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AVIFAUNAL BASIC ASSESSMENT FOR THE PROPOSED DU PLESSIS DAM PV1 AND PV2 GRID CONNECTION INFRASTRUCTURE NEAR DE AAR, NORTHERN CAPE

For

Landscape Dynamics Environmental Consultants

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1 INTRODUCTION

Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus') was appointed by Landscape Dynamics Environmental Consultants ('Landscape Dynamics') to conduct avifaunal specialist studies for the proposed grid connection and associated infrastructure for the approved Du Plessis Dam PV1 (DFFE Ref. No. 14/12/16/3/3/2/456 and Du Plessis Dam PV2 (DFFE Ref. No. 14/12/16/3/3/2/455) Photovoltaic ('PV', Solar) Energy Facilities near De Aar, Northern Cape province of South Africa (Figures 1 and 2). Project components associated with each of the proposed developments are described in Table 1 below.

Table 1: Description of Project Components for the Proposed Du Plessis Dam Solar PV1 and PV2 Grid Connection and Associated Infrastructure

Grid Connection Infrastructure	Du Plessis Dam Solar PV1	Du Plessis Dam Solar PV2
Access Road	• ± 2km Existing Road Widened to 12 m; • Starting point at the R48 and ends at the PV1 Switching Station.	• ± 3km Existing Road Widened to 12 m; • Starting point at the R48 and ends at the PV1 Switching Station.
Switching Station	• ± 0.5 ha in size (50 m x 100 m) • Internal access roads of 6 m wide.	• ± 1 ha in size (100 m x 100 m) • Internal access roads of 6 m wide.
Overhead Power Line	• 132 kV power line of ± 6 km; • The power line will connect the Du Plessis Dam PV1 Facility to the Mulilo Total Hydra Storage Central Substation.	• 132 kV power line of ± 8 km; • The power line will connect the Du Plessis Dam PV2 Facility with the Vetlaagte Main Transmission Substation
Servitude	• Servitude Width ± 31 m; • ± 6 m wide access road constructed within servitude along the line route for construction and maintenance purposes.	• Servitude Width ± 31 m; • ± 6 m wide access road constructed within servitude along the line route for construction and maintenance purposes
Laydown Area	• ± 1 ha directly adjacent to the PV1 Switching Station	• ± 1 ha directly adjacent to the PV2 Switching Station
Storage	• < 80 m^3 Diesel	• < 80 m^3 Diesel

The broader area has been extensively studied for various renewable energy and linear infrastructure developments and the avifaunal community of the receiving environment is well documented. The specialist has conducted several avifaunal assessments, site visits and monitoring programmes in and around the proposed development site over the last three years and several programmes are ongoing. The specialist is therefore very familiar with the avifaunal community and the potential impacts and risks associated with the proposed development.

The proposed transmission corridors follow existing overhead power lines or roads for the majority of their routes.

1.1 Terms of Reference

While no avifaunal specific protocol exists for the reporting and assessment of grid connection infrastructure, the output of the National Web-based Screening Tool[1] listed a single avifaunal species in the Relative Animal Species Theme.

The compilation of this report therefore follows the criteria of Government Gazette, No. 43855 (Published in Government Notice No. 1150) of 30 October, 2020: "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species" for activities requiring environmental authorisation, and the Species Environmental Assessment Guideline[2] as prescribed therein. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations[3]. This report also takes into consideration the National Environment Management Act, 1998 (Act 107 0f 1998).

The aims of the study were to:

- Describe the avifaunal status quo, including a description of available avifaunal habitats available on and around the project site;
- Produce an avifaunal sensitivity map;
- Identify and assess the potential impacts of the proposed development to the avifaunal community of the receiving environment;
- Identify recommendations and/or mitigation measures (if any) to reduce the potential impacts of the project on avifauna.

2 METHODS

2.1 Site Sensitivity Verification

The site sensitivity verification was undertaken through the use of:

- A Desktop analysis, using satellite imagery;
- A preliminary on-site inspection; and
- Any other available and relevant information.

2.1.1 Desktop Study

The desktop study included data obtained from the following sources:

- Broad vegetation types present on the project site were obtained from the updated National Vegetation Map 2018 (NVM 2018) database[4] and the vegetation descriptions were obtained from Mucina & Rutherford (2006)[5];
- Bird distribution data of the Southern African Bird Atlas Project 2 (SABAP2) obtained from the Avian Demography Unit of the University of Cape Town[6];
- Co-ordinated Avifaunal Road Count (CAR) project[7];

[1] https://screening.environment.gov.za/ Accessed 2022-05-04

[2] South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

[3] The Environmental Impact Assessment Regulations, 2014, as amended, and as promulgated under Section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

[4] South African National Biodiversity Institute (2006-2018). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018 accessed January 20 2020.

[5] 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.

[6] http://sabap2.birdmap.africa/

[7] 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.

- Co-ordinated Water-bird Count (CWAC) project[8];
- The Important Bird Areas of southern Africa (IBA) project[9];
- Output from the National Web-based Screening Tool ('Screening Tool');
- Habitat suitability maps compiled by BirdLife South Africa;
- Power line Mortality data obtained from the Endangered Wildlife Trust ('EWT');
- Badenhorst Dam Solar PV Development: Pre-construction bird monitoring report (Avisense 2014, unpublished report);
- Du Plessis Dam Solar PV Development: Pre-construction bird monitoring report (Avisense 2014, unpublished report);
- Mulilo Total Hydra Storage Project Grid Interconnection and Associated Infrastructure Avifaunal Assessment (Arcus 2021; unpublished report);
- Mulilo Total Hydra Storage Project Grid Interconnection and Associated Infrastructure Pre-Construction Avifaunal Monitoring (Arcus 2021, unpublished data);
- Publically available satellite imagery; and
- The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland[10].

2.1.2 Site Visits

A site visit was not deemed necessary for this study, as the specialist is/has been involved in a number of avifaunal assessments in and around the proposed development. The most relevant visits conducted by the avifaunal specialist are outlined below.

- Date: 2020-02-10 to 2020-02-14; 2021-07-27 to 2021-08-04; 2021-08-30 to 2021-09-05
- Duration: 21 Days
- Season: Summer (wet season), Winter (dry season);
- Season Relevance: The timing of the site inspections coincided with the peak of avifaunal abundance and included seasonal variability in potential habitat utilisation.

2.1.3 Site Ecological Importance (SEI)

The SEI was determined for a grid connection corridor of 600 m in width. SEI is considered to be a function of the biodiversity importance (BI) of the receiving environment (e.g. species of conservation concern and the habitat type present on the site) and its resilience to impacts (i.e. receptor resilience [RR]). The BI of the receiving environment is in turn a function of the conservation importance (CI) and the functional integrity (FI) of the receiving environment.

Conservation importance is defined as: '*The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*'

Functional integrity (FI) of the receiving environment/habitats is defined as its current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions, i.e. a measure of the ecological condition of the receiving environment as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts. The degree of connectivity between habitat patches varies greatly with the dispersal ability

[8] 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.

[9] Marnewick, M.D., Retief, E.F., Theron, N.T., Wright, D.R., Anderson, T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

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

of the taxa in question and similarly, existing impacts will have differential effects on each species.

As biodiversity importance (BI) is a function of conservation importance (BI) and the functional integrity (FI), the biodiversity importance can be determined.

Receptor resilience (RR) is the intrinsic capacity of the receptor to resist major damage from an impact and/or to recover to its original state with limited or no human intervention. Resilience can be linked to a particular disturbance/impact or time of year; e.g. large birds of prey have different levels of resilience to noise disturbance depending on whether they are breeding or not. The avifaunal sensitivity map was informed by the calculated SEI in the context of the species attributes and the characteristics of the site.

2.1.4 Impact Assessment Rating System

Significance ratings of the potential impacts were determined using the methodology provided and outlined in Appendix A.

3 RESULTS

3.1 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. Power line mortality data was obtained to address this limitation;
- 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 the generation of a species list of the area, to overcome this limitation a wider search (of 8 pentads) was conducted and data was supplemented by interrogating additional studies in the area; and
- Co-ordinated Avifaunal Road counts (CAR) and Co-ordinated Waterbird Counts (CWAC) sites are counted irregularly and this information is potentially out-dated.

3.2 Desktop Study

3.2.1 Project Area of Influence (PAOI)

The PAOI for the purposes of the mapping generated for this report was considered to be a 600 m assessment corridor. It is acknowledged that the potential area of influence of some impacts could extend well beyond the boundary of the project area should population-level impacts (such as fatalities) occur. It is the specialist's opinion that the loss of site-specificity that would arise from extending the PAOI outweighs the benefits of doing so. Nevertheless, the potential impacts on local and regional populations of species have been considered during the assessment process as well as habitats in the surrounding area through the incorporation of avifaunal data from multiple sources.

3.2.2 Regional Context

The broader area surrounding De Aar is important for many bird species such biome-restricted passerines and large terrestrial birds and raptors and falls within an Important Bird Area (IBA SA037 outlined below). Ludwig's Bustard is a particularly important species in the area and a breeding display site ('lek') is known to be present within 50 km of the proposed development. '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[11]. 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 area has therefore been the focus of long-term research[12] on the impacts of power line collisions on the species and efficacy (or lack-thereof) or mitigation measures to reduce the likelihood of collisions.

3.2.3 Local Context

The proposed development site is adjacent to the town of De Aar and is characterised by relatively flat plains comprising karroid shrubland under varying degrees (moderate to high) of grazing pressure from sheep, goats and cattle (Figure 3). These areas include habitat suitable for small passerines and ground-dwelling species such as korhaans and bustards, albeit at relatively low densities. Multiple existing linear infrastructure elements, including overhead power lines and roads, are present across the proposed development site (Figures 1 and 2).

Figure 3: Typical low-density karroid scrubland dominated by less palatable grasses and dwarf bushes, the proposed site is characterised by flat plains that may be utilised by korhaans and bustards

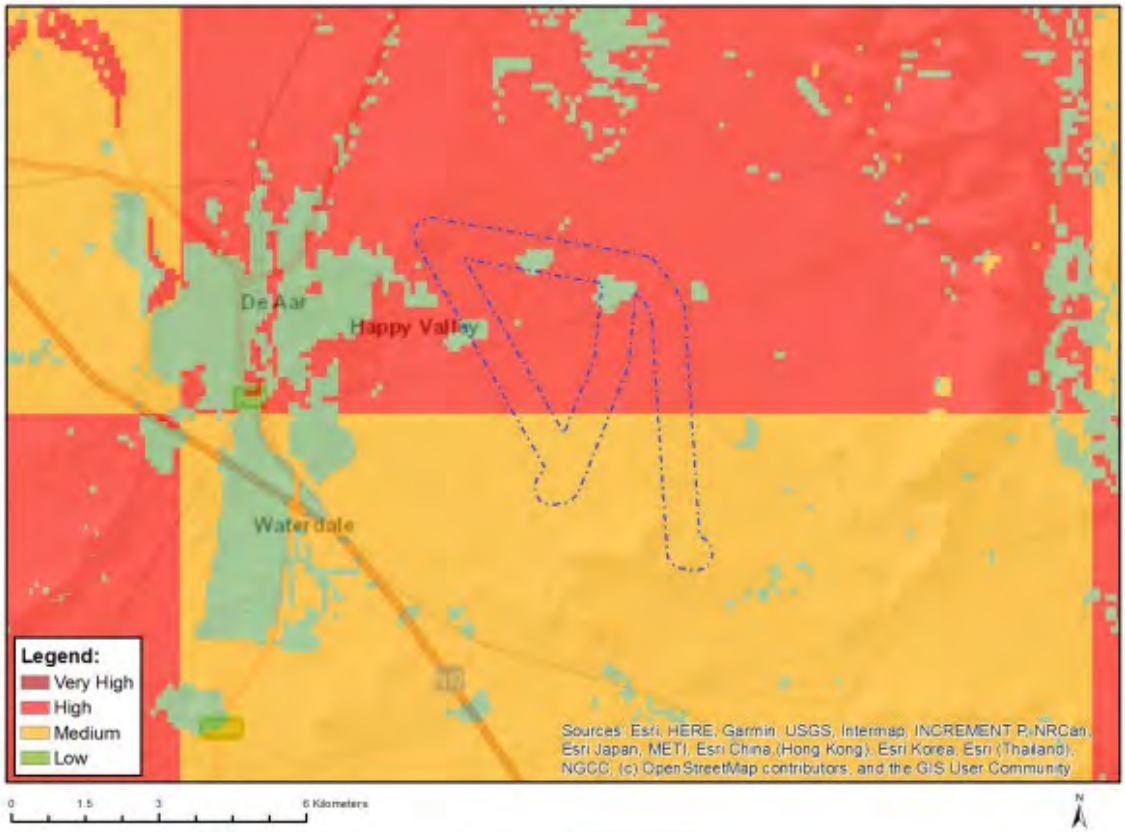
3.2.4 Screening Tool

The output from the Screening Tool indicated that the majority of the site was of high sensitivity in the Relative Animal Species Theme with the remainder of the site to be of medium sensitivity, both due to a single avifaunal species, namely Ludwig's Bustard (*Neotis ludwigii,* Figure 4).

[11] Allan, D.G.: Ludwig's Bustard. In Roberts Birds of Southern Africa. 7th edition. Edited by: Hockey, P.A.R., Dean, W.J.R., Ryan, P.G. Trustees of the John Voelcker Bird Book Fund, Cape Town; 2005:293–294.

[12] Shaw, J.M., Reid, T.A., Schutgens, M., Jenkins, A.R. and Ryan, P.G. 2018. High power line collision mortality of threatened bustards at a regional scale in the Karoo, South Africa. Ibis, 160: 431-446. https://doi.org/10.1111/ibi.12553.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
Low	Low sensitivity
Medium	Aves-Neotis ludwigii

Figure 4: Output from the National Web-based Screening Tool

3.2.5 South African Bird Atlas Project 2 (SABAP2)

SABAP2 data were examined for the pentads (which are approximately 8 km x 8 km squares) in and around the study area. A total of 141 species were recorded by SABAP2 in the pentads 3030_2400 (70 species, 3 cards), 3035_2400 (137 species, 10 cards), (77 species, 2 cards), 3030_2405 (90 species, 4 cards), 3035_2405 (44 species, 1 card), 3040_2405 (30 species, 1 card), 3030_2410 (81 species, 5 cards), 3035_2410 (48 species, 1 card) and 3040_2410 (22 species, 1 card). This included 11 species classified as *Endangered*, *Near Threatened* or *Vulnerable* and 16 endemic or near-endemic species (Table 2).

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, e.g. Kori Bustard *(Near Threatened)* which was previously observed on site during a walk-through are notably absent from the data.

Table 2: Red-data and endemic or near-endemic species listed by SABAP2

Species	Red Data Status (Regional, Global)	Endemic or Near-endemic	Priority Score
Bustard, Ludwig's	EN, EN		320
Eagle, Tawny	EN, LC		290
Eagle, Martial	EN, VU		350
Korhaan, Blue	LC, NT	*	270
Flamingo, Greater	NT, LC		290
Korhaan, Karoo	NT, LC		240
Pipit, African Rock	NT, LC	*	200
Crane, Blue	NT, VU		320
Eagle, Verreaux's	VU, LC		360
Falcon, Lanner	VU, LC		300
Stork, Black	VU, LC		330
Buzzard, Jackal		*	250
Canary, Black-headed		*	
Chat, Sickle-winged		*	
Flycatcher, Fairy		*	
Flycatcher, Fiscal		*	
Lark, Karoo		*	
Lark, Large-billed		*	
Prinia, Karoo		*	
Thrush, Karoo		*	
Tit, Grey		*	
Warbler, Cinnamon-breasted		*	

3.2.6 Co-ordinated Avifaunal Roadcounts Project (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 19 000 km. Twice a year, in midsummer and midwinter, road counts are carried out using a standardised method. Data from CAR routes surrounding the project site 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.

3.2.7 Co-ordinated Waterbird Counts Project (CWAC)

Five CWAC sites are situated in the broader area of the project site. De Aar Sewage Works (30412402) is located approximately 5 km northwest from the project site and important species recorded at this site include low numbers of Greater Flamingo and South African Shelduck. Important species recorded at Dam 30552416, located approximately 40 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 (30522438) is a large farm dam on the Seekoei River located approximately 70 km to the southeast of the project site where species such as African Fish-eagle, African

Spoonbill, Greater Flamingo, Lesser Flamingo, Osprey, Great White Pelican and South African Shelduck have been recorded. Nuwejaarsfontein Farm Dam (30512359) and Nuwejaarsfontein House Dam (30532401) are located approximately 25 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.

3.2.8 Important Bird Areas (IBAs)

The entire project site falls within the large Platberg-Karoo Conservancy (SA037). 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. The IBA was established specifically due to the presence of several globally and regionally threatened species of large terrestrial birds and raptors, certain biome-restricted passerines, and congregatory species. Globally threatened bird species include Blue Crane, Ludwig's Bustard, Kori Bustard, Secretarybird, Martial Eagle, Blue Korhaan, Black Harrier and Denham's Bustard. Regionally threatened species include Black Stork, Lanner Falcon, Tawny Eagle, Karoo Korhaan and Verreaux's Eagle. Biome-restricted species include Karoo Lark, Karoo Long-billed Lark, Karoo Chat, Tractrac Chat, Sickle-winged Chat, Namaqua Warbler, Layard's Tit-Babbler, Pale-winged Starling, and Black-headed Canary. Besides the presence of large resident raptors, congregatory species such as Amur Falcon and Lesser Kestrel also occur here, with almost 10 % of the global population of Lesser Kestrels roosting in this conservancy during summer. The IBA is also seasonally important for White Stork during insect outbreaks.

3.2.9 The Endangered Wildlife Trust (EWT) Power Line Mortality Data

Power line 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 broader 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 kilometre 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 broader area of the proposed development.

3.3 Sensitivity Mapping

The desktop study and site visits resulted in the following list of focal avifaunal species: The regionally *Endangered* Ludwig's Bustard, Martial Eagle, Tawny Eagle; the *Vulnerable* Verreaux's Eagle, Lanner Falcon, Black Stork, Secretarybird (globally *Endangered*), Burchell's Courser as well as *Near-Threatened* species such as Blue Crane (globally *Vulnerable*), Kori Bustard, Karoo Korhaan, Greater Flamingo and African Rock Pipit. Although this impact assessment focuses on Red Data species, the impact on non-Red Data species was also considered.

3.3.1 Current Impacts

Several minor and major impacts exist across the proposed development area including cultivated land and grazing/agricultural practices, roads and disturbance from the adjacent town of De Aar. The current impact with the most relevance to avifauna is the presence of multiple existing overhead power lines crossing the area, converging on the nearby Eskom Hydra Main Transmission Substation (Figures 1, 2 and 5). The majority of the existing spans of overhead power lines do not have bird flight diverters or similar mitigation measures currently attached to them and the pylons of parallel lines are often adjacent to each other.

The gravel roads surrounding De Aar (e.g. Arend Street) also currently experience traffic from large construction vehicles associated with the nearby quarry, local stone crushers and brickworks.

Figure 5: Multiple overhead power lines converge on the Eskom Hydra Main Transmission Substation, mostly without bird flight diverters

The main impacts as they relate to avifauna associated with the proposed development are therefore already present on the proposed development site. The proposed development may offer an opportunity to reduce the cumulative impacts to avifauna instead of increasing them through the implementation of mitigation measures that operate in concert with the current infrastructure, particularly for large-bodied avifauna through increased visibility of obstacles across the landscape potentially reducing the cumulative risk of collisions.

3.3.2 Site Ecological Importance (SEI)

The functional integrity of the site was considered low for most of the species of particular relevance to the proposed development due to the reduced habitat connectivity, current negative ecological impacts present and low rehabilitation potential imposed on the area from the existing infrastructure (Table 3). The SEI determination would nevertheless remain as Very Low for these species even if the site was generously considered to be of medium integrity. The site does not contain preferred habitat for Verreaux's Eagle, Black Stork nor African Rock Pipit and their utilisation of the site would likely be low.

The receptor resilience was considered to be very high for the site as the existing impacts reduce the likelihood that species particular sensitive to disturbance would utilise the site. Therefore, the species or individuals likely to utilise the site have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed given that suitable available habitat is widespread in the surrounding area. No nesting

structures of particular relevance were located on the existing transmission lines; however, several crow nests were present).

Table 3: Site Ecological Importance evaluated for species of particular relevance to the proposed development that may occur in the area

Species	Habitat	EOO (km^2)	Status Used	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Ludwig's Bustard	Scrublands	> 10	EN (A4)	High	Low	Medium	Very High	**Very Low**
Martial Eagle	Scrublands	> 10	EN (A2; C1)	High	Low	Medium	Very High	**Very Low**
Tawny Eagle	Scrublands	> 10	EN (A2, 3; C1)	High	Low	Medium	Very High	**Very Low**
Secretarybird	Scrublands	> 10	EN (A2 , 3, 4)	Medium	Low	Low	Very High	**Very Low**
Verreaux's Eagle	Rocky Slopes	> 10	VU (A2; C1)	High	Low	Medium	Very High	**Very Low**
Lanner Falcon	Scrublands	> 10	VU (A2: C1)	High	Low	Medium	Very High	**Very Low**
Black Stork	Wetlands, Rivers	> 10	VU (A2, D1)	Low	Low	Low	High	**Very Low**
Blue Crane	Grasslands, Wetlands, Dams	> 10	VU (A3, 4)	Medium	Low	Low	Very High	**Very Low**
Burchell's Courser	Scrublands	> 10	VU (A2, 4, C1, 2)	High	High	High	Very High	**Low**
Kori Bustard	Scrublands		NT (A2, 3, 4)	Medium	Low	Low	Very High	**Very Low**
Greater Flamingo	Dams		NT (A2)	Medium	Low	Low	Very High	**Very Low**
Karoo Korhaan	Scrublands		NT (A2)	Medium	Low	Low	Very High	**Very Low**
African Rock Pipit	Rocky Slopes		NT (A2, 3; C1; E)	Medium	Low	Low	Very High	**Very Low**

The conservation importance for Ludwig's Bustard was considered to be high for the site despite being listed under Criterion A only as it is assumed here that the population is < 10 000 mature individuals and the broader area may include an important source population for this species.

The proposed development is unlikely to have a significant negative impact on the persistence or long-term viability of populations of Burchell's Courser in the area given the nature of the proposed development and its position in relation to existing infrastructure. The resulting avifaunal sensitivity map therefore indicates that the whole assessment corridor relating to the Du Plessis Dam PV1 Grid Connection (and associated infrastructure) is of very low avifaunal sensitivity (Figure 6).

Similarly, the majority of the assessment corridor relating to the Du Plessis Dam PV2 Grid Connection and associated infrastructure) is of very low avifaunal sensitivity, however a slightly elevated area associated with the extreme southern portion of the assessment corridor has been assigned a slightly elevated avifaunal sensitivity (i.e. low, Figure 7). The primary reason for the difference between low and very low sensitivity areas is that the slightly elevated areas may be utilised by Ludwig's Bustard for displaying (albeit with a low likelihood).

4 IDENTIFICATION OF IMPACTS

The following key potential impacts on avifauna arising from the proposed development have been identified for assessment:

- Construction Phase:
  - Direct Habitat Destruction – modification, removal and clearing of vegetation for development of infrastructure such as temporary laydown areas, pylon bases, switching station, storage areas, access roads and servitudes;
  - Disturbance/Displacement – indirect habitat loss and/or reduced breeding success due to displacement by noise and activity associated with machinery and construction activity; and
  - Direct Mortality – fatalities of avifauna due to vehicle collision, entrapment, entanglement or collision with temporary infrastructure (e.g. fencing), entrapment in uncovered excavations and increased predation pressure.
- Operational Phase:
  - Disturbance/Displacement – indirect habitat loss, reduced breeding success, obstruction of movement corridors due to displacement by infrastructure and noise/activity associated with ongoing, routine operational tasks/maintenance activity; and
  - Direct Mortality – fatalities of avifauna due to collision or entrapment with perimeter fencing, collision with overhead power lines, and electrocution from electrical components.
- Decommissioning Phase:
  - As per construction phase.

5 ASSESSMENT OF POTENTIAL IMPACTS

The major impacts (identified above), that may potentially or likely will occur, are assessed below for the construction and operational phases of the grid connections and associated infrastructure.

The assessment applies to both Du Plessis Dam PV1 and PV2 Grid Connections and associated infrastructure as their potential impacts with respect to the avifaunal community of the receiving environment are identical and recommended mitigation measures are applicable to both.

5.1 Construction Phase Impacts

5.1.1 Impact 1: Habitat Destruction during Construction

Impact Description

Habitat loss associated with the clearing of vegetation for road widening, lay-down areas, switching station, temporary construction facilities and pylon bases. During the construction phase some habitat destruction and alteration is inevitable. The clearing of vegetation results in the permanent loss of habitats for birds, although to a limited extent. These activities also have an impact on birds breeding, foraging and roosting in or in close proximity of the proposed developments through modification of habitat, and may result in species being displaced from the immediate area.

Servitudes and access roads associated with existing infrastructure are currently present across the site and required widening will unlikely result in significant habitat loss. The area required for pylon bases, laydown areas and switching stations is relatively small and positioned adjacent to existing infrastructure. 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.

Cumulative impact description

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. The cumulative impact of habitat destruction was considered together with habitat destruction associated with the existing infrastructure, approved solar facilities in the study area, the other grid connection components considered in this assessment as well as other renewable energy facilities in the broader area. Two operational wind energy facilities occur in the vicinity, Longyuan Mulilo De Aar 1 Wind Energy Facility (100 MW) and Longyuan Mulilo De Aar 2 North Wind Energy Facility (140 MW) located approximately 20 km to the north-east. All of these consist of additional electrical infrastructure including facility substations and power lines. Much of the cumulative impact risk therefore already exists in the area and it is unlikely that the proposed development will significantly contribute to the negative impact on bird habitat.

Mitigation

- Existing roads should be used where possible. The minimum footprint areas of infrastructure should be used wherever possible;
- Temporary access roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation, and
- All contractors are to apply good environmental practice during construction.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Habitat Destruction	Site	Long Term	Definite	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)	YES	**NO**

Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.1.2 Impact 2: Disturbance and Displacement during Construction

Impact Description

Disturbances and noise from staff and construction activities can impact certain sensitive species particularly whilst feeding and breeding, resulting in indirect habitat loss through a perceived increase in predation risk. Avifaunal species that are particularly sensitive to disturbance are unlikely to frequently utilise the site given the proximity of the site to the town of De Aar and the current impacts present in the vicinity of the site (e.g. vehicular traffic associated with the nearby quarry activities). The disturbance and displacement impacts associated with the construction phase are generally temporary in nature. The area surrounding the project site comprises 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. No nesting structures of particular relevance or sensitivity to disturbance were located on the existing transmission lines; however, several crow nests were present).

Cumulative impact description

It is considered unlikely that the disturbance associated with the construction phase of the proposed development will have a significantly negative impact on the persistence or long-term viability of avifaunal

species across the project site as species particularly sensitive to this impact would likely not frequently utilise the area given the current existing impacts present.

Mitigation

- Maximum use of existing access road and servitudes;
- No unnecessary off-road driving should be permitted;
- Speed limits should be strictly enforced to reduce unnecessary noise;
- 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;
- An appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential priority species that may occur across the development area 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; and
- If any Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m 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 Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance / Displacement	Site	Short Term	Possible	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)	YES	**NO**

Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.1.3 Impact 3: Direct Mortality during Construction

Impact Description

Direct mortalities of avifauna due to construction activities could include roadkill of ground-dwelling species such as bustards and korhaans, poaching, entrapment, entanglement or collision with temporary infrastructure (e.g. fencing), entrapment in uncovered excavations and increased predation pressure from species such as crows.

Cumulative impact description

It is considered unlikely that the proposed development would contribute significantly to the existing impacts across the site following the implementation of mitigation measures given the proximity of the proposed development site to the town of De Aar.

Mitigation

- Maximum use of existing access road and servitudes;
- Night driving must be avoided where possible;
- Any holes dug should not be left open for extended periods of time to prevent entrapment of ground dwelling birds (especially chicks) and only be dug when required and filled in soon thereafter;
- Site access should be controlled and no unauthorised persons should be allowed onto the site;
- Personnel should not be allowed to wander off the construction site;
- All personnel should undergo an initial environmental induction with regards to birds and in particular awareness about not harming or collecting species or eggs;
- The illegal collection, hunting or harvesting of birds at the site should be strictly forbidden;
- No animals such as dogs or cats to be allowed on site other than those of the landowners;
- Perimeter or security fences should be spaced a minimum of 2.5m apart if double-layered fencing is installed to prevent entrapment of larger bodied birds that may find themselves between the fences;

- Appropriate solid-waste management should be implemented to reduce the likelihood of attracting species such as crows to the project site as increases in their numbers may impart additional predation pressure on eggs of nesting birds; and
- Any birds directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance / Displacement	Site	Short Term	Possible	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)	YES	**NO**

Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.2 Operational Phase Impacts

5.2.1 Impact 4: Disturbance and Displacement during Operation

Impact Description

Disturbance and displacement of birds may occur during operational activity of the switching stations as well as during the periodic maintenance that is required of the servitude and power line infrastructure. The grid connection infrastructure may also require aerial inspection or maintenance. The disturbance of avifauna during the operational phase, while ongoing, is not continuous.

Cumulative impact description

It is considered unlikely that the disturbance associated with the operational phase of the proposed development will have a significantly negative impact on the persistence or long-term viability of avifaunal species across the project site as species particularly sensitive to this impact would likely not frequently utilise the area given the current existing impacts present. Any disturbed species have a very high likelihood of returning to a site once the disturbance or impact has been removed given that suitable available habitat is widespread in the surrounding area. Disturbance and displacement due to operational activity associated with the proposed development is not expected to be significant as routine maintenance of existing transmission infrastructure already occurs along the existing servitude and any birds that remain in the area are likely to be habituated to the operational activity of facilities approved nearby.

Mitigation

- Maximum use of existing access road and servitudes;
- No unnecessary off-road driving should be permitted;
- Speed limits should be strictly enforced to reduce unnecessary noise;
- 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;
- An appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential priority species that may occur across the development area 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; and
- If any Red Data species are confirmed to be breeding (e.g. if a nest site is found), maintenance activities (e.g. vegetation clearing and aerial surveys) within 500 m 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 Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance / Displacement	Site	Long Term	Possible	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)	YES	**NO**

Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.2.2 Impact 5: Direct Mortality during Operation: Collisions

Impact Description

Collisions with large (>132 kV) power lines are a well-documented threat to avifauna in southern Africa[13] while smaller lines pose a higher threat of electrocution but can still be responsible for collision. This impact is already present across the proposed development site. 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. Ludwig's Bustard and Kori bustard are known to be particularly prone to collision[12]. However, collisions are significantly more likely to occur away from roads[12] and the portions of the proposed routes that are not adjacent to existing overhead power lines run adjacent to the road. The installation of flappers and bird flight diverters (BFDs) may increase the visibility of the proposed power lines, however while this has been shown to reduce the number of collisions for many species it does not appear to be effective at preventing bustard collisions[14]. To a lesser extent, collisions, entrapment or entanglement can also occur from perimeter security fencing. If double-layered fences are to be used larger-bodied birds can find themselves between the fences and unable to escape if the clearances between the fences are insufficient to allow for take-off.

Cumulative impact description

This impact is already present across the proposed development site. The proposed power line routes largely run adjacent to existing power lines. The majority of the spans of existing overhead power lines do not include bird flight diverters and support pylons are largely adjacent to each other where multiple lines are parallel. The considered placement of pylons (i.e. staggered relative to adjacent lines) and addition of bird flight diverters on the proposed overhead power lines present an opportunity to ***reduce the overall cumulative impact of collisions*** to species such as Ludwig's Bustard in the area. The installation of flappers and bird flight diverters may 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.

Mitigation

- There is opportunity to potentially reduce the risk of collision associated with the proposed and adjacent, existing power line by attaching flappers and bird flight diverters to the proposed line;
- The most appropriate and up-to-date marking devices must be selected in consultation with the Endangered Wildlife Trust (EWT);

[13] 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.

[14] Shaw, J.M., Reid, T.A., Gibbons, B.K., Pretorius, M., Jenkins, A.R., Visagie, R., Michael, M.D. and Ryan, P.G. 2021. A large-scale experiment demonstrates that line marking reduces power line collision mortality for large terrestrial birds, but not bustards, in the Karoo, South Africa, Ornithological Applications, Volume 123, Issue 1, 1 February 2021, duaa067, https://doi.org/10.1093/ornithapp/duaa067

- 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;
- Pylon positions of the proposed lines should be ***staggered*** between the pylon positions of the existing, adjacent overhead power line where practically possible to increase visibility of both lines to flying birds;
- Perimeter or security fences should be spaced a minimum of 2.5m apart if double-layered fencing is installed to prevent entrapment of larger bodied birds that may find themselves between the fences;
- An operational monitoring programme must include regular monitoring of the entire length of the power lines and perimeter fences for collision incidents for the lifespan of the project; and
- Collision incidents must be recorded and reported to the Endangered Wildlife Trust (EWT).

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance / Displacement	Site	Long Term	Possible	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)	YES	**NO**

Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.2.3 Impact 6: Direct Mortality during Operation: Electrocution with Energized Infrastructure

Impact Description

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[15]. 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 within the proposed switching station are possible but should not affect the more sensitive 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.

Cumulative impact description

The proposed development is unlikely to have a significant contribution to the cumulative impact of the area with respect to direct mortalities resulting from electrocutions. This impact can be effectively mitigated.

Mitigation

- The pylons to be constructed must be 'bird friendly' and approved by the EWT's Wildlife and Energy Programme;
- 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;
- An operational monitoring programme must be implemented and include regular monitoring of the power lines and switching stations for electrocution incidents (this can be done simultaneously with the collision monitoring) and integrity of anti-perch devices and insulated components; and
- Any mortalities must be reported to the EWT.

Impact Assessment

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

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance / Displacement	Site	Long Term	Possible	High	**Low**	**Low**

Impact on Irreplaceable Resources (*after* mitigation)		YES	**NO**
Cumulative impact rating (*after* mitigation)	**Low**	Medium	High

5.3 Decommissioning Phase

As per construction phase.

5.4 Alternative Assessments

The assessment of the grid connection and associated infrastructure proposed for Du Plessis Dam PV1 considers two alternative routes for the overhead power line (Figure 6). Either alternative is acceptable from an avifaunal perspective, however Alternative 1 is preferred as the route follows multiple existing overhead power lines thereby increasing the opportunity (and likely efficacy) of improving the visibility of these obstacles through the addition of the proposed overhead power line and recommended mitigation measures.

No alternatives other than the 'no-go' alternative were assessed for the grid connection and associated infrastructure for Du Plessis Dam PV2. This is not considered to be a significant limitation by the specialist as the proposed grid connection corridor follows an existing overhead power line and road (Figure 7).

5.5 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 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 also 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.

6 OPPORTUNITIES

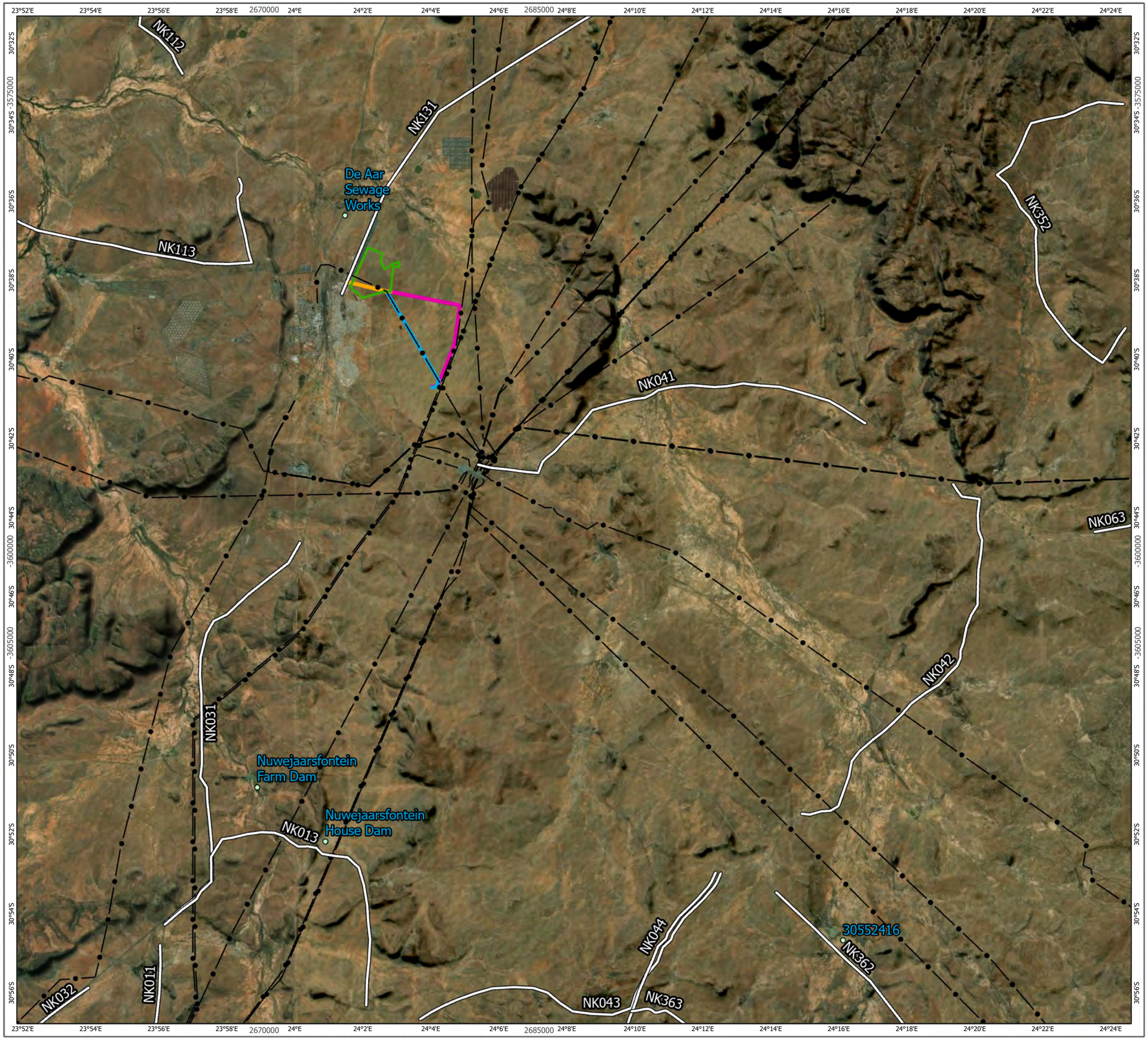
Significant opportunity exists to increase the visibility of the existing power lines that traverse the site adjacent to the proposed power line, as the existing power lines are largely unmarked in terms of bird flight diverters or flappers. By attaching bird flight diverters or flappers to the proposed 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.

7 CONCLUSIONS

The total area of habitat destruction associated with the footprint of the grid connection and associated infrastructure is relatively small compared to the proportion of habitat available in the area, and does not represent a fatal flaw that would prevent the proposed development from proceeding. As the majority of the proposed power line corridors assessed run adjacent to existing power lines, which are largely 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 and could potentially reduce the overall risk to birds.

8 IMPACT STATEMENT

The proposed project is unlikely to impose significant impacts on the avifauna of the receiving environment. No significant negative impacts have been identified and therefore the project can be authorised from an avifaunal perspective.



\\Uksprdgisapp01\sa-gis\Projects\4751 Du Plessis Dam Grid connection\4751 Du Plessis Dam Grid connection.aprx\4751-REP-0001 Fig 1 PV1 Location

ARCUS

- CWAC Site
- CAR Route
- Existing Overhead Power Line (OHPL)
- 132 kV OHPL (Alternative 1)
- 132 kV OHPL (Alternative 2)
- Access Road
- Du Plessis Dam PV1 Facility (Approved)

1:200,000 Scale @ A3

0 4 8 km

NORTH

Produced By: OD	Ref: 4751-REP-0001
Checked By: AB	Date: 5/5/2022

Du Plessis Dam PV1
Grid Connection Location
Figure 1

Du Plessis Dam Grid Connection
Avifaunal Specialist Assessment

ARCUS

- CWAC Site
- CAR Route
- Existing Overhead Power Line (OHPL)
- 132 kV OHPL
- Access Road
- Du Plessis Dam PV2 Facility (Approved)

1:200,000 Scale @ A3

0 4 8 km

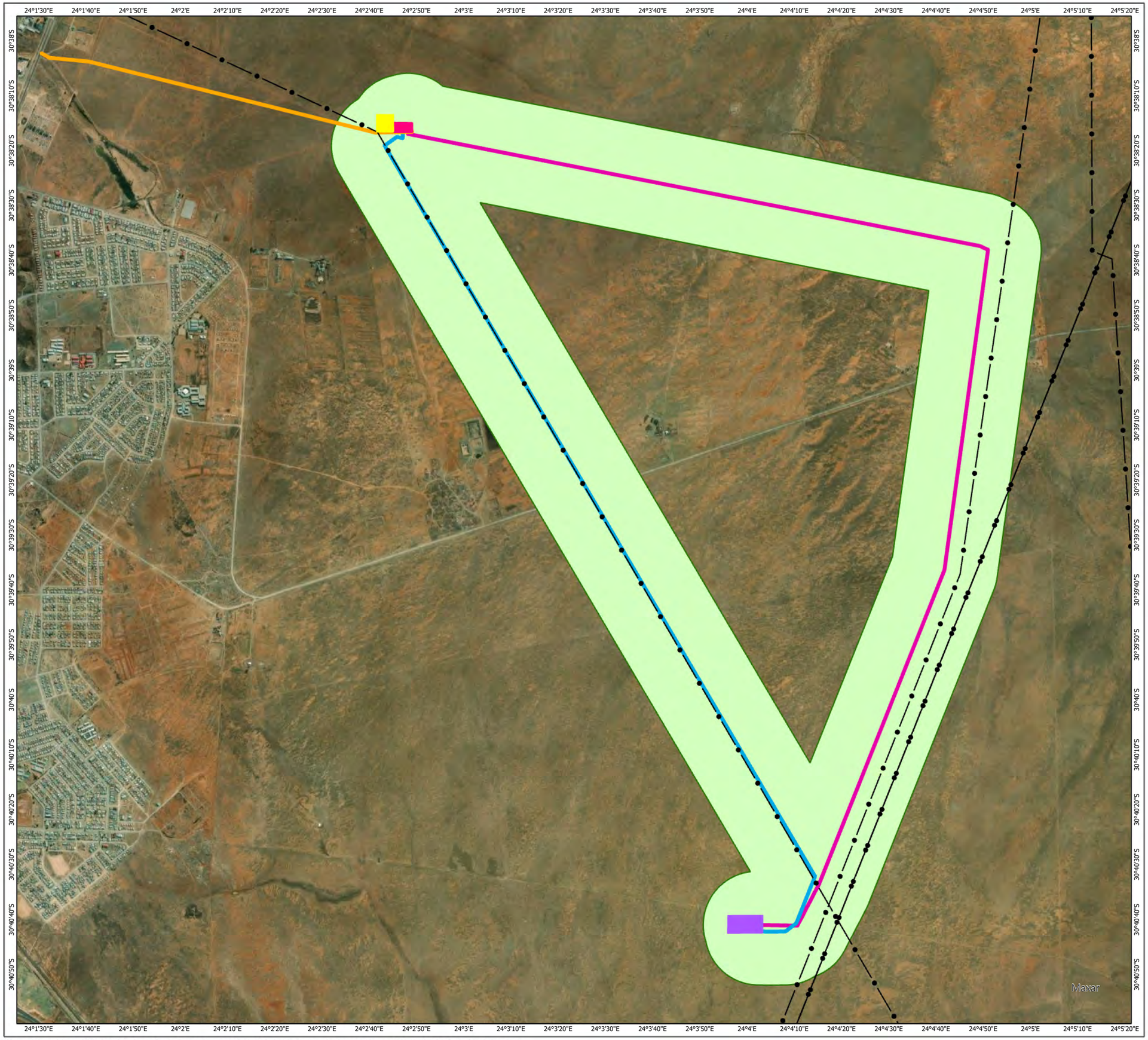
NORTH

Produced By: OD	Ref: 4751-REP-0002
Checked By: AB	Date: 5/5/2022

Du Plessis Dam PV2
Grid Connection Location
Figure 2

Du Plessis Dam Grid Connection
Avifaunal Specialist Assessment

\\Uksprdgisapp01\sa-gis\Projects\4751 Du Plessis Dam Grid connection\4751 Du Plessis Dam Grid connection.aprx\4751-REP-0002 Fig 2 PV2 Location



ARCUS

- Assessent Corridor (600 m)
- Existing Overhead Power Line (OHPL)
- Du Plessis Dam PV1 Switching Station (0.5 ha)
- Laydown Area (1 ha)
- MTHS Central Substation
- 132 kV OHPL (Alternative 1)
- 132 kV OHPL (Alternative 2)
- Access Road
- Very Low Avifaunal Sensitivity

1:24,000 Scale @ A3

0 0.5 1 km

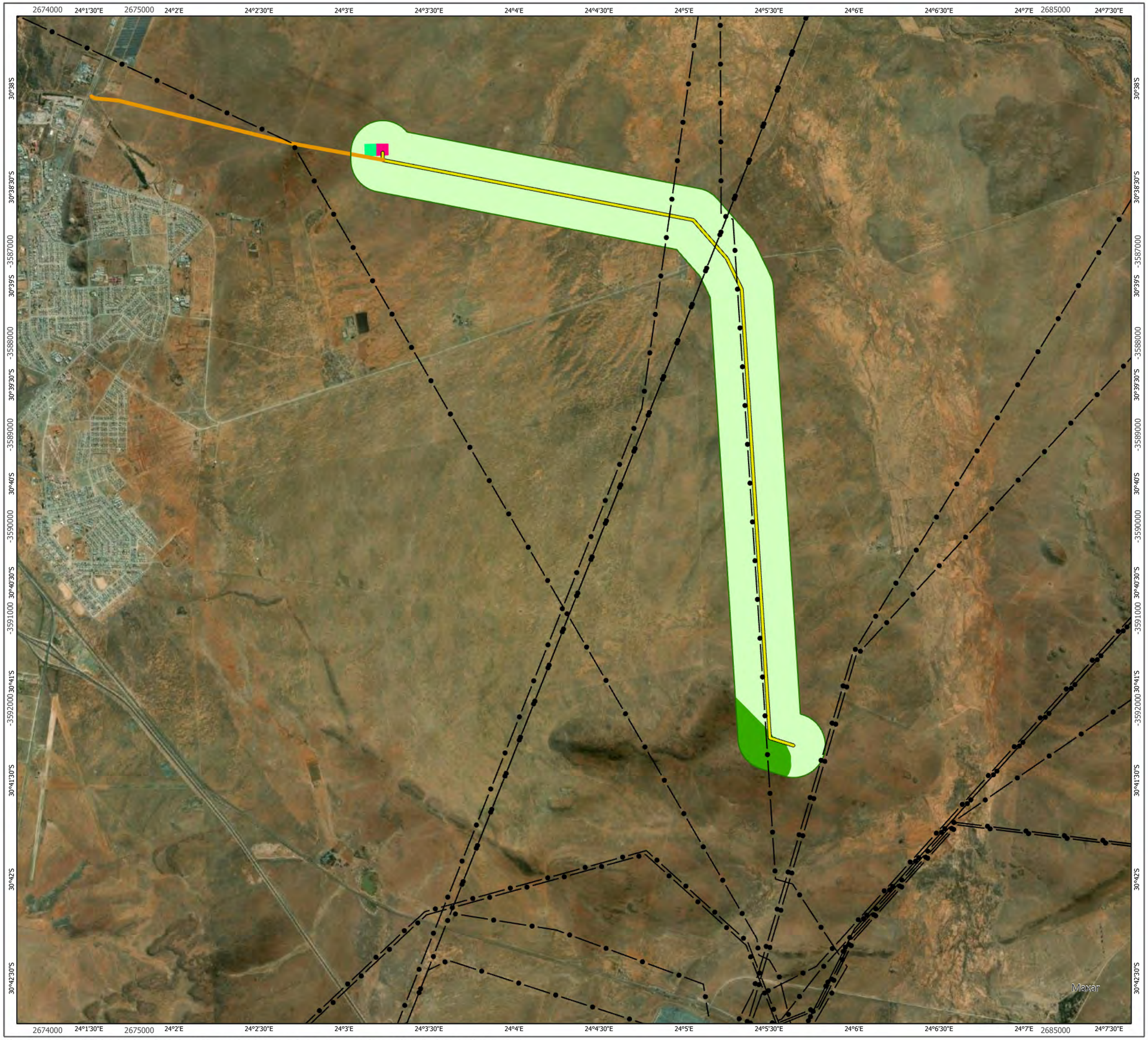
NORTH

Produced By: OD	Ref: 4751-REP-0003
Checked By: AB	Date: 5/5/2022

Du Plessis Dam PV1
Grid Connection Avifaunal Sensitivity
Figure 6

Du Plessis Dam Grid Connection Avifaunal Specialist Assessment

\\Uksprdgisapp01\sa-gis\Projects\4751 Du Plessis Dam Grid connection\4751 Du Plessis Dam Grid connection.aprx\4751-REP-0003 Fig 6 Pv1 Sensitivity



ARCUS

- Assessment Corridor
- Existing Overhead Power Line (OHPL)
- 132 kV OHPL
- Access Road
- Du Plessis Dam PV2 Switching Station (1 ha)
- Laydown Area (1 ha)
- Low Avifaunal Sensitivity
- Very Low Avifaunal Sensitivity

1:40,000 Scale @ A3

0 1 2 km

NORTH

Produced By: OD	Ref: 4751-REP-0004
Checked By: AB	Date: 5/5/2022

Du Plessis Dam PV2
Grid Connection Avifaunal Sensitivity
Figure 7

Du Plessis Dam Grid Connection Avifaunal Specialist Assessment

\\Uksprdgisapp01\sa-gis\Projects\4751 Du Plessis Dam Grid connection\4751 Du Plessis Dam Grid connection.aprx\4751-REP-0004 Fig 7 Pv2 Sensitivity

APPENDIX A: IMPACT SIGNIFICANCE RATING METHODOLOGY

Impacts are evaluated and assessed in terms of the following criteria:

Extent of impact	*Explanation of extent*
Site	*Impacts limited to construction site and direct surrounding area*
Local	*Impacts affecting environmental elements within the local area / district*
Regional	*Impacts affecting environmental elements within the province*
National	*Impacts affecting environmental elements on a national level*

Duration of impact	*Explanation of duration*
Short term	*0 - 5 years. The impact is reversible in less than 5 years.*
Medium term	*5 - 15 years. The impact is reversible in less than 15 years.*
Long term	*>15 years, but where the impacts will cease if the project is decommissioned*
Permanent	*The impact will continue indefinitely and is irreversible.*

Probability of impact	*Explanation of Probability*
Unlikely	*The chance of the impact occurring is extremely low*
Possible	*The impact may occur*
Probable	*The impact will very likely occur*
Definite	*Impact will certainly occur*

Reversibility of impact	*Explanation of Reversibility Ratings*
Low	*The affected environment will not be able to recover from the impact - permanently modified*
Medium	*The affected environment will only recover from the impact with significant intervention*
High	*The affected environmental will be able to recover from the impact*

Significance of impact	*Explanation of Significance*
None	*There is no impact at all*
Low	*Impact is negligible or is of a low order and is likely to have little real effect*
Moderate	*Impact is real but not substantial*
High	*Impact is substantial*
Very high	*Impact is very high and can therefore influence the viability of the project*

APPENDIX B: SPECIALIST CV AND DECLARATION OF INDEPENDENCE

Specialist details:

- Dr Owen Rhys Davies
- Phone: +27 10 596 3493 / +27 (0) 72 558 0080
- E-mail: owen.davies@arcusconsulting.co.za
- SACNASP Registration 117555

- Specialisms: Avifaunal Surveys, Ecological Surveys, Field Research, Data Analysis and Assessment of Ecological Data
- *Curriculum vitae* attached

Statement of independence

I, Owen Rhys Davies, as the appointed terrestrial animal specialist, hereby declare/affirm the correctness of the information provided in this compliance statement, and that I:

Meet the general requirements to be independent and have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and

Am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014).

Signature

2022-05-04

Date

CURRICULUM VITAE

Dr Owen Davies Pr. Sci. Nat. (Ecology)

Senior Ecologist – Avifaunal Specialist

Email:OwenD@arcusconsulting.co.za

Specialisms

- Avifaunal surveys
- Ecological surveys
- Field research
- Data analysis and assessment of ecological data

Summary of Experience

Owen is a Professional Natural Scientist registered with the South African Council for Natural Scientific Professions (SACNASP) and obtained his doctoral degree from the Percy FitzPatrick Institute of African Ornithology, a DST-NRF Centre of Excellence at the University of Cape Town. Owen has been involved in avifaunal monitoring activities for renewable energy projects since 2013. Extensive field research has given Owen experience in the techniques required for conducting biological surveys on a variety of taxa including observations, physical trapping and identification of small terrestrial birds, raptors, bats, small mammals, rodents, snakes, reptiles, scorpions and fish. He is also qualified to conduct observations and acoustic monitoring of marine mammals in the offshore environment. Data collection in a diversity of habitats and ecosystems, combined with formal training in field skills such as off-road driving, enables Owen to conduct ecological surveys across southern Africa. In addition, his skills in data analysis and scientific writing at the PhD level enable him to produce high quality assessments and reports.

Qualifications and Professional Interests

- **University of Cape Town, Percy FitzPatrick Institute of African Ornithology, 2010 to 2015**
  PhD Zoology
- **University of Cape Town, Percy FitzPatrick Institute of African Ornithology, 2008 to 2010**
  MSc Zoology (upgraded to PhD)
- **University of Cape Town, 2007**
  BSc Zoology (Hons)
- **University of Cape Town, 2003 to 2006**
  BSc Zoology
  BSc Botany

Professional History

2019 to present - Avifaunal Specialist, Ecologist, field team leader, Arcus Consultancy Services South Africa (Pty) Ltd, Cape Town
2015 to 2017 - Ecologist, Avifaunal Field Team Leader, Arcus Consultancy Services
2014 to 2015 - Bat monitoring field assistant, Arcus Consultancy Services
2013 to 2015 - Avifaunal observer, Arcus Consultancy Services
2009 to 2013 - Research Assistant (birds) to Dr J. Fuchs (Curator of Birds at the Muséum national d'Histoire naturelle, Paris), throughout South Africa
2007 to 2013 - Research Assistant (birds) to Prof T. M. Crowe (Percy FitzPatrick Institute of African Ornithology, Department of Zoology, University of Cape Town), throughout South Africa
2011 - Research Assistant (birds) to Dr I. Little, Endangered Wildlife Trust, Uganda
2010 - Research Assistant (bats) to Asst. Prof Hassan Salata, Department of Wildlife (South Sudan), Northern Cape
2010 to 2011 - Research Assistant (small mammals) to Dr B. Smit, University of Pretoria, Northern Cape
2010 - Research Assistant to Dr H. Smit-Robinson, Birdlife SA, Western and Northern Cape

CURRICULUM VITAE

Project Experience

- Confidential WEF near Beaufort West, Western Cape Province (Avifaunal monitoring, data analysis and reporting)
- Confidential WEF near Lutzville, Western Cape Province (Ecological assessment and reporting)
- Umsinde Emoyeni WEF (Avifaunal assessment, data analysis and reporting)
- Confidential WEF near Molteno, Northern Cape Province (Avifaunal monitoring data analysis and reporting)
- Confidential Battery Energy Storage System (BESS) near De Aar, Northern Cape Province (Avifaunal assessment, Ecological Assessment, site-walkthrough and reporting)
- Confidential Grid Connection near De Aar, Northern Cape Province (Avifaunal assessment, Ecological assessment, site-walkthrough, data analysis and reporting)
- Confidential WEF near Yzerfontein, Western Cape Province (Avifaunal assessment, Ecological assessment, site-walkthrough, data analysis and reporting)
- Confidential WEF near Kuruman, Northern Cape Province (Ecological Assessment and reporting)
- Confidential WEF near Pofadder, Northern Cape Province (Avifaunal assessment and reporting)
- Confidential WEF near Nelspoort, Western Cape Province (Avifaunal assessment and reporting)
- Metsimatala Solar (Field team leader, bird observations, data analysis and reporting in collaboration with specialists)
- Kolkies WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Karee WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Gouda WEF (Field team leader, bird observations – post construction)
- Hopefield WEF (Field team leader, bird observations, data analysis and reporting in collaboration with specialists – post construction)
- Spitzkop West WEF (Bird observations, bat mast commission)
- Pofadder WEF (Bat mast commission)
- Cookhouse WEF (Bat mast commission and decommission)
- Komsberg WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Bokpoort Solar (Avifaunal assessment, bird observations, data analysis and reporting)

Publications

FJELDSÅ, J., DINESEN, L., DAVIES, O.R., IRESTEDT, M., KRABBE, N.K., HANSEN, L.A. AND BOWIE, R.C. 2021. Description of two new Cisticola species endemic to the marshes of the Kilombero floodplain of southwestern Tanzania. Ibis. https://doi.org/10.1111/ibi.12971

JUNKER, K., SPICKETT, A., DAVIES, O.R., JANSEN, R., KRASNOV, B. R. 2021. Gastrointestinal nematodes in two galliform birds from South Africa: patterns associated with host sex and age. Parasitology Research. https://doi.org/10.1007/s00436-021-07254-0

DAVIES, O.R, JUNKER, K, JANSEN, R, CROWE, T.M. & BOOMKER, J. 2008. Age- and sex-based variation in helminth infection of Helmeted Guineafowl (*Numida meleagris*) with comments on Swainson's Spurfowl (*Pternistis swainsonii*) and Orange River Francolin (*Scleroptila levaillantoides*). South African Journal of Wildlife Research 38 (2): 163-170.

JUNKER, K., DAVIES, O.R., JANSEN, R., CROWE, T.M. & BOOMKER, J. 2008. Nematodes of Swainson's Spurfowl *Pternistis swainsonii* and Orange River Francolin *Scleroptila levaillantoides* from the Free State province, South Africa, with a description of *Tetrameres swainsonii*, sp. nov. (Nematoda: Tetrameridae). Journal of Helminthology 82: 365-371.