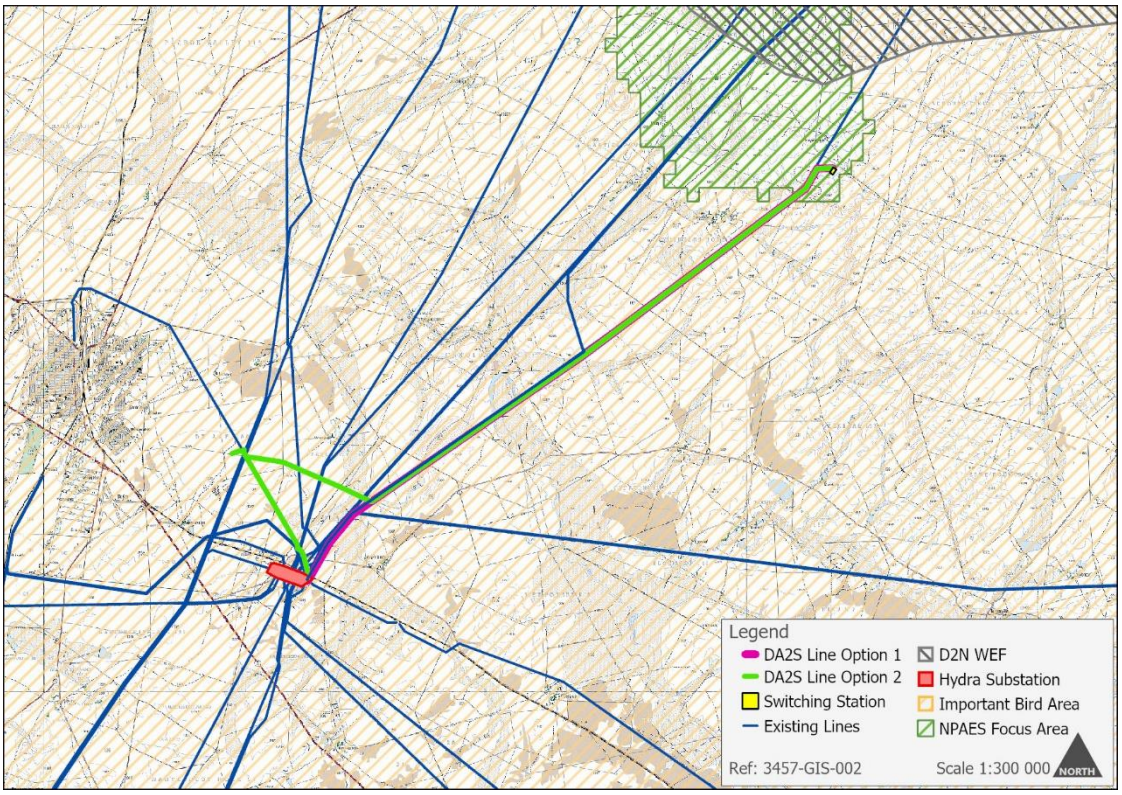

Figure 3: The location of existing grid infrastructure in relation to the proposed power lines. Existing power lines (blue lines) converge on the Hydra substation (red polygon) while the proposed components are indicated by the purple and lime green lines. A NPAES Focus Area (green hatching) and the extent of the existing De Aar 2 North Wind Energy Facility (grey hatching) is also indicated.

3.3 General Avifaunal Community of the Study Area

Various databases were used to get a good understanding of the potential bird species that occur in and around the project site and to determine which species are particularly at risk of impact from the development and to account for seasonal variation of bird movements in the area.

3.3.1 South African Bird Atlas Project 2 (SABAP2)

SABAP2 data were examined for the pentads (which are approximately 8 km x 8 km squares) in the study area (Figure 1). A total of 195 species were recorded by SABAP2 in the pentads 3030_2400 (70 species, 3 cards), 3035_2400 (137 species, 10 cards), 3040_2400 (77 species, 2 cards), 3030_2405 (90 species, 4 cards), 3035_2405 (44 species,

1 card), 3040_2405 (30 species, 1 card), 3030_2410 (89 species, 3 cards), 3035_2410 (48 species, 1 card), 3040_2410 (22 species, 1 card), 3030_2415 (140 species, 7 cards), 3035_2415 (84 species, 3 cards), 3040_2415 (43 species, 1 card), 3030_2420 (98 species, 3 cards), 3035_2420 (124 species, 5 cards) and 3040_2420 (112 species, 5 cards).

This includes 13 species classified as *Endangered, Near Threatened* or *Vulnerable* and 25 endemic or near-endemic species (Table 1). Due to the relatively few surveys conducted in some of the pentads (indicated by the number of cards submitted) several species which are likely to occur in the area have not been recorded by SABAP2, Kori Bustard *(Near Threatened)* which was observed on site during the walk-through is notably absent from the data.

Table 1: Red-data and endemic or near-endemic species listed by SABAP2 and observed during the site walk-through.

Species	Red Data	Endemic or Near-endemic	Observed
Bustard, Ludwig's	EN		*
Eagle, Martial	EN		
Eagle, Tawny	EN		
Pipit, African Rock	NT	*	*
Courser, Double-banded	NT		
Crane, Blue	NT		
Flamingo, Greater	NT		
Korhaan, Karoo	NT		*
Courser, Burchell's	VU		
Eagle, Verreaux's'	VU		*
Falcon, Lanner	VU		*
Secretarybird	VU		
Stork, Black	VU		
Buzzard, Jackal		*	*
Canary, Black-headed		*	
Chat, Sickle-winged		*	
Eremomela, Karoo		*	*
Flycatcher, Fairy		*	*
Flycatcher, Fiscal		*	*
Francolin, Grey-winged		*	*
Korhaan, Blue		*	
Lark, Black-eared Sparrow-		*	*
Lark, Eastern Long-billed		*	*
Lark, Karoo		*	*
Lark, Large-billed		*	*
Lark, Melodious		*	
Prinia, Karoo		*	
Starling, Pied		*	*
Sunbird, Southern Double-collared		*	*
Swallow, South African Cliff		*	
Thrush, Karoo		*	
Tit, Grey		*	
Tit-Babbler, Layard's		*	*
Warbler, Cinnamon-breasted		*	
Warbler, Namaqua		*	
Weaver, Cape		*	*
White-eye, Cape		*	*

3.3.2 Co-ordinated Avifaunal Road Counts (CAR)

CAR counts were pioneered in 1993 in the Western Cape and since then have spread rapidly to other provinces. Citizen scientists now monitor 36 species of large terrestrial birds (e.g. cranes, bustards, korhaans, storks, Secretarybird etc.) along 350 fixed routes across South

Africa covering over 19 000km. Twice a year, in midsummer and midwinter, road counts are carried out using a standardised method. Data from three CAR routes surrounding the project site (NK131, NK041 and NK352, Figure 1) indicate that Ludwig's Bustard was the most commonly recorded species on these routes combined, followed by White Stork, Blue Crane, Northern Black Korhaan, Karoo Korhaan, Kori Bustard and Secretarybird.

3.3.3 Co-ordinated Waterbird Counts (CWAC)

Five CWAC sites are situated within 50 km of the project site (Figure 1). De Aar Sewage Works (30412402) is located approximately 15 km northwest from the project site and important species recorded at this site include low numbers of Greater Flamingo and South African Shelduck. Any species moving between this site, the Brakrivier and the Kafferspoort Dam (30552416) or Faugh A Ballagh (30522438) to the southeast of the project site would cross the proposed power line route. Important species recorded at Kafferspoort Dam, located approximately 30 km to the south of the project site, include African Spoonbill, African Fish-eagle, Black Stork, Lesser Flamingo and large numbers of Greater Flamingo and South African Shelduck. Faugh A Ballagh is a large farm dam on the Seekoei River located approximately 50 km to the southeast of the project site where important species such as African Fish-eagle, African Spoonbill, Greater Flamingo, Lesser Flamingo, Osprey (Appendix II of the Bonn Convention), Great White Pelican and South African Shelduck have been recorded. Nuwejaarsfontein Farm Dam (30512359) and Nuwejaarsfontein House Dam (30532401) are located approximately 20 km to the southwest of the project site and records of African Spoonbill and South African Shelduck have been made at both of these dams. Lesser Flamingo, Osprey and Great White Pelican were not recorded in the SABAP2 data for the pentads investigated, they are however species vulnerable to collisions with power lines and have been taken into account when assessing the impact of the proposed project.

3.3.4 Important Bird Areas (IBAs)

The entire project site falls within the large Platberg-Karoo Conservancy (ZA028, Figure 1). The conservancy covers the entire districts of De Aar, Philipstown and Hanover in the south-eastern portion of the Northern Cape Province. Although the land in the IBA is primarily used for grazing and agriculture, it includes the suburban towns of De Aar, Philipstown, Petrusville and Hanover. This huge area lies in the plains of the central Great Karoo, forming part of the South African plateau and holds vitally important populations of two globally threatened species (Blue Crane and Lesser Kestrel), several biome-restricted species and important populations of other arid-zone birds[3].

Lesser Kestrel have roosts throughout the area, including large roosts (5 000 – 10 000 individuals) in the towns of De Aar, Hanover and Philipstown; they are frequently seen foraging in the conservancy in summer, when close to 10% of the global population of Lesser Kestrels roost in this IBA[4]. Some of the dams are important roosts; during summer 1996/97, more than 850 Blue Crane were counted on a dam in the IBA[3].

The lowland karroid plains are particularly good for Ludwig's Bustard, Kori Bustard and large numbers of Karoo Korhaan, Karoo Lark, Karoo Chat, Tractrac Chat, Sickle-winged Chat, Lark-like Bunting and Karoo Long-billed Lark. In the grassier areas Blue Korhaan are common. Black Harrier are occasionally seen quartering the plains, where huge numbers of Blue Crane regularly congregate. Tawny Eagle and Martian Eagle breed on the power lines in the area. The belts of riverine *Vachellia* (Acacia) woodland support Namaqua Warbler, Layard's Tit-babbler and Grey Tit. Pale-winged Starling and African Rock Pipit occur in rocky gorges and

[3] http://datazone.birdlife.org/site/factsheet/platberg-karoo-conservancy-iba-south-africa/text

[4] https://www.birdlife.org.za/iba-directory/platberg-karoo-conservancy/

kloofs. Other arid-zone species occurring within the conservancy are Pale Chanting Goshawk, Pririt Batis, Fairy Flycatcher and White-throated Canary.

Power lines in the district have been identified as a high threat to large terrestrial birds such as cranes and bustards, which collide with them, and to raptors, which have been electrocuted while perching on them. Power lines can, however, also be beneficial to large raptors such as Martial Eagle which breed on them in areas where large trees are uncommon.

3.3.5 Studies on Neighbouring Projects

Chris van Rooyen Consulting conducted an Avifaunal Impact Assessment Study in 2014 on the Longyuan Mulilo De Aar 2 North (Pty) Ltd 132kV overhead power line to connect the Longyuan Mulilo De Aar 2 North Wind Energy Facility (DEFF REF. NO. 12/12/20/2463/2) to the national transmission grid via Hydra Substation. The proposed power line connection assessed in this study runs adjacent to the power line assessed by van Rooyen (2014) for approximately 12 km. van Rooyen (2014) identified 11 Red Data species that could potentially occur in the area but concluded that with mitigation risks associated with collisions and habitat destruction would be low.

A number of Verreaux's Eagle nests that occur in the study area were mapped by van Rooyen (2014) including a nest on a cliff within 500 m of the proposed power line route assessed in this study (Figure 4). WildSkies Ecological Services conducted an Avifaunal Impact Assessment Study on the Castle Wind Energy Facility directly adjacent to the land portions relevant to this study. Smallie (2014) scored the risk of the WEF for 15 target species (including Egyptian Goose) but also observed several notable species on site including Lanner Falcon, Amur Falcon, Secretarybird, Booted Eagle and Black-chested Snake Eagle. In discussing the mitigation of the grid connection Smallie (2014) recommended that power line infrastructure be built to the east of the existing 220kV power line, and that the line will need to conform to all Eskom standards in terms of bird friendly pole monopole structures with Bird Perches on every pole-top (to mitigate for bird electrocution), and anti-bird collision line marking devices (to mitigate for bird collision) on the earth wires of high risk sections. Applicable mitigation measures included in these studies have been included in the current assessment.

Data relating to the avifaunal baseline was made available from the operational phase bird monitoring at the Longyuan Mulilo De Aar 2 North Wind Energy Facility (located approximately 3 km from the project site) conducted by van Rooyen (2018, 2019). These data covered the first year of operational monitoring and the first three quarters of the second year of monitoring and were conducted between December 2017 and October 2019. During this period, several species relevant to the current assessment were observed, including African Rock Pipit, Blue Crane, Booted eagle, Greater Kestrel, Grey-winged Francolin, Jackal Buzzard, Kori Bustard, Lesser Kestrel, Ludwig's Bustard, Martial Eagle, Northern Black Korhaan, Secretarybird, Southern Pale Chanting Goshawk and Verreaux's Eagle.

Arcus (2019) conducted four seasons of monitoring in 2018 during the pre-construction phase of the proposed Zingesele Wind Energy Facility, located approximately 15 km to the east of the project site. The scoping report identified that a few large birds (such as White-backed Vulture, Verreauxs' Eagle and Martial Eagle), susceptible to electrocution (particularly in the absence of safe and mitigated structures), occur in the area. The report identified that Blue Crane, Blue Korhaan, Ludwig's Bustard, Kori Bustard, Karoo Korhaan and Northern Black Korhaan, as well as Verreaux's Eagle, Tawny eagle, Martial Eagle, Secretarybird and White-backed Vulture may be affected by collisions with power lines at the site. Ludwig's Bustard were the most regularly encountered species recorded during the drive transects, while Blue Crane accounted for the highest number of individuals

recorded, the report noted that Blue Crane and Ludwig's Bustard are abundant on the low lying plains in the area. Apart from summer, when there is an influx of Amur Falcons and Lesser Kestrel, raptor activity on the site was found to be relatively low and there was only a single flight of White-backed Vulture reported.

3.3.6 The Endangered Wildlife Trust (EWT) Powerline Mortality Data

Powerline mortality data from around De Aar were obtained from the EWT to determine which species have suffered mortalities as a result of electrical distribution infrastructure in the area. The data received was collected between 2001 and 2018 and included collision mortality incidents of Ludwig's Bustard, Kori Bustard, Blue Crane, Verreaux's Eagle and an unidentified flamingo species. Electrocution mortalities included Verreaux's Eagle, Cape Eagle-owl, Lanner Falcon and Pale-chanting Goshawk.

Records of mortalities associated with the expansive stretches of transmission lines from the Hydra substation between 2008 and 2016 revealed that the top ten affected species by transmission lines in the larger area included Ludwig's Bustard, Blue Crane, Northern Black Korhaan, unidentified sp., White Stork, Pied Crow, Secretarybird, Kori Bustard, Karoo Korhaan and Blue Korhaan. No calculations regarding mortalities per km were performed as the data include power lines which cross areas that may pose a greater risk to birds and the numbers may therefore be misleading. These data were nevertheless useful to assist in the identification of species shown to be at risk in the area.

3.3.7 Focal Species

From the above data and microhabitats available on the project site, focal species were identified for this study by identifying species most likely to be negatively affected by the proposed development. In general, large, heavy flying birds are more vulnerable to collision with overhead power lines, while perching raptors and storks are more vulnerable to electrocution. Smaller passerines are more likely to be impacted upon through habitat destruction and disturbance. The resultant list of focal species for this study is as follows: White-backed Vulture *(Critically Endangered),* Ludwig's Bustard *(Endangered)*, Martial Eagle *(Endangered)*, Tawny Eagle *(Endangered)*, Verreaux's Eagle *(Vulnerable)*, Lanner Falcon *(Vulnerable)*, Black Stork *(Vulnerable)*, Secretarybird *(Vulnerable)*, Great White Pelican *(Vulnerable)*, Burchell's Courser *(Vulnerable)*, Blue Crane *(Near Threatened)*, Kori Bustard *(Near Threatened)*, Karoo Korhaan *(Near Threatened)*, Greater Flamingo *(Near Threatened)*, African Rock Pipit *(Near Threatened)*, Double-banded Courser *(Near Threatened)*, White Stork *(Bonn Convention)* and South African Shelduck. In some cases, these species serve as surrogates for other similar species (as mitigation will be effective for both), Greater Flamingo for Lesser Flamingo, Lanner Falcon for Amur Falcon, South African Shelduck for other geese and ducks and the various eagles for Osprey *(Bonn Convention)*. Although this impact assessment focuses on Red Data species, the impact on non-Red Data species is also assessed. Furthermore, much of the mitigation recommended for Red Data species will also protect non-Red Data species.

3.4 Avifaunal Sensitivity Assessment

The avifaunal sensitivity of the project site is presented in Figure 4. A single 300 m High Sensitivity 'no-go' buffer was identified surrounding an active Verreaux's Eagle Nest. This no-go area applies throughout the year. Construction activities in the vicinity of the active Verreaux's Eagle nest should be timed to not occur within the breeding periods of these birds (May, June, July and August), a 500 m buffer around the nests represents a minimum area within which construction activities should not occur during these months. Areas within 200 m of National Freshwater Ecosystem Priority Areas (NFEPA) rivers were identified as Medium Sensitivity and construction of pylons or additional access roads in these areas should be avoided to reduce the potential impact on wetland habitats which are important

to birds in arid areas. Areas around farm dams, impoundments or temporary wetlands and vleis were similarly classified as Medium Sensitivity. Rocky ridges and slopes are important for various Red Data species and classified as Medium Sensitivity, including rocky slope areas where the endemic African Rock Pipit *(Near Threatened)* was either heard during the walk-through or contained suitable habitat for this species. Construction of additional infrastructure in these areas should be avoided as far as practically possible to reduce the potential impact on these habitats. Lowland plain areas suitable for coursers, bustards and korhaans were classified as Low Sensitivity for the construction of novel infrastructure, however mitigation in these areas such as bird flight diverters, flappers and bird-friendly pylons with bird perches would still be required in these areas. Bird flight diverters, flappers and bird perches are required on the full length of the proposed lines, including areas classified as Medium and Low sensitivity.

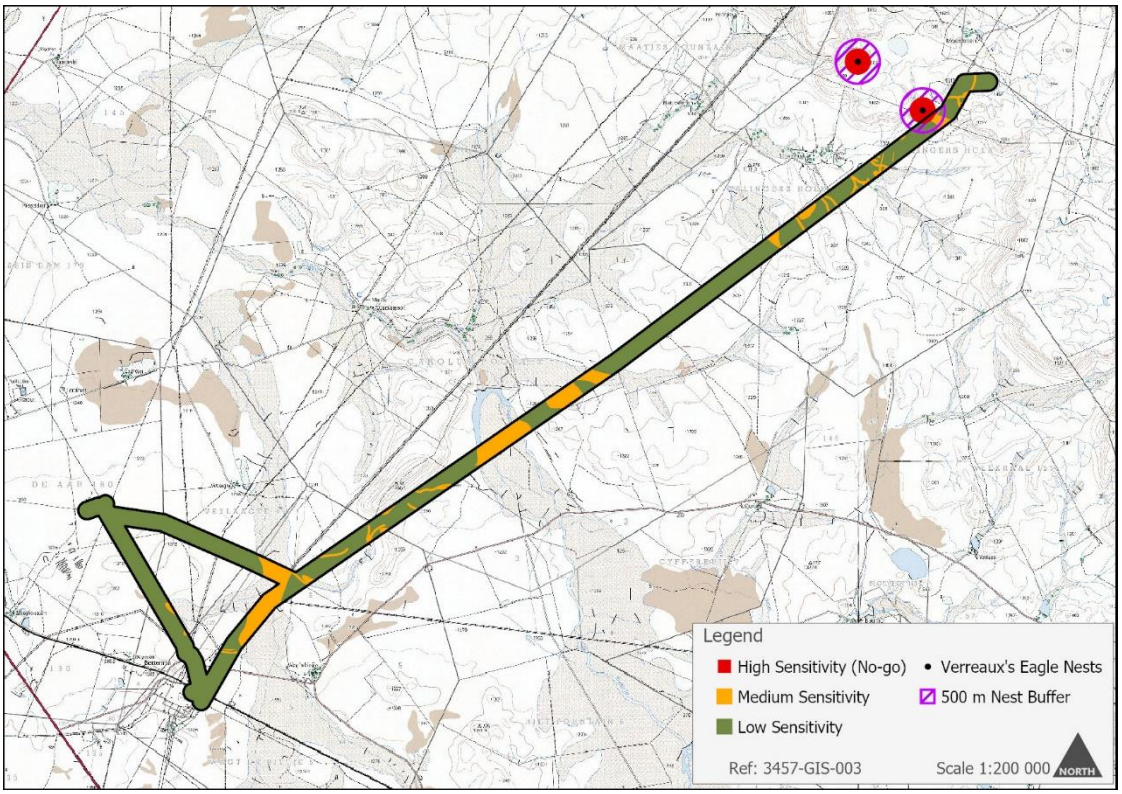

Figure 4: Avifaunal sensitivity map indicates that the project corridor assessed is mostly of Low avifaunal sensitivity, with a few areas of Medium sensitivity (mostly aquatic features and rocky slopes). High sensitivity no-go areas are placed around Verreaux's Eagle nests. The purple hatching represents a 500 m nest buffer where any construction activities must be timed to avoid peak breeding activity.

4 IMPACT ASSESSMENT

4.1 Identification of Potential Impacts

Many existing power lines traverse the area and therefore most of the potential impacts already exist in and around the project site. The majority of the proposed power line routes are adjacent to existing power lines.

The proposed power line routes traverse or pass near several important habitats for avifauna, including grassy plains (important for cranes, bustards and korhaans), rocky ridges (important for raptors) as well as various wetlands, rivers and dams (important for waterbirds and cranes). Particular attention has been given to the potential impact on Ludwig's Bustard in this assessment as some areas around the project site are known to

be important breeding and 'lekking' grounds. 'Lekking' is a mating system where males congregate in an area to display to females, Ludwig's Bustards exhibit an 'exploded' or 'dispersed' lekking system in which the displaying males are more widely spread over an area than typical of more conventional lekking arenas observed in other species[5]. While the project site is not directly within these areas, the species may be impacted upon while traversing the project site to and from these areas.

The key potential impacts on avifauna associated with power line and grid connection infrastructure (e.g. switching station) include:

- Displacement of priority or Red Data avifauna due to habitat destruction and transformation;
- Displacement of avifauna due to disturbance;
- Mortality of priority or Red Data avifauna due to collisions; and
- Mortality of priority or Red Data avifauna due to electrocution.

4.2 Assessment of Potential Impacts

The proposed overhead power lines will be adjacent to existing overhead power lines along the majority of the proposed route. There are no alternative route options to assess.

4.2.1 Construction Phase Impacts

4.2.1.1 Impact 1: Habitat Destruction during Construction

Sections of natural habitat will be destroyed during the construction phase for clearing of servitudes, creation of access roads and for clearing of pylon bases, lay-down areas and temporary construction facilities. Clearing these areas will have an impact in terms of loss of habitat for avifauna. Approximately 1 ha of land associated with the proposed switching station will be cleared, as the vegetation type associated with the switching station assessment area is largely intact, the impact is considered to be of low significance. Pylon bases have a relatively small footprint and therefore do not pose a significant impact of habitat loss. The use of existing access roads and servitudes associated with the adjacent, existing power line will significantly reduce the impact associated with the proposed development, as the total area of natural habitat that needs to be cleared will be relatively small. Most of the novel clearing will therefore be transient in nature and for a short duration, as recovery will take place once the construction phase is completed.

While the clearing of some habitat during construction is inevitable, the probability that the clearing associated with the proposed development will have a negative impact on the avifaunal populations in terms of their long-term viability and persistence in the area is low, as the area surrounding the project site is widespread, contiguous and largely untransformed natural habitat, therefore the impact significance is low. These impacts can be further reduced following the implementation of mitigation measures.

Impact Phase: Construction							
Potential impact description: Habitat loss associated with the clearing of vegetation for lay-down areas, switching station, temporary construction facilities and pylon bases.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Negative	L	L	H
With Mitigation	M	L	L	Negative	L	L	H

[5] Allan DG: Ludwig's Bustard. In Roberts Birds of Southern Africa. 7th edition. Edited by: Hockey PAR, Dean WJR, Ryan PG. Trustees of the John Voelcker Bird Book Fund, Cape Town; 2005:293–294.

Can the impact be reversed?	Mostly. Destruction of habitat will largely be transient in nature.
Will impact cause irreplaceable loss of resources?	No. The habitats on site are widespread and the development footprint is relatively small.
Can impact be avoided, managed or mitigated?	Mostly. The use of existing servitudes will mitigate most of the residual impact.
Mitigation measures to reduce residual risk or enhance opportunities: • Existing roads and servitudes to be used wherever possible; • Minimise the development footprint as far as possible and rehabilitate disturbed areas that are not required by the operational phase of the development such as lay-down areas and temporary construction facilities; • No construction activity must occur within seasonally inundated areas during the peak rainfall period in summer to reduce the potential impact on wetland habitats; • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; and • No open fires should be permitted outside of designated areas.	
Impact to be addressed/ further investigated	No.

4.2.1.2 Impact 2: Disturbance and Displacement during Construction

Disturbances and noise from staff and construction activities can impact certain sensitive species particularly whilst feeding and breeding, resulting in effective habitat loss through a perceived increase in predation risk. There are various potentially sensitive species occurring on the project site including Ludwig's Bustard, Kori Bustard, Verreaux's Eagle, Northern Black Korhaan, Karoo Korhaan and Blue Crane. Disturbance can cause these species to be displaced, either temporarily (i.e. for some period during the construction activity) or permanently (i.e. they do not return), into less suitable habitat which may reduce their ability to survive and reproduce. Disturbance of priority raptor species at nest sites, may result in failed breeding attempts. The disturbance and displacement impacts associated with the construction phase are generally temporary in nature. The area surrounding the project site is largely untransformed, contiguous, suitable natural habitat and therefore displacement distances should not incur a great energetic cost and should allow for rapid return to the site once the disturbance concludes. The probability of significant disturbance and displacement occurring is reduced by adhering to mitigation measures such as appropriate timing of construction activities near sensitive sites, such as the Verreaux's Eagle nest. The displacement of avifauna by construction activities associated with the proposed development is therefore considered to be of low significance if mitigation measures are adhered to.

Impact Phase: Construction							
Potential impact description: Displacement of priority species, particularly Red Data species, due to disturbance associated with construction activities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?			Yes. Disturbance associated with construction is transient in nature and the impact will cease once construction has been completed.				
Will impact cause irreplaceable loss of resources?			No. Avifaunal communities will recolonize the area once construction has been completed.				
Can impact be avoided, managed or mitigated?			Yes. The probability and intensity of disturbance can be reduced with mitigation measures.				

Mitigation measures to reduce residual risk or enhance opportunities: • No construction activities within 500 m of the identified Verreaux's Eagle nest (-30.595564, 24.265331) should proceed during the breeding season (i.e. May, June, July and August); • No construction activities or personnel should be permitted to enter the 300 m no-go nest buffer around the identified Verreaux's Eagle nest at any time; • Maximum use of existing access road and servitudes; • No off-road driving; • Speed limits (30 km/h) should be strictly enforced to reduce unnecessary noise; • Construction camps should be lit with as little light as practically possible, with the lights directed downwards where appropriate; • The movement of construction personnel should be restricted to the construction areas on the project site; • No dogs or cats other than those of the landowners should be allowed on site; • Any holes dug e.g. for foundations of pylons should not be left open for extended periods of time to prevent entrapment by ground dwelling avifauna or their young and only be dug when required and filled in soon thereafter; • An appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential priority species as well as the signs that indicate possible breeding by these species; • The ECO must make a concerted effort to look out for such breeding activities especially of Red Data species; • If any Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.

Impact to be addressed/ further investigated	No.

4.2.2 Operational Phase Impacts

4.2.2.1 Impact 3: Disturbance and Displacement during Operation

Periodic maintenance is required of the servitude and power line infrastructure, including the regular clearing of excess vegetation to allow for unrestricted movement along the service and access roads and to minimize the risk of fires. The power line may also require aerial inspection or maintenance. The disturbance of avifauna during the operational phase, while ongoing, is not continuous and is therefore considered to be of low significance if mitigation measures are adhered to.

Impact Phase: Operation							
Potential impact description: Displacement of priority species or Red Data species, due to disturbance associated with operational activities such as line assessment and maintenance.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	M	Negative	M	H	High
With Mitigation	L	M	L	Negative	L	L	High
Can the impact be reversed?			Yes. Birds will move back into the area after a disturbance event.				
Will impact cause irreplaceable loss of resources?			No.				
Can impact be avoided, managed or mitigated?			Yes. The probability and intensity of disturbance can be reduced with mitigation measures.				
Mitigation measures to reduce residual risk or enhance opportunities: • Aerial assessment or maintenance of the power line (e.g. by helicopter) should not be conducted around the Verreaux's Eagle nest during the breeding season (May, June, July and August) where possible;							

• All vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; • Speed limits (30 km/h) should be strictly enforced to reduce unnecessary noise; • The movement of personnel should be restricted to the servitudes and access roads on the project site; • No dogs or cats other than those of the landowners should be allowed on site; and • No-go areas should be adhered to.	
Impact to be addressed/ further investigated	No.

4.2.2.2 Impact 4: Collisions with Power Lines during Operation

Collisions with large (>132 kV) power lines are a well-documented threat to avifauna in southern Africa[6] while smaller lines pose a higher threat of electrocution but can still be responsible for collision. Collisions with overhead power lines occur when a flying bird does not see the cables, or is unable to take effective evasive action, and is killed by the impact or impact with the ground. Heavy-bodied birds such as bustards, cranes and waterbirds, with limited manoeuvrability are especially susceptible to this impact[6]. Species that may be particularly affected on the proposed development site include Ludwig's Bustard, Kori Bustard, Karoo Korhaan, Northern Black Korhaan and Secretarybird. Ludwig's Bustard and Kori bustard are known to be particularly prone to collision[7]. A Verreaux's Eagle mortality has also been attributed to collision with power lines in the area (EWT data, recorded in 2005).

The proposed power line route largely runs adjacent to an existing power line. The existing power line is not marked by flappers or bird flight diverters. The proposed power line presents an opportunity to increase the visibility of the existing power line and potentially reduce collisions of heavy-bodied birds such as bustards. The installation of flappers and bird flight diverters (BFDs) may therefore effectively increase the visibility of both the proposed and the existing power lines. Similarly, should it be feasible to stagger the pylons of the proposed power line in relation to the existing power line this may also increase the visibility to birds susceptible to power line collision.

The pair of Verreaux's Eagle associated with the nest in the north-east of the power line corridor are presumably at a low risk of collision with the existing power line due to their familiarity with it. They would, however, potentially be at risk of collision with the new power line as it will be unfamiliar to them. The fledglings of each season would potentially be at risk while learning to fly if the proposed power line was placed too close to the nest. It is therefore recommended that the proposed power line be placed to the east of the existing power line as a mitigation measure to reduce the risk of collision.

The collision of avifauna with power lines is considered to be of moderate significance, even with the implementation of mitigation measures which reduces the probability of the impact.

Impact Phase: Operation							
Potential impact description: Collision of birds with power lines.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	H	Negative	M	H	H

[6] van Rooyen, C.S. 2004. The Management of Wildlife Interactions with over-headlines. In The fundamentals and practice of Over-head Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

[7] Shaw J, Reid T, Shutgens MG, Jenkins AR & Ryan PG. 2018. High power line collision mortality of threatened bustards at a regional scale in the Karoo, South Africa. Ibis 160:431-446 doi:10.1111/ibi.12553.

With Mitigation	M	M	H	Negative	M	M	M
Can the impact be reversed?			No. Some collisions by Red Data species is possible.				
Will impact cause irreplaceable loss of resources?			Potentially. The wider area is important for the conservation of some Red Data species.				
Can impact be avoided, managed or mitigated?			Partially. Flappers and other bird flight diverters are not 100% effective at preventing collisions.				
Mitigation measures to reduce residual risk or enhance opportunities: • The proposed power line is to be constructed to the east of the existing power line to reduce the risk of collision by the breeding pair of Verreaux's Eagle and their fledglings; • There is opportunity to potentially reduce the risk of collision associated with the both the existing line and the new line by attaching flappers and bird flight diverters (BFDs) to the proposed line, as the existing line does not have any attached to it; • The most appropriate and up-to-date marking devices (such as flappers and BFDs) must be selected in consultation with the Endangered Wildlife Trust (EWT); • Attach appropriate marking devices on **all** spans of all new power lines in accordance with installation guidelines to increase visibility; • Flappers and BFDs must be maintained and replaced where necessary, for the life span of the project; • An operational monitoring programme must be implemented and include regular monitoring (i.e. quarterly) of the entire length of the power lines for collision incidents for the lifespan of the project; • Collision incidents must be recorded and reported to the Endangered Wildlife Trust EWT; and • The potential to stagger pylon towers in relation to the existing power line should be investigated as this may increase the visibility of both existing and new power lines to heavy-bodied flying birds such as bustards.							
Impact to be addressed/ further investigated			Yes. The most appropriate and up-to-date flappers and BFDs must be determined in consultation with EWT and installed according to installation guidelines.				

4.2.2.3 Impact 5: Electrocution during Operation

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components[6]. Overhead power line infrastructure with a capacity of 132 kV or more do not generally pose a risk of electrocution due to the large size of the clearances between the electrical infrastructure components. Electrocutions are therefore more likely for larger species whose wingspan is able to bridge the gap such as eagles or vultures. Various large raptors (such as Martial Eagle, Verreaux's Eagle and potentially vultures), susceptible to electrocution (particularly in the absence of safe and mitigated structures) may occur in the broader project area. Electrocutions within the proposed switching station are possible but should not affect the more sensitive Red Data species, as these species are unlikely to use the infrastructure within the switching station yard for perching, nesting or roosting. The electrocution risk is considered to be of low probability and therefore low significance, the impact can be further reduced if mitigation measures are adhered to.

Impact Phase: Operation							
Potential impact description: Electrocution of avifauna by powered infrastructure.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	H	Negative	L	L	H
With Mitigation	M	M	H	Negative	L	L	H
Can the impact be reversed?			No. Some electrocution of priority or Red Data species is possible.				

Will impact cause irreplaceable loss of resources?	Potentially. Electrocution of Red Data species is possible.
Can impact be avoided, managed or mitigated?	Yes. The probability and intensity of electrocution can be reduced with mitigation measures.
Mitigation measures to reduce residual risk or enhance opportunities: • The pylons to be constructed must be 'bird friendly' and provide a safe and suitable perch; • The pylons to be constructed must have bird deterrent devices mounted on relevant parts of the structure where necessary to reduce the chances of electrocution; • The pylons to be constructed must be approved by the EWT's Wildlife and Energy Programme; • An operational monitoring programme must be implemented and include regular monitoring (i.e. quarterly) of the power lines for electrocution incidents (this can be done simultaneously with the collision monitoring); and • Any mortalities must be reported to the EWT.	
Impact to be addressed/ further investigated	Yes. Final design of the pylons must be approved by the EWT.

4.2.3 Cumulative impacts

A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other nearby activities as a result of the proposed development. Two operational wind energy facilities occur in the vicinity, Longyuan Mulilo De Aar 1 Wind Energy Facility (100MW), located approximately 20 km west of the project site, and Longyuan Mulilo De Aar 2 North Wind Energy Facility (140MW) located approximately 3 km to the north. When assessed together with other proposed wind energy facilities nearby (e.g. Zingesele WEF) the risks of collisions of birds with infrastructure and electrocution increases the potential to have a cumulatively negative impact on the avifauna of the area. The addition of the proposed line, however, is unlikely to significantly increase the cumulative impact on birds if mitigation measures are adhered to. This is largely due to the proximity of the study site to an existing substation (Eskom's Hydra Substation, Figure 3), and the large number of associated transmission lines that already exist in the area. The impact table identifies the significance of the cumulative risk as medium, however as the majority of the proposed power line follows existing power lines for most of the route, the cumulative impact of an additional line is considered to be of low significance by the specialist as much of the impact associated with the proposed power line are already present.

Indeed, some opportunity exists with the development of a new power line to reduce some of the residual risks associated with the current infrastructure on the site. This may seem counter-intuitive, however the existing line traverses habitat features that increase the risk of collisions, such as aquatic environments, but it is not fitted with flappers or bird flight diverters to reduce potential collisions. The proposed power line running adjacent to the existing power line, if fitted with such mitigation measures and with a staggered pylon design (relative to the existing pylons), may increase the visibility of the existing power line to birds and reduce overall collisions along the route. Where the proposed power line runs alongside smaller, lower voltage transmission lines, the higher and larger lattice towers typical of higher voltage power lines (as proposed) are more likely to be used as perches than the smaller towers. As the larger towers used for higher voltage transmission have larger clearances between the electrical infrastructure components, preferential use of these towers as perches may reduce the overall likelihood of electrocution.

Impact Phase: Operation							
Potential impact description: Cumulative impact of habitat destruction, collisions and electrocution, in the context of existing power lines in the area.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**

Without Mitigation	M	M	H	Negative	M	M	M
With Mitigation	M	M	M	Negative	M	M	M
Can the impact be reversed?			Unlikely. Reversal would require the decommissioning of all the transmission infrastructure in the area.				
Will impact cause irreplaceable loss of resources?			Potentially. The wider area is important for the conservation of some Red Data species and some habitat loss and mortality may occur.				
Can impact be avoided, managed or mitigated?			Partially. Much of the cumulative impact risk already exists along the route and it is unlikely that the proposed development will significantly increase the negative impact on birds. The intensity of the cumulative impact can be reduced if mitigation measures are adhered to.				
Mitigation measures to reduce residual risk or enhance opportunities: • The various mitigation and management plans associated with the development should be followed and implemented effectively to reduce the cumulative contribution of the current development and enhance opportunities.							
Impact to be addressed/ further investigated			Yes. Bird flight diverters as well as optimum pylon positioning and design should be further investigated.				

4.2.4 No-go Alternative

The no-go alternative is that the activity does not go ahead, implying a continuation of the current situation or the status quo. The no-go alternative is not necessarily the most ecologically attractive alternative with respect to avifauna in the area, as opportunities exist to improve the visibility of existing infrastructure to birds with the 'go' alternative. The no-go alternative is therefore not the preferred alternative from an avifaunal perspective. The no-go alternative will limit the potential associated with the approved renewable energy developments that require connection to the grid, the potential of the area as a whole for ensuring local energy security and the realisation of renewable energy targets on a provincial and national scale, ultimately limiting the potential to mitigate climate change impacts on avifauna.

5 OPPORTUNITIES

Significant opportunity exists to increase the visibility of the existing power line that runs adjacent to the proposed power line as the existing power line is unmarked in terms of bird flight diverters or flappers. By attaching bird flight diverters or flappers to the proposed line and potentially staggering the pylon placement in relation to the existing power line the visibility of the lines may increase for those sections where they run parallel to each other. This has the potential to reduce the risk of collision by birds traversing the area as they are already at risk from existing infrastructure.

6 CONCLUSIONS AND RECOMMENDATIONS

The area of habitat destruction associated with the footprint of the power line infrastructure, temporary construction facilities and the switching station are relatively small in extent compared to the proportion of untransformed habitat available in the area, and do not represent a fatal flaw that would prevent the proposed development from proceeding.

A number of Red Data species, and species vulnerable to collisions with power lines exist in the area of the proposed power line route and the impact of collisions to birds has a Medium significance even with the implementation of mitigation measures. However, as the majority of the proposed power line route is adjacent to an existing power line, which

is unmarked in terms of bird flight diverters, the impact significance of collision associated with the proposed power line is unlikely to increase beyond that which already exists. Appropriate bird flight diverters, or flappers should be attached to the full length of the proposed power lines, and pylons/towers should be staggered as much as possible in relation to the adjacent, existing power lines. The motivation for this requirement is due to the route being within an Important Bird Area, crossing near cliffs, over drainage lines and farm dams and being in an area important for collision prone species such as Ludwig's Bustard, Blue Crane and Secretarybird. The proposed power line should be constructed to the east of the existing power line to reduce the risk of collision by the Verreaux's Eagle pair and their fledglings in the north-east of the project corridor. The other potential impacts assessed are of low significance following the implementation of mitigation measures.

Construction activities should be timed to coincide with the local conditions and breeding activity of Verreaux's Eagles to reduce the overall impact. For example, construction activity in seasonally inundated areas should not occur during the peak rainfall period in summer to reduce the impact on wetland habitats, and construction activity near the Verreaux's Eagle nest should not occur during peak breeding periods in winter.

An external review of this assessment report was conducted by Jon Smallie of WildSkies Ecological Services (Pty) Ltd, the recommendations were agreed with and incorporated into the report. The main recommendations included an increase of the no-go nest buffer from 200 m (now 300 m), an increase in the breeding season buffer duration (now including December 2020) and the addition of a clarification statement regarding the placement of the proposed power line to the east of the existing power line to reduce the risk of collision by the resident pair of Verreaux's Eagle and their offspring.

Impact Statement

The proposed project is unlikely to generate significant impacts on avifauna after mitigation. No highly significant negative impacts were observed, therefore from an avifaunal perspective the proposed project can be authorised if all recommendations and mitigation measures are implemented accordingly.

APPENDICES

APPENDIX I: METHODOLOGY

Data Sources

Data sources consulted to compile this study are detailed below.

Site Screening

While no specific protocols for the avifaunal assessment of linear infrastructure are listed in the National Gazette, No. 43110 of 20 March, 2020: "National Environmental Management Act (107/1998) Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation", the information presented by the online screening tool[8] was consulted to determine the sensitivity of the project site prior to the field site visit and ground-truthing.

Furthermore, the avifaunal impact assessment was conducted prior to the publication of The National Gazette, No. 43855 of 30 October 2020, however the new protocols listed therein do not include specific protocols for the avifaunal assessment of linear infrastructure.

Therefore, Appendix 6 of the EIA Regulations, 2014 (as amended), has been followed for this impact assessment report.

Avifaunal Baseline

- Bird distribution data of the Southern African Bird Atlas Project 2 (SABAP-2) obtained from the Avian Demography Unit of the University of Cape Town[9];
- Co-ordinated Avifaunal Road Count (CAR) project[10];
- Co-ordinated Water-bird Count (CWAC) project[11];
- The Important Bird Areas of southern Africa (IBA) project[12];
- Chris van Rooyen Consulting. 2014. Bird Impact Assessment Study Longyuan Mulilo De Aar 2 North Wind Energy Facility. DEFF REF. NO. 12/12/20/2463/2;
- WildSkies Ecological Services. 2014. Castle Wind Energy Facility Avifaunal Impact Assessment. Unpublished Report;
- Chris van Rooyen Consulting. 2018. Operational phase bird monitoring at the Longyuan Mulilo De Aar 2 North Wind Energy Facility. Year 1. Unpublished Report;
- Chris van Rooyen Consulting. 2018. Operational phase bird monitoring at the Longyuan Mulilo De Aar 2 North Wind Energy Facility. Year 2 Quarters 1-3. Unpublished Report;
- Arcus Consulting. 2019. Zingesele Wind Energy Facility Final Pre-construction Bird Monitoring and Avifaunal Impact Assessment Scoping Report. Unpublished Report;
- Publically available satellite imagery; and
- The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland[13].

[8] https://screening.environment.gov.za/

[9] http://sabap2.birdmap.africa/ Accessed 18 February 2020.

[10] Young, D.J., Harrison, J.A, Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds). 2003. Big birds on farms: Mazda CAR Report 1993-2001. Avian Demography Unit: Cape Town.

[11] Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. Coordinated waterbird Counts in South Africa, 1992-1997. Avian Demography Unit, Cape Town.

[12] Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

[13] Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.

APPENDIX II: LEGISLATIVE REQUIREMENTS

The legislation relevant to this specialist field and the proposed project is as follows:

Convention on Biodiversity (CBD)

The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. South Africa became a signatory to the CBD in 1993, which was ratified in 1995. Article 14 (a) of the CBD states that *"Each Contracting Party, as far as possible and as appropriate, shall: (a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures".*

National Environmental Management Act (Act No. 107 of 1998, NEMA)

Section 24 of the Constitution of the Republic of South Africa provides the right to every person for a non-harmful environment and simultaneously mandates the government to protect the environment. NEMA is the framework to enforce Section 24 of the Constitution.

NEMA requires, amongst others, that:

- Development must be socially, environmentally, and economically sustainable;
- Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.

Government Notice No. 40733 of 2017: Draft National Biodiversity Offset Policy published under NEMA is to ensure that significant residual impacts of developments are remedied, thereby ensuring sustainable development as required by section 24 of the Constitution of the Republic of South Africa, 1996. This policy should be taken into consideration with every development application that still has significant residual impact after the mitigation has been followed. The mitigation sequence entails the consecutive application of avoiding or preventing loss, then at minimizing or mitigating what cannot be avoided, rehabilitating where possible and, as a last resort, offsetting the residual impact.

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – Threatened or Protected Species List (TOPS)

Amendments to the TOPS Regulations and species list were published on 31 March 2015 in Government Gazette No. 38600 and Notice 256 of 2015. The amended species list excluded all species threatened by habitat destruction and which are not affected by other restricted activities, but included the following potentially relevant target species for this study: Endangered – Martial Eagle, Ludwig's Bustard; Protected – Kori Bustard

The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention), 1983

An intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The fundamental principles listed in Article II of this treaty state that signatories acknowledge the importance of migratory species being conserved and agree to take action to this end "whenever possible and appropriate", "paying special attention to migratory species the

conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat".

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), 1999

An intergovernmental treaty developed under the framework of the Convention on Migratory Species (CMS), concerned the coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Signatories of the Agreement have expressed their commitment to work towards the conservation and sustainable management of migratory waterbirds, paying special attention to endangered species as well as to those with an unfavourable conservation status.

Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)

Developed to protect both animal and plant species within the province which warrant protection. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

APPENDIX III: IMPACT SIGNIFICANCE RATING SYSTEM

The impact significance rating system used in this assessment follows Hacking (2001)[14]. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Table 1: Ranking the Duration and Spatial Scale of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised	Fairly widespread Beyond site boundary Local	Widespread
	Within site boundary Site		Far beyond site boundary Regional/national

Table 2: Criteria for ranking the Severity of negative impacts on the bio-physical environment

Environment	**Ranking Criteria**		
	L-	**M-**	**H-**
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).

[14] Hacking, T. 2001. An innovative approach to structuring environmental impact assessment reports; Part 2: Ranking the significance of environmental aspects and impacts. Geotechnical News, 19(3) 56-59.

Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or e ndangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 3: Ranking the Consequence of an impact

SEVERITY = L					
DURATION	Long-term	**H**			
	Medium-term	**M**			**MEDIUM**
	Short-term	**L**	**LOW**		
SEVERITY = M					
DURATION	Long-term	**H**			**HIGH**
	Medium-term	**M**		**MEDIUM**	
	Short-term	**L**	**LOW**		
SEVERITY = H					
DURATION	Long-term	**H**			
	Medium-term	**M**			**HIGH**
	Short-term	**L**	**MEDIUM**		
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, provides the overall significance (risk) of impacts.

Table 4: Ranking the Overall Significance of impacts

PROBABILITY	Definite Continuous	**H**	**MEDIUM**		**HIGH**
	Possible Frequent	**M**		**MEDIUM**	

	Unlikely Seldom	**L**	**LOW**		**MEDIUM**
			L	**M**	**H**
			CONSEQUENCE (from Table 3)		

APPENDIX IV: SABAP2 Species List

Species	Red Data	Endemic or Near-endemic	Pentads													
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Avocet, Pied			0	40	0	0	0	0	33	0	0	29	0	0	0	0	20
Barbet, Acacia Pied			67	70	100	25	0	0	67	100	0	71	100	0	67	80	100
Barbet, Crested			0	0	0	0	0	0	0	0	0	71	33	0	0	0	0
Batis, Pririt			0	0	0	0	0	0	33	0	0	29	67	0	0	0	0
Bee-eater, European			33	60	0	25	0	100	33	0	0	14	0	0	0	40	40
Bishop, Southern Red			67	60	50	75	100	0	33	100	0	0	33	0	33	80	100
Bokmakierie			67	70	100	75	100	0	67	100	0	100	100	0	67	100	80
Bulbul, African Red-eyed			67	70	50	75	0	100	67	100	0	100	100	0	100	80	100
Bunting, Cape			0	10	0	50	100	0	33	0	0	100	100	0	100	60	20
Bunting, Cinnamon-breasted			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bunting, Lark-like			0	10	50	50	100	0	0	100	0	86	67	0	67	60	80
Bustard, Ludwig's	EN		67	20	0	25	100	0	0	0	100	71	0	0	67	80	40
Buzzard, Common (Steppe)			0	10	0	0	0	100	0	0	0	14	33	0	33	0	40
Buzzard, Jackal		*	0	0	0	0	0	100	33	0	0	57	67	0	0	60	40
Canary, Black-headed		*	0	0	0	0	0	0	0	0	0	57	0	0	33	80	0
Canary, Black-throated			0	40	0	25	0	0	33	0	0	57	33	0	0	60	60
Canary, White-throated			100	40	50	75	0	0	0	0	100	86	100	0	100	100	60
Canary, Yellow			0	0	0	50	0	0	33	0	0	29	67	100	67	100	60
Chat, Ant-eating			33	90	0	75	100	100	33	0	100	71	100	100	33	100	80
Chat, Familiar			33	70	0	25	0	100	33	0	100	100	100	0	67	100	100
Chat, Karoo			67	0	0	25	100	0	0	100	0	0	0	0	33	20	60
Chat, Sickle-winged		*	33	0	50	0	0	100	33	0	0	100	33	100	67	80	60

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Chat, Tractrac			0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Cisticola, Desert			67	40	0	75	100	0	33	100	0	86	67	0	67	80	80
Cisticola, Grey-backed			67	30	0	50	100	0	100	0	100	100	100	0	33	80	80
Cisticola, Levaillant's			0	20	0	0	0	0	0	0	0	0	0	0	0	20	40
Cisticola, Zitting			100	50	50	50	100	100	0	100	0	0	33	0	0	40	0
Coot, Red-knobbed			0	20	0	75	0	0	0	0	0	14	0	100	0	0	0
Cormorant, Reed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Cormorant, White-breasted			0	10	0	25	0	0	0	0	0	14	0	100	0	0	0
Courser, Burchell's	VU		0	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Courser, Double-banded	NT		0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Crake, Black			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane, Blue	NT		0	30	50	0	100	100	0	0	0	29	0	100	67	40	100
Crombec, Long-billed			0	0	0	0	0	0	33	0	0	43	33	0	0	20	0
Crow, Cape			0	0	0	0	0	0	33	0	0	0	33	0	0	20	20
Crow, Pied			100	90	100	100	100	100	33	100	100	86	100	100	33	60	100
Cuckoo, Diederik			67	20	50	50	0	0	0	100	0	29	33	0	0	20	20
Dove, Cape Turtle			100	90	100	75	100	100	67	100	0	100	100	0	100	100	80
Dove, Laughing			67	100	100	25	0	100	33	100	0	100	67	0	67	80	80
Dove, Namaqua			67	30	0	0	0	0	33	100	0	14	33	100	67	60	20
Dove, Red-eyed			0	60	50	0	0	0	0	0	0	71	33	0	0	20	80
Dove, Rock			0	20	50	0	0	0	0	0	0	0	0	0	0	0	0
Drongo, Fork-tailed			0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Duck, African Black			0	10	0	0	0	0	0	0	0	14	0	100	0	0	0
Duck, White-faced Whistling			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Duck, Yellow-billed			0	30	50	25	0	0	0	0	0	14	0	100	0	20	20
Eagle, African Fish			0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Eagle, Black-chested Snake			0	0	0	0	0	0	0	0	0	14	0	0	0	20	0
Eagle, Booted			0	30	0	0	0	0	33	0	0	0	0	0	0	20	40
Eagle, Martial	EN		0	0	0	0	100	0	33	0	0	43	0	0	0	20	0
Eagle, Tawny	EN		0	10	0	0	0	0	33	0	0	14	0	0	0	0	80
Eagle, Verreauxs'	VU		33	0	0	25	0	0	67	0	0	14	33	0	33	20	40
Egret, Little			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Egret, Western Cattle			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Eremomela, Karoo		*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Eremomela, Yellow-bellied			33	20	0	0	100	0	0	0	0	86	0	0	67	80	60
Falcon, Amur			33	20	0	25	0	0	0	0	0	0	0	0	33	20	0
Falcon, Lanner	VU		0	10	0	0	100	0	0	0	0	0	0	0	0	20	0
Finch, Red-headed			33	10	50	0	0	0	0	0	0	0	0	0	0	20	20
Firefinch, Red-billed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Fiscal, Common			100	90	100	75	100	100	0	0	0	100	100	100	67	100	80
Flamingo, Greater	NT		0	30	0	25	0	0	0	0	0	14	0	100	0	20	0
Flycatcher, Chat			100	10	50	25	100	0	67	0	0	86	0	100	100	100	80
Flycatcher, Fairy		*	0	0	0	0	0	0	67	0	0	57	67	0	33	20	0
Flycatcher, Fiscal		*	0	20	50	0	0	0	33	0	0	57	100	100	33	40	40
Flycatcher, Spotted			0	20	50	0	0	0	0	0	0	0	0	0	0	0	0
Francolin, Grey-winged		*	0	0	0	0	0	0	33	0	0	86	67	0	0	0	0
Goose, Egyptian			33	80	50	75	100	0	0	100	0	86	0	100	67	100	80
Goose, Spur-winged			0	40	50	50	100	0	0	0	0	43	0	100	0	20	40

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Goshawk, Gabar			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Goshawk, Pale Chanting			100	60	50	75	0	100	100	100	100	100	67	100	67	100	80
Grebe, Little			0	10	0	50	0	0	0	0	0	0	0	100	0	0	0
Greenshank, Common			0	30	0	0	0	0	0	0	0	14	0	100	0	0	40
Guineafowl, Helmeted			0	70	100	25	100	0	0	0	0	86	100	0	100	100	60
Gull, Grey-headed			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Hamerkop			0	10	0	25	0	0	0	0	0	0	0	100	0	40	20
Hawk, African Harrier-			0	10	0	0	0	0	0	0	0	0	0	0	0	20	0
Heron, Black-headed			33	30	0	0	0	0	0	0	0	0	0	0	33	20	60
Heron, Grey			0	40	0	25	0	0	0	0	0	0	0	100	33	0	40
Honeyguide, Greater			0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
Honeyguide, Lesser			0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Hoopoe, African			0	40	50	0	0	0	33	0	0	71	0	0	0	20	20
Ibis, African Sacred			0	80	100	50	0	0	0	100	0	0	0	100	0	0	40
Ibis, Glossy			0	60	0	0	0	0	0	0	0	0	0	0	0	0	0
Ibis, Hadeda			67	90	100	50	100	0	0	100	0	71	67	0	67	100	100
Kestrel, Greater			33	0	50	50	0	0	0	0	0	14	0	100	0	20	60
Kestrel, Lesser			100	50	100	100	100	100	67	100	0	14	0	100	33	40	0
Kestrel, Rock			0	20	0	25	100	0	33	0	0	57	33	0	0	20	0
Kingfisher, Malachite			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Kite, Black-shouldered			0	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Kite, Yellow-billed			0	0	0	0	0	0	0	0	0	0	0	100	0	0	20
Korhaan, Blue		*	33	20	50	0	0	0	0	0	0	0	0	0	67	0	0
Korhaan, Karoo	NT		67	0	0	25	0	0	0	0	0	57	67	0	67	80	80

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Korhaan, Northern Black			100	90	100	100	100	0	100	100	0	71	100	100	100	100	100
Lapwing, Blacksmith			0	70	100	50	0	0	33	100	0	71	0	100	67	80	100
Lapwing, Crowned			0	20	50	0	0	0	0	0	0	14	0	0	100	60	20
Lark, Black-eared Sparrow-		*	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Lark, Eastern Clapper			100	60	100	100	100	0	67	100	0	100	100	0	100	80	100
Lark, Eastern Long-billed		*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lark, Grey-backed Sparrow			67	10	50	25	100	0	33	100	0	14	0	0	0	20	60
Lark, Karoo		*	0	10	0	0	0	0	33	0	0	14	0	100	0	20	0
Lark, Karoo Long-billed			67	0	0	50	100	0	67	100	0	100	100	0	67	60	80
Lark, Large-billed		*	100	20	100	50	0	100	33	0	0	100	67	0	67	60	80
Lark, Melodious		*	0	0	0	0	0	0	0	0	0	14	33	0	0	20	0
Lark, Red-capped			0	0	0	0	0	0	0	0	0	29	0	0	67	20	20
Lark, Sabota			67	40	50	75	100	100	0	100	0	71	100	0	67	40	40
Lark, Spike-heeled			67	50	100	75	100	100	67	100	100	86	100	0	67	100	100
Martin, Brown-throated			67	20	0	25	0	0	0	0	0	14	0	0	0	20	20
Martin, Rock			0	50	50	50	0	0	33	100	0	86	100	0	100	100	80
Moorhen, Common			0	50	0	0	0	0	0	0	0	0	0	100	0	0	0
Mousebird, Red-faced			0	40	50	0	0	0	0	0	0	57	67	0	33	40	20
Mousebird, Speckled			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mousebird, White-backed			33	90	50	50	0	0	33	100	0	100	100	0	0	80	80
Neddicky			0	0	0	0	0	0	0	0	0	29	33	0	0	0	0
Nightjar, European			0	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Nightjar, Rufous-cheeked			0	0	0	0	0	0	0	0	0	14	33	0	0	0	0
Ostrich, Common			0	20	0	25	0	0	0	0	0	0	0	0	0	0	0

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Owl, Spotted Eagle-			0	10	0	0	0	0	0	0	0	71	67	0	33	20	40
Penduline-tit, Cape			33	0	0	0	0	0	0	0	0	29	0	0	0	40	0
Pigeon, Speckled			67	60	100	75	100	100	33	0	0	100	67	0	100	80	80
Pipit, African			67	70	50	75	100	100	67	100	100	29	100	0	67	80	80
Pipit, African Rock	NT	*	0	0	0	0	0	0	67	0	0	86	100	0	33	40	40
Pipit, Long-billed (Nicholson's)			0	10	0	0	0	0	33	0	0	86	67	0	67	0	0
Pipit, Plain-backed			0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Plover, Kittlitz's			0	10	50	25	0	0	0	0	0	14	0	0	0	0	20
Plover, Three-banded			33	70	50	25	100	0	0	0	0	71	0	100	100	20	60
Prinia, Black-chested			67	10	0	25	0	0	0	0	0	29	33	0	33	20	20
Prinia, Karoo		*	33	20	50	50	100	0	67	0	0	57	67	0	0	40	40
Quail, Common			0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Quail-finch, African			0	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Quelea, Red-billed			33	30	50	0	0	0	0	0	0	14	0	0	33	40	60
Raven, White-necked			0	10	0	0	0	0	33	0	0	57	67	0	0	20	0
Robin, Kalahari Scrub			0	0	0	0	0	0	0	0	0	0	0	0	0	40	0
Robin, Karoo Scrub			67	60	50	75	100	100	100	100	0	86	100	100	67	100	100
Robin-chat, Cape			0	60	50	75	0	100	33	100	0	86	100	100	0	40	80
Ruff			0	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandgrouse, Namaqua			0	10	0	0	0	0	33	0	0	29	33	0	33	60	40
Sandpiper, Common			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandpiper, Curlew			0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandpiper, Wood			0	10	0	0	0	0	0	0	0	0	0	0	0	0	20
Secretarybird	VU		0	10	0	0	0	0	0	0	0	43	0	0	33	20	0

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Shelduck, South African			67	50	0	75	0	0	67	0	0	71	0	100	67	60	40
Shoveler, Cape			0	10	0	0	0	0	0	0	0	0	0	0	0	0	20
Sparrow, Cape			100	100	100	100	100	100	67	100	100	86	100	0	100	100	100
Sparrow, House			67	60	50	50	0	0	0	0	0	100	0	0	67	60	80
Sparrow, Southern Grey-headed			67	0	50	25	0	0	33	100	0	57	0	0	0	40	0
Sparrowhawk, Rufous-breasted			0	0	0	0	0	0	0	0	0	0	33	0	0	0	0
Sparrow-weaver, White-browed			67	10	0	0	0	0	0	0	0	0	0	0	0	60	0
Spoonbill, African			0	0	0	25	0	0	0	0	0	0	0	100	0	0	0
Starling, Cape Glossy			0	10	50	25	0	0	0	0	0	71	33	0	33	60	20
Starling, Common			0	50	0	0	0	0	0	0	0	0	0	0	0	0	0
Starling, Pale-winged			0	30	0	0	0	0	67	100	0	86	100	0	67	20	20
Starling, Pied		*	33	50	100	100	0	0	67	100	0	86	33	0	33	100	80
Starling, Red-winged			0	0	0	25	0	0	0	0	0	14	0	0	0	0	0
Starling, Wattled			0	10	0	0	0	0	0	0	0	14	0	0	33	20	0
Stilt, Black-winged			0	70	0	25	0	0	33	0	0	29	0	100	0	0	0
Stint, Little			0	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Stonechat, African			67	50	50	0	0	0	0	0	100	0	0	0	0	60	40
Stork, Black	VU		0	20	0	50	0	0	0	0	0	0	0	0	0	20	0
Stork, White	(Bonn)		33	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Sunbird, Dusky			0	10	0	50	0	0	33	0	0	14	100	0	33	20	40
Sunbird, Malachite			0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Sunbird, Southern Double-collared		*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swallow, Barn			100	50	100	75	100	100	67	100	100	29	33	100	67	60	60

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Swallow, Greater Striped			100	30	100	100	100	100	67	100	100	57	67	100	33	80	60
Swallow, South African Cliff		*	67	50	50	75	100	0	33	0	0	0	0	0	0	0	0
Swallow, White-throated			67	20	50	25	100	0	0	100	0	14	0	100	0	20	20
Swift, African Black			33	0	0	0	0	0	0	0	0	0	0	0	33	0	0
Swift, Alpine			0	0	0	0	0	0	33	0	0	14	67	0	0	0	20
Swift, Common			33	10	0	25	0	0	0	0	0	29	33	0	67	20	20
Swift, Little			33	70	50	50	0	100	33	100	0	71	33	0	67	60	60
Swift, White-rumped			67	40	100	50	0	0	33	0	100	14	33	0	67	40	60
Teal, Cape			0	30	0	0	0	0	0	0	0	43	0	0	0	0	0
Teal, Red-billed			0	20	0	50	0	0	0	0	0	14	0	0	0	0	0
Thick-knee, Spotted			0	20	0	0	0	0	33	0	0	71	33	0	0	60	60
Thrush, Karoo		*	33	80	50	25	0	0	33	100	0	100	67	0	0	40	60
Thrush, Short-toed Rock			0	0	0	0	0	0	33	0	0	43	33	0	0	0	0
Tit, Grey		*	0	0	50	0	0	0	33	0	0	57	67	0	33	0	0
Tit-Babbler, Chestnut-vented			0	0	0	25	0	0	67	100	0	71	100	0	0	40	40
Tit-Babbler, Layard's		*	0	0	0	0	0	0	67	0	0	86	100	0	67	60	40
Wagtail, Cape			33	70	50	50	100	100	67	100	0	71	100	100	67	100	60
Warbler, African Reed			0	40	50	25	0	0	0	100	0	0	0	0	0	0	0
Warbler, Cinnamon-breasted		*	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Warbler, Lesser Swamp			0	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Warbler, Namaqua		*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Warbler, Rufous-eared			100	80	100	100	100	100	67	100	100	86	100	100	100	80	100
Waxbill, Common			0	30	0	0	0	0	0	0	0	0	0	0	0	60	60
Weaver, Cape		*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species	Red Data	Endemic or Near-endemic	Pentads														
			3030_2400	3035_2400	3040_2400	3030_2405	3035_2405	3040_2405	3030_2410	3035_2410	3040_2410	3030_2415	3035_2415	3040_2415	3030_2420	3035_2420	3040_2420
			Reporting Rate (%)														
Weaver, Southern Masked			100	100	50	100	100	100	67	100	100	100	100	100	67	80	100
Wheatear, Capped			0	40	100	0	100	100	33	0	100	0	0	100	67	40	60
Wheatear, Mountain			0	0	50	25	0	0	67	100	100	100	100	0	67	80	40
White-eye, Cape		*	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0
White-eye, Orange River			0	30	50	0	0	0	33	0	0	86	100	0	0	0	0
Whydah, Pin-tailed			0	20	0	25	0	0	0	100	0	14	0	0	33	60	0