Appendix G.7

AVIFAUNA ASSESSMENT

Avifauna Scoping Assessment for the Proposed Verkykerskop WEF Cluster: Kromhof WEF

Prepared by:

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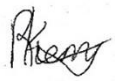
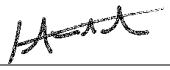
Report Name	**Avifauna Scoping Assessment for the Proposed Verkykerskop WEF Cluster: Kromhof WEF**
Submitted to	**Kromhof Wind Power (Pty) Ltd**
Lead Specialist (Fieldwork and Report Writing)	**Tyron Clark**  Tyron Clark (Pr. Sci. Nat. 121338) has more than decade's worth of experience conducting biodiversity assessments in a number of African countries, affording him good experience in variety of development types, particularly avifaunal assessments. He attained his MSC in Zoological science from the University of the Witwatersrand. His research interests centre on biogeography and ecological niche modelling. Tyron has also completed courses in wetland delineation and management hosted by the University of the Free State.
Reviewer	**Ryno Kemp**  Ryno Kemp is Pr Sci Nat registered (117462/17) in Zoological Science and is finalising his PhD in Zoology from the University of Pretoria. Ryno is a qualified Avifauna specialist with over three years of experience, three years of experience in conservation and more than eight years of scientific research experience across South Africa.
Reviewer	**Andrew Husted**  Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 16 years' experience in the environmental consulting field.
Fieldwork	Core: Lloyd Mhlongu (Phd candidate), Susan Abell (MSc), Tyron Clark (MSc). Contributors: Dr. Ryno Kemp, Andre van Tonder (MSc), Cheri Clark, Ernest Porter, Geoff Lockwood, Samantha Bradley.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

Malachite Sunbird (*Nectarinia famosa*)

DECLARATION

I, Tyron Clark, declare that:

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

Tyron Clark (Pr. Sci. Nat. 121338)

Avifaunal Lead (Meraki Consulting Pty Ltd)

For: The Biodiversity Company

January 2025

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1. Introduction

Due to the advance progress of the avifaunal monitoring program, this scoping report details key findings from both the scoping fieldwork as well as the first years-worth of avifaunal monitoring conducted for the proposed Kromhof Wind Energy Facility (WEF). The Kromhof WEF forms part of the Mulilo Renewable Project Developments (Pty) Ltd. ("Mulilo") Verkykerskop WEF Cluster (VWC). The VWC is situated in the Thabo Mofutsanyane District Municipality and Phumelela Local Municipality, near the town of Harrismith, in the Free State Province of South Africa near Verkykerskop, South Africa.

The VWC consists of three separate WEF applications each with their own 132 kV Grid Connections, within an area (Figure 1) spanning approximately 17958 ha in extent. The individual WEFs include Groothoek (6170 ha, 300 MW), Kromhof (5721 ha, 300 MW) and Normandien (6067 ha, 300 MW). The project triggers three species-specific best practice guidelines as published by BirdLife South Africa for (1) Cape Vulture (within 50 km of three roosts one of which breeding; Pfeiffer and Ralston-Paton, 2018), (2) Verreaux's Eagle (within 10 km of at least one confirmed nest; Ralston-Paton and Murgatroyd, 2021) and (3) Black Harrier (within suitable foraging grounds; Simmons et al. 2020). Collectively these guidelines impose, *inter-alia,* two-years-worth of intensive pre-construction monitoring (including 72 hours of vantage point surveying by two observers per year).

The purpose of this scoping assessment was to highlight any potential flags associated with the Kromhof WEF or the project as a whole and to establish and refine the sampling sites and survey protocol to be adopted for the pre-construction monitoring. The approach is designed to comply with all relevant global and national legislation and best practice standards. This includes, *inter alia*, the International Finance Corporation (IFC) Performance Standard 6 (IFC, 2019) and Equator Principles (EP4, 2020) but also leading global best practice standards specifically with regards to birds and wind energy particularly Jenkins et al. (2015). This scope of study caters to comply with the species-specific best practice guidelines for Cape Vulture (BLSA, 2018), Verreaux's Eagle (BLSA, 2017) and Black Harrier (BLSA, 2020). For reference purposes the Area of Influence or "AOI" as referred to in this study was defined so as to include all potential Cape Vulture roost sites within a 50 km radius of the project area and was refined to follow natural or man-made boundaries such as roads or escarpments. The term "region" refers to all areas within the greater Phumelela local municipality.

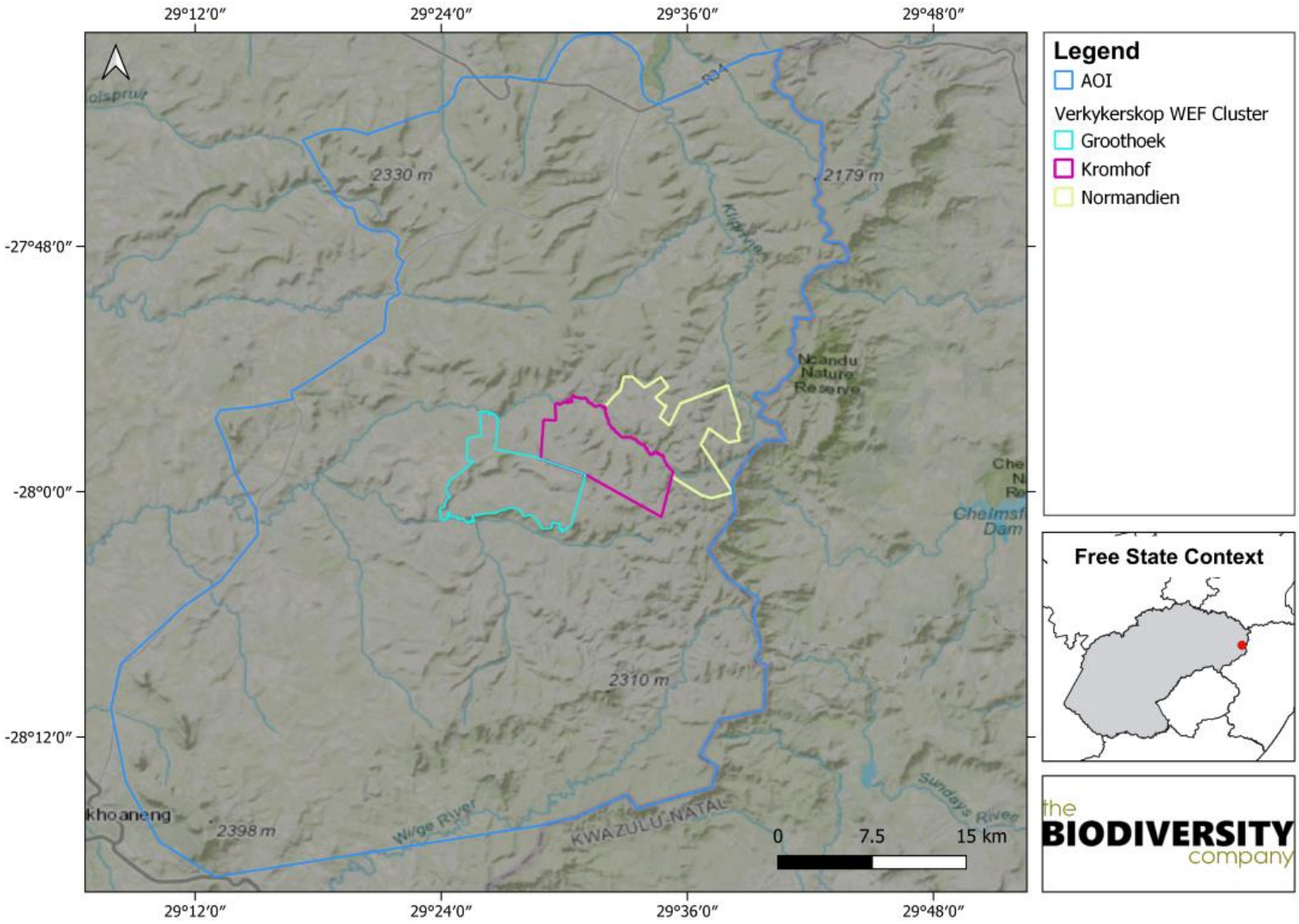

Figure 1-1 Overview of the location of the Kromhof WEF in relation to the greater Verkykerskop WEF Cluster

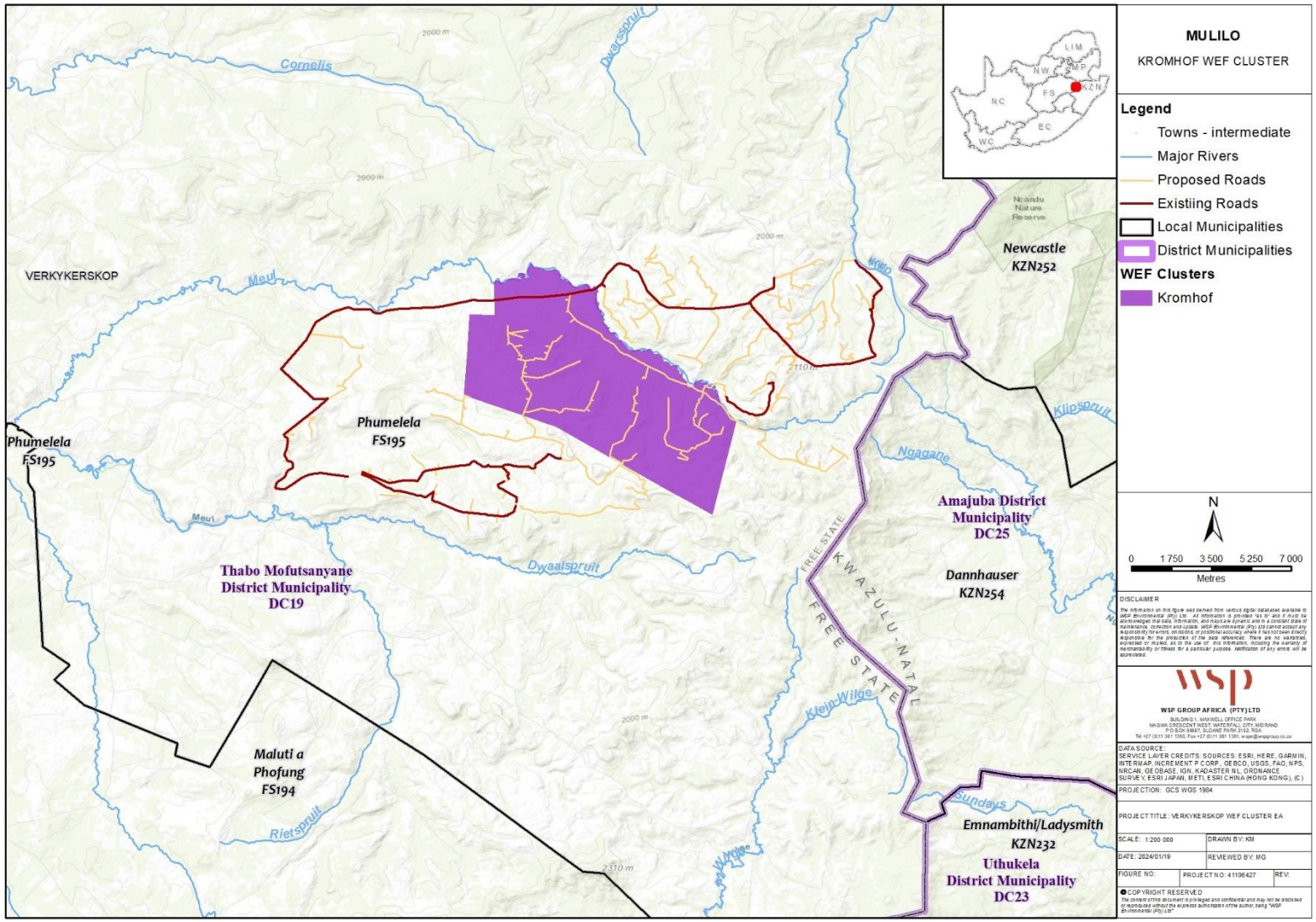

Figure 1-2 Location of the Kromhof WEF

1.1 Project Description

The Kromhof Wind Power Project is divided into two separate applications. The first being the WEF itself (up to 320 MW) which is subject to the full Scoping and EIA (S&EIA), The second is the Grid Connection (132 KV) which is subject to a Basic Assessment (BA) process. As such only the WEF will be considered for the purposes of the scoping assessment.

The WEF is situated in the west of the cluster and spans an area of 5721 ha. It covers 11 farm portions namely Leiden No. 2, Myn-Burg No. 3, Naauw Kloof No. 4, Krom Hof No. 530, Puntje No. 1240, Aanfield No. 253, Aanfield No. 253, Ox Hoek No. 98, Ox Hoek No. 98, Ox Hoek No. 98 and Ox Hoek No. 98. At present, the Kromhof WEF is planned to comprise:

- A total of up to 55 wind turbines with a rotor diameter of 200 m, a hub height of 140 m and a total height of 240 m. The hard standing area is < 0.8 ha per turbine;
- A reticulation network of 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical;
- A 132kV onsite collector substation (<2 ha);
- Concrete batching plant (1 ha);
- Construction camp and site office (4 ha);
- Materials laydown area (8 ha);
- Internal roads (8 m width);
- O&M building (<1 ha); and
- An 800MWH Battery Energy Storage System or BESS (7 ha).

1.2 Legislative Setting

The legislation, policies and guidelines listed below are applicable to the current project with regard to avifauna. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (**Error! Reference source not found.**).

Table 1-1 A list of key legislative requirements relevant to these studies in the Free State

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	African-Eurasian Waterbird Agreement (AEWA)
	Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia.
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 43110 (March 2020)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)

	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Spatial Biodiversity Assessment (NSBA)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	White Paper on Biodiversity
	South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998
Provincial	Free State Nature Conservation Ordinance 8 of 1969

1.3 Assumptions and Limitations

The following limitations should be noted for the assessment:

- Access was only arranged for survey work within the VWC;
- The number and locations of turbines within the turbine area has been provisionally provided but will only be finalised over the course of the two-year monitoring programme;
- No information has yet been provided on the location and length of the linear grid connection infrastructure;
- No information has yet been provided on the location and length of access roads to the turbines for maintenance and construction;
- No information has yet been provided on the location and length of access roads to the turbines nor the location of any Battery Energy Storage Systems (BESS); and
- The number of vantage points and their positions was carefully chosen based on the original WEF boundaries supplied by Mulilo in 2023 to ensure >75 % coverage assuming a 2 km 360° viewshed. Any changes to the extent of the original WEF boundaries supplied may be subject to a variation order to ensure adequate site coverage in line with best practice as outlined in Jenkins et al. (2015).

2. Methodology

This scoping report includes methodologies and key results from the first years-worth of avifaunal monitoring conducted at the Kromhof WEF. Note: Long term avifaunal monitoring is still ongoing at the time of compiling this report, the results of which will advise the final specialist impact assessment report in the EIA phase of the project. The monitoring methodology was designed to comply with all relevant global and national legislation and best practice standards. In addition to the species-specific guidelines for Cape Vulture, Verreaux's Eagle and Black Harrier, this includes the International Finance Corporation (IFC) Performance Standard 6 (IFC, 2019) Equator Principles (EP4, 2020) and Jenkins et al. (2015).

2.1 Desktop Assessment

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

- Chittenden et al. (2016), Roberts Birds of Guide (2nd Edition.). The primary source for species identification, geographic range, life history information and birding routes in the AOI;
- Sinclair and Ryan (2010), Birds of Africa. Secondary source for identification;
- South African Bird Atlas Project (SABAP 2). Full protocol atlassing data from nine pentads cover the project area was used to construct the expected species list. These included 2755_2920, 2800_2920, 2755_2925, 2800_2925, 2750_2930, 2755_2930, 2800_2930, 2750_2935, 2755_2935;
- Taylor et al. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Used for conservation status, nomenclature and taxonomical ordering;
- Birdlife South Africa website. For information on Important Bird Areas;
- Birds and wind energy best practice guidelines (Jenkins et al. 2015);
- Cape Vulture and wind farms best practice guidelines (BLSA, 2018);
- Verreaux's Eagle and wind farms best practice guidelines (BLSA, 2017);
- The National Web-Based Environmental Screening Tool DEA website (2022);
- South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna Protocols for environmental impact assessments in South Africa;
- South African National Biodiversity Institute, Pretoria. Version 1.2020; and
- Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998.

2.2 Fieldwork

Fieldwork was conducted in line with the birds and wind energy best practice standards (Jenkins et al. 2015) as well as the species-specific guidelines for Cape Vulture (Pfeiffer and Ralston-Paton, 2018), Verreaux's Eagle (Ralston-Paton and Murgatroyd, 2021) and Black Harrier (Simmons et al. 2020). All data was logged on BirdLasser to standardise entries among observers and expedite data processing.

Sampling was conducted within an AOI spanning an area (281494 ha) from Memel in the north to Harrismith and Van Reenen in the south and from Verkykerskop in the west to the Great Escarpment in the east. However, the standardised, formal sampling (vantage points, walked transects, driven transects and point counts) was restricted to within the 17958 ha WEF Complex and specifically with regards to Kromhof WEF this involved an area of 5721 ha. Sampling within the remainder of the AOI was limited to incidental observations of priority species and focal point surveys (primarily roost and nest investigations).

Sampling was always conducted by at least three observers at a time. Two observers were assigned to a vantage point while the third (floater) observer was tasked with conducting either walked transects, driven transects, point counts or focal points at the same time. Observer tasks were rotated to avoid fatigue. Aside from the eight-day scoping investigation, Year 1 monitoring effort involved six surveys typically 20-23 days each, (of which 5 days were reserved for Kromhof WEF) representing a total of 429 person days (ca. 100 person days for Kromhof WEF) spanning a period from June 2022 - October 2023. Fieldwork was conducted primarily by Lloyd Mhlongu (PhD candidate), Susan Abell (MSc) and Tyron Clark (MSc). Additional contributors included Andre Van Tonder (MSc), Cheri Clark, Ernest

Porter, Geoff Lockwood and Ryno Kemp (PhD candidate), Dr. Gareth Tate and Dr. Robin Colyn. Avifaunal surveys for the Verkykerskop project conducted up to the end of year 1 include:

- Pre-scoping:
    - Remotely Piloted Aircraft System (RPAS) survey of threatened bird nests near the eastern Drakensberg Escarpment Part 1: Verkykerskop and Potter's Hill: 23-27 May 2022. EWT (2022)
- Scoping:
    - Scoping: 8 days, 18-25 July 2022.
- Standard pre-construction monitoring surveys upon which this scoping assessment is based:
    - Survey 1: 20 days, 3-12 August and 15-25 August, winter (5 days for Kromhof WEF);
    - Survey 2: 20 days, 16-25 November and 28 November-07 December 2022 (5 days for Kromhof WEF);
    - Survey 3: 23 days, 1-10 February, 13-22 February and 15-17 March (5 days for Kromhof WEF);
    - Survey 4: 23 days, 11-20 April, 2-11 May and 17-19 May 2023 (5 days for Kromhof WEF);
    - Survey 5: 23 days, 3-12 July, 17-26 July and 4-6 August 2023 (5 days for Kromhof WEF);
    - Survey 6: 22 days 31-8 Aug, 11-20 September and 26-28 September 2023 (5 days for Kromhof WEF);
- Supplementary Investigations:
    - Cape Vulture Roost Investigation Survey 1: 11-14 June 2023 Ryno Kemp (PhD candidate);
    - Cape Vulture Roost Investigation Survey 2: 12-14 October 2023 Tyron Clark; and
    - Martial Eagle Investigation:12-14 October 2023 Tyron Clark

Sampling was designed to account for seasonal variation in order to facilitate the detection of the best possible spectrum of migratory avifauna, including both Intra-African and Palearctic migrants. A map of the various sampling points and transects is given in Figure 2-2. Details on the specific protocol to be followed at or along each is discussed in greater detail below. Year 2 surveys completed but not included this year 1 summary and scoping report include:

- Survey 7, Year 2: Leg 1 (20-29 November 2023), Leg 2 (5-16 December 2023);
- Survey 8, Year 2: Leg 1 (19 February -1 March 2024), Leg 2 (6-15 March 2024);
- Survey 9 Year 2 Leg 1 (4 April -15 April 2024), Leg 2 (16-21 May 2024), Leg 3 (3-9 June);
- Survey 10 Year 2 Leg 1 (18 – 27 June 2024), Leg 2a (22 June -2 August 2024);
- Survey 11 Year 2: Leg1 (21-30 August), Leg 2 (3 -14 September 2024); and
- Survey 12 Leg1 (2-11 October), Leg 2 (14-25 October 2024)

2.2.1 Vantage Point Surveys

Five of the 18 VWC vantage points (including the control) were sampled for the Kromhof WEF. These included VPs 5, 9, 10, 11 and 12. In accordance with the species-specific best practice guidelines for Cape Vulture, each vantage point was sampled by two observers for 72 hours per year (and will do so for two years). The position of these vantage points within the Kromhof WEF is shown in Figure 2-1. Each VP was carefully selected using a combination of digital elevation models and GIS processing to ensure > 75% coverage of the developable area which is taken as the turbine footprint area (Figure 2-1). This was done in accordance with best practice requirements (Jenkins et al. 2015). This calculation assumes a maximum 2 km radial detection limit on each VP (also in accordance with best practice) with a 360° viewshed. Information recorded during vantage point surveys included, *inter alia*, climatic conditions, wind speed, wind direction, visibility, species, counts, activity (perched, flying, on grounds, on water), flight direction, flight height, flight duration and flight path (mapped visually on Google Earth).

2.2.2 Walked Transects

One walked transect was conducted at each vantage point in the Kromhof WEF as well as at the control site. The length of each transect differed slightly, but all were roughly 2 km long. The aim of the transects was to gather data on the diversity and relative abundance of birds on site, particularly with regard to smaller passerines that are not always adequately represented in the vantage point surveys which are designed to record flights.

2.2.3 Driven Transects

A total of three driven transects were sampled within the Kromhof WEF (DT7 and 8) as well as one at the control site (DT Control). The total distance covered by the three driven transects within the WEF was 42.9 km with an average transect length of 14.3 km. The control driven transect was 17.3 km long. The variables recorded are the same as for walked transects. However, the primary objective of the driven transects was to cover ground in search of wide-ranging mobile species, such as large-bodied priority species such as cranes, bustards, korhaans, storks, eagles and vultures that are less easily encountered during the much shorter and more rigid walked transects.

2.2.4 Focal Point Surveys

Avifaunal abundance is hardly ever evenly distributed throughout a project area. Instead, birds tend to congregate in hotspots centred around prominent landscape features where primary productivity and moisture levels are higher, such as a pan, lake, dam, wetland or rocky outcrop. Sampling involved an adapted form of point count sampling for a more extended (yet fixed duration) at the same time of day during each site visit. The observer utilised either a spotting scope or binoculars to maximise detection and identification. Breeding areas for red-listed species or other key areas likely to support / attract significant congregations of local and migratory species were prioritised for the focal surveys. In Kromhof this involved monitoring of Southern Bald Ibis Roost 2 (FP2), Jackal Buzzard Nest 1 (FP3) and a large dam (FP1). Efforts were made to visit the various focal points at the appropriate time of day to maximise observation. For example vulture roosts were surveyed after 14:00 or before 09:00 (when most vultures are on the roost).

2.2.5 Point counts

Additionally, 31 standardised point counts were made throughout the Kromhof WEF. The point counts were conducted to gather data on the species composition and relative abundance of species within the various habitats within the project area. Each point count is run over a 5 min period. The horizontal detection limit was set at 200 m. At each point the observer documented the date, start time and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and flight direction and general notes on habitat and nesting suitability for conservation important species.

2.2.6 Incidental Searches

To supplement the species inventory with cryptic and illusive species that may not have been detected within the rigid point count protocol, diurnal incidental searches are also included. This involved opportunistic sampling of species between vantage points, transects focal points and point counts.

2.2.7 Cape Vulture Roost Investigation

Initial planning (conducted prior to scoping) involved utilising a combination of digital elevation data and satellite imagery to identify potential roost sites for Cape Vulture within a 50 km radius of the project area (defined as the Verkykerskop WEF cluster). During scoping and the course of the first pre-construction monitoring trip these sites were briefly visited to verify signs of vulture use. Three roost sites were identified (see Section 3). Contact was then made with Dr. Gareth Tate from the Endangered Wildlife Trust (together with Mulilo) to establish the extent of knowledge regarding the three roosts identified within the Area of Influence (AOI). Efforts were also made to organise permission from landowners to access the roost sites. Valuable insights were also obtained from land owners Rick Dillon and Graham Hobbs.

Fieldwork was conducted over two separate trips. It was decided that the first trip should take place in May-August (preferably June) to coincide with peak egg-laying and nest attendance. The first visit was conducted from 11-14 June 2023 by Ryno Kemp (The Biodiversity Company) and involved a visit to all three roosts. Tyron Clark (sub-contracted by The Biodiversity Company) conducted the second follow-up visit from 12-14 October 2023. The second trip focused on Nelson's Kop with the aim of assessing breeding success.

Most observation time was spent non-intrusively surveying roosting birds from a nearby vantage using a combination of spotting scopes and binoculars. Photographs were taken using both a 400 mm Canon telephoto lens on a Canon 7D DSLR Body and a 600 mm Sigma telephoto lens on a mirrorless camera body. Fieldwork was heavily contingent on suitable weather conditions, as clouds and mist can obscure entire roosts. Suspected breeding birds or active nests were more closely inspected using a DJI Mavic Pro.

2.2.8 Martial Eagle Nest Investigation

Mulilo requested that a high-level reconnaissance survey with the specific aim of searching suitable habitat and locating Martial Eagle Nests within the AOI surrounding the Verkykerskop development be conducted. This investigation was commissioned on the basis of the large potential implications for the wind farm should Martial Eagle nests be found in or in close proximity to the proposed development. Although ongoing incidental searches for priority species nests are carried out during the course of pre-construction monitoring surveys, the project area is exceptionally large and Martial Eagles are notoriously wide-ranging. Consequently, the chances of finding important nests such as this in between the rigorous survey protocol, without dedicating full-day target searches to the species is low.

In response, two full days were dedicated solely to finding and locating Martial Eagle Nests. The initial stages of the investigation were dedicated to collecting all known locality data on Martial Eagle Nests from the area. This involved collating data from the specialist's (T. Clark's) personal nest records as well as any information provided by locals. The rest of the field time was spent searching for new nests and visiting known nests.

2.2.9 Data Analysis

For the sake of this scoping report, only vantage points and general spatial data were analysed. Data from the BirdLasser cards was captured into Excel. Most statistical analyses were performed in the R statistical environment (R Core Team, 2024). Spatial analyses and models were performed in QGIS.

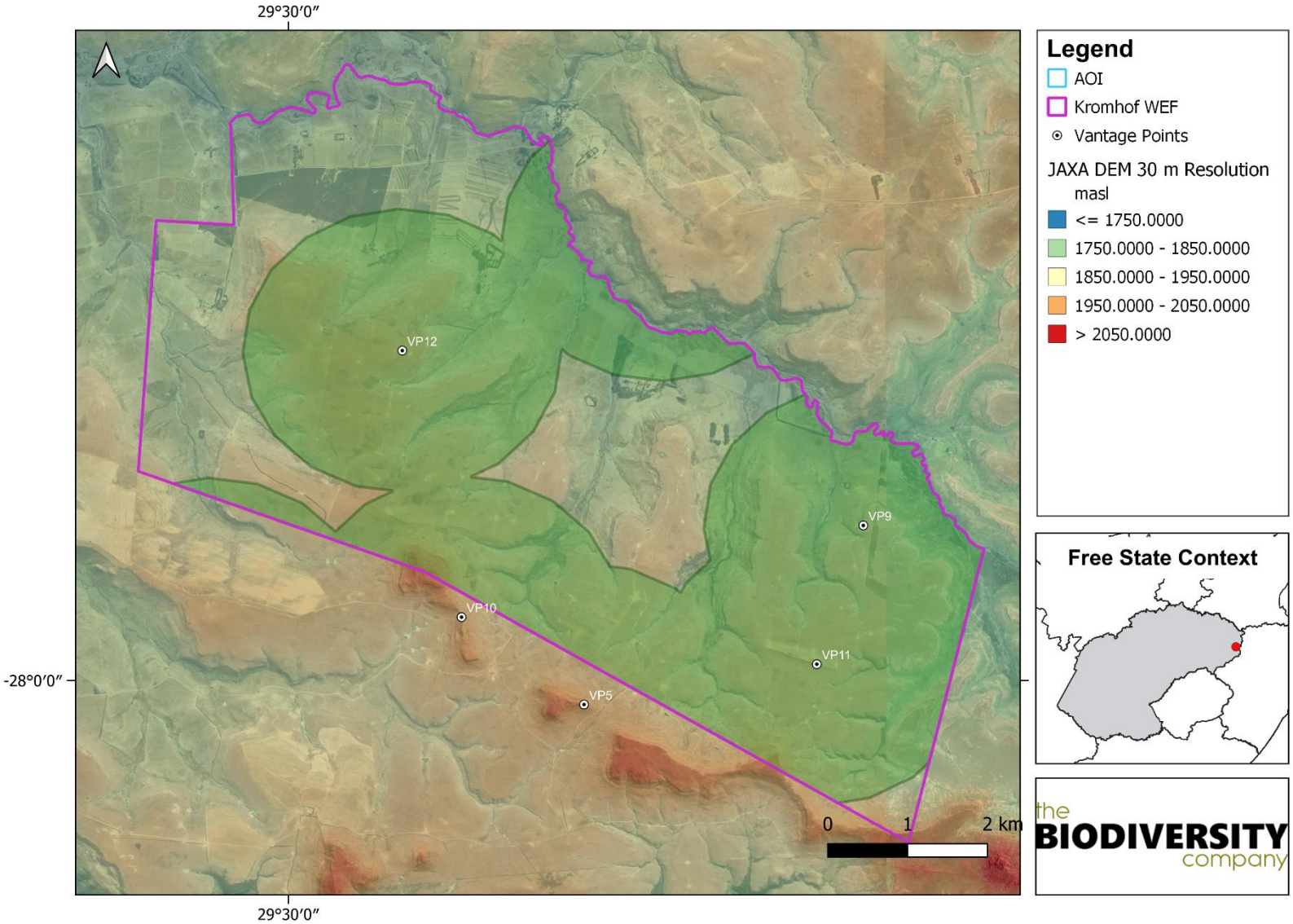

Figure 2-1 Spatial depiction of viewshed coverage from vantage points in relation to developable area (proposed turbine footprint area)

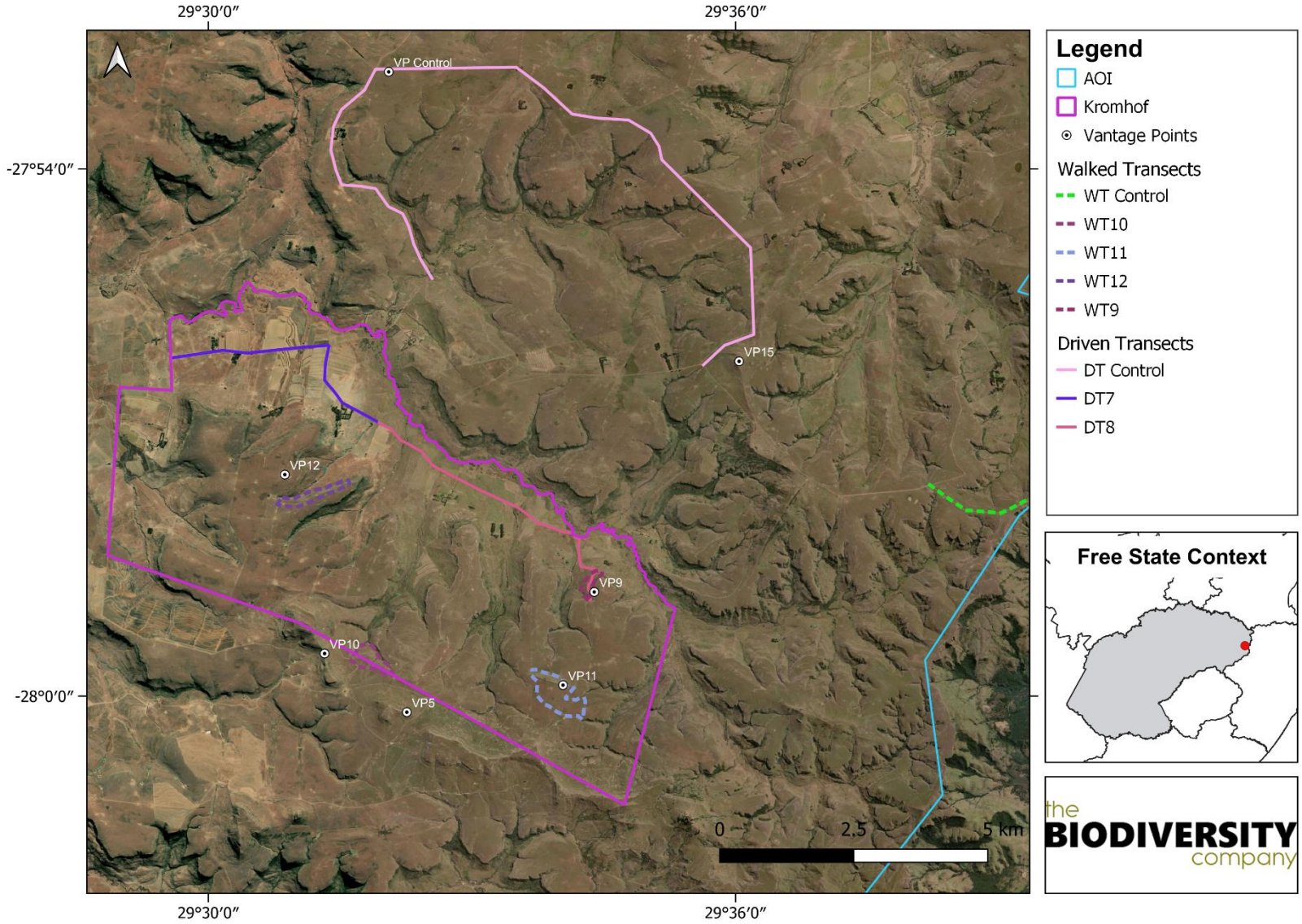

Figure 2-2 Location of walked and driven transects in relation to the vantage points

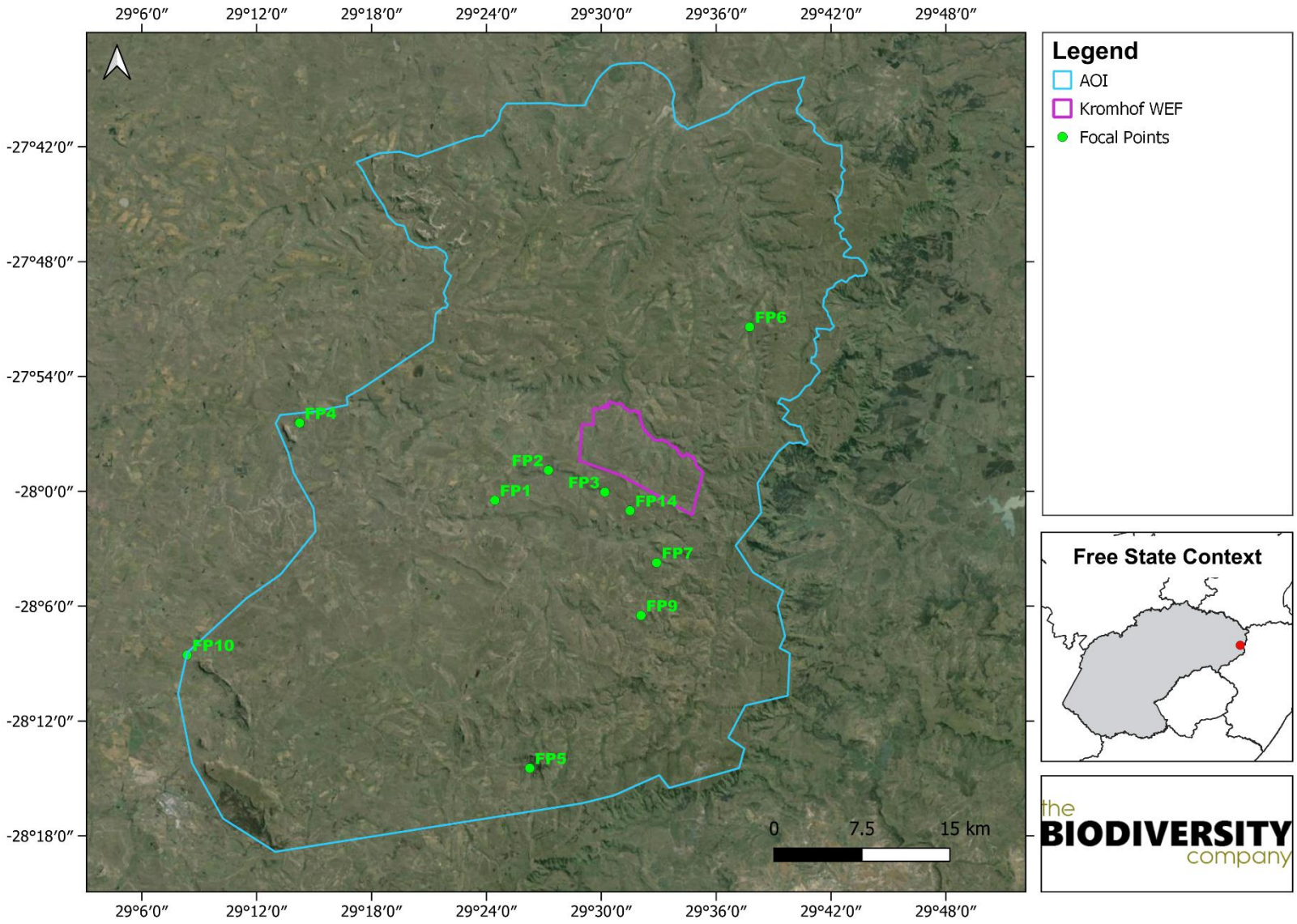

Figure 2-3 Spatial arrangement of key focal points in the AOI

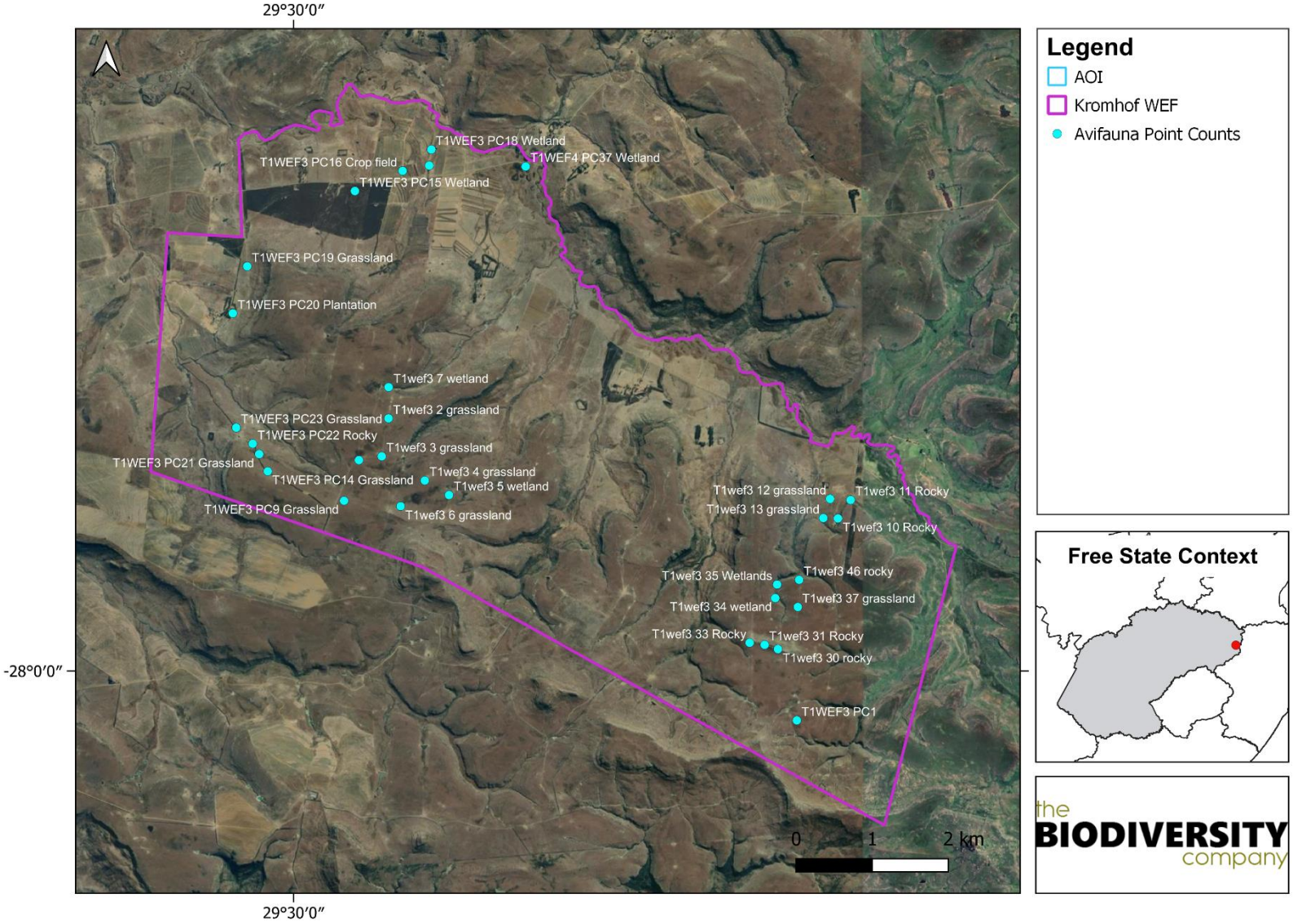

Figure 2-4 Spatial arrangement of the various point counts in the project area

3. Receiving Environment

The region is renowned for its birdlife. The greater AOI intersects with five IBAs and six statutorily protected areas. The Memel birding route (as described in Roberts Birds Application) traverses portions of the WEF cluster and AOI. The, birding route is highlighted as one of the best and most extensive habitats for high-altitude grassland endemics in South Africa (Chittenden et al.2017).

3.1 Free State Biodiversity Conservation Plan

At Kromhof WEF most of the central south and eastern regions of the WEF are classified as CBA1 (with a small central patch of CBA2) while the western and northern (along Muel River) boundaries are classified as ESAs (Figure 3-1).

The Free State Biodiversity Conservation spatial layer was developed to illustrate the province's most Critical Biodiversity Areas. These areas need to be maintained to meet the province's biodiversity targets. The broad categories recognised are: Protected Areas (PA), Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONA), and Modified Areas.

CBAs represent areas of high biodiversity significance in the province (SANBI-BGIS, 2017).

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

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI-BGIS, 2017).

Degraded Areas (sometimes called 'transformed' areas) are areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets (SANBI-BGIS, 2017). Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly, and in many cases irreversibly, compromised.

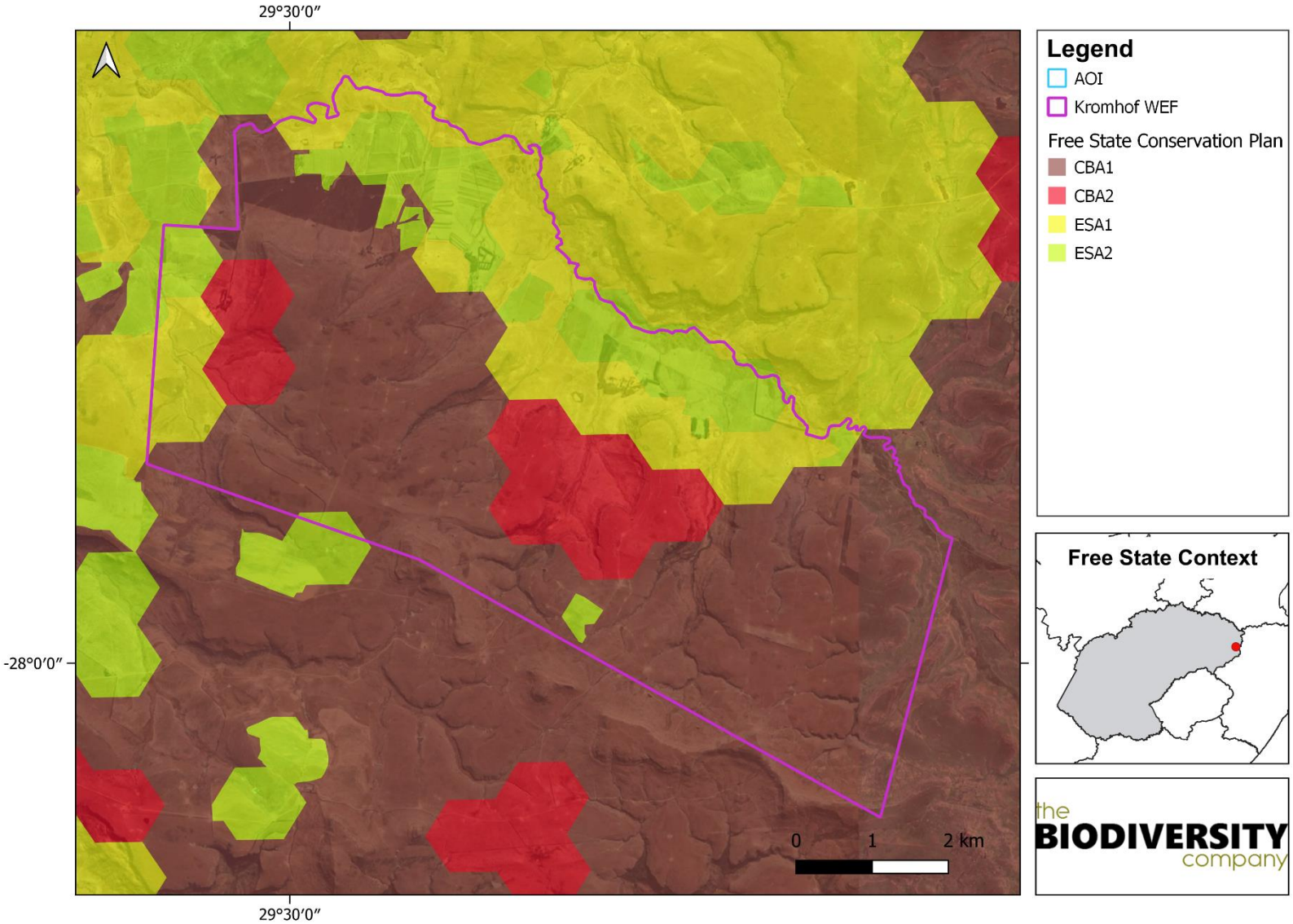

Figure 3-1 Project area in relation to the Free State Biodiversity Conservation Plan

3.2 National Environmental Screening Tool

The national environmental screening tool is a web-based application hosted by the Department of Environmental Affairs that allows developers to screen their prospective site for environmental sensitives. Importantly, this tool now serves as the first step in the environmental authorisation process as laid out in the gazetted assessment protocols for each environmental theme. Guidance towards achieving these protocols for terrestrial biodiversity is provided in the Species Environmental Assessment Guideline (SANBI, 2020) which, in turn, relies on the results of the screening tool to inform the level of assessment required. The screening tool was used to inform the desktop level assessment of the sensitivity of the AOI prior to fieldwork. There are four sensitivity layers produced by the screening tool that are of relevance for this study namely (1) Avian Theme (2) Animal Species Theme and (3) Terrestrial Biodiversity Theme and (4) Vulture Theme. The receptors triggering each sensitivity theme, their sensitivity rating and their mapped potential occurrence (i.e. modelled potentially suitable habitat) according to DFFE are summarised in Table 3-1 and spatially depicted in Figure 3-2to Figure 3-6. The DFFE Avian Theme Screening Tool indicates the presence of a Vulture Restaurant within 20km of the site but without information on its location or activity status.

Table 3-1 Receptors triggering each sensitivity theme according to the DFFE data at Kromhof WEF

Receptor	Sensitivity	DFFE Mapped Occurrence (Project Area)
Avian Theme		
Within 20 km of Vulture Restaurants	High	Large radial buffer overlapping eastern third of project area
Areas beyond buffer on Vulture Restaurants	Low	All other areas
Animal Species Theme (Avifauna)		
Southern Bald Ibis (*Geronticus calvus*)	High	Ubiquitous. Most grassland areas, excluding cultivated lands.
Black Stork (*Ciconia nigra*)	High & Medium	Wetlands and grasslands along the Muel River.
Yellow-breasted Pipit (*Anthus chloris*)	High & Medium	High altitude grasslands, particularly in the south and eastern regions, along the ridge that runs towards Mont Pelaan
Grey Crowned Crane (*Balearica regulorum*)	High & Medium	Wetlands and grasslands
White-bellied Korhaan (*Eupodotis senegalensis*)	High & Medium	High altitude grasslands, particularly in the south and eastern regions, along the ridge that runs towards Mont Pelaan
Denham's Bustard (*Neotis denhami*)	High & Medium	High altitude grasslands, particularly in the south and eastern regions, along the ridge that runs towards Mont Pelaan
Lanner Falcon (*Falco biarmicus*)	High	Restricted. Incised topography with steeper slopes in south east.
Secretarybird (*Sagittarius serpentarius*)	High & Medium	Most areas, excluding actively cultivated lands.
Bush Blackcap (*Sylvia nigricapillus*)	High & Medium	Gullies in south-eastern region.
Botha's Lark (*Spizocorys fringillaris*)	Medium	Sparse patchily distributed. North and western grasslands.
Rudd's Lark (*Heteromirafra ruddi*)	Medium	West-central plateau grasslands.
African Grass Owl	Medium	Low lying grasslands in southern half of WEF.
Terrestrial Biodiversity Theme		
CBA 1	Very High	Most of central, southern and eastern regions of WEF.
Vulture Species Theme		
Cape Vulture (*Gyps coprotheres*)	High	Affecting an area representing 10-20% of the population

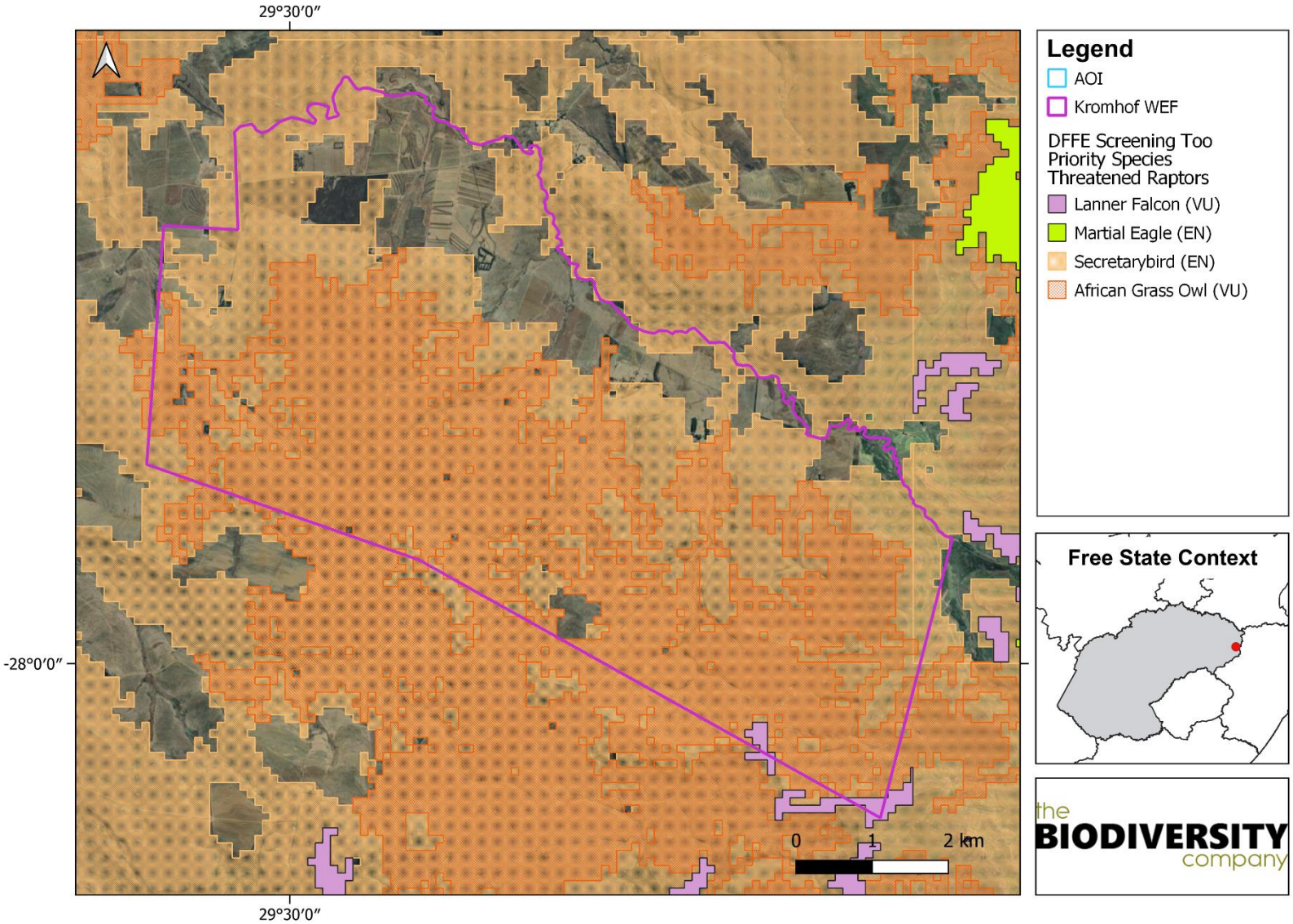

Figure 3-2 Modelled potential occurrence of threatened raptors in the project area as provided in the national screening tool (DFFE)

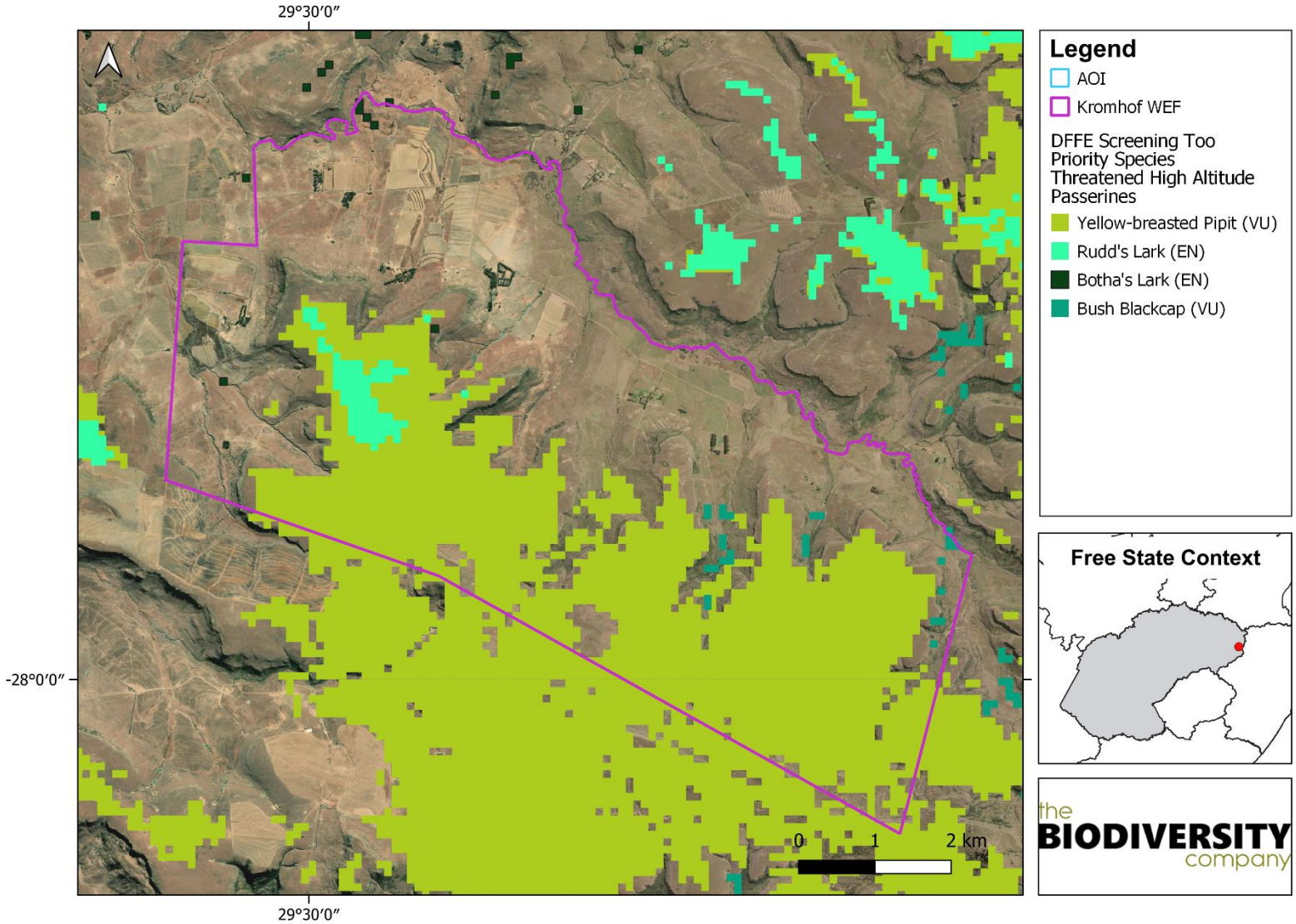

Figure 3-3 Modelled potential occurrence of threatened high altitude passerines in the project area as provided in the national screening tool (DFFE)

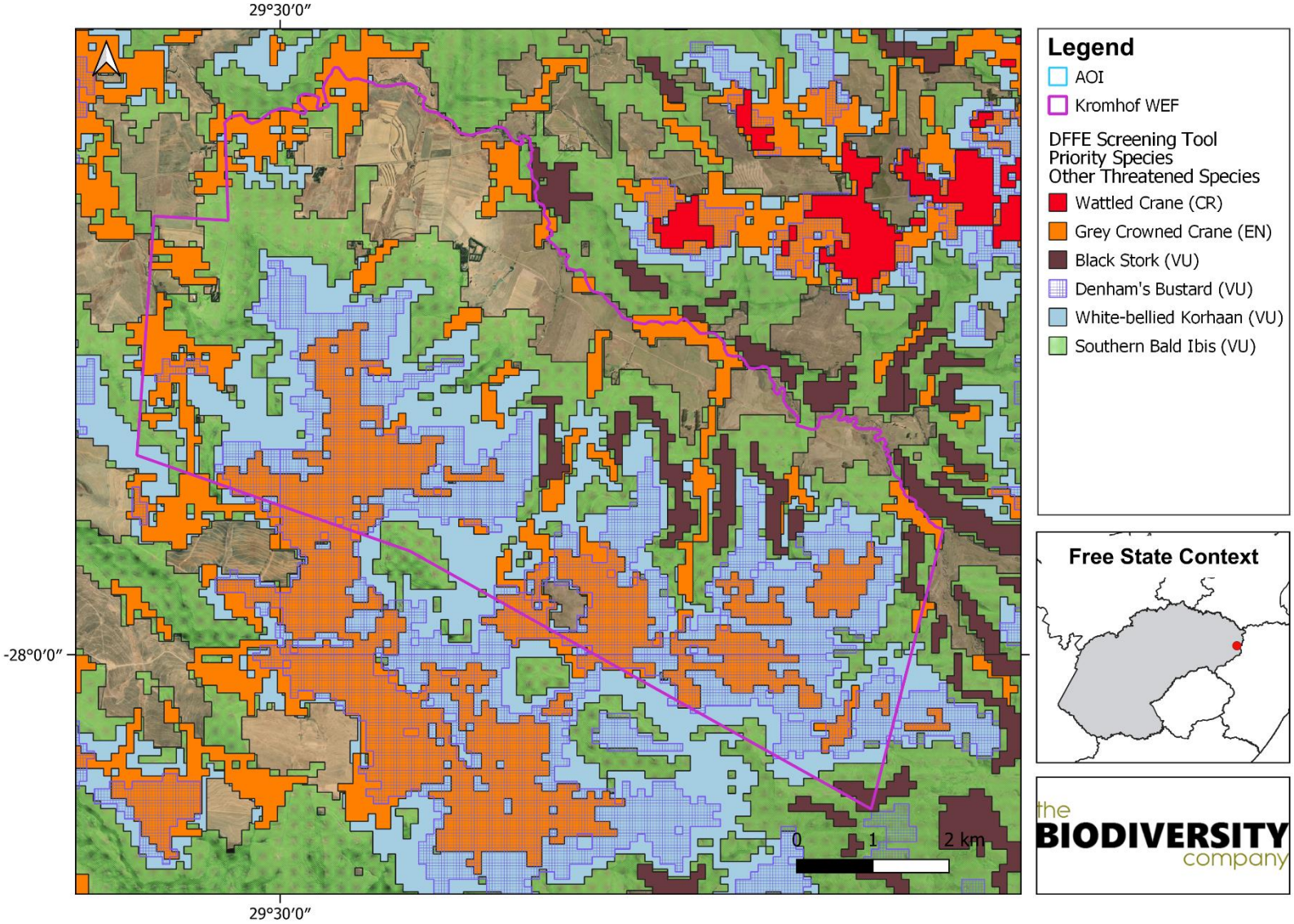

Figure 3-4 Modelled potential occurrence of other threatened avifauna in the project area as provided in the national screening tool (DFFE)

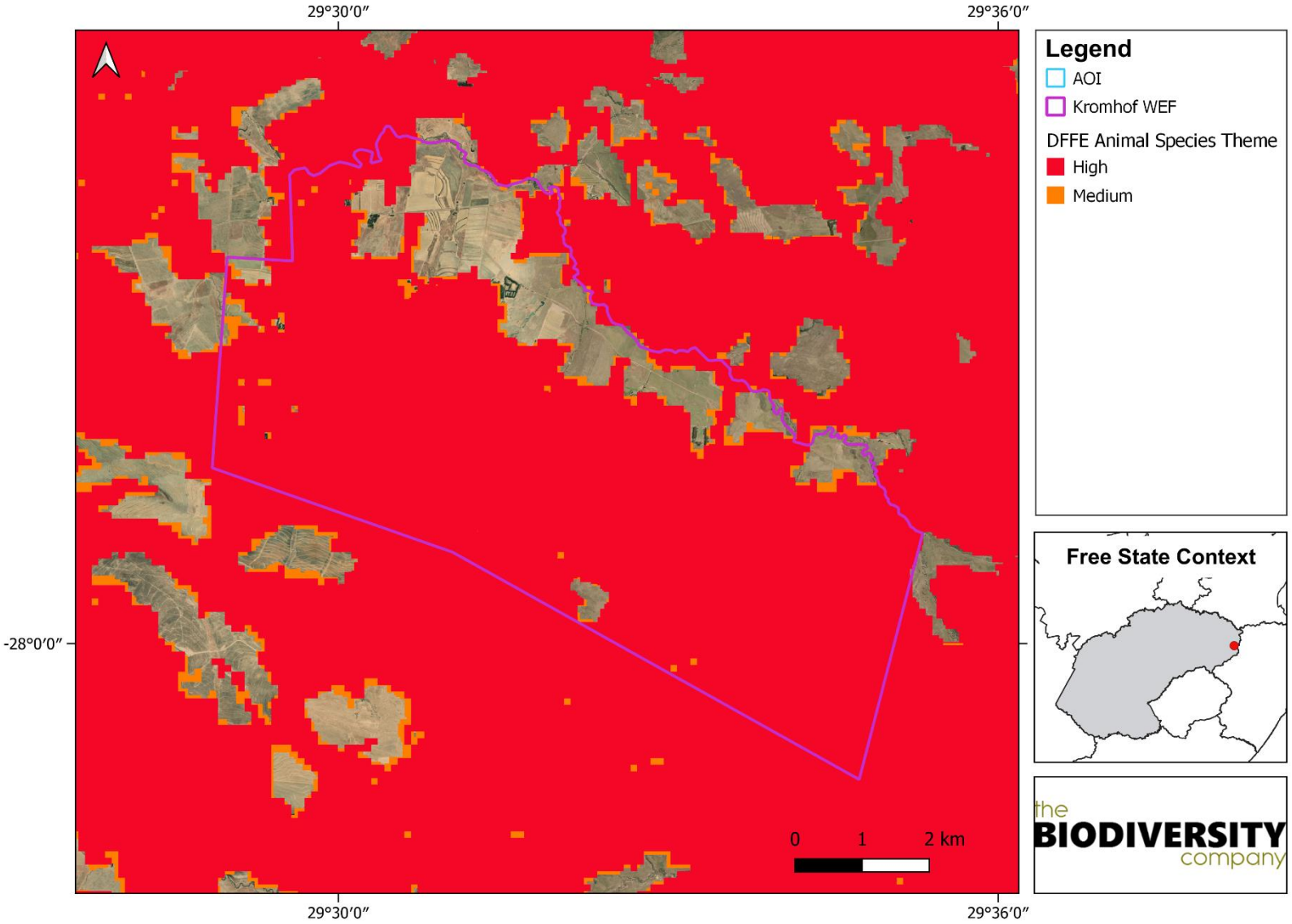

Figure 3-5 Visual representation of the DFFE Animal Species theme of the national screening tool sensitivities as applicable to avifauna

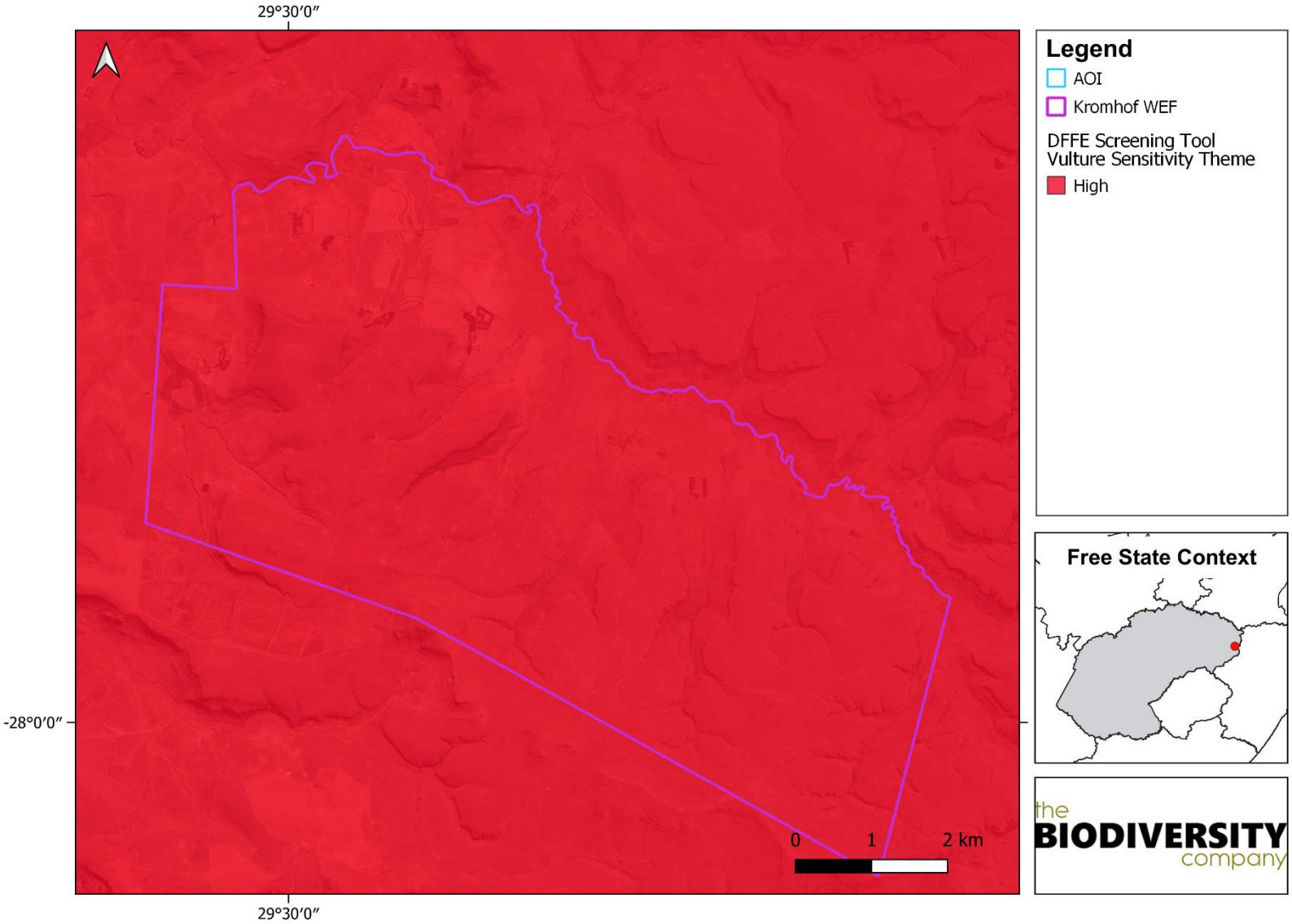

Figure 3-6 Visual representation of the DFFE vulture sensitivity theme of the national screening tool

3.3 Important Bird Areas

Important Bird and Biodiversity Areas (IBAs), represent a network of sites considered to be of global significance for bird and other biodiversity conservation. They are identified on a per-country basis using globally standardised, quantitative and scientifically agreed criteria (Birdlife International, 2022). The Kromhof WEF does not overlap any IBAs. Five IBAs do, however, occur in the AOI.

3.3.1 Grasslands (SA020)

This is the closest IBA to the WEF (4 km NE). It is a large area of higher altitude plateau to escarpment grassland encompassing the towns of Volksrust, Wakkerstroom and Memel. The area includes a number of reserves. Seekoeivlei (near Memel) is the closest and most relevant to the project area. The IBA is renowned for hosting the core populations of most of South Africa's Threatened and endemic grassland species. Most notably this includes most of the Endangered White-winged Flufftail *(Sarothrura ayresi*) population (three wetlands), all three of South African crane species (all Threatened), 85% of the global population of Rudd's Lark (*Heteromirafra ruddi*) and substantial breeding colonies of Southern Bald Ibis (*Geronticus calvus*). Many other red-listed species and high-altitude endemics occur. The larger wetlands in the IBA support globally significant congregations of local and migratory waterbirds.

3.3.2 Ingula Nature Reserve (SA043)

This high altitude (1700-1800 masl) IBA is centred on the private farms of Wilge River, Chatsworth and Bedford. It includes the pristine large Wilge River Floodplain wetland and surrounding grasslands of the Little Drakensberg. The IBA hosts some 280 bird species. It is renowned for supporting four of South Africa's Critically Endangered species, namely the White-winged Flufftail (*Sarothrura* ayresi), Wattled Crane (*Bugeranus carunculatus*), Rudd's Lark (*Heteromirafra ruddi*) and Eurasian Bittern (*Botaurus stellaris*). Importantly, the wetland hosts the largest single population of White-winged Flufftails in South Africa. Many of the escarpment's red-listed and endemic grassland species occur at Ingula including a breeding pair of Martial Eagles (*Polemaetus bellicosus*).

3.3.3 Alexpan (SA042)

Situated 19.5 km SE of project area. This IBA is centred on a large (7.5 ha) pan in high altitude grassland 20 km NE of Harrismith. The IBA hosts an inventory of just over 100 species but is most reknowned for being one of the few places where Wattled Crane (*Bugeranus carunculatus*), Grey Crowned Crane (*Balearica regulorum*) and Blue Crane (*Anthropoides paradiseus*) regularly occur together. Excellent habitat occurs here for Rudd's Lark (*Heteromirafra ruddi*) and Botha's Lark (*Spizocorys fringillaris*).

3.3.4 Chelmsford Nature Reserve (SA059)

This IBA encompasses the Chelmsford Nature Reserve. The reserve is centred on the large Ntshingwayo Dam and protects a good example of Northern KwaZulu-Natal Moist Grassland. The reserve is frequently visited by Southern Bald Ibis (*Geronticus calvus*), Grey Crowned Crane (*Balearica regulorum*) and Blue Crane (*Anthropoides paradiseus*). Other wetland and grassland species of concern are African Marsh Harrier Circus ranivorus, Corn Crake (*Crex crex*), African Grass Owl (*Tyto capensis*), Secretarybird (*Sagittarius serpentarius*) and White-bellied Korhaan (*Eupodotis senegalensis*). The rocky outcrops hold Ground Woodpecker (*Geocolaptes olivaceus*).

3.3.5 Murphy' Rust (SA045)

The Murphy's Rust IBA is situated 20 km east of Harrismith. It is centred on a large *Phragmites* dominated palustrine wetland. The site was created to protect the White-winged Flufftail (*Sarothrura ayresi*).

3.4 Key Biodiversity Areas

Key Biodiversity Areas (KBAs) are sites which contribute most significantly to the global persistence of biodiversity in terrestrial, freshwater and marine ecosystems (IUCN, 2016). Both SANBI and BirdLife South Africa have recognised the importance of mapping, monitoring conserving these areas of global biodiversity importance through the implementation of the Key Biodiversity Areas Program. To date a network of 263 terrestrial KBAs have been identified and assessed against the global standard set by the IUCN. The areas will ultimately supersede IBAs as the main currency for identifying areas of high avian importance in the country. A large proportion of the Kromhof WEF in the south overlaps the Eastern Free State Escarpment KBA which is covers most of the WEF's plateau grasslands. This KBA is recognised primarily for its importance in supporting a high diversity of threatened and range-restricted avifauna. The KBA is classified as 100% irreplaceable. This KBA envelops the Grasslands and Alexpan IBAs (KBA Partnership, 2024).

3.5 Statutorily Protected Areas

The proposed development site does not intersect any protected areas. However, the AOI intersects with seven statutorily protected areas. The most significant of which being the Upper Wilge Protected Environment championed by BirdLifeSA. It is important to note that, based on communications with Birdlife SA, a request has recently been submitted to declare additional properties as part of the Sneeuberg Protected Environment in the area between the existing PE and the proposed Verkykerskop WEF Cluster.

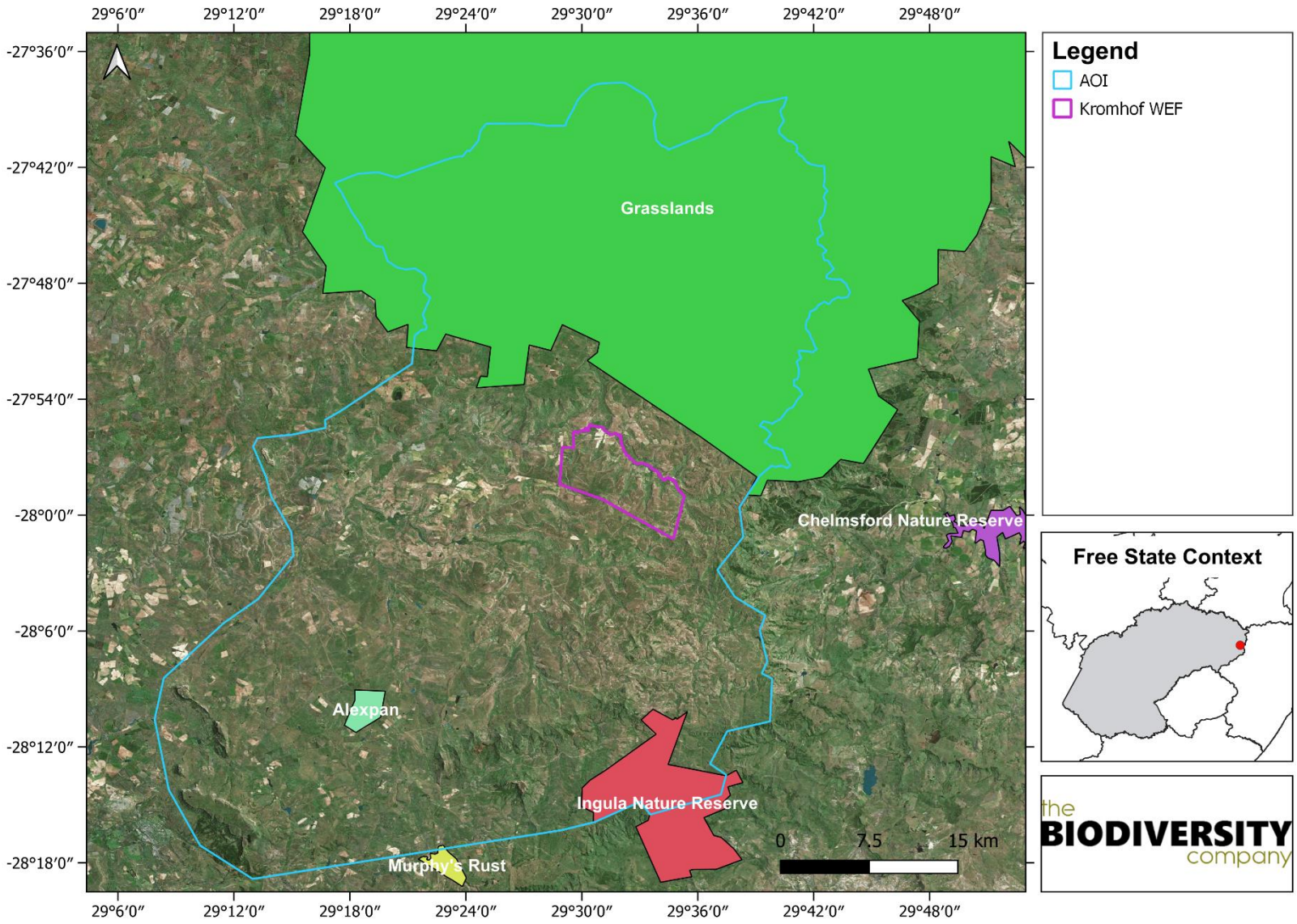

Figure 3-7 Important Bird and Biodiversity Areas in relation to the project area

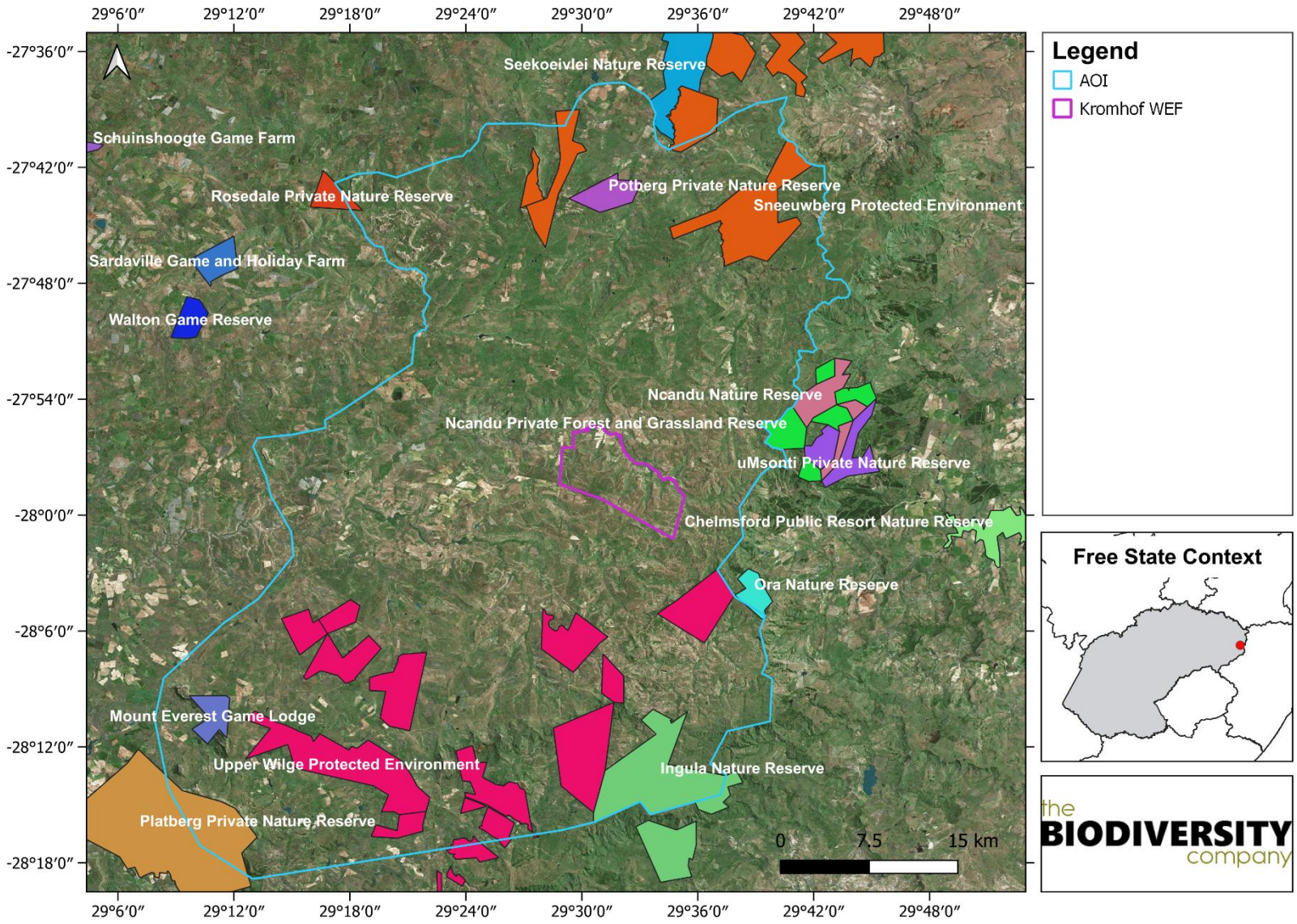

Figure 3-8 Position of nationally protected areas in relation to the project area

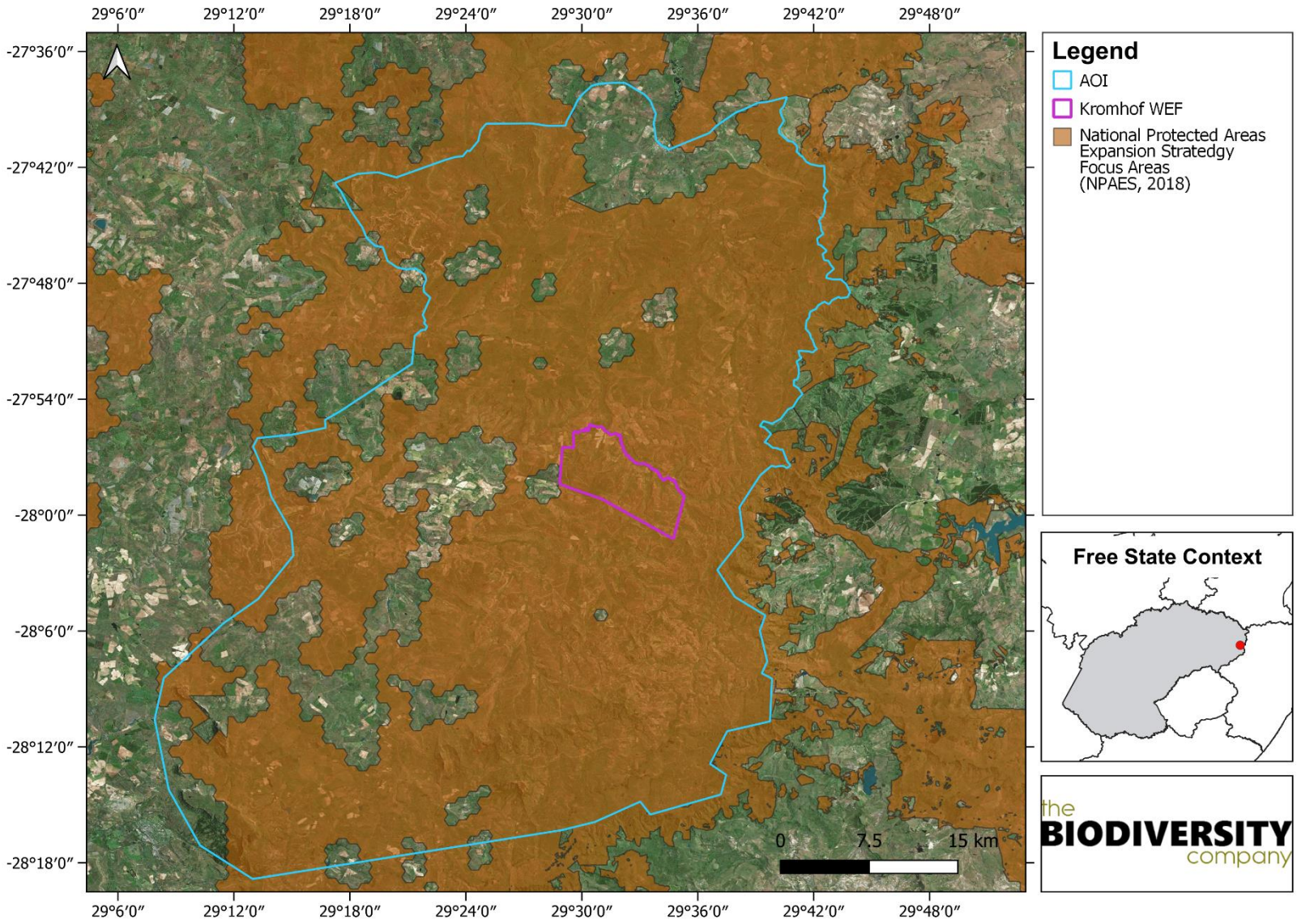

Figure 3-9 Extent of the national protected areas expansion strategy in relation to the project area

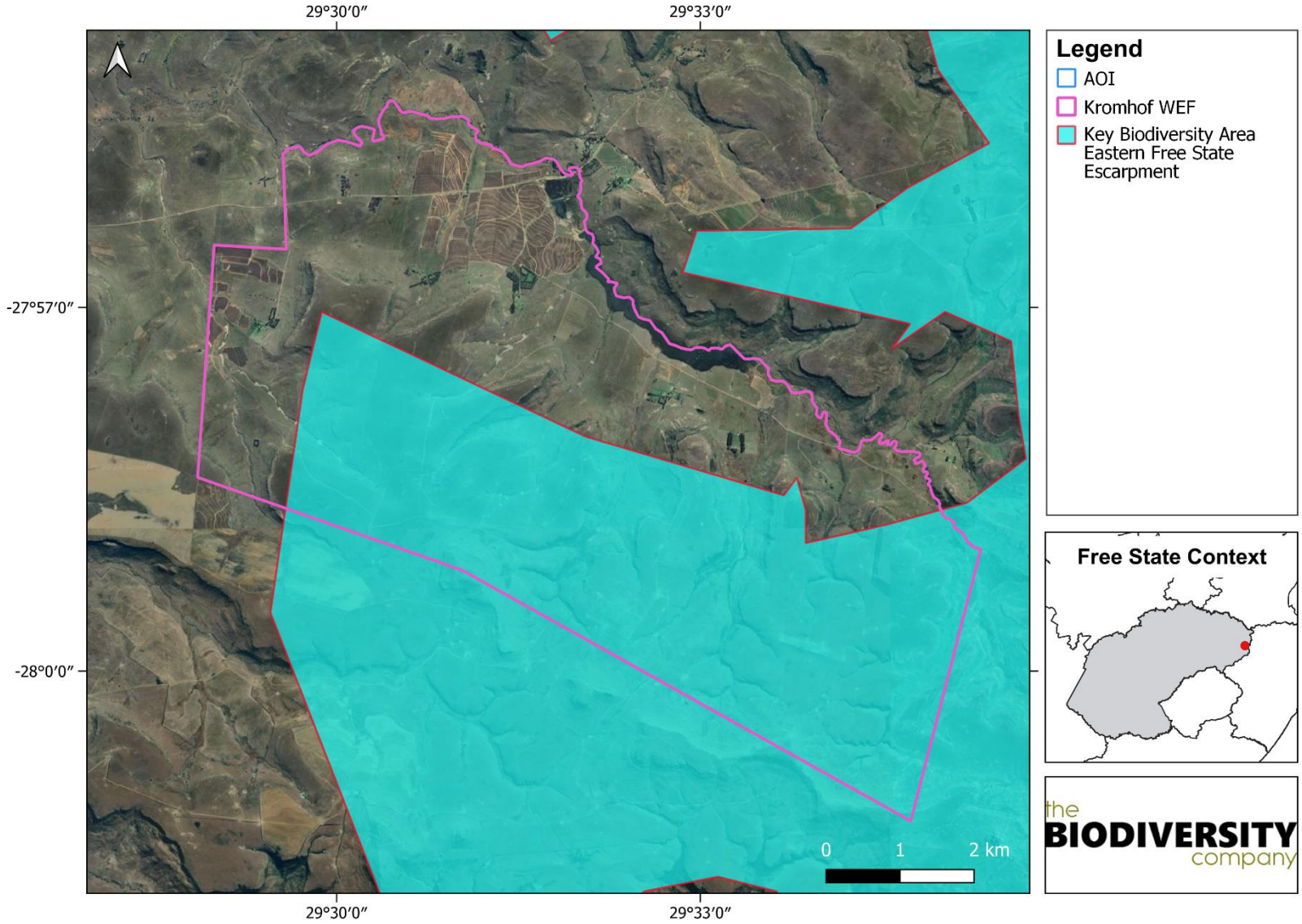

Figure 3-10 Project area in relation to Key Biodiversity Areas

4. Pertinent Findings (Scoping & Year 1)

4.1 Local Avian Diversity

4.1.1 Habitats

Kromhof WEF spans an altitudinal gradient from the broad low lying Muel River floodplain in the north to the high-altitude plateau grasslands in the south, some of the most intact and conservation important to be found in the VWC. The southern plateaus are subject to harsh conditions and often receive snowfall. As such these areas support short (relatively treeless) high-altitude grasslands. The land use is predominantly natural grasslands (under grazing), interspersed with commercial croplands and pasture lands with livestock (cattle grazing). The prevailing biome is grassland. More specifically, Eastern Free State Sandy Grassland predominates (Mucina and Rutherford, 2006). At this stage at least four broad habitats as relevant to avifauna were identified. These included Open Grassland, Rocky Grassland, Wetlands and Croplands.

Figure 4-1 Examples of the three main natural avifaunal habitats identified in the project area; A) Wetland, B) Rocky Grassland and C) Open Grassland

4.1.1.1 Open Grassland

The Kromhof WEF supports some of the best examples of intact high-altitude grasslands to be found in the VWC. At least two sub-classifications could be distinguished as relevant for avifauna which include the higher altitude, short plateau grassland (to the south) and the lower altitude moist grasslands

along the Muel River valley (in the north). The Plateau grasslands are likely to support most of the regionally occurring high altitude endemics and red-listed species. A prominent ridge runs along the southern border (the footslope of Mont Pelaan). This area is the highest-lying area in the entire VWC and provides optimal; habitat for all of the regions threatened, high-altitude grassland species. It is characterised by a dense, short and relatively homogenous plateau grass sward dominated by *Eragrostis* spp. and *Themeda triadra*. Red-listed species regularly seen in this habitat include Rudd's Lark (*Heteromirafra ruddi*), Yellow-breasted Pipit (*Anthus chloris*), Denham's Bustard (*Neotis denhami*), Blue Korhaan (*Eupodotis caerulescens*), Blue Crane (*Anthropoides paradiseus*) and Southern Bald Ibis (*Geronticus calvus*). Of greatest significance in this regard is the grassland's importance in terms of supporting breeding pairs of Rudd's Lark and Yellow-breasted Pipit. Blue Crane also nest in two locations near VP 11 (Nests 1 and 3). The area between the Met mast and VP 11 is particularly productive and has been designated as a Core Habitat for Threatened High Altitude species.

4.1.1.2 Rocky Grassland

The Rocky Grassland habitat typically occurs in areas with a slope gradient of more than 20 %. This habitat includes boulder strewn mid to upper slopes as well as crests which support sandstone cliff and scarp-like *Leucosidea*-dominated forest-scrub. At Kromhof WEF, the scrub is slightly more species rich than the western regions of the VWC, increasing in density and species composition towards the base of the crest especially in more fire-protected areas. Structural complexity, vegetation diversity, food, cover and microclimatic niche differentiation is highest in this habitat type. This habitat type is likely to be most important in terms of supporting rupicolous high-altitude endemics, raptors and cliff-nesting species. These scrub-forests seasonally support Bush Blackcap (*Sylvia nigricapillus*) in summer. However, these scrub-forests appear to lack the structural complexity frequented by most of the true forest specialists such as Cape Parrot (*Poicephalus robustus*) and White-starred Robin (*Pogonocichla stellata*). In addition to the scrub-forest, the rocky grasslands at Kromhof WEF are important in terms of supporting rupicolous high-altitude endemics such as African Rock Pipit (*Anthus crenatus*), as well as smaller cliff-nesting raptors such as Jackal Buzzard (Nest 3), and one Southern Bald Ibis breeding roost (Roosts 5). Flight paths of most of the regionally occurring red-listed raptor species are strongly associated with the deeply incised Rocky Grassland and associated cliffs habitat, especially in areas with a slope gradient of >20%. These include Cape Vulture (*Gyps coprotheres*), Martial Eagle (*Polemaetus bellicosus*), Verreaux's Eagle (*Aquila verreauxii*), Lanner Falcon and White-necked Raven (*Corvus albicollis*) and especially around VP 9 Rock Kestrel (*Falco rupicolus*).

4.1.1.3 Wetlands

The northern boundary is marked by the perennial Muel River floodplain which flows west to east. This habitat is likely to be most significant in terms of supporting wetland specialists as well as cranes and harriers. The Muel floodplain is very broad wetland with a shallow longitudinal gradient and as such, has an extremely high channel sinuosity. Consequently, the floodplain supports an abundance of well-developed oxbow lakes, back water depressions and floodplain levees, lined by extensive sedge-dominated seeps which provide together provide the type of habitat conditions typically frequented by Critically Endangered White-winged Flufftail. These Critically Endangered birds are known to occur in at least large palustrine wetlands in the region directly to the north and south of the VWC near Memel and Ingula respectively. Striped Flufftail (*Sarothrura affinis*) may well occur in some of the high-altitude wetland areas. The size of the Muel floodplain with its abundance of sedges also provides suitable habitat for Critically Endangered Wattled Crane which have been observed on the neighbouring Normandien WEF (proposed). However, this wetland habitat has been threatened by the construction of a large dam wall near the western boundary of the WEF. Other wetlands include channelled and unchanneled valley-bottoms but also hillslope seeps, bench (or plateau) seeps and depressions and mountain streams cutting through gorges. The mountain streams and gorges are lined by scarp-like forest with a moderately diverse floral assemblage.

Blue Crane breed in a number of wetlands throughout the WEF both along the Muel floodplain and in the plateau grasslands, but no sign of Crowned or Wattle Crane Breeding has yet been confirmed in the WEF. However the wetland lacks dense stands of *Imperata cylindrica* and other rank grasses and thus appears suboptimal for breeding by African Grass Owl (*Tyto capensis*). In any event it would appear that their occurrence in the region is marginal. The floodplain and perennial streams at Kromhof WEF provide suitable habitat for Half-collared Kingfisher (*Alcedo semitorquata*) and the species has been recorded at the low-level bridge just downstream of the dam outflow.

4.1.1.4 Croplands

Croplands occur in the lower lying north-western portions of the WEF. These croplands mostly produce fodder crops for livestock (mainly cattle), typically maize and oats. Many of these fields are irrigated from the dam along the Muel River. This habitat also includes patches of seeded pasture lands. Overall, it supports a high abundance but low diversity of birds comprising mainly seed-eaters.

4.1.2 Expected Site Diversity

A total of 218 bird species have been recorded during atlassing surveys (SABAP2, 2022) within the nine pentads that overlap the VWC (see figure below). This inventory is considered to be a relatively accurate, if not slightly under-representative, portrayal of regional diversity. Consequently, this list was supplemented with additional species known to occur based on Chittenden et al. (2016) and expert knowledge of avifauna from the region. This integrated inventory, totalling 294 species, was used as the basis for the project's species probability list as presented in Appendix A.

Of these regionally occurring species, around 239 are considered highly likely to occur on a regular basis in the Kromhof WEF. However, when considering seasonal variation in species assemblages and local movements, the number of species likely to be encountered on any day in the project area is typically to be < 130 species.

4.1.3 Observed Site Diversity

Over the course of the Year 1 pre-construction monitoring, a total of 161 bird species were recorded by the project team within Kromhof WEF (which represents 72% of the 224 species recorded in the AOI). This inventory will gradually increase over time but should be considered a good representation of the typical bird assemblage in the project area. Although this represents moderate diversity in the South African context it is important to remember that a very high proportion are red-listed and / or endemic species.

4.2 Priority Species

Table 4-1 provides a list of the 70 regionally occurring priority species along with their likelihood of occurrence within the project area. This list also details their level of endemism and conservation status at global, national and provincial levels. The birds in

Table 4-1 have been short-listed as priority species based on a combination of their conservation status, level endemism, rarity, degree of habitat specialisation and potential susceptibility to impacts from wind energy developments. To date, 32 of the 70 regionally occurring priority species have been recorded in the Kromhof WEF (see LO column in

Table 4-1).

The GPS location of each Year 1 priority species sighting has been documented in a database for the entire VWC of 1620 point localities with a total count of 7748 individuals. This point locality data is shown in Figure 4-14 and represents the basis of the kernel density model which was used to map hotspots for priority species as portrayed in Figure 4-15. This map shows that priority species are concentrated in at least six main hotspot areas throughout the VWC, of which one occurs in the Kromhof

WEF. This data was later used in the delineation of core habitat areas for threatened high altitude, wetland and raptor species. This core habitat area for threatened high-altitude species occupies a large portion of the north-western corner of the project area.

Table 4-1 List of present and potentially occurring priority species

Common Name	Scientific Name	Conservation Status					Kromhof	VK Cluster	AOI	SABAP2
		Global	Regional	TOPS	FS	Endemicity				
Wattled Crane	*Grus carunculata*	VU	CR	CR	PG		2	x	x	x
White-winged Flufftail	*Sarothrura ayresi*	CR	CR		PG		2			
Bearded Vulture	*Gypaetus barbatus*	NT	CR	CR	PG		2		x	
Grey Crowned Crane	*Balearica regulorum*	EN	EN	EN	PG		1	x	x	x
Black Harrier	*Circus maurus*	EN	EN		PG	NE	2	x	x	x
Cape Vulture	*Gyps coprotheres*	VU	EN	EN	PG		1	x	x	x
Rudd's Lark	*Heteromirafra ruddi*	EN	EN		PG	E	1	x	x	x
Martial Eagle	*Polemaetus bellicosus*	EN	EN	EN	PG		1	x	x	x
Botha's Lark	*Spizocorys fringillaris*	EN	EN		PG	E	2	x	x	x
Secretarybird	*Sagittarius serpentarius*	EN	VU		PG		1	x	x	x
Maccoa Duck	*Oxyura maccoa*	EN	NT		PG		2		x	
African Marsh Harrier	*Circus ranivorus*	LC	EN		PG		2	x	x	x
Yellow-billed Stork	*Mycteria ibis*	LC	EN		PG		2	x	x	
Bush Blackcap	*Sylvia nigricapillus*	VU	VU		PG	E	2	x	x	x
Yellow-breasted Pipit	*Anthus chloris*	VU	VU		PG	E	1	x	x	x
Southern Bald Ibis	*Geronticus calvus*	VU	VU	VU	PG	E	1	x	x	x
Blue Crane	*Grus paradisea*	VU	NT	PS	OG		1	x	x	x
Red-footed Falcon	*Falco vespertinus*	VU	NT		PG		1	x	x	x
Denham's Bustard	*Neotis denhami*	NT	VU	VU	PG		1	x	x	x
Striped Flufftail	*Sarothrura affinis*	LC	VU		PG		3	x	x	
Verreaux's Eagle	*Aquila verreauxii*	LC	VU		PG		1	x	x	x
Black Stork	*Ciconia nigra*	LC	VU		PG		1	x	x	x
White-bellied Korhaan (Bustard)	*Eupodotis senegalensis*	LC	VU		PG		1	x	x	x
Lanner Falcon	*Falco biarmicus*	LC	VU		PG		1	x	x	x
Short-tailed Pipit	*Anthus brachyurus*	LC	VU		PG		3			
Half-collared Kingfisher	*Alcedo semitorquata*	LC	NT		PG		1	x	x	x
African Rock Pipit	*Anthus crenatus*	LC	NT		PG	E	1	x	x	x
Crowned Eagle	*Stephanoaetus coronatus*	NT	VU		PG		4			
African Grass Owl	*Tyto capensis*	LC	VU		PG		4			
Blue Korhaan	*Eupodotis caerulescens*	NT	LC		PG	E	1	x	x	x
Ground Woodpecker	*Geocolaptes olivaceus*	NT	LC		PG	E	1	x	x	x
Sentinel Rock Thrush	*Monticola explorator*	NT	LC		PG	E	2	x	x	x
Pallid Harrier	*Circus macrourus*	NT	NT		PG		3			
Black-winged Pratincole	*Glareola nordmanni*	NT	NT		PG		4			
Abdim's Stork	*Ciconia abdimii*	LC	NT		PG		2			
Marabou Stork	*Leptoptilos crumenifer*	LC	NT		PG		4			
Forest Buzzard	*Buteo trizonatus*	NT	LC		PG	E	3			x
Black Sparrowhawk	*Accipiter melanoleucus*	LC	LC		PG		1	x	x	x
Little Sparrowhawk	*Accipiter minullus*	LC	LC		PG		2	x	x	
Rufous-breasted Sparrowhawk	*Accipiter rufiventris*	LC	LC		PG		2	x	x	x

Marsh Owl	*Asio capensis*	LC	LC	PG		2	x	x	
African Cuckoo Hawk	*Aviceda cuculoides*	LC	LC	PG		4			
Barratt's Warbler	*Bradypterus barratti*	LC	LC	PG	NE	2	x	x	x
Spotted Eagle-Owl	*Bubo africanus*	LC	LC	PG		1	x	x	x
Cape Eagle-Owl	*Bubo capensis*	LC	LC	PG		2	x	x	x
Common (Steppe) Buzzard	*Buteo buteo*	LC	LC	PG		1	x	x	x
Jackal Buzzard	*Buteo rufofuscus*	LC	LC	PG	NE	1	x	x	x
White Stork	*Ciconia ciconia*	LC	LC	PG		3	x	x	x
Brown Snake Eagle	*Circaetus cinereus*	LC	LC	PG		4			x
Black-chested Snake Eagle	*Circaetus pectoralis*	LC	LC	PG		3			x
Montagu's Harrier	*Circus pygargus*	LC	LC	PG		2			
White-necked Raven	*Corvus albicollis*	LC	LC			1	x	x	x
Chorister Robin-Chat	*Cossypha dichroa*	LC	LC	PG	E	4			x
Forest Canary	*Crithagra scotops*	LC	LC	PG	E	1			x
Black-winged Kite	*Elanus caeruleus*	LC	LC	PG		1	x	x	x
Sickle-winged Chat	*Emarginata sinuata*	LC	LC	PG	NE	1	x	x	
Amur Falcon	*Falco amurensis*	LC	LC	PG		1	x	x	x
Lesser Kestrel	*Falco naumanni*	LC	LC	PG		2	x	x	x
Peregrine Falcon	*Falco peregrinus*	LC	LC	PG		2	x	x	
Greater Kestrel	*Falco rupicoloides*	LC	LC	PG		2	x	x	x
Rock Kestrel	*Falco rupicolus*	LC	LC	PG		1	x	x	x
Eurasian Hobby	*Falco subbuteo*	LC	LC	PG		3			
African Fish Eagle	*Haliaeetus vocifer*	LC	LC	PG		2	x	x	x
Booted Eagle	*Hieraaetus pennatus*	LC	LC	PG		1	x	x	
Black-bellied Bustard	*Lissotis melanogaster*	LC	LC	PG		3		x	
Yellow-billed Kite	*Milvus aegyptius*	LC	LC	PG		2	x	x	x
Melodious Lark	*Mirafra cheniana*	LC	LC	PG	NE	2	x	x	x
Cape Rock Thrush	*Monticola rupestris*	LC	LC	PG	E	1	x	x	x
African Harrier-Hawk	*Polyboroides typus*	LC	LC	PG		2	x	x	x
Grey-winged Francolin	*Scleroptila afra*	LC	LC	OG	E	1	x	x	x

Key: Pa = Project Area; AOI = Area of Influence. Status: CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NA = Not Assessed; NT = Near Threatened; OG = Ordinary Game; PG = Protected Game; PS = Protected Species; VU = Vulnerable. Likelihood of Occurrence (LO): A – anecdotal; 1 = Confirmed to occur; 2 = High; 3 = Moderate; 4 = Low / None; X = observed during SABAp2 surveys. Sources: Taylor et al. (2015); BirdLife South Africa (2016); SABAP 2 (2022)

*Only when in large murmuration flocks exceeding several hundred individuals.

4.2.1.1 Red-listed Species

A total of 37 red-listed species are known to occur in the region based on a combination of distribution data provided in Chittenden et al. (2016), the 9 pentads covering the VWC (SABAP2, 2024) and expert knowledge. Of these, 23 species are considered highly likely to occur in the project area based on habitat suitability. This represents a high number of red-listed species in the South African context. To date, 19 red-listed species have been recorded in the Kromhof WEF. Particularly noteworthy observations from the Kromhof WEF include:

- Rudd's Lark (Endangered):
    - During S2, two males and one female were detected in a high-altitude grassland between VP12 and VP10 on a north-facing aspect at the foot of a mountain slope near the met mast (27.973423°; 29.516873°). The males were observed displaying at a height of 20-50 m for 5-10 min for a few hours before sunset, on two occasions (calm, warm evenings)

    - It is likely that this footslope represents important breeding habitat for the species.
    - During S3, this species was observed (again in the same locality.
    - The species appears to frequent lush, high-lying, plateau grasslands. Currently, their presence within certain locations and not in others remains enigmatic. Future surveys are likely to yield more localities for the species.

- Cape Vulture (Endangered):
    - Seen regularly in the WEF.
    - Most frequently observed from VP 5, 10 and 9.
    - A storm during S9 forced a large flock of 59 birds low over VP12.
- Secretarybird (Endangered):
    - Observed regularly especially at VP 9 and VP11.
- Yellow-breasted Pipit (Vulnerable):
    - This species was observed at three locations (near VP11 and either side of the VP10 mountain) each time in short, lush high-altitude grassland. In each instance the birds were discovered from calling males.
    - Observation of non-breeding male near VP12 indicates year-round residency.
- Denham's Bustard (Vulnerable):
    - Often observed in grasslands near the met mast.
    - Attendance notably higher in summer.
- Verreauxs' Eagle (Vulnerable).
    - A pair frequently patrols the gorges around VP 9 and the Muel River valley.
    - On one occasion they predated upon a chick at Jackal Buzzard Nest 3.
- Southern Bald Ibis (Vulnerable)
    - A breeding roost was found in a sandstone cliff in a ravine on the north-western boundary of the project area was found during Survey 2 (Roost 5). Nesting was confirmed at this roost with the observation of a birds on eggs;
    - Another breeding roost (Roost 11) with buffer implications for the Kromhof WEF occurs nearby on the neighbouring proposed Groothoek WEF; and
    - The species often forages in the plateau grasslands particularly in the identified core habitat for threatened high altitude species.
- Blue Korhaan (Near-Threatened)
    - Mainly active in summer up to 16 April 2023.
- Blue Cranes (Vulnerable):
    - Confirmed multiple successful breeding attempts.
- Half-collared Kingfisher (Vulnerable):
    - Resident pair observed regularly at low-level crossing downstream of the newly constructed large dam on the Muel River.

The following noteworthy additional observations were made by the bat specialists (Inkululeko Wildlife Services) during the fieldwork in the greater VWC:

- The observation of an estimated 200 Cape Vultures at 28,04783 S, 29,52242 E within the Cluster. During IWS site visits, vultures were observed utilising a variety of habitats and flying in and out of rotor sweep whilst flying above ridges, between ridges, and down from ridges into the central valleys.

- More than 25 Cape Vultures were observed near Biggs' Farm at 28,04455 S, 29,54404 E, soaring above the ridge, utilising updraughts/thermals, and moving continually within turbine rotor sweep height.
- Martial Eagle was seen near Mount Pelan Auction Kraals.
- Two Black Harrier were observed on the R35 outside Memel.

4.2.1.2 Cape and Bearded Vulture

At present five Cape Vulture roosts (of which one is a confirmed breeding colony) and one Bearded Vulture nest have been confirmed to occur in the AOI (all within 50 km of the VWC). Initially, during scoping fieldwork, three Cape Vulture roosts on three distinct inselbergs were identified to the south of VWC. Due to the proximity of the VWC to the roosts and in accordance with the BirdLife Cape Vulture and wind energy best practice guidelines, the specialist recommended that the status of these roosts (in terms of breeding and seasonal occupancy) be thoroughly investigated. However, completing an investigation of this nature was difficult to achieve during the pre-construction monitoring surveys due to the to the exceptionally tight fieldwork schedule and the vast distances involved in traveling between roosts on bad roads and the general remoteness of the roosts. As such a dedicated vulture roost investigation was motivated and subsequently conducted for the proposed VWC. The need for the investigation was raised during a meeting between TBC and Mulilo and a decision was made for a basic, high level, dual season investigation of the breeding status of these roosts to be carried out.

Since then, VULPRO tracking data from 14 Cape Vultures fitted with GPS loggers has been used to identify an additional two roosts on two separate inselbergs to the north-west of the VWC. Both roosts were visited and tentatively ascribed as non-breeding natural roosts which are used regularly. This section summarises the findings of the vulture roost investigations to date. Photographs of are given in Figure 4-2 and each roost / nest is described in Table 4-2 along with its proximity to the closest boundary on Kromhof WEF. The location of each roost is represented spatially in Figure 5-2.

Table 4-2 Vulture roost details

Number	Inselberg	Description	Closest Distance	Buffer Implications
CV Roost 1	Arend's Kop	Cape Vulture Roost (large, regular non-breeding). Inselberg near Harrismith. Roost is on west facing aspect on north-western end of inselberg.	38 km SW	Yes
CV Roost 2	Scheurklip	Cape Vulture Roost (regular non-breeding). On large distinctive (lobster claw-shaped cliff) inselberg closest to project area. Roost is on north aspect.	16.4 km S	Yes
CV Roost 3	Nelson's Kop	Cape Vulture Breeding Roost (large colony) and Bearded Vulture Nesting Site. Roost is on the southern aspect of the north-western buttress of Nelson's Kop.	26 km SSW	Yes
CV Roost 4	Witkoppe	Cape Vulture Roost (regular non-breeding). Situated on the eastern most spur of the Witkoppe Inselberg. Roost is on north facing aspect of spur.	19.5 km NW	Yes
CV Roost 5	Verkykerskop	Cape Vulture Roost (small non-breeding). Situated on the western aspect of Verkykerskop Inselberg. Roost is on north facing aspect of spur.	28.6 km W	Yes
BV Nest 1	Nelson's Kop	Bearded Vulture Nest on Nelson's Kop. Inactive as of October 2023, new nest suspected. Breeding Pair.	26 km SSW	No

Note: Another roost occurs just beyond 50 km on Rensburgskop near Manyenyeza Peak and the Love Alive Lions Sanctuary (Vulpro pers. comm. 2025)

Following several detailed visits to the roosts, evidence of breeding has only been recorded at Nelson's Kop. The remaining roosts appear, at this stage, to be non-breeding "spillover" roosts. The first official vulture roost investigation carried out in June 2023 and subsequent fieldwork in April 2024 yielded no evidence of breeding at any roosts other than Nelson's Kop. Of the non-breeding roosts Arend's Kop is the more significant. It is apparent, based on multiple season observations (focal point counts from the

R722 road) that Arend's Kop roost is utilised very regularly throughout the year. The inselberg was hiked during preconstruction Survey 5 (27 July 2023). However, upon closer inspection no active nests or signs of breeding (nesting material, mating birds, eggs, chicks) were observed, although suitable nest leges do occur (although limited) and the possibility for breeding once the colony reaches critical mass should not be conclusively ruled out (Geoff Lockwood pers. comm). At Nelson's Kop, during the June 2023 vulture investigation, two breeding birds (**Error! Reference source not found.**) were found to be incubating after reassessing the photographs. Approximately 200 birds were observed roosting at Nelson's Kop that trip.

The second follow-up visit to Nelson's Kop was carried out over two days. The first was a reconnaissance day (information gathering from local landowners and general scoping of the greater inselberg from afar). The second day involved a full day hike to the base of the vulture colony and a detailed count. Noteworthy findings were as follows:

- Cape Vulture breeding status: One of the two nests (that were observed on 13 June 2023) has yielded a chick (Figure 4-3). The nest is situated towards the top left-hand side of the main roost (when facing north). The chick is currently in a transition phase from downy to feathered plumage with an approximate age 50 days (as of 13 October 2023 and depending on hatch date). The chick is tended by both parents and is actively guarded. The attempt made by the second incubating pair appears to have been unsuccessful, but the pair still sit faithfully at the failed nest site. Recently the number of Cape Vultures breeding at Nelsonskop has increased to an estimated 7 nests (based on expert input received from Sonja Krueger and Brent Coverdale (Ezemvelo KZN Wildlife) during a visit in November 2024;
- Cape Vulture colony size: A detailed afternoon inbound count conducted on 13 June 2023 yielded 131 adult birds. It is, however, likely that more birds may have landed on other parts of the inselberg not visible at the time of the count and it is likely that the colony regularly supports well over 200 birds;
- Bearded Vulture breeding: A particularly significant finding was that Bearded Vulture (Gypaetus barbatus) breed at Nelson's Kop. The species is listed as Critically Endangered in South Africa. Nelson's Kop represents the most northerly breeding site for the species in the country and the only one away from the main Drakensberg escarpment. The nest has been monitored on an ad hoc basis since 2006 by Rick Dillon with the last successful breeding attempt (Figure 4-4 documented in 2014 (by R. Dillon and Sonja Kruger). Since then, and following the COVID 19 pandemic, the nest has not been comprehensively monitored. During the current visit, the main nest was found to be inactive. Another nest was, however, found on the western face which may represent a new nest site. A single adult (Figure 4-4**Error! Reference source not found.**) was observed landing in close proximity to this nest;
- Vulture restaurants: At present the only confirmed vulture restaurant is situated at Nambiti Game Reserve 57 km south-east of Nelson's Kop. However, the vultures have been observed feeding on carcasses in the VWC and AOI on numerous occasions;
- Black Stork: A single individual was observed flying over the Cape Vulture colony. It is suspected that the species may be nesting on the northern aspect of Nelson's Kop;
- Lanner Falcon: A pair were observed actively fending off any birds which came to close to the western cliff face. It is suspected that they have an active nest on Nelson's Kop;
- Verreaux's Eagle: A single adult bird flew over Nelson's Kop; and
- Barrat's Warbler: A pair was heard calling from a Yellowwood tree at the base of the cliff.

Overall, the Cape Vulture roost investigation highlights the importance of Nelson's Kop in supporting breeding populations of several threatened cliff-nesting species which include Bearded Vulture

(Critically Endangered), Cape Vulture (Endangered), Lanner Falcon (Vulnerable) and Black Stork (Vulnerable). The other four roosts appear, at this stage, appear to be non-breeding “spillover” roosts. The project’s spatial dataset has been updated to include the Bearded Vulture nest and its recommended 10 km Very High exclusion buffer as well as the two new roosts at Verkykerskop and the Witkoppe. The VWC (and therefore Kromhof WEF) falls outside of the 18 km Very High buffer zone as stipulated by BirdLife South Africa for breeding colonies of Cape Vulture. However, it does fall within the 50 km High sensitivity buffer of all five roosts. Although the VWC falls beyond the 10 km suggested buffer radius for Bearded Vulture (Brink, 2020), their presence is a cause for concern given their wide-ranging nature. The sporadic occurrence of Bearded Vulture, particularly juveniles in the project area is supported by locality records as provided in Reid et al (2015). Overall, Kromhof WEF and the VWC is situated within an area likely to be frequently used by >200 Cape Vultures and infrequently used by at least a pair of Bearded Vulture from Nelson’s Kop as well as their dispersing juveniles but other birds may also visit the site from the Central and Northern Drakensburg.

Figure 4-2 Photographs of the three Cape Vulture roosts; A) Roost 1 Arendskop, B) Roost 2 Skeurklip, C) Roost 3 Nelson’s Kop, D) Roost 4 Witkoppe

Figure 4-3 ***Photographs of the Nelson's Kop roost taken during the second follow up visit in October 2023 showing A) the location of the two breeding pairs. Note only CVN1 successfully hatched a chick, B) The chick at CVN1 and C) the nest cup of CVN1.***

Figure 4-4 ***Photographs of Bearded Vulture taken at Nelson's Kop. The first column represents observations of the currently presumed nest location (A and C) and the recently observed adult (E and G) while the second column represents observations of the known breeding location (B and D) and birds including the 2014 fledgling (F and H).***

4.2.1.3 Martial Eagle

Overall, five Martial Eagle nests were documented (Table 4-3). The location[1] of these nests is shown in **Error! Reference source not found.**. The nests are labelled as "Martial Nests 1-5" in the project's Priority Species Nests shapefile. Of these, the most significant with regards to the VWC and Kromhof WEF cluster is Martial Eagle Nest 2**.** The nest borders on farm Bath and has considerable implications for the Kromhof WEF, essentially covering most of it. A single juvenile fledged from the nest in October 2023. The presence of the nest was suspected to occur from flight activity patterns observed during Survey 6. Two adults were seen hovering in this area (Farm Bath) mostly in rotor sweep height for 4 hours. The male has since been captured and fitted with a GPS tracker by Dr. Gareth Tate of EWT who provisionally plans to go back out to site in August 2024.

Table 4-3 Martial Eagle nest details

Nest	Description	Status	Buffer implications for WEF
1	Nest ca 12 m high in poplar tree in a Eucalyptus bushclump on Clan Leslie Estates farm, private property. Approximately halfway between Verkykerskop and Warden.	Active, last documented activity, single juvenile flew from nest November 2022	No
2	Nest ca. 18 m high in tallest tree of Eucalyptus bushclump on land bordering Farm Bath.	Active, last documented activity, single juvenile flew from nest October 2023	No
3	Nest in *Eucalyptus* bushclump	Active, breeding success uncertain	No
4	Nest in escarpment forest in Ingula Nature Reserve.	Active, pair have successfully fledged juveniles	No
5	Nest in Eucalyptus tree at headwaters of wetland	Active	No

[1] Note, due to the sensitivities regarding the poaching and disturbance of these birds and given their Threatened conservation status the map shown here and precise location of these nests should be kept confidential and should not be shared or published in the public domain.

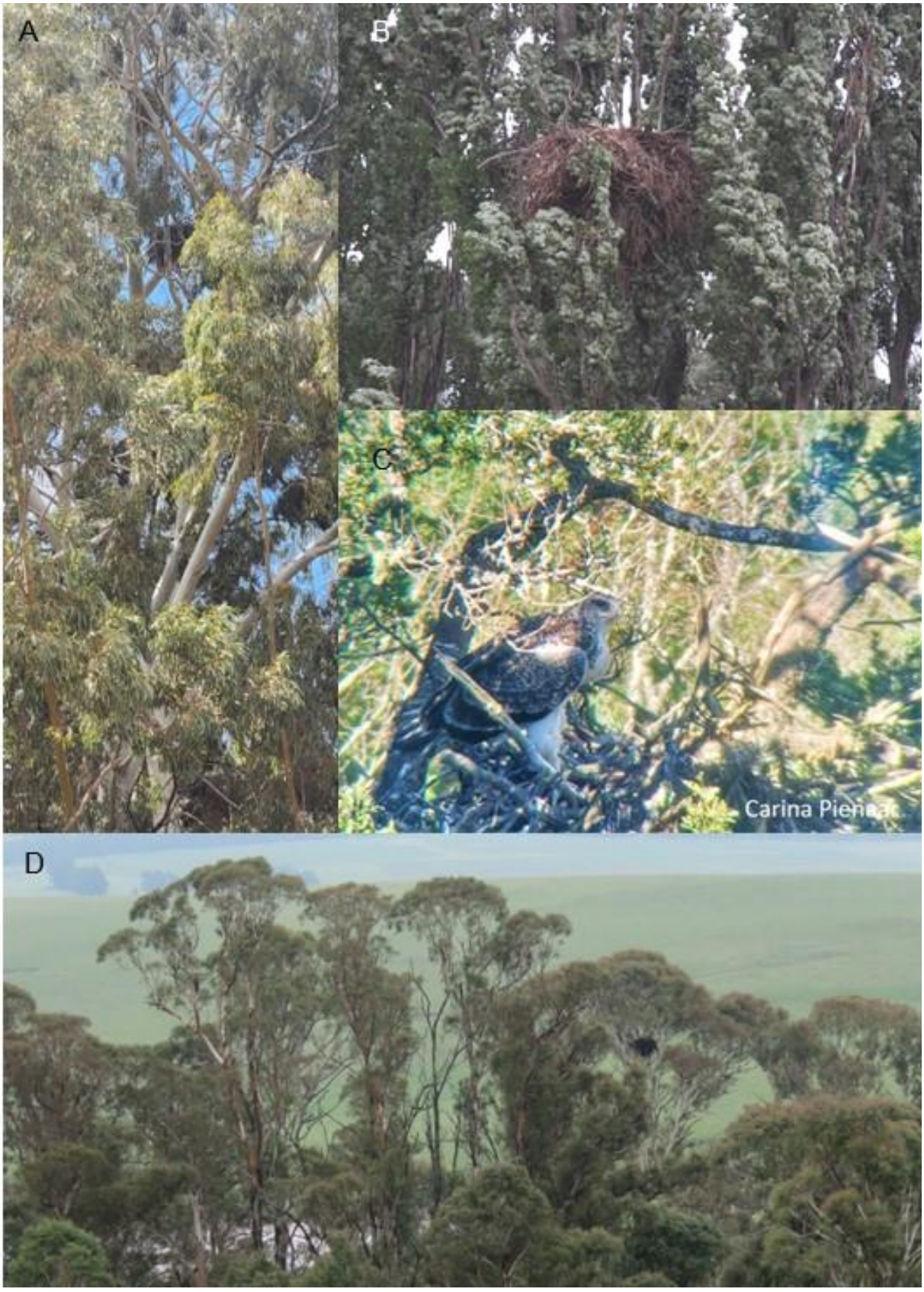

Figure 4-5 Photographs of Martial Eagle nests A) 2, B) 1, C) 4 and D) 3

4.2.1.4 Southern Bald Ibis

To date 11 Southern Bald Ibis roosts have been found within the AOI. Of these two namely Roosts 5, and 11 have buffer implications for Kromhof WEF, both are breeding roosts. Overall, four roosts in the AOI (roosts 7, 8, 9 and 10) are actively monitored by Carina Pienaar (Ingula and Grassland Conservation Project Manager at BirdLife South Africa). The most significant of which being roosts 8 and 9 on the Witkoppe inselberg approximately 20 km north-west of the project area, which hosts the largest breeding colony of Southern Bald Ibis in the world. Based on the high number of foraging individuals encountered within the project area (considerably higher than the number of birds observed roosting at night in the project area) it would appear that many individuals from this (and other roosts even further afield) make regular foraging excursions to the grasslands in the project area.

Table Southern Bald Ibis nest details

Roost	Description and Status	Significance	Buffer implications for WEF
1	Uncertain. Likely breeding roost but unconfirmed. Situated in sheltered crag on Waterkop near Markgraaf's Rest WEF.	Medium	No
2	Breeding roost. Inactive. Evidence of nesting, but erratic. Approximately 8 birds.	High	Yes (very high and high sensitivity zones)
3	Non-breeding roost. No breeding observed to date. Situated on crag on entrance road to farm Bath on Markgraaf's Rest WEF.	Low	No
4	Non-breeding roost behind residence.	Low	No
5	Breeding roost. Nesting observed 2022 but not 2023. On cliffs along river.	High	No
6	Breeding roost large. Active. Breeding confirmed. At least 17 individuals. Two nests observed. Pair of chicks on one and pair of eggs on other. In small gorge.	High	No
7	Breeding roost. Four birds observed sitting on nests. Roost monitored by Renette Steyn and Carina Nel Meissie.	High	No
8	Breeding roost. Active breeding colony. Witkoppe Inselberg. Part of largest in the world.	Very High	No
9	Breeding roost. Witkoppe Inselberg. Largest in world.	Very High	No
10	Breeding roost. Active. Breeding confirmed. Cliff over river near low level bridge on R722.	High	No
11	Breeding roost. Active. Breeding confirmed. One nest with two chicks. Centrally situated on portion land between Groethoek, Kromhom and Markgraaf's Rest WEFs	High	Yes (very high and high sensitivity zones)

Figure 4-6 Evidence of Southern Bald Ibis breeding activity; A) adult tending nest, B) eggs on nest, C) downy chick, D) feathered chicks, E) adult incubating, F) courtship

4.2.1.5 Verreaux's Eagle

Three Verreaux's Eagle nests occur within the AOI, none of which are in the VWC or Kromhof WEF. Of these, breeding has only been confirmed at Nest 3 on Verkykerskop, 25 km west of the Kromhof WEF. This nest is actively tended by a pair and signs of breeding include the construction of an inner wreath. The occupancy and breeding status of the remaining two remains uncertain due to the remoteness and inaccessibility of their locations. Verreaux's Eagle Nest 2 on Mont Pelaan has not yet been positively confirmed as a Verreaux's Eagle nest. Verreaux's Eagle Nests 2 is of greatest potential significance for the Kromhof WEF due to its proximity and has buffer implications for the WEF.

Table 4-4 Verreaux's Eagle nest details

Name	Description	In WEF	Buffer Implications for WEF
Verreaux's Eagle Nest 1	Uncertain	No	No
Verreaux's Eagle Nest 2	Inactive	No	Yes
Verreaux's Eagle Nest 3	Active	No	No

4.2.2 Blue Crane

Four Blue Crane nests have been encountered in the project area. Three of which have buffer implications for the project. All successfully reared their chicks. Nest sites were all selected in remote locations far from people and infrastructure. Nest site selection varied from open grassland to wetland habitats.

Table 4-5 Blue Crane nest details

Name	Description	Buffer Implications for WEF
Blue Crane Nest 1	Active. Two eggs November 2023. On ground in grassland no nest material.	Yes
Blue Crane Nest 2	Active. Two eggs found November 2023. Nest significant mound in permanent zone of wetland	Yes
Blue Crane Nest 3	Chicks hatched and moved on. Nest on ground in grassland no nest material	Yes
Blue Crane Nest 4	Active chicks hatched December 2023 and moved off. Nest on ground in grassland no nest material.	No

Figure 4-7 Evidence of Blue Crane breeding activity; A) eggs on Nest 2 in wetland, B) eggs on Nest 1 in grassland, C) downy chick, D) feathered chick

4.2.3 Endemic Species

A total of 15 South African endemics occur in the region. Non-red listed species include Grey-winged Francolin (*Scleroptila afra*), Forest Buzzard (*Buteo trizonatus*) Cape Rock Thrush (*Monticola rupestris*), Buff-streaked Chat (*Campicoloides bifasciata*) and Pied Starling (*Lamprotornis bicolor*). All except, Forest Buzzard were recorded during Year 1 monitoring. Except for Pied Starling (which is ubiquitous) all of these species tend to frequent the higher altitude Plateau Grassland and Rocky Grassland habitat.

4.2.4 Migratory Species

Many large flocks of migratory birds move across the project area in early summer, the most notable of which being a globally significant migratory flock of Amur Falcons (numbering over a thousand individuals which moved along the Meul River valley for several days.

4.2.5 Other keystone species

Other priority raptor species whose nests have buffer implications for the Kromhof WEF include Jackal Buzzard Nest 3 and potentially a Rock Kestrel nest at VP 9 (requires verification).

Table 4-6 Other priority species nest details

Name	Description	Buffer Implications for WEF
African Harrier-hawk Nest 1	Active	No
Black Sparrowhawk Nest 1	Active	No
Black Sparrowhawk Nest 2	Status Uncertain	No
Black Sparrowhawk Nest 3	Inactive	No
Black Sparrowhawk Nest 4	Inactive	No
Jackal Buzzard Nest 1	Active	No
Jackal Buzzard Nest 2	Inactive	No
Jackal Buzzard Nest 3	Active	Yes
Lanner Falcon Nest 1	Active	No
Secretarybird	Active	No

Figure 4-8 ***Nests of cliff-nesting raptors A) Jackal Buzzard Nest 3, Lanner Falcon Nest 1, Jackal Buzzard nest 1 with eggs, D) Verreaux's Eagle Nest 3***

Figure 4-9 ***Photographs of red-listed raptors observed in the AOI;A) Cape Vulture, B) Bearded Vulture, C) Martial Eagle carrying a Denham's Bustard, D) Verreaux's Eagle, E) Secretarybird, F) Lanner Falcon***

Figure 4-10 ***Photographs of small to medium-sized red-listed species observed in the AOI; A) Rudd's Lark, B)Yellow-breasted Pipit, C) African Rock Pipit, D) Ground Woodpecker, E) Bush Blackcap, F) Maccoa Duck, G and H) Southern Bald Ibis***

Figure 4-11 ***Photographs of large-bodied priority species observed in the AOI; A) Blue Crane, B) Grey Crowned Crane, C) Wattled Crane, D) Denham's Bustard, E) Black-bellied Bustard, F) Blue Korhaan, G) White Stork, H) Black Stork***

Figure 4-12 ***Photographs of other priority raptor species observed in the AOI; A) Amur Falcon, B) Peregrine Falcon, C) Juvenile Jackal Buzzard, D) African Harrier-hawk, E) Rufous-breasted Sparrowhawk, F) Black-winged Kite***

Figure 4-13 ***Photographs of other generally rare or illusive speciesobserved in the AOI; A) African Crake, B) Sickle-winged Chat, C) Barrat's Warbler, D) Black-winged Lapwing, E) Cape Rock Thrush, F) Grey-winged Francolin***

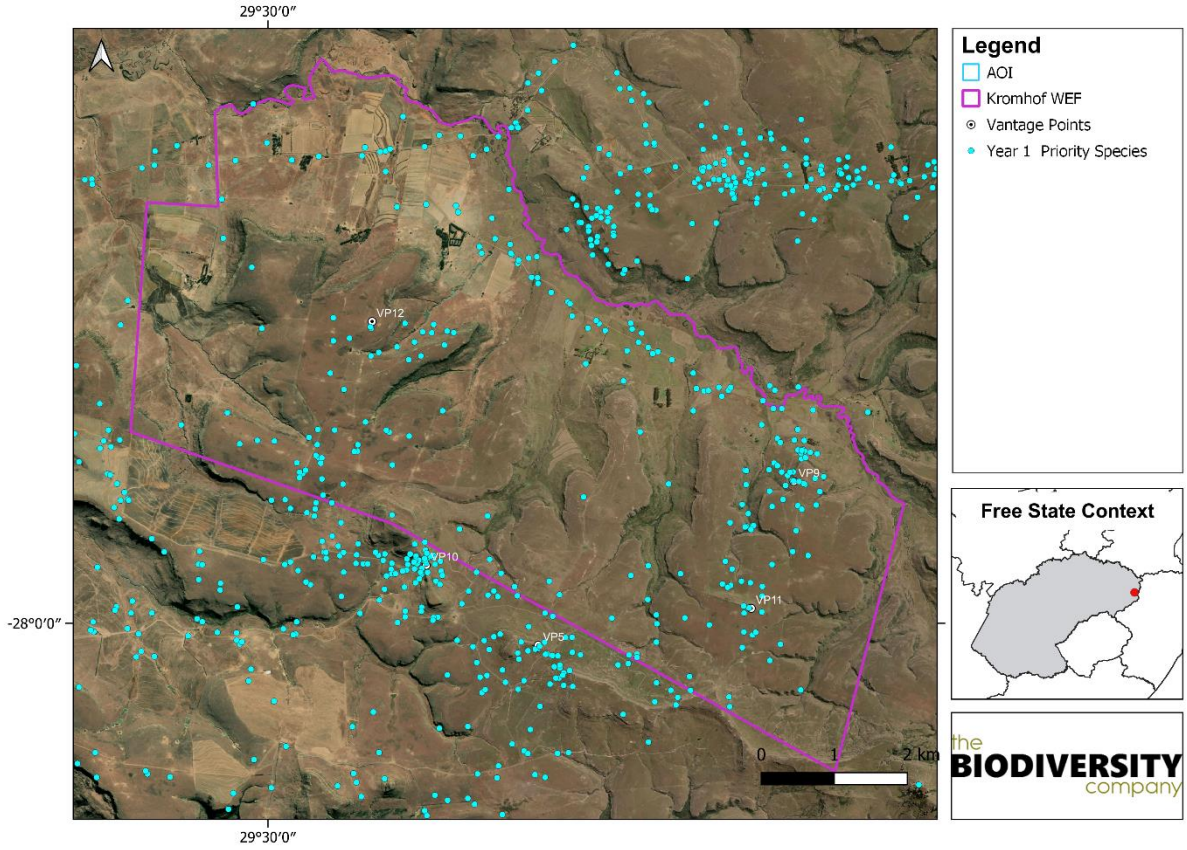

Figure 4-14 Point localities of year 1 priority species observations

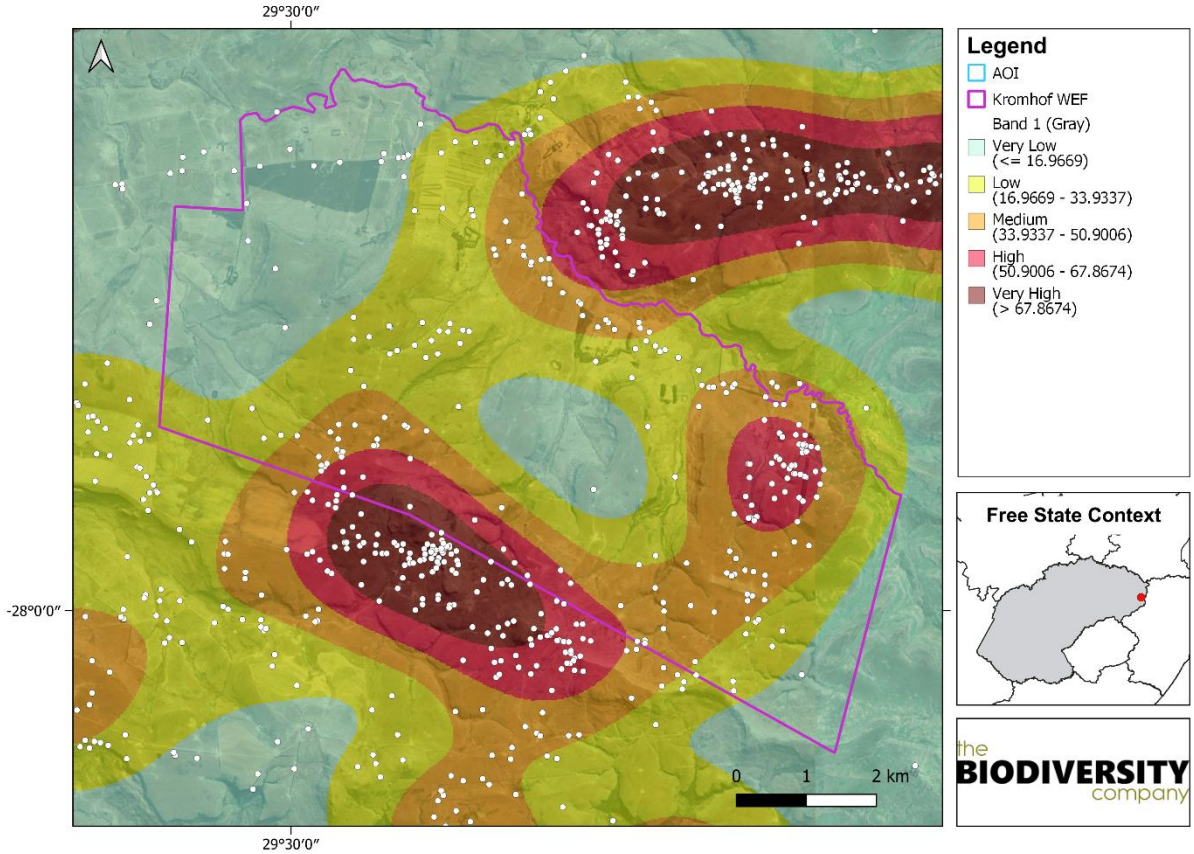

Figure 4-15 Kernel density model portraying hotspots of priority species occurrence.

4.3 Flight Activity

4.3.1 All Priority Species

Year 1 flight activity data for the Kromhof WEF (n= 5 VPs, 12-hours per VP over 6 surveys totalling 72 hours per VP per year) and the control site (1 VP for the same period) for all priority species with emphasis on Cape Vulture are summarised in the table below. Overall, 360 hours of observations from vantage points in the Kromhof WEF yielded a total of 599 flights of priority species, totalling 40.9 hours with a passage rate of 1.33 birds^{-hour}. This passage rate is notably higher than that observed at the control site (0.97 birds^{-hour}). For the sake of this scoping report and project planning purposes, Cape Vulture was singled out for further analysis on flight activity, see Section 4.3.2 below for details.

Table 4-7 Summarised Year 1 flight activity data from both the project area and the control site (for all priority species and Cape Vulture)

Site	Variable	VPs (n)	Surveys/Year	Hours	Hours/VP	No. Fly. Ind.	Passage Rate	Flight Hours
Kromhof WEF	Priority Species	5	6	360	72	480	1.33	40.906
Kromhof WEF	Cape Vulture	5	6	360	72	108	0.30	15.819
Control	Priority Species	1	6	72	72	66	0.92	7.453
Control	Cape Vulture	1	6	72	72	1	0.01	0.017

When comparing passage rates of priority species among VPs per survey VPs 5, 9 and 10 stand out with a mean annual passage rate of 1.38 birds^{-hour}, 1.26 birds^{-hour} and 1.9 birds^{-hour} respectively. When considering variation among surveys, a marked phenological response in priority species activity is revealed. It is clear that the passage rates peak in Summer (S3, 2.95 birds^{-hour}). This is expected given the higher activity associated with increased primary productivity (and consequently insect, seed and other food availability) during this time in this summer rainfall region, breeding and influx of migrants. This period was not only characterised by an influx of Palearctic and intra-African migrants but was found to also be also strongly influenced by altitudinal migration from several Southern African residents (species which move away from these colder highlands to warmer, moister regions below the escarpment and nearer the coast during winter).

Table 4-4-8 Passage rates of priority species among VPs per survey

	Passage Rate						
Survey	S1	S2	S3	S4	S5	S6	Mean
Season	Winter	Spring	Summer	Autumn	Winter	Spring	
Control	0.08	0.08	5.08	0.25	0.00	0.00	0.92
5	0.17	1.58	1.92	3.67	0.25	0.67	1.38
9	0.83	2.50	1.17	0.42	1.83	0.83	1.26
10	0.33	2.50	5.83	1.58	0.83	0.33	1.90
11	0.42	0.42	4.00	0.50	0.33	0.42	1.01
12	0.33	1.33	1.83	0.17	0.83	0.33	0.81
Mean	0.42	1.67	2.95	1.27	0.82	0.52	

When comparing passage rates among the 31 priority species observed over the six surveys, four species emerge as having notably higher passage rates than any other. In order of highest to lowest passage rate these include Southern Bald Ibis (0.37 birds^{-hour}), Cape Vulture (0.3 birds^{-hour}), Amur Falcon (0.18 birds^{-hour}) and Jackal Buzzard (0.14 birds^{-hour}). Although recorded elsewhere in the VWC, Black Harrier has not yet been recorded in the Kromhof WEF. Winter is characterised by a noticeable reduction in the diversity and abundance of large terrestrial birds such as cranes, ibises, korhaans and bustards. Most notable was the reduction in the prevalence of Blue and Crowned Cranes (to almost zero). It was subsequently established that most of the regional crane populations that occur in the project area during summer leave the project area to aggregate and overwinter, in large non-breeding

flocks (of several hundred birds), at one of the two known congregation sites situated on Farm Nugget near Verkykerskop and the dairy farm near Memel. Exclusively summer visitors include Yellow-billed Kite, Booted Eagle, Common Buzzard, Denham's Bustard, Lesser Kestrel.

Table 4-9 Passage rates among the 31 priority species observed over the six surveys

Common Name	Winter	Spring	Summer	Autumn	Winter	Spring	Mean
	S1	S2	S3	S4	S5	S6	
African Harrier-Hawk							
Amur Falcon			1.050				0.175
Black Harrier							
Black Sparrowhawk							
Black-winged Kite	0.033					0.017	0.008
Blue Crane		0.217	0.183			0.233	0.106
Booted Eagle							
Cape Vulture	0.083	0.467	0.283	0.917		0.050	0.300
Common Buzzard		0.033					0.006
Denham's Bustard			0.083				0.014
Greater Kestrel					0.033		0.006
Grey Crowned Crane							
Ground Woodpecker							
Jackal Buzzard	0.150	0.100	0.100	0.133	0.283	0.100	0.144
Lanner Falcon	0.017	0.083		0.033	0.067	0.050	0.042
Lesser Kestrel							
Little Sparrowhawk							
Martial Eagle			0.033		0.017	0.033	0.014
Melodious Lark							
Peregrine Falcon							
Rock Kestrel	0.050	0.083	0.033	0.083	0.117	0.033	0.067
Rudd's Lark		0.017					0.003
Rufous-breasted Sparrowhawk							
Secretarybird				0.033			0.006
Southern Bald Ibis	0.050	0.617	1.167		0.167	0.233	0.372
Verreaux's Eagle		0.033	0.017	0.033	0.050	0.083	0.036
Wahlberg's Eagle						0.017	0.003
White-necked Raven	0.033			0.033	0.067	0.050	0.031
Yellow-billed Kite							
Yellow-billed Stork							
Yellow-breasted Pipit		0.017					0.003

Flight activity was also found to be influenced by time of day with trends in daily activity patterns having varied significantly among the four main time slots. Early mornings (06:30-09:30), as would be expected, are characterised by a peak in total species richness and abundance (particularly with regards to small-passerines). Late mornings (09:30-12:30) are associated with a timeous and drastic increase in the prevalence of soaring birds, which appears related to an increased in temperature and subsequently wind speed (particularly above 10 km/h). Early afternoons (12:30-15:30) are considerably quieter with bird activity decreasing drastically. Late afternoon (15-30-18:30) bird activity starts slow before a last increase in priority species flights towards nightfall with peak activity around and just after sunset as many species (particularly Bald Ibis and large raptors) begin their commute back to their roosts / nests.

Flight paths of all priority species observed during vantage point surveys within the project area are mapped in Figure 4-16. From this figure it is apparent that Southern Bald Ibis (n = 134) and Cape

Vulture (n = 108) constituted by far the majority of flight passes. To better understand the intensity of flights over the project area a flight path intersection density model was made (Figure 4-17). This model (essentially a form of kernel density estimation applied to intersecting lines) subsequently formed the basis of the flight corridors sensitivity layer included in the sensitivity assessment. From this figure it is apparent that flights by priority species are concentrated two main “hotspots” around the major gorges of VP 9 and 12.

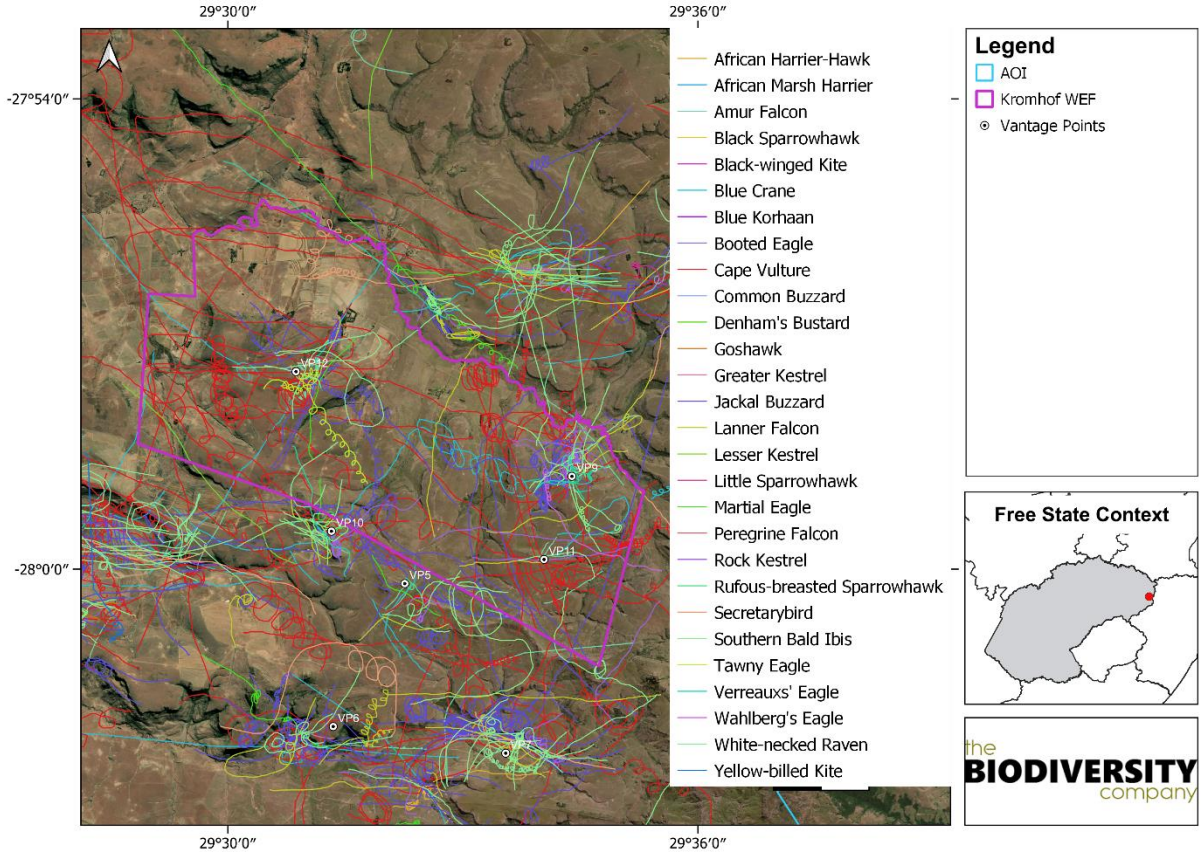

Figure 4-16 Flight paths of priority species

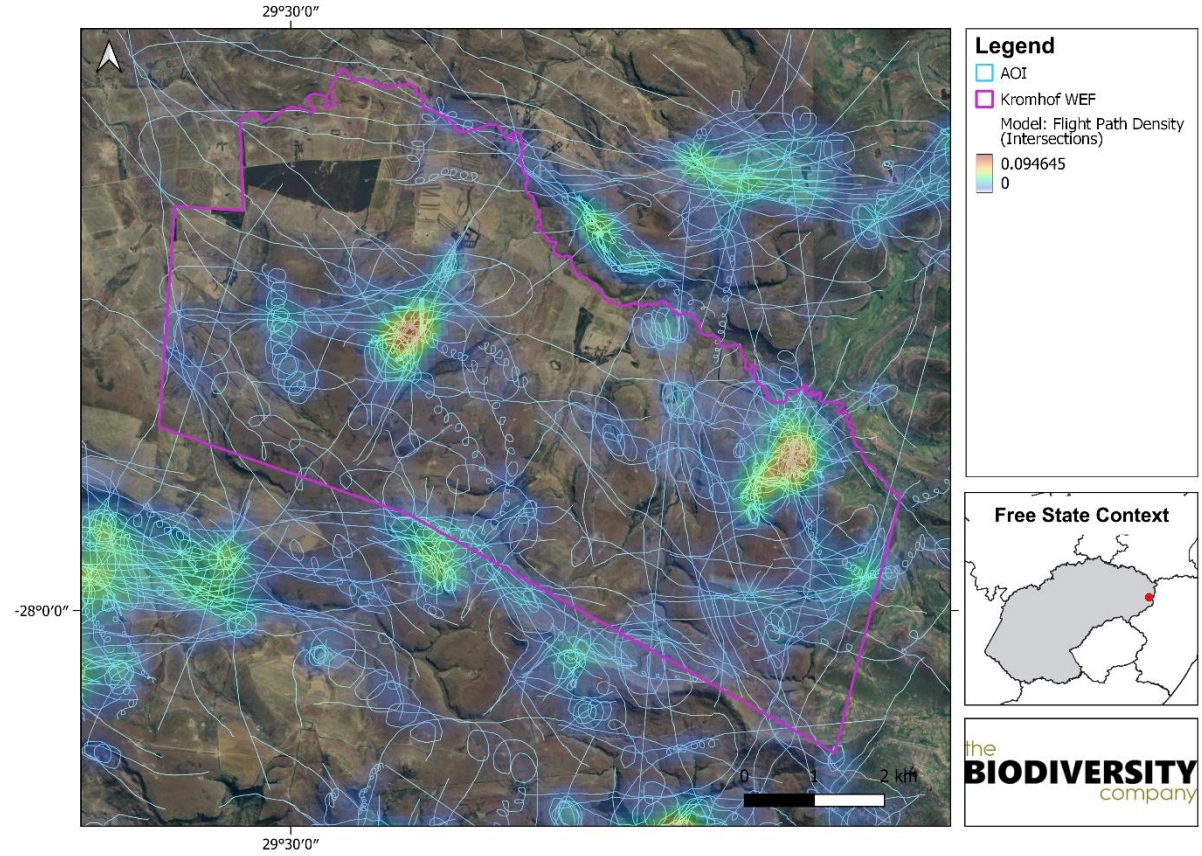

Figure 4-17 Flight path density model

4.3.2 Cape Vulture

At Kromhof WEF a total of 108 individual Cape Vulture passages were recorded from the five on-site vantage points (n= 360 hours) during the Year 1 monitoring. Each flight path across the Kromhof WEF is represented spatially in Figure 4-16. This represents an average annual passage rate of 0.3 birds^{-hour}. Essentially the same as the average for the VWC as a whole. Cape Vulture are present year-round in the WEF, and a strong seasonal variation in passage rate was observed with a threefold increase to 0.92 birds^{-hour} during autumn. It is important to remember although the passage rate data provides information on the regularity and frequency of vulture flights it does not account for the duration and time spent flying at rotor height nor the spatial variation thereof.

Table 4-10 Cape Vulture flight time below, within and above rotor sweep height (n=108 flights).

Zone	Flight Hours	Mean	SD	SE
H1 (below)	0.0916	0.00085	0.0034	0.0003
H2 (within)	6.55	0.0607	0.0697	0.0037
H3 above)	9.1775	0.0849	0.101	0.0097

Some general assertions which can be made after the first year of monitoring are as follows:

- Two distinct corridors for Cape Vulture movement over Kromhof include powerline servitude (west of VP 12) or crests along the Muel River Valley;
- Digital Elevation models shed light on observed Cape Vulture flight route patterns and suspected triangulation between roosts;
- Both in-filed observations and tracking data provided by VULPRO suggest that Cape Vultures from Nelson's Kop often fly northwards in an eastwards curving arc from Nelsonskop towards the Witkoppe following either a distinct series of inselbergs (which includes Waterkop and Mont Pelaan Ridge), the powerline servitude or the crest line of the Rietspruit. Then they often either head south-westwards towards Arend's Kop via Verkykerskop before circling back to Nelsonskop or continue onwards towards the Magaliesberg. They gain height over the broad, higher elevation Phumelela Plateau on route to Witkoppe;
- Tracked vulture C82AB0 demonstrates this trend well, regularly visiting all five roosts in the AOI; and
- Its likely Cape Vultures also use the Witkoppe as a last stopover before flying to the Magaliesberg via Suikerbosrand and / or Vredefort Dome.

The above table shows that the Cape Vultures collectively spent a total of 15.8 hours flying over the Kromhof WEF. Although most of the flight time (9.178 hours or 58 %) was logged above potential rotor height, it should be noted that a large proportion (6.55 hours or 41%) of time was also spent flying at potential rotor height. Flight time spent at the various turbine height classes (below, within and above rotor sweep) is visualised in the figure below. As the day warms and thermal activity increases the groups begin to circle and gradually ascend using the ridge of VP 10 (Mont Pelaan foothills) to gain lift as they leave the project area usually in a northerly to north-westerly direction towards the Witkoppe Mountains or Arend's Kop. Full day focal points at the various roost sites show that vultures tend to start returning to their roosts from midday with most having returned by around 15:30 in summer.

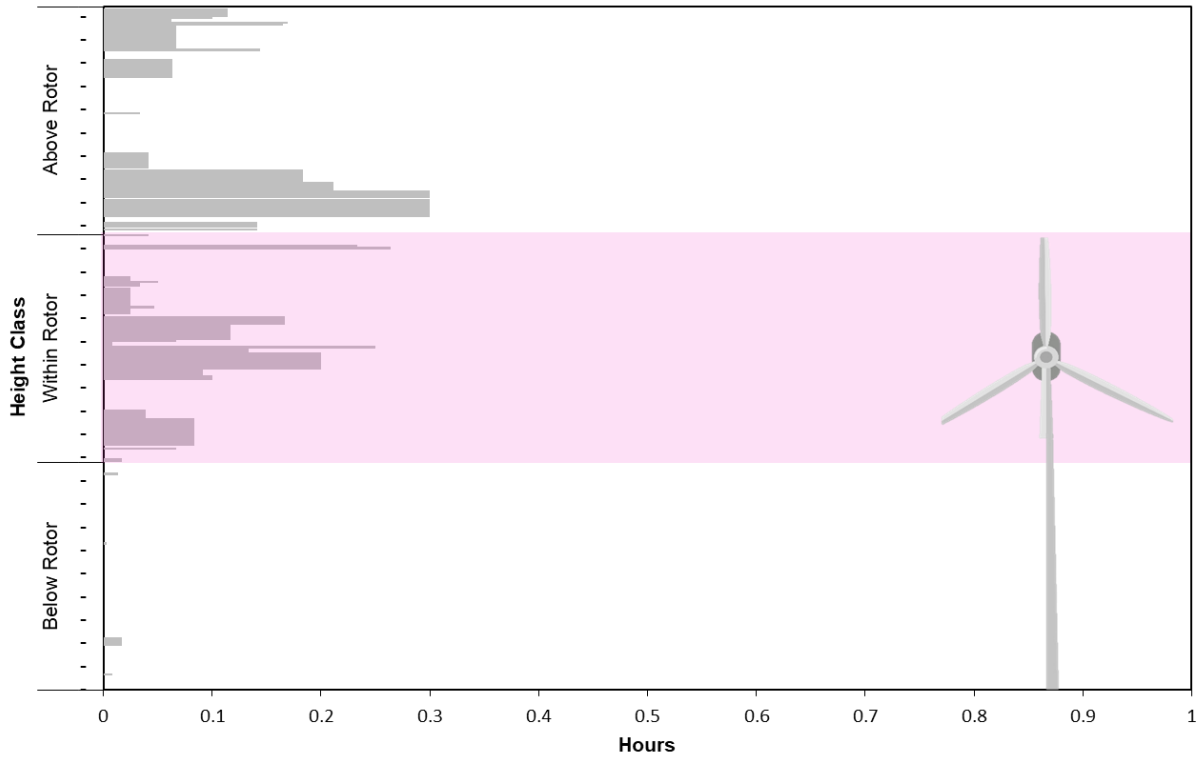

Figure 4-18 Cape vulture flight hours below, within and above rotor sweep heights

Cape Vulture were recorded at from all four VPs (VPs 1-4) and the Control (Figure 4-18). However, considerable variation in flight time at rotor height was observed among the VPs. The differences in mean flight time at rotor height per VP are shown in Figure 4-19. Overall, Kromhof WEF demonstrated the lowest flight times for Cape Vulture of all the WEFs in the VWC. However, this is likely an artefact of annual variation in attendance and / or stochastic variation in flight route selection. Conditions are suitable for Cape Vulture soaring and preliminary year 2 observations are yielding significantly higher passage rates over the WEF.

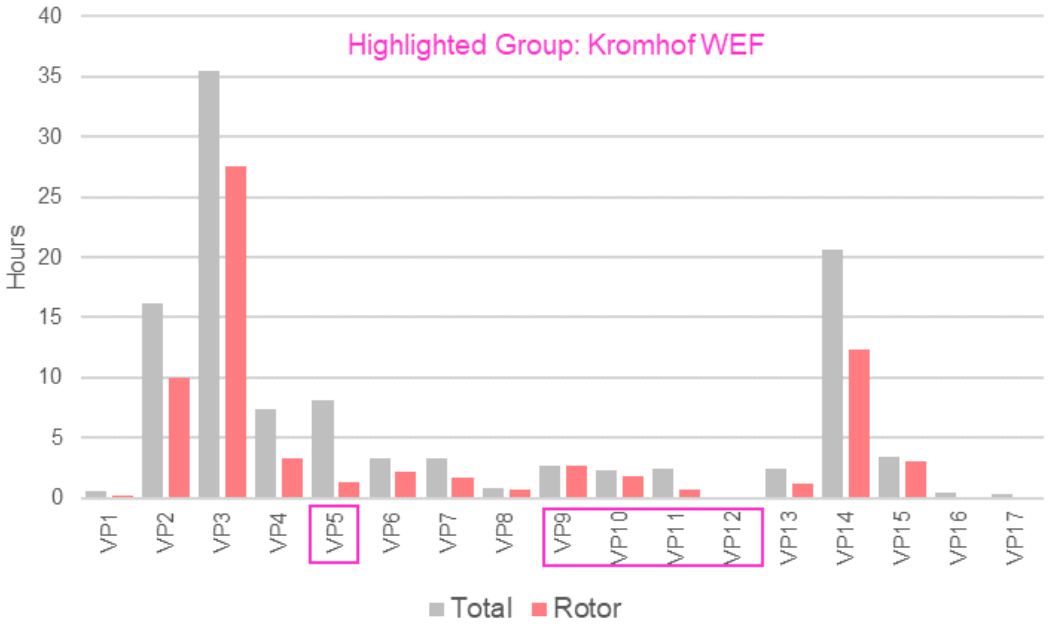

Figure 4-19 Duration of Cape Vulture flights in total and at rotor sweep height per VP

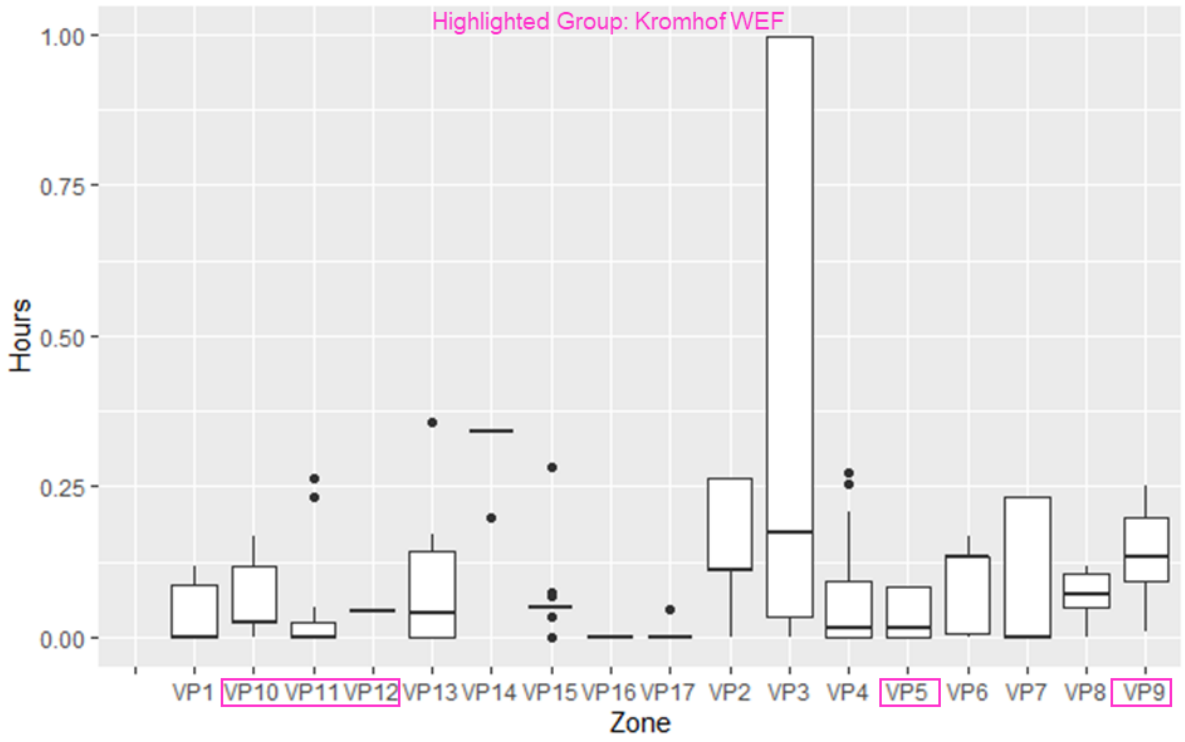

Figure 4-20 Boxplot of mean Cape Vulture flight time at rotor sweep height per VP

5. Site Sensitivity Verification and Preliminary Sensitivity Assessment

At a regional scale, the VWC is surrounded by five IBAs (within 30 km radius) including one that marginally overlaps the north-western corner of the VWC (Grasslands SA020). Additionally, several well-established birding routes traverse the AOI. A large proportion of the site is also overlaps the Eastern Free State Escarpment KBA. At a local scale the Kromhof WEF intersects 22 nest buffers of priority species (highlighted in red in the table below). These include Cape Vulture Roosts 1-5, Southern Bald Ibis Roosts 5, 11, 14, 16, 17, 18 and 19, Blue Crane Nests 1-3, Jackal Buzzard Nest 3, Lanner Falcon Nests 2 and 3, Rock Kestrel Nest 1, and Verreaux's Eagle Nests 2 and 3.

The southern regions of the Kromhof WEF overlaps near pristine plateau grassland which was identified as a core habitat for Threatened high altitude species (i.e. Rudd's Lark, Yellow-breasted Pipit, Southern Bald Ibis and Denham's Bustard). This area is also recognised as a global KBA. Additionally, two flight corridors for priority species were identified over the project area. The WEF also supports an abundance of rugged terrain with a slope greater than 20% which was identified as important habitat for threatened raptors. The key receptors underpinning the sensitivity map (Figure 5-1), the sensitivity ratings and justifications are given in Table 5-1 below. These areas of avifaunal sensitivity area spatially depicted in Figure 5-1.

Table 5-1 Receptors underpinning the prescribed buffers and justification within the AOI and their Implications for Kromhof WEF

Name	Description	Buffer1[2] (m)	Buffer2[3] (m)	Buffer3[4] (m)	Justification	Buffer Implications for Kromhof WEF
African Harrier-hawk Nest 1	Active	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
African Harrier-hawk Nest 2	Status Uncertain. Presumed African Harrier-hawk	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Bearded Vulture Nest 1	Inactive as of October 2023, new nest suspected. Only one bird observed over last two months. Status of second bird uncertain either gone or tending nest. Last known chick fledged in 2014 but requires more investigation as nest has not been comprehensive	5500	10000	0	Krueger, S & Amar, A. (2021). The Ecology and Management of a Critically Endangered Population of Bearded Vultures. Imperilled: The Encyclopedia of Conservation 10.1016/B978-0-12-821139-7.00168-9.	No
1Black Sparrowhawk Nest 1	Active	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
1Black Sparrowhawk Nest 2	Status Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
1Black Sparrowhawk Nest 3	Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Black Sparrowhawk Nest 4	Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Black Sparrowhawk Nest 5	Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Black Sparrowhawk Nest 6	Status Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Black Sparrowhawk Nest 7	Status Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Black Sparrowhawk Nest 8	Status Uncertain	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Blue Crane Nest 1	Active. Two eggs November 2023. On ground in grassland no nest material.	150	300	0	DFFE stipulation.	Yes
Blue Crane Nest 2	Active. Two eggs found November 2023. Nest significant mound in permanent zone of wetland	150	300	0	DFFE stipulation.	Yes
Blue Crane Nest 3	Chicks hatched and moved on. Nest on ground in grassland no nest material	150	300	0	DFFE stipulation.	Yes
Blue Crane Nest 4	Active chicks hatched December 2023 and moved off. Nest on ground in grassland no nest material.	150	300	0	DFFE stipulation.	No
Cape Vulture Roost 1	Non-breeding Roost	0	0	50000	Cape Vulture species-specific guidelines (BLSA, 2018) for all colonies and roosts. Field Verified.	Yes
Cape Vulture Roost 2	Non-breeding Roost	0	0	50000	Cape Vulture species-specific guidelines (BLSA, 2018) for all colonies and roosts. Field Verified.	Yes
Cape Vulture Roost 3	Breeding Roost one chick as of October 2023	18000	0	50000	Cape Vulture species-specific guidelines (BLSA, 2018) for all colonies and roosts. Field Verified.	Yes

[2] Very High sensitivity, Infrastructure exclusion zone
[3] High sensitivity, turbine and other infrastructure minimisation and intensive mitigation zone
[4] High sensitivity zone applied to 50 km radial buffer on Cape Vulture roosts. Turbine mitigation zone.

Name	Description	Buffer1[2] (m)	Buffer2[3] (m)	Buffer3[4] (m)	Justification	Buffer Implications for Kromhof WEF
Cape Vulture Roost 4	Non-breeding Roost	0	0	50000	Cape Vulture species-specific guidelines (BLSA, 2018) for all colonies and roosts. Field Verified.	Yes
Cape Vulture Roost 5	Non-breeding Roost	0	0	50000	Cape Vulture species-specific guidelines (BLSA, 2018) for all colonies and roosts. Field Verified.	Yes
Grey Crowned Crane Nest 1	Adult on nest	1000	0	0	Specialist recommendation. Endangered species.	No
Ground Woodpecker Nest 1	Confirmed nest hole	150	300	0	Specialist recommendation. Endangered species.	No
Ground Woodpecker Nest 2	Confirmed nest hole	150	300	0	Specialist recommendation. Endangered species.	No
Half-collared Kingfisher Nest 1	Active nest hole in upper Klip River catchment tended by resident pair.	1000	0	0	Pairs typically defend a 1-3 km reach of river (Chittenden et al. 2016). Threatened Species.	No
Jackal Buzzard Nest 1	Active	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Jackal Buzzard Nest 2	Inactive	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Jackal Buzzard Nest 3	Active	750	0	0	Specialist recommendation. Some flexibility typically allowed.	Yes
Jackal Buzzard Nest 4	Status Uncertain. Presumed Jackal Buzzard Nest.	750	0	0	Specialist recommendation. Some flexibility typically allowed.	No
Lanner Falcon Nest 1	Active	1000	3000	0	Core turbine exclusion of 1000 m based on specialist recommendation and industry best practice. High sensitivity 3000 m buffer based on DFFE avian theme sensitivity.	No
Lanner Falcon Nest 2	Lanner Falcon	1000	3000	0	Core turbine exclusion of 1000 m based on specialist recommendation and industry best practice. High sensitivity 3000 m buffer based on DFFE avian theme sensitivity.	Yes
Lanner Falcon Nest 3	Active. Pothole on cliff. Two chicks tended by both adults.	1000	3000	0	Core turbine exclusion of 1000 m based on specialist recommendation and industry best practice. High sensitivity 3000 m buffer based on DFFE avian theme sensitivity.	Yes
Martial Eagle Nest 1	Active	5000	0	0	DFFE stipulation and Brink, R. (2020).	No
Martial Eagle Nest 2	Active chick fledged October 2023	5000	0	0	DFFE stipulation and Brink, R. (2020).	No
Martial Eagle Nest 3	Currently Inactive as of 2024	5000	0	0	DFFE stipulation and Brink, R. (2020).	No
Martial Eagle Nest 4	Active, location approximate	5000	0	0	DFFE stipulation and Brink, R. (2020).	No
Martial Eagle Nest 5	Active	5000	0	0	DFFE stipulation and Brink, R. (2020).	No
Rock Kestrel Nest 1	Rock Kestrel	750	0	0	Specialist recommendation. Some flexibility typically allowed.	Yes
Secretarybird Nest 1	Active	500	1000	0	Specialist recommendation. Some flexibility typically allowed.	No
Southern Bald Ibis Roost 1	Uncertain. Likely breeding roost but unconfirmed	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 2	Breeding roost. Inactive. Breeding confirmed but irratic	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 3	Non-breeding roost. No breeding observed to date.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 4	Non-breeding roost.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No

Name	Description	Buffer1[2] (m)	Buffer2[3] (m)	Buffer3[4] (m)	Justification	Buffer Implications for Kromhof WEF
Southern Bald Ibis Roost 5	Breeding roost. Nesting observed 2022 but not 2023.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 6	Breeding roost large. Active. Breeding confirmed. At least 17 individuals. Two nests observed. Pair of chicks on one and pair of eggs on other.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 7	Breeding roost. Four birds observed sitting on nests. Roost monitored by Renette Steyn and Carina Nel Meissie.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 8	Breeding roost. Active breeding colony, part of largest in the world	1000	5000	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 9	Breeding roost. Largest in world	1000	5000	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 10	Breeding roost. Active. Breeding confirmed.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 11	Breeding roost. Active. Breeding confirmed. One nest with two chicks.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 12	Breeding roost. Two nests with adults sitting and potential baby	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 13	Breeding roost. One adult on nest	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 14	Non-breeding roost. No breeding observed to date.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 15	Breeding roost. Significant Southern bald ibis roost and breeding spot - 22 birds counted	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	No
Southern Bald Ibis Roost 16	Non-breeding roost. No breeding observed to date.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 17	Uncertain breeding status. No breeding observed to date.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 18	Non-breeding roost. No breeding observed to date.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Southern Bald Ibis Roost 19	Breeding Roost. Breeding erratic.	1000	2500	0	Specialist recommendation and consultation with Albert Froneman.	Yes
Verreaux's Eagle Nest 1	Uncertain	3700	5200	0	Verreauxs' Eagle species-specific guidelines (BLSA, 2017) for all nests (including alternate nests).	No
Verreaux's Eagle Nest 2	Inactive	3700	5200	0	Verreauxs' Eagle species-specific guidelines (BLSA, 2017) for all nests (including alternate nests).	Yes
Verreaux's Eagle Nest 3	Active	3700	5200	0	Verreauxs' Eagle species-specific guidelines (BLSA, 2017) for all nests (including alternate nests).	No

Name	Description	Buffer1[2] (m)	Buffer2[3] (m)	Buffer3[4] (m)	Justification	Buffer Implications for Kromhof WEF
Verreaux's Eagle Nest 4	Inactive, but signs of recent use	3700	5200	0	Verreauxs' Eagle species-specific guidelines (BLSA, 2017) for all nests (including alternate nests).	Yes
White-necked Raven Nest 1	Active. Adult on nest.	750	0	0	Specialist recommendation.	No

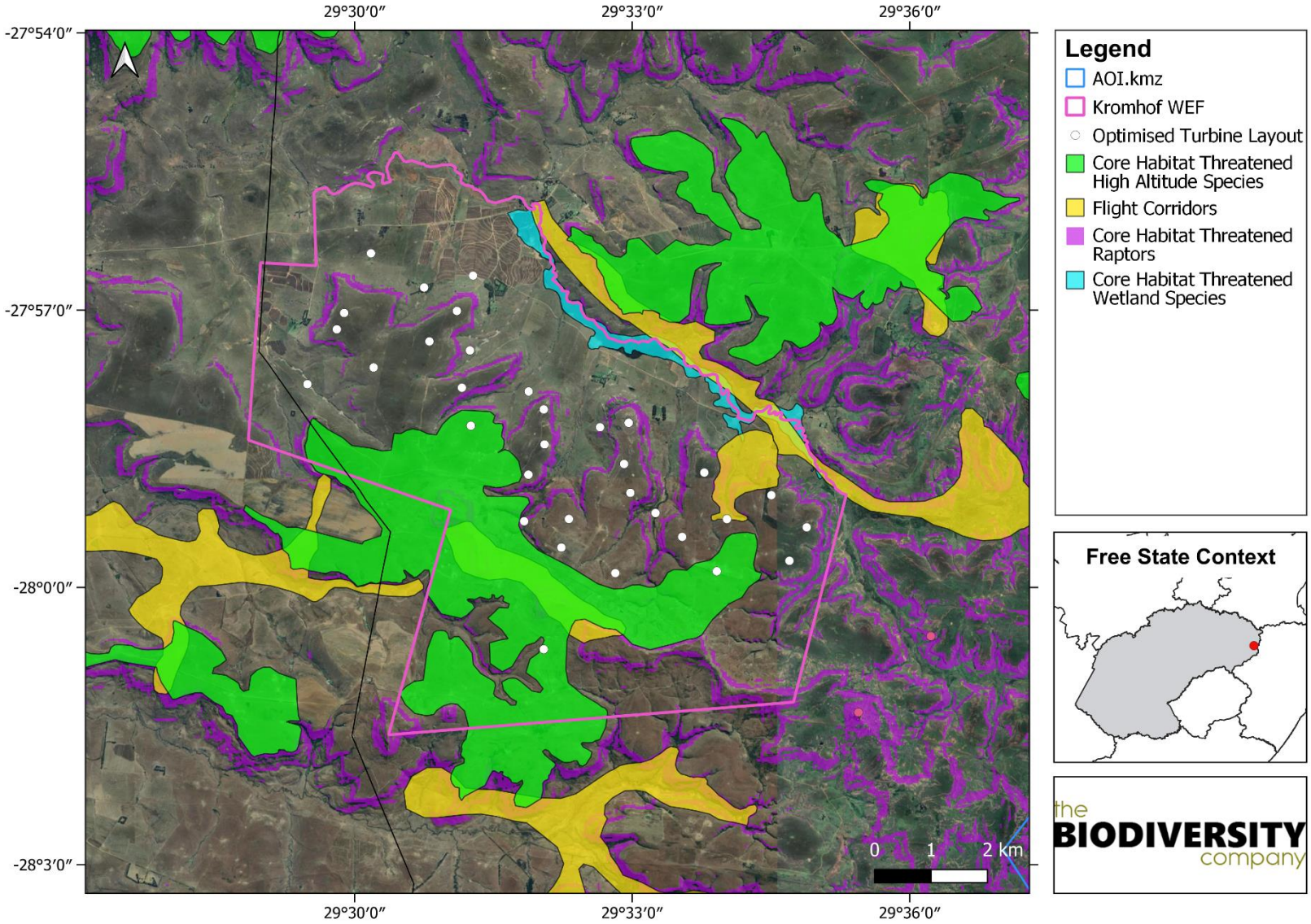

Figure 5-1 Map depicting key flight paths and core habitats for threatened high altitude, wetland and raptor species

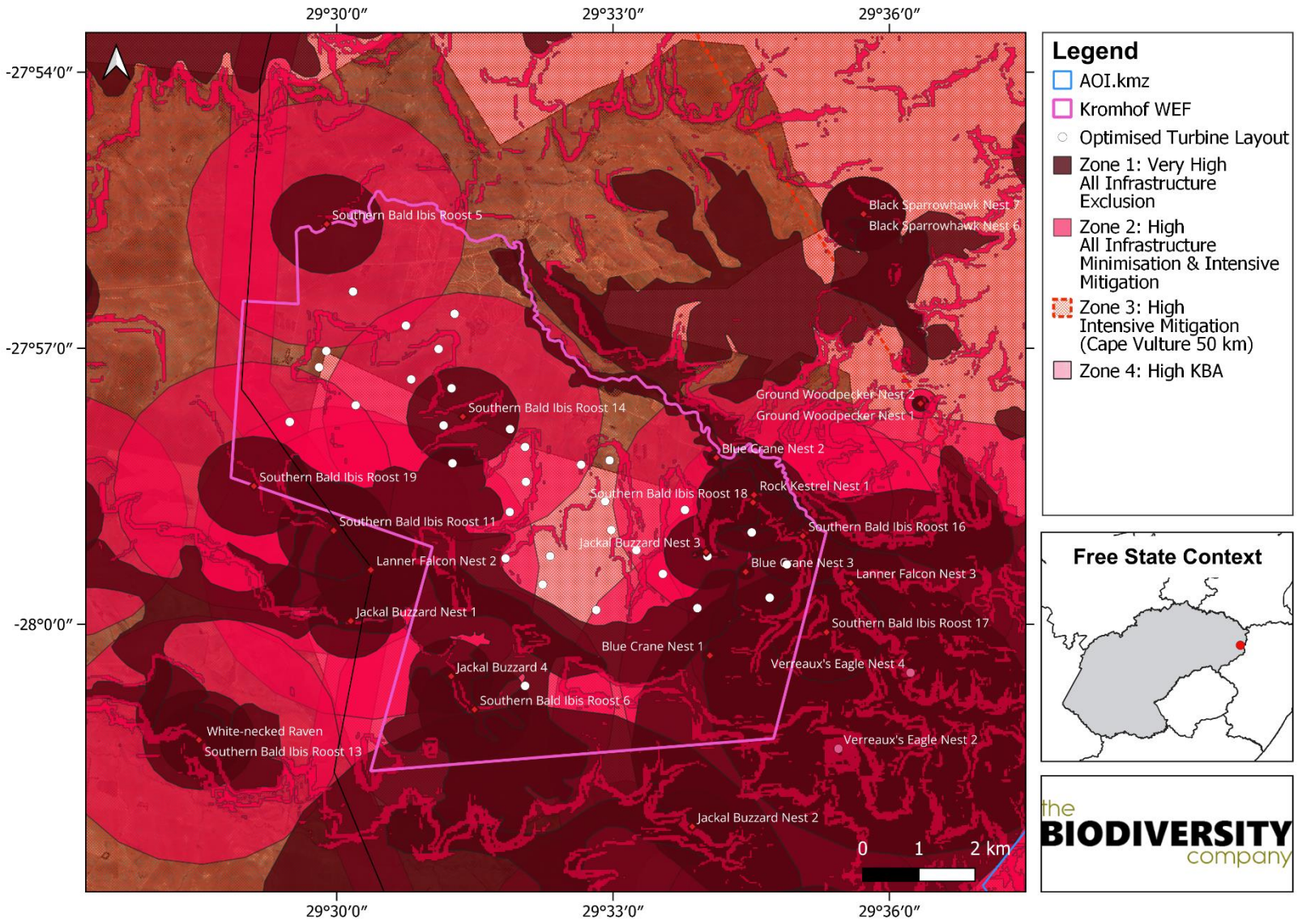

Figure 5-2 Preliminary Avifaunal sensitivity map for Kromhof WEF

6. Identification of Impacts

6.1 Existing Impacts

The following existing impacts were observed:

- Livestock Grazing. The predominant livestock is beef cattle but sheep and horses also occur. The grazing intensity is moderate with most grasslands being kept shortly cropped;
- Crop Cultivation. A few areas have been set aside in the north-west of the WEF and along the Muel River floodplain for crop production. Most fields are under a specific maize cultivar tailored for silage production. These croplands displace natural grassland habitat;
- Perennial Pastures, especially along Muel River floodplain. In addition to commercial crop cultivation large areas of grassland have been converted to perennial pastures. These pastures are fenced off from the cattle and are cut and bailed regularly for hay production. Pastures also displace natural grassland habitat;
- Fences. The project area is criss-crossed by a multitude of well-maintained cattle fences (many of which are 8-stranded). These pose a risk of collision and entrapment for many bird species, particularly large-terrestrial species, such as the Secretarybird;
- Powerlines. Many powerlines occur throughout the WEF. The most significant of which is a large transmission line that runs along the eastern region of the Kromhof WEF, which traverses several wetlands and mountain slopes. No bird flappers have been installed on the earth cables along this line;
- Erosion. Most of the larger valley-bottom wetlands and many of the hillslope seeps are deeply eroded. Longstanding head cut erosion (from overgrazing) has led to the formation of very large galleys. Insufficiently designed dams in some wetlands have exacerbated the erosion, especially when they fail following high rainfall events;
- Roads. There are many sand roads in the WEF. The main roads service Normandien and Collin's Passes but also run towards Verkykerskop and Memel. These are large busy sand roads which pose a direct collision risk to many birds especially small seed-eating passerines; and
- Dust. Large amounts of dust are generated from the strong winds moving over fallow croplands and from vehicles moving along the sand roads.

6.2 Preliminary Anticipated Impacts

As this is a scoping report only a very preliminary and cursive indication of some of the more significant potential impacts of the proposed development are identified below. The full impact assessment will be compiled after year 2 of the pre-construction monitoring has been completed. As per WSP stipulation these scoping level impacts are rated for pre-mitigation significance only.

6.2.1 Construction

6.2.1.1 Loss or Alteration of Habitat

6.2.1.1.1 Impact Description

Habitat loss from wind farm developments is mainly associated with the construction of access roads, the turbine footprint itself, the electrical transmission infrastructure and the Battery Energy Storage Facility. However, the turbine field is relatively large (n=55) with difficult access in steep, largely pristine terrain which, without mitigation and avoidance has the potential to result in a significant impact for range-restricted or threatened grassland species. At Kromhof WEF the most susceptible in this regard are the Threatened high-altitude grassland species currently occupying the area such as Rudd's Lark, Denham's Bustard, Yellow-breasted Pipit and Southern Bald Ibis. All three species, show a high degree of habitat specialisation tending to be restricted to small patches of more intact, high rainfall, plateau grassland. The occurrence of these species is patchily distributed throughout the region. Consequently, an effort was made to identify "hotpots" or core habitat areas for these species through a combination of kernel density distribution modelling, slope analysis and visual delineation using satellite imagery. In total four core habitats were identified and mapped within the VWC (Figure 5-1). Even relatively small habitat losses or alterations in these areas could have a significant impact on these highly range restricted and rare habitat specialists. One of these core habitat areas overlaps a large portion of the southern portion of the Kromhof WEF. Another potential impact is the possible degradation of wetland integrity for threatened wetland species through sedimentation from road and turbine construction. The consequence of this impact is highest in this area (see Figure 5-1). The pre-mitigation impact is therefore anticipated to be of **High** significance.

Table 6-1 Scoping-level, pre-mitigation impact significance rating for loss or alteration of habitat.

Impact	Probability	Consequence	Significance
Loss or Alteration of Habitat	4	3	High

6.2.1.1.2 Preliminary Mitigation

- Complete spatial avoidance of the identified very high sensitivity core habitat areas for threatened high altitude species;
- Effective and gazetted conservation of these and other remaining natural grasslands through conservation stewardship and appropriate land management practices could reduce the residual impact significance;
- Offsetting. Compilation and implementation of a biodiversity offset strategy with key focus on the conservation of high-altitude plateau grassland for threatened and / or endemic avifauna through appropriate land management practices; and
- Based on TBC's recommendation Mulilo has recently commissioned Dr. Robin Colyn of Afri-Avian to conduct detailed habitat modelling and acoustic monitoring for White-winged Flufftail. Additionally, Afri-Avian have been tasked with conducting detailed habitat suitability modelling for several selected threatened species. It is recommended that these additional modelling

exercises should include as a minimum species such as such as Rudd's Lark, Botha's Lark, Yellow-breasted Pipit, Denham's Bustard, Southern Bald Ibis and Wattled Crane.

- Consult the Birdlife 6 October 2022 Guidance Note: Minimising the impacts of infrastructure development on Secretarybirds *Sagittarius serpentarius.* The main tenets being the minimisation of large tracts of contiguous grassland habitat, respecting nest buffers and conserving habitat between nest sites and optimal foraging habitat.

6.2.1.2 Roadkill and other mortalities

6.2.1.2.1 Impact Description

The influx of people and motor vehicle movement during construction will invariably result in an increase in bird-vehicle collision. This can, however, be mitigated to a large degree through signage warning of bird hotspots along the access road and enforcing speed limits of staff and contractors in the project area and educating them on bird sensitivities during inductions. Vehicle movement at present, fairly infrequent and the birds on site are skittish. A slightly more pressing threat would be the destruction of nestlings of ground-nesting species during access road construction. Overall, the pre-mitigation impact is anticipated to be of **Low** significance.

Table 6-2 Scoping-level, pre-mitigation impact significance rating for roadkill and other mortalities.

Impact	Probability	Consequence	Significance
Roadkill and other mortalities	2	2	Low

6.2.1.2.2 Preliminary Mitigation

- Signpost the entry of roads into areas zoned as core habitat for threatened high altitude species as "Environmentally Sensitive Area Reduce Speed";
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.

6.2.1.3 Sensory Disturbance

6.2.1.3.1 Impact Description

At Kromhof WEF, the greatest and most potentially direct construction-related sensory threat would be the potential disturbance of breeding Rudd's Lark, Yellow-breasted Pipit and Southern Bald Ibis. Noise during construction may affect display by the grassland passerines whereas in-field observations show that roosting Southern Bald Ibis are nervous and quick to vacate their nests / roosts. It is also highly probable that large species such as cranes, korhaans, bustards and Secretarybirds may be displaced during construction. Disturbance associated with construction is expected to be short term (most adverse during the summer months for Rudd's Lark and Yellow-breasted Pipit) and the effects largely temporary.

Table 6-3 Scoping-level, pre-mitigation impact significance rating on sensory disturbance during construction.

Impact	Probability	Consequence	Significance
Sensory disturbance during construction	3	3	Medium

6.2.1.3.2 Preliminary Mitigation

- Spatial avoidance. Adhering to the prescribed nest and roost buffers. At present a 5 km radial infrastructure exclusion buffer has been assigned to Martial Eagle Nest 2 while Southern Bald Ibis Roosts 1, 6 and 11 have been assigned a 1 km very high infrastructure exclusion zone and a 2.5 km high sensitivity turbine minimisation zone; and
- Temporal avoidance. Timing construction to take place outside critical breeding window for Southern Bald Ibis (near breeding roosts) and threatened high-altitude grassland species.

6.2.2 Operation

6.2.2.1 Collisions With Turbines

6.2.2.1.1 Impact Description

Overall, the high abundance and diversity of priority species (which included 18 red-listed species) recorded within the Kromhof WEF suggests a high potential risk for significant mortalities during operation. Vantage point data (VPs 5, 9, 10, 11 and 12) from the first year of pre-construction monitoring (360 hours) revealed a total of 480 flights by priority species, totalling 40.9 hours with a passage rate of 1.33 birds^{-hour}. Rudimentary extrapolations on fatality rate (assuming 98% avoidance) predict that as many as 12.4 priority species may be killed in the turbine field (n=55) per year.

At Kromhof WEF three species are of greatest significance with regards to collision risk namely Rudd's Lark, Yellow-breasted Pipit, Southern Bald Ibis, Cape Vulture, Blue Crane, Jackal Buzzard and Amur Falcon. However, it should be noted that Bearded Vulture maintain a nest 27 km to the south and as such the potential for collision by this species (albeit low) should not be ruled out. Verreaux's Eagle collision is a concern given the close proximity of the WEF to a potential nest on Mont Pelaan (Nest 2). Another concern is the fatality rates projected for Southern Bald Ibis (3.71 birds^{-year}) and Cape Vulture (3 birds^{-year}). These projected mortality rates are high and should be considered unacceptable. Overall, this impact is afforded a Very High significance. Due to the sensitivity of the project area and magnitude of this impact, mitigation and avoidance strategies are unlikely to reduce the residual impact significance appreciably.

Rudd's Lark, and Yellow-breasted Pipit which are highly prone to collisions as they occupy plateau grasslands (where most of the turbines are likely to placed) and spend a large amount of time (up to 40 min at a time) displaying at rotor sweep height.

Southern Bald Ibis ranks eighth on BirdLife South Africa's priority list of collision prone species (Ralston Paton et al. 2017. Their high susceptibility is primarily attributed to their conservation status (Threatened), their ranging behaviour, gregarious nature and their overlap with potential wind energy development areas. As most operational wind farms occur outside the distribution range of the species little is known regarding their interaction with turbines. However, in light of their potential vulnerability as highlighted by Ralston Paton et al. (2017), the precautionary principle should be adopted. Vantage point observations support this assertion revealing that Southern Bald Ibis make regular flights across the project area from roosts to foraging areas and back. Juveniles in particular appear to spend most of their time foraging within 2.5 km radius of their natal roost. At Kromhof WEF the most significant breeding roosts with the greatest implications for turbine placement are Roosts 5 and 11.

Cape Vulture ranks first on BirdLife South Africa's priority list of collision prone species (Ralston Paton et al. 2017). This assertion, which was made almost 7 years ago with very limited data, is now backed by observed mortality rates from multiple wind farms. This data was recently presented in the Birdlife Conservation Conversations Webinar entitled "*Sharing the Sky*" which demonstrated that Cape Vultures have one of the highest mortality rates of any priority species in the country of 0.011 birds per turbine per year, placing them third only to Jackal Buzzard and Amur Falcon. In the project area a total of 108 individual Cape Vulture passages were recorded from the five on-site vantage points at a passage rate of 0.3 birds^{-hour} during the Year 1 monitoring. However, a strong seasonal variation in flight activity was

observed with a threefold increase during autumn 0.92 birds^{-hour}. The birds are coming mainly from three roosts to the south of the project area (all within a 50 km radius) with the bulk emanating from the breeding colony at Nelson's Kop (ca. 200 individuals). The general trend is for groups to appear low over the horizon from the south in the direction of one of the three roosts to the south of the project area (typically 09:30 to 11:30 am in winter and 08:00 to 10:30 am in summer), fly across the project area before gaining height as they leave the project in a northerly direction, often towards the Witkoppe Mountains. A number of factors likely underpin the high attendance of Cape Vultures. These include the close proximity of roosts, ample carcass opportunities (major cattle farmers in the region) and the presence of a large Eskom Transmission line which cross the south-western corner of the WEF and provides a corridor for movement and overnight roosting. At times up to 120 birds were seen roosting on these powerlines overnight and more than 200 birds have been observed feeding at carcasses in the area.

Table 6-4 Projected fatality rates for the various priority species. Methodology adapted from that used by Wild Skies

Common Name	Annual Passage Rate	VP Birds^{-year}	Birds at Rotor^{-year}	Projected Fatalities^{-year}
African Harrier-Hawk	0.017	73.00	6.80	0.14
Amur Falcon	0.153	333.67	31.08	0.62
Black Harrier		0.00	0.00	0.00
Black Sparrowhawk	0.006	24.33	2.27	0.05
Black-winged Kite		0.00	0.00	0.00
Blue Crane	0.078	340.67	31.73	0.63
Booted Eagle		0.00	0.00	0.00
Cape Vulture	0.331	1447.83	134.84	2.70
Common Buzzard	0.003	12.17	1.13	0.02
Denham's Bustard	0.014	60.83	5.67	0.11
Greater Kestrel	0.008	36.50	3.40	0.07
Grey Crowned Crane		0.00	0.00	0.00
Ground Woodpecker		0.00	0.00	0.00
Jackal Buzzard	0.214	936.83	87.25	1.75
Lanner Falcon	0.053	231.17	21.53	0.43
Lesser Kestrel		0.00	0.00	0.00
Little Sparrowhawk		0.00	0.00	0.00
Martial Eagle	0.022	97.33	9.07	0.18
Melodious Lark		0.00	0.00	0.00
Peregrine Falcon		0.00	0.00	0.00
Rock Kestrel	0.028	121.67	11.33	0.23
Rudd's Lark	0.003	12.17	1.13	0.02
Rufous-breasted Sparrowhawk	0.006	24.33	2.27	0.05
Secretarybird	0.008	36.50	3.40	0.07
Southern Bald Ibis	0.431	1885.83	175.64	3.51
Verreaux's Eagle	0.022	97.33	9.07	0.18
Wahlberg's Eagle		0.00	0.00	0.00
White-necked Raven	0.072	316.33	29.46	0.59
Yellow-billed Kite		0.00	0.00	0.00
Yellow-billed Stork	0.003	12.17	1.13	0.02
Yellow-breasted Pipit		0.00	0.00	0.00
Total		6100.67	568.18	11.36

Table 6-5 Scoping-level, pre-mitigation impact significance rating on collisions with turbines

Impact	Probability	Consequence	Significance
Collisions with turbines	4	4	Very high

6.2.2.1.2 Preliminary Mitigation

- More tracking data on Southern Bald Ibis flight patterns is needed to better understand flight patterns and collision risk over the WEF and the VWC as a whole. It is recommended that Mulilo collaborate with Dr. Carina Pienaar who is currently tracking birds from the Witkoppe roost to investigate the possibility of fitting fledglings from Roosts 6 and 11 in particular;
- Mitigation efficacy limited by high Cape Vulture flight prevalence (cumulative passage rate and flight time at rotor height) over the WEF. Highlighted as a significant risk;
- Spatial Avoidance. In event that the WEF is authorised then spatial avoidance is paramount. The most important mitigation measure in this regard centres on spatial planning. All infrastructure should be completely avoided in areas designated in the sensitivity map as Very High sensitivity. Infrastructure should be minimised unless completely unavoidable in all areas of High sensitivity;
- Temporal avoidance. One aspect that should be thoroughly investigated would be the possibility for curtailment during peak flight times. The vantage point data revealed a strong diurnal variation in flight activity of priority species. By far the majority of flight activity occurred between 09:30 and 12:30 in winter and 08:30 to 11:30 in summer. Another peak occurs for about an hour before and following sunset when most priority species particularly Southern Bald Ibis and Martial Eagle commute back from foraging. Complete shutdown of the entire wind farm, or the shutdown of the majority of selected “risky” turbine locations, during these times will drastically reduce the risk of turbine collisions. Another key event to consider is the annual migration of Amur Falcon which peaks for only a few days. Observer-based shutdown could be critical to the avoidance of mass strikes;
- Any turbines placed in High sensitivity areas must be subject to intense mitigation measures such as intelligent camera systems (e.g. Identiflight or Bioseco), automated curtailment using Artificial Intelligence (AI) models and GPS flight data, radar and bird spotters to inform shutdown on demand, blade painting. Given the sensitivity of the site, as a minimum, all planned turbines which currently overlap Very High and High buffers should be removed from the turbine layout;
- Observer led shut down on demand (SDOD) should be implemented. It is, however, important to note that the efficacy of this system will be significantly limited by the extreme and highly erratic climatic conditions on site. Cloud, mist and rain can dramatically hamper visibility and therefore the efficacy of this system for several days at a time. However, vultures and other priority species were still observed flying in these conditions. It is recommended that selected turbines may need to be shut down in periods of intense mist and cloud cover. This would involve a massive undertaking by a very large team of well-trained observers capable of working (and surviving) at sub-zero temperatures in harsh conditions which includes snow blizzards. The team would require radios and satellite phones as a minimum and be linked to an emergency response team.
- One blade should be painted red. Anticipate and, budget for communications and authorisations from CAA;

- A Cape Vulture Food Management Programme will need to be designed and implemented to ensure all dead livestock/wildlife on site are removed as soon as possible and transferred to designated vulture restaurants sufficiently far awa from the WEF. This would need to be an intensive undertaking by a team of full-time rangers working in close radio communication with the farmers;
- Develop a contingency mitigation budget to cater for significant mortality events. This budget should allow for research into, and effective implementation of, adaptive management strategies such as human based turbine shutdown on demand; habitat alteration; bird deterrence from site; and any others identified as feasible;
- A Biodiversity Management Plan (BMP) must be compiled for the project by an ornithologist prior to construction which outlines critical thresholds for fatalities and the appropriate management response;
- Inform and collaborate with relevant NGOs such as VULPRO, BirdLife South Africa and the Endangered Wildlife Trust (EWT). It is imperative that these organisations be given ample opportunity to provide information (e.g. tracking data, models and reports) that is critical to informing project planning regarding feasibility. Some collaboration with EWT and Birdlife is underway but VULPRO remains uninformed;
- Track Martial Eagles within the project area. A study of this nature has recently been commissioned by Mulilo and the first male eagle has already been captured and fitted with a GPS logger by Dr. Gareth Tate of EWT (May 2024);
- Track Southern Bald Ibis. Dr Carina Pienaar is currently busy tracking bald ibises from the Witkoppe Roost. It is recommended that she be contacted to consider fitting GPS loggers to fledglings from within the VWC; and
- Collision Risk Modelling. Mulilo is currently engaging with TBC and Afri-Avian to design and compile a detailed collision risk model for five species anticipated most prone to collision with the proposed wind turbines.

6.2.2.2 Collisions and Electrocutions with Electrical Transmission Lines and Auxiliary Infrastructure

6.2.2.2.1 Impact Description

It is currently uncertain as to the extent, position or length of any new transmission lines to be established for the WEF or where exactly the grid connection point will be. These linear infrastructure aspects will also be covered in a separate grid connection application report. However, the establishment of any transmission lines, and any overhead internal reticulation lines, poses a potential collision and electrocution risk to birds especially larger-bodied, less manoeuvrable species such as cranes, korhaans, bustards, storks, secretarybirds and raptors. Kromhof WEF (together with Markgraaff WEF) supports one of the highest concentrations of Denham's Bustard in the VWC, a species likely to be particularly prone to collisions with electrical infrastructure.

The undulating landscape and frequent misty/rainy conditions of the Eastern Free State, contribute to high powerline collision rates for birds, even when the lines are marked with conventional flappers or alternating black/white pigtails. Increased wind speeds during winter, when mist/rain are less likely, makes manoeuvrability for large species like cranes more difficult (BirdlifeSA pers.comm. 2025).

Table 6-6 Scoping-level, pre-mitigation impact significance rating on Collisions and Electrocutions with Electrical Transmission Lines and Auxiliary Infrastructure.

Impact	Probability	Consequence	Significance

Collisions and Electrocutions with Electrical Transmission Lines and Auxiliary Infrastructure	3	3	Medium

6.2.2.2.2 Preliminary Mitigation

- Carefully plan the route of any above ground electrical infrastructure to avoid where possible large wetlands, cliffs, gorges and other areas of high avian abundance or sensitivity;
- Install Eskom-approved flappers or coils (flight diverters), along the entire length of the 500 m line at no more than 10 m intervals. Flight diverter structures should ideally alternate between light and dark shades to maximise visibility and contrast against background as seen from powerline level. The structures must be installed as the powerlines are being spanned. This will drastically help to increase the visibility of transmission lines especially the thinner earth line with which most collisions tend to be associated (Martin et al. 2010);
- Anti-perch devices should be intensified on main Eskom powerlines to further reduce perch suitability;
- All power cables between panels and the battery energy storage system (BESS) within the project area should be thoroughly insulated and buried in demarcated corridors; and
- All above ground electrical transmission infrastructure should be fitted with the latest Eskom approved anti-bird structures and anti-collision line marking devices.
- Quarterly monitoring at Ingula Nature Reserve can be used to help assess the likely significance of powerline collisions, after mitigation. An average of 5 priority threatened species (e.g. Cape Vulture, cranes, Denham's Bustard) are killed by collision per annum along the Ingula-Majuba 400kV line, which traverses a similar habitat type, land use, and avifaunal species composition (BirdlifeSA, pers.comm. 2025).

6.2.2.3 Sensory Disturbance

6.2.2.3.1 Impact Description

The effects of noise on threatened songbirds in the project area remains a pressing and under studied risk. The noise generated by a wind turbine can often exceed 30 dBA even at a distance of 800 m (Katinas et al., 2016; Rogers et al., 2006) which is the distance most often associated with avoidance behaviour (Santos et al., 2021). In this regard it is important to consider that a change of 3 dBA already reduces the hearing range of birds by 50% while a change in excess of 12dBA effectively reduces the hearing range of a bird by more than 90% meaning that at the core of the wind turbine noise-polluted area, birds are expected to barely perceive any other acoustic cues in their environment at all Barber et al. (2010).

Empirical research on the effects of turbine noise nose on birds is an emerging field. The few existing studies show that turbine-related noise impacts are likely to be hardest felt by songbirds which rely on vocalisations for a wide array of critical behavioural interactions from courtship and territory defence to rearing of young and alarm signalling causing them to either vacate the area or change the acoustic parameters of their calls with behavioural consequences. For example, a study by Lehnardt et al. (2021) using a simulated broadcast of turbine noise at a site in Israel noted a 45% and 36% decrease in abundance for the lesser whitethroat (*Sylvia curruca*) and Sardinian warbler (*Sylvia melanocephala momus*), respectively. Another study by Zwart et al. (2015) showed that male European Robins (*Erithacus rubecula*) called at higher frequencies in the presence of wind turbine noise, presumably in an attempt to combat acoustic masking at the expense of lower frequency contact calls used for territorial disputes. The consequence being a decreased ability to deter a rival through scolding alone leading to an increased energy expenditure, risks of injury and, ultimately breeding success.

Of the various songbirds susceptible to noise in the project area, two species namely Rudd's Lark, and Yellow-breasted Pipit are of particular significance with regards the Kromhof WEF. The males of all three species spend a considerable proportion of their time, during the breeding season, calling during protracted aerial displays which can last more than 40 minutes at a time. Consequently, due to a combination of their Threatened status and acoustic-dependant breeding behaviour it stands to reason that these species may be significantly adversely affected by turbine noise.

Table 6-7 Scoping-level, pre-mitigation impact significance rating on sensory disturbance during operation.

Impact	Probability	Consequence	Significance
Sensory disturbance during operation	3	4	High

6.2.2.3.2 Preliminary Mitigation

- Spatial Avoidance. Avoid the placement of turbines in areas identified as core habitats identified for threatened high-altitude species; and
- Temporal Avoidance. The possibility of curtailment, namely stopping turbine operation during certain times of the day (mid-morning and late afternoon) during peak breeding season should be considered.

6.2.3 Effect on Migratory and Congregatory Species

6.2.3.1.1 Impact Description

Many flocks of migratory birds move across the project area in early summer. One of the most potentially significant flocks in this regard is the annual migration of Amur Falcon. During Survey 3 a very large migratory flock (numbering in the thousands) was observed moving along the Meul River valley (mainly in the Kromhof WEF) in a dense swarm numbering over a thousand birds. Migratory flocks of this size are of global significance. The potential for a large collision event is a possibility and represents a large risk in terms of wind farm development. Projected fatality rates suggest that as many as 21 birds could be killed in the turbine field on an annual basis.

Another potentially significant aspect is the project's proximity to the Great Escarpment (100 m from eastern-most corner). The escarpment is important from a national and regional bird movement perspective. Many of South-Africa's resident grassland species make seasonal altitudinal movements across the escarpment in response to climate and food availability (between high altitude grasslands and lower altitude savannahs). Additionally, the lift created through thermals in these steep mountainous areas provides ideal conditions for large-bodied, red-listed soaring species such as Bearded Vulture, Cape Vulture, Verreaux's Eagle, Secretarybird, Martial Eagle, Black Stork and Yellow-billed Stork, which frequently move along the escarpment to access foraging grounds on either side of it.

Table 6-8 Scoping-level, pre-mitigation impact significance rating on effect on migratory and congregatory species.

Impact	Probability	Consequence	Significance
Effect on migratory and congregatory species	4	4	Very High

6.2.3.1.2 Preliminary Mitigation

- Due to the seasonal arrival of large migratory flocks it is possible that a combination of observer-based shut-down on demand and temporal avoidance can be employed to reduce the probability of collisions.

6.2.4 Cumulative Impact

The AOI is largely natural and, in most areas, pristine. At present there are no operational wind energy facilities in or within 50 km surrounding the project area. However, there are two other proposed Mulilo WEF projects in the region namely that of Phumelela (avifauna assessment conducted by TBC) and Goedehoop (avifauna monitoring conducted by Dr. Steven Evans). Additionally, EDF has proposed WEF projects for most of the land in between these WEFs. Including this project there are at least 4 prospective wind developments planned for the Phumelela region. There is, however, also a vested birding interest in the region (e.g. Roberts Memel Birding Site, Memel Getaway Birding Routes) and NGOs such as BirdLife and EWT are distinctly aware of the avifaunal importance and are actively working in the region. The proposed VWC is not located within one of the promulgated Renewable Energy Development Zones (REDZ) and a portion of the northern end of the VWC overlaps the Grasslands IBA. Known projects located within a 50km radius of the are listed in Table 6-10 and mapped in Figure 6-1. Based on the information at hand, the cumulative impact of wind energy developments in this region is likely to have a significance consequence for birdlife on a national to global scale.

Table 6-9 Scoping-level, pre-mitigation impact significance rating on the cumulative impact.

Impact	Probability	Consequence	Significance
Cumulative impact	4	4	Very High

Table 6-10 Renewable energy applications within a 50 km radius as provided by WSP

Project Name	Applicant	Status	Reference Number	Distance away (KM)
Newcastle Gas Engine Power Plant (NGEPP), Newcastle, KwaZulu-Natal Province.	Newcastle Energy (Pty) Ltd	Refused	14/12/16/3/3/2/2074	36
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle	Distributed Energy Generation (Pty) Ltd	In process	14/12/16/3/3/1/1164	37
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle - Amendment	Distributed Energy Generation (Pty) Ltd	Approved	14/12/16/3/3/1/1164/AM1	37
Proposed Newcastle solar energy facility near Newcastle, KwaZulu-Natal Province	Building Energy (Pty) Ltd	Refused	14/12/16/3/3/1/1225	38

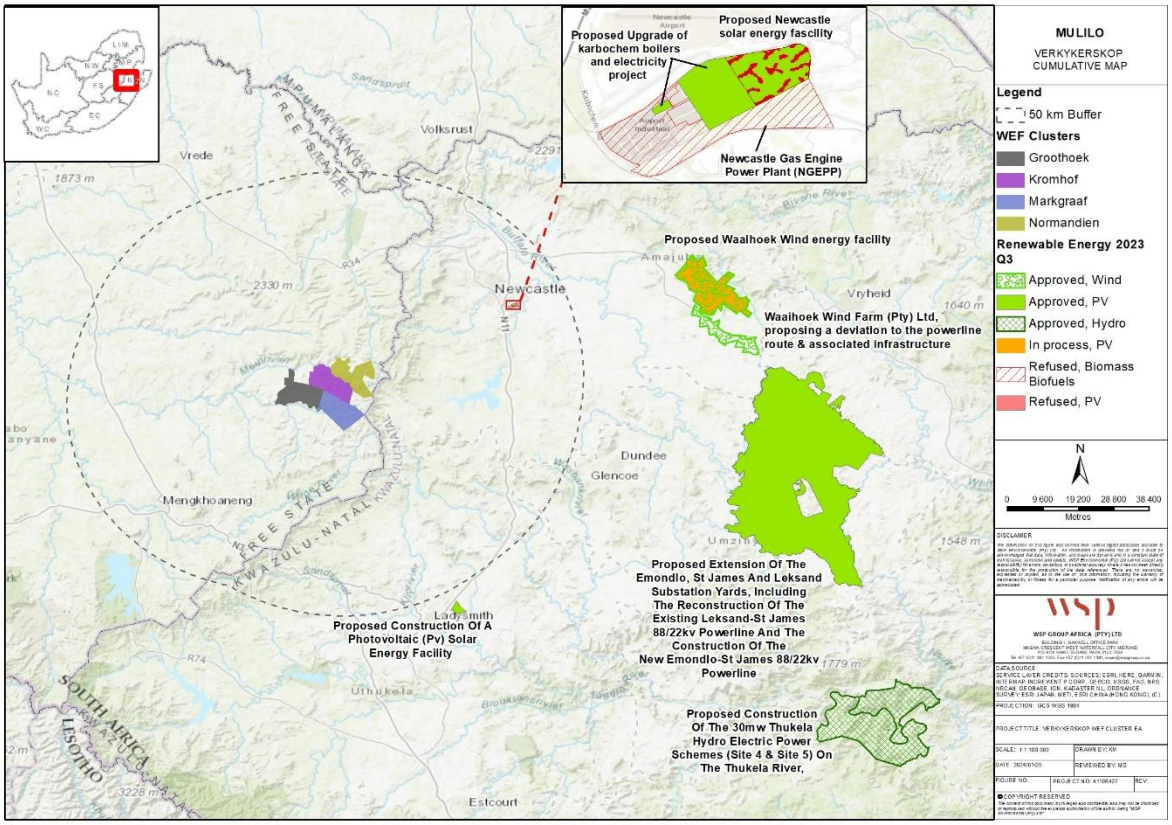

Figure 6-1 Renewable energy applications within a 50 km radius of the VWC. Note this map excludes several proposed wind energy projects in the Phumelela / Memel Area.

7. Plan of Study – Pre-construction Monitoring

Based on the information provided it the developer will seek to establish up to four wind energy facilities within the VWC of which Kromhof WEF is one. It is also noted that each will have its own grid connection linear infrastructure. As the position and length of each grid connection corridor is currently unknown this project allows for two 15 km alternatives for the Kromhof WEF.

7.1 Compliance

The approach outlined below in the schedule and deliverables section has been designed to comply with the following global and national legislation and best proactive standards:

- International Finance Corporation (IFC) Performance Standard 6 (IFC, 2019);
- Equator Principles (EP4, 2020);
- Birds and wind energy best practice guidelines (Jenkins et al. 2015);
- Cape Vulture and wind farms best practice guidelines (BLSA, 2018);
- Verreaux's Eagle and wind farms best practice guidelines (BLSA, 2017);
- The National Web-Based Environmental Screening Tool DEA website (2022);
- South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna Protocols for environmental impact assessments in South Africa;

- Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 when applying for Environmental Authorisation (Gazetted October 2020); and
- Protocol for the specialist assessment and minimum report content requirements for environmental impacts on avifaunal species by onshore wind energy generation facilities where the electricity output is 20MW or more (Government Gazette No. 43110 – 20 March 2020).

7.2 Schedule and Deliverables

Scoping fieldwork involved an eight-day reconnaissance survey from 18-25 July 2022 (two days per WEF). Due to the scale of the project, there are six surveys in a year as opposed to the conventional four. Each survey for the VWC is run over two 22-day periods (which translates to ca. 5-6 days for Groothoek WEF per survey). Based on the two-year monitoring requirement, fieldwork sessions were thus planned to end in late 2024, assuming no unforeseen catastrophic events or pandemic restrictions. The scoping reports are set to be submitted in January 2025. Then, allowing for data processing and reporting, the first draft submission deadline for all four WEF reports (one for each WEF) would be April 2025 (with progress reports after each sampling season). The following plan and scope of work is anticipated.

1. Information requests session (bullet point list and one remote meeting, completed).
2. Scoping Assessment (desktop study followed by 8-day site visit divided into 2 days per WEF project and a brief report (**completed**).
3. Use results of scoping assessment to inform initial layout planning of WEF and establish more precise scope of avifauna monitoring (**completed**).
4. Species specific guidelines **are** warranted, therefore:
    - Two-year cycle;
    - Intensive pre-construction monitoring conducted according to national and international best practice as well as the species-specific guidelines for Verreauxs' Eagle, Cape Vulture;
    - Fieldwork per annual cycle:
        - Three in-field observers per site visit, which includes one avifaunal lead and two competent avifaunal field assistants;
        - This is broken into Six, 22-day field sessions (one in each main season and others in peak breeding season). This equates to six, 5-6 day trips per WEF project per year. Note the sessions are broken into two WEFs at a time (two site visit legs per survey). This essentially means 12 trips to and from our base in northern Gauteng per year so 12 surveys or 24 trips over the 2-year cycle;
        - A total of 17 Vantage Points and one Control for the VWC. Average of four vantage points per WEF;
        - 12 hours of surveying per vantage point **per season totalling 72 hours per VP per year conducted by two observers simultaneously**;
        - Two to four driven transects per WEF (including one control) conducted by the third observer in rotation with the vantage point observers;
        - One walked transect at each VP (including one control); and

- Several focal point surveys scattered throughout the VWC and AOI;

- Progress report after each fieldwork session (6 per year);
- Three pre-construction monitoring reports (one for each WEF) after 24-month cycle completed;
- Three Avifaunal Impact Assessment Reports (one for each WEFs grid connection infrastructure) submitted after the two-year monitoring WE reports have been completed; and
- Mulilo will be initiating a carcass management project within the project area in collaboration with the local landowners and their staff. The Biodiversity Company was commissioned to extend the avifaunal monitoring by two surveys to note any changes in vulture attendance.

Note: The VWC is situated 23 km north of a known Cape Vulture colony on Nelson's Kop as well as two other roost sites (<35 km radius of the project area). The status of this colony has been confirmed as a breeding colony. As such the decision-making hierarchy / philosophy is going to be based on the flow diagram for Cape Vultures as presented in the 2018 best practice document entitled Cape Vulture and Wind Farms Guidelines for impact assessment, monitoring and mitigation.

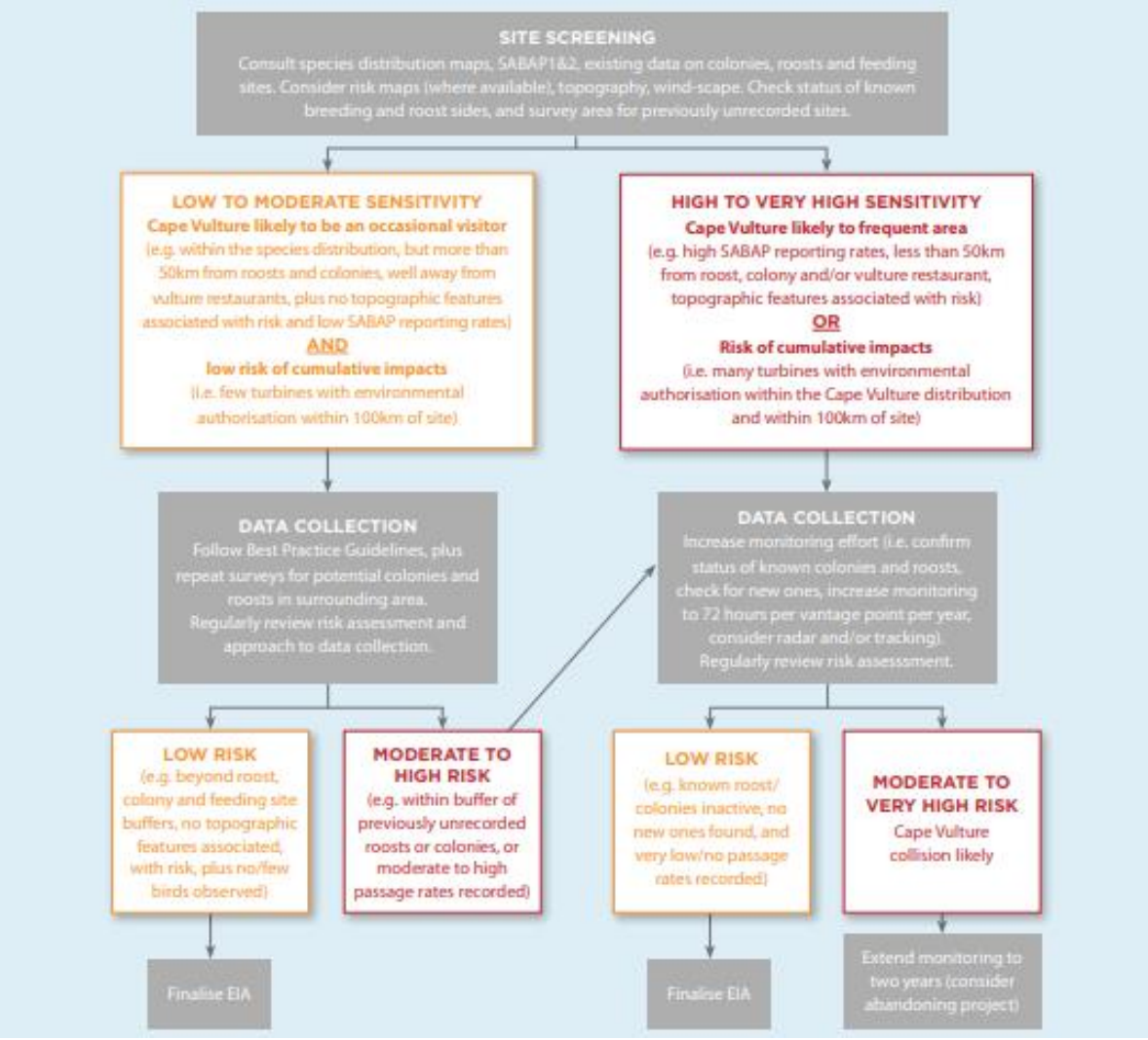

Figure 7-1 Decision hierarchy as applicable to Cape Vulture sensitive areas (BLSA, 2018).

8. Conclusion

At a regional scale, the project area is surrounded by five IBAs (within 30 km radius). Additionally, several well-established birding routes traverse the AOI. A large proportion of the WEF to the south (associated with the plateau grasslands) is zoned as global KBA. At a local scale 18 red-listed species (of which 15 are Threatened) have been documented within the Kromhof WEF, a high number in the South African context. the Kromhof WEF intersects 22 nest buffers of priority species namely Cape Vulture Roosts 1-5, Southern Bald Ibis Roosts 5, 11, 14, 16, 17, 18 and 19, Blue Crane Nests 1-3, Jackal Buzzard Nest 3, Lanner Falcon Nests 2 and 3, Rock Kestrel Nest 1, and Verreaux's Eagle Nests 2 and 3. Two habitats in the proposed Kromhof WEF are particularly important from an avifaunal perspective namely the plateau grasslands and the Muel River floodplain. Both of which have been preliminarily mapped and should, as a minimum, be considered infrastructure exclusion zones (see Figure 5-1). The precise extent of these key habitats will be refined through an intensive habitat modelling study which is currently underway (and it is highly probable that these areas could be expanded upon).

In terms of key grasslands, the Kromhof WEF supports some of most extensive and representative plateau habitat to be found within the VWC. The highest and most pristine plateau grassland habitat (associated with the Mont Pelaan ridge along the southern boundary) has been identified as important core habitat for threatened high-altitude grassland species. Most significant in this regard are the breeding populations of Rudd's Lark (Endangered) and Yellow-breasted Pipit (Vulnerable). Both species engage in protracted aerial displays throughout the summer months. The plateau grasslands are also frequently used by Denham's Bustard (Vulnerable) Blue Korhaan (Near-Threatened), Blue Crane (Vulnerable) and Southern Bald Ibis (Vulnerable).

In contrast to the high plateau grasslands, the broad Muel River floodplain provides important habitat for cranes and potentially flufftails. The wetland is regularly occupied by both Blue Crane (Vulnerable) and Grey Crowned Crane (Endangered). Although both are likely to breed in the wetland only a Blue Crane nest has been found to date. Additionally, the abundance of sedges provides suitable habitat for Wattled Crane and possibly White-winged Flufftail which are both Critically Endangered. However, this wetland habitat is threatened by inundation from recent the construction of a large dam.

At this stage the main impacts anticipated for avifauna at Kromhof WEF involve habitat loss, collisions and sensory disturbance. Habitat loss has the greatest potential implications for threatened high-altitude grassland species such as Rudd's Lark which are patchily distributed and have a small extent of occurrence on a global scale. Any loss of there already restricted range should be considered significant and any loss of core breeding habitat should be avoided all together. In terms of collision risk Southern Bald Ibis, Cape Vulture, Amur Falcon and Jackal Buzzard stand out from a passage rate perspective. Southern Bald Ibis regularly forage in the WEF and maintain two breeding roosts just outside the northern and southern boundaries of the Kromhof WEFF. For Cape Vulture, five distinct roosts on separate inselbergs have been identified within a 50 km radius of the Kromhof WEF. These include three to the south of the project area one to the west and one to the north-west. Of these, successful breeding was confirmed at Roost 3 on Nelson's Kop (27 km south-west). A strong seasonal variation in their flight activity was uncovered with flight activity peaking significantly in summer. Migratory Amur Falcon visit the WEF during the summer to forage and congregate annually along the Muel River floodplain where they perch in large numbers on the powerlines and trees. A pair of Jackal Buzzard breed at Nest 3 near VP 9 and thus the species is well represented in the flight path data and susceptible to collision, particularly in the eastern regions of the WEF. Additionally, in-field observations suggest that Yellow-breasted Pipit and Rudd's Lark may also be prime candidates for collision from a flight duration perspective, particularly in the summer months due to their breeding behaviour which involves protracted aerial displays at potential rotor sweep height. Lastly noise generated by the turbines is highlighted as a potentially significant impact for threatened songbirds. In this regard two species

namely Rudd's Lark, and Yellow-breasted Pipit are particularly susceptible due to a combination of their Threatened status and call-dependant breeding behaviour.

9. Preliminary Specialist Statement

Given the largely intact, high altitude grassland nature of the WEF, its close proximity to the Drakensburg Escarpment, high diversity and abundance of red-listed and / or endemic species and high number of priority species nests and roosts, it is apparent that the project area is situated in an area of high avifaunal importance and sensitivity. The establishment of wind turbines in this area (in spite of micro-siting and mitigation), may pose a significant risk to local birdlife, particularly in terms of Rudd's Lark, Yellow-breasted Pipit, Southern Bald Ibis Cape Vulture, Jackal Buzzard and Amur Falcon. Based on the nest localities, flight activity data and projected fatality rates it is cautioned that significant mortalities of several Threatened species are likely to occur on an annual basis. There are currently no operational wind energy facilities on high-altitude plateau grasslands associated with the Great Escarpment in the eastern Free State and as such our knowledge regarding the collision risk of many of these grassland endemics is limited. A thorough exploration of the realistic mitigation and spatiotemporal avoidance options is required which includes the incorporation of findings from the ongoing habitat modelling for selected threatened passerines and the Martial Eagle tracking into the final report. It is recommended that the pursuit of this application be carefully considered, given the high avifaunal sensitivity of the region and the significant risk of collision posed to a high number of threatened bird species.

10. References

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11. Appendix: Present and Potentially Occurring Avifauna

Common Name	Scientific Name	Conservation Status					Priority Spp	LO Kromhof	VK Cluster	AOI	SABAP2 (cards)
		Global	Regional	TOPS	FS	Endemicity					
Common Ostrich	*Struthio camelus*	LC	LC					5			2
Grey-winged Francolin	*Scleroptila afra*	LC	LC		OG	E	x	1	x	x	6
Red-winged Francolin	*Scleroptila levaillantii*	LC	LC		OG			1	x	x	5
Shelley's Francolin	*Scleroptila shelleyi*	LC	LC		OG			**4**			
Natal Spurfowl	*Pternistis natalensis*	LC	LC		OG			1	x	x	2
Red-necked Spurfowl	*Pternistis afer*	LC	LC		OG			2	x	x	
Swainson's Spurfowl	*Pternistis swainsonii*	LC	LC		OG			1	x	x	10
Common Quail	*Coturnix coturnix*	LC	LC		OG			1	x	x	10
Helmeted Guineafowl	*Numida meleagris*	LC	LC		OG			1	x	x	13
White-faced Whistling Duck	*Dendrocygna viduata*	LC	LC		PG			1	x	x	
White-backed Duck	*Thalassornis leuconotus*	LC	LC		PG			1	x	x	
Maccoa Duck	*Oxyura maccoa*	EN	NT		PG		x	2		x	
Egyptian Goose	*Alopochen aegyptiaca*	LC	LC		PG			1	x	x	15
South African Shelduck	*Tadorna cana*	LC	LC		OG			1	x	x	6
Spur-winged Goose	*Plectropterus gambensis*	LC	LC		OG			1	x	x	9
Knob-billed Duck	*Sarkidiornis melanotos*	LC	LC		PG			3			
African Black Duck	*Anas sparsa*	LC	LC		PG			1	x	x	6
Yellow-billed Duck	*Anas undulata*	LC	LC		OG			1	x	x	14
Cape Shoveler	*Spatula smithii*	LC	LC		PG			1	x	x	2
Red-billed Teal	*Anas erythrorhyncha*	LC	LC		OG			1	x	x	5
Common (Kurrichane) Buttonquail	*Turnix sylvaticus*	LC	LC		PG			2	x	x	
Greater Honeyguide	*Indicator indicator*	LC	LC		PG			1	x	x	2
Lesser Honeyguide	*Indicator minor*	LC	LC		PG			3			
Brown-backed Honeybird	*Prodotiscus regulus*	LC	LC		PG			3			
Red-throated Wryneck	*Jynx ruficollis*	LC	LC		PG			1	x	x	10
Ground Woodpecker	*Geocolaptes olivaceus*	NT	LC		PG	E	x	1	x	x	14

Olive Woodpecker	*Dendropicos griseocephalus*	LC	LC	PG			2	x	x	
Acacia Pied Barbet	*Tricholaema leucomelas*	LC	LC	PG			2	x	x	1
Black-collared Barbet	*Lybius torquatus*	LC	LC	PG			2	x	x	2
Crested Barbet	*Trachyphonus vaillantii*	LC	LC	PG			2	x	x	
African Hoopoe	*Upupa africana*	LC	LC	PG			1	x	x	9
Green Wood-hoopoe	*Phoeniculus purpureus*	LC	LC	PG			2	x	x	2
Lilac-breasted Roller	*Coracias caudatus*	LC	LC	PG			3	x	x	
Half-collared Kingfisher	*Alcedo semitorquata*	LC	NT	PG		x	1	x	x	1
Malachite Kingfisher	*Corythornis cristatus*	LC	LC	PG			1	x	x	7
Brown-hooded Kingfisher	*Halcyon albiventris*	LC	LC	PG			2		x	1
Giant Kingfisher	*Megaceryle maxima*	LC	LC	PG			1	x	x	6
Pied Kingfisher	*Ceryle rudis*	LC	LC	PG			1	x	x	2
European Bee-eater	*Merops apiaster*	LC	LC	PG			2	x	x	
Speckled Mousebird	*Colius striatus*	LC	LC				1	x	x	8
Red-faced Mousebird	*Urocolius indicus*	LC	LC				1	x	x	
Jacobin Cuckoo	*Clamator jacobinus*	LC	LC	PG			4			
Great Spotted Cuckoo	*Clamator glandarius*	LC	LC	PG			4			
Red-chested Cuckoo	*Cuculus solitarius*	LC	LC	PG			1	x	x	4
Black Cuckoo	*Cuculus clamosus*	LC	LC	PG			3			1
Common Cuckoo	*Cuculus canorus*	LC	LC	PG			4			
Klaas's Cuckoo	*Chrysococcyx klaas*	LC	LC	PG			2	x	x	
Diederik Cuckoo	*Chrysococcyx caprius*	LC	LC	PG			1	x	x	5
Alpine Swift	*Tachymarptis melba*	LC	LC	PG			1	x	x	6
Common Swift	*Apus apus*	LC	LC	PG			2	x	x	1
African Black Swift	*Apus barbatus*	LC	LC	PG			1	x	x	10
Little Swift	*Apus affinis*	LC	LC	PG			2	x	x	2
Horus Swift	*Apus horus*	LC	LC	PG			1	x	x	2
White-rumped Swift	*Apus caffer*	LC	LC	PG			1	x	x	11
Western Barn Owl	*Tyto alba*	LC	LC	PG			2	x	x	
African Grass Owl	*Tyto capensis*	LC	VU	PG		x	3			
Southern White-faced Owl	*Ptilopsis granti*	LC	LC	PG			2			
Cape Eagle-Owl	*Bubo capensis*	LC	LC	PG		x	2	x	x	2
Spotted Eagle-Owl	*Bubo africanus*	LC	LC	PG		x	1	x	x	3

Marsh Owl	*Asio capensis*	LC	LC		PG		x	2	x	x		
Fiery-necked Nightjar	*Caprimulgus pectoralis*	LC	LC		PG			1	x	x	1	
Freckled Nightjar	*Caprimulgus tristigma*	LC	LC		PG			2				
Rock Dove	*Columba livia*	LC	LC		PG			2			4	
Speckled Pigeon	*Columba guinea*	LC	LC					1	x	x	13	
African Olive Pigeon	*Columba arquatrix*	LC	LC		PG			2	x	x	2	
Laughing Dove	*Spilopelia senegalensis*	LC	LC					1	x	x	10	
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	LC	LC					1	x	x	16	
Red-eyed Dove	*Streptopelia semitorquata*	LC	LC		PG			1	x	x	15	
Namaqua Dove	*Oena capensis*	LC	LC		PG			1	x	x	3	
Denham's Bustard	*Neotis denhami*	NT	VU	VU	PG		x	1	x	x	4	
Blue Korhaan	*Eupodotis caerulescens*	NT	LC		PG	E	x	1	x	x	5	
White-bellied Korhaan (Bustard)	*Eupodotis senegalensis*	LC	VU		PG		x	1	x	x	3	
Black-bellied Bustard	*Lissotis melanogaster*	LC	LC		PG		x	3		x		
Grey Crowned Crane	*Balearica regulorum*	EN	EN	EN	PG		x	1	x	x	10	
Blue Crane	*Grus paradisea*	VU	NT	PS	OG		x	1	x	x	12	
Wattled Crane	*Grus carunculata*	VU	CR	CR	PG		x	2	x	x	1	
Striped Flufftail	*Sarothrura affinis*	LC	VU		PG		x	3	x	x		
White-winged Flufftail	*Sarothrura ayresi*	CR	CR		PG		x	3				
African Rail	*Rallus caerulescens*	LC	LC		PG			2	x	x	1	
African Crake	*Crecopsis egregia*	LC	LC		PG			1	x	x		
Corn Crake	*Crex crex*	LC	LC		PG			3				
Black Crake	*Zapornia flavirostra*	LC	LC		PG			2			1	
Baillon's Crake	*Zapornia pusilla*	LC	LC		PG			2				
African (Purple) Swamphen	*Porphyrio madagascariensis*	LC	LC		PG			2			2	
Common Moorhen	*Gallinula chloropus*	LC	LC		PG			1	x	x	6	
Red-knobbed coot	*Fulica cristata*	LC	LC		OG			1	x	x	13	
African Snipe	*Gallinago nigripennis*	LC	LC		PG			1	x	x	1	
Common Greenshank	*Tringa nebularia*	LC	LC		PG			3			1	
Common Sandpiper	*Actitis hypoleucos*	LC	LC		PG			1	x	x		
African Jacana	*Actophilornis africanus*	LC	LC		PG			1	x	x		
Spotted Thick-knee	*Burhinus capensis*	LC	LC		PG			2	x	x	2	
Black-winged Stilt	*Himantopus himantopus*	LC	LC		PG			1	x	x		

Pied Avocet	*Recurvirostra avosetta*	LC	LC		PG			2			
Common Ringed Plover	*Charadrius hiaticula*	LC	LC		PG			3			
Kittlitz's Plover	*Charadrius pecuarius*	LC	LC		PG			3			
Three-banded Plover	*Charadrius tricollaris*	LC	LC		PG			1	x	x	2
Blacksmith Lapwing	*Vanellus armatus*	LC	LC		PG			1	x	x	9
African Wattled Lapwing	*Vanellus senegallus*	LC	LC		PG			1	x	x	4
Black-winged Lapwing	*Vanellus melanopterus*	LC	LC		PG			2	x	x	2
Crowned Lapwing	*Vanellus coronatus*	LC	LC		PG			1	x	x	4
Black-winged Pratincole	*Glareola nordmanni*	NT	NT		PG		x	4			
Whiskered Tern	*Chlidonias hybrida*	LC	LC		PG			1			2
African Cuckoo Hawk	*Aviceda cuculoides*	LC	LC		PG		x	4			
Black-winged Kite	*Elanus caeruleus*	LC	LC		PG		x	1	x	x	15
African Fish Eagle	*Haliaeetus vocifer*	LC	LC		PG		x	1	x	x	4
Bearded Vulture	*Gypaetus barbatus*	NT	CR	CR	PG		x	2		x	
Cape Vulture	*Gyps coprotheres*	VU	EN	EN	PG		x	1	x	x	7
Black-chested Snake Eagle	*Circaetus pectoralis*	LC	LC		PG		x	3			1
Brown Snake Eagle	*Circaetus cinereus*	LC	LC		PG		x	4			1
African Marsh Harrier	*Circus ranivorus*	LC	EN		PG		x	2	x	x	1
Black Harrier	*Circus maurus*	EN	EN		PG	NE	x	2	x	x	2
Pallid Harrier	*Circus macrourus*	NT	NT		PG		x	4			
Montagu's Harrier	*Circus pygargus*	LC	LC		PG		x	2			
African Harrier-Hawk	*Polyboroides typus*	LC	LC		PG		x	1	x	x	6
Little Sparrowhawk	*Accipiter minullus*	LC	LC		PG		x	2	x	x	
Rufous-breasted Sparrowhawk	*Accipiter rufiventris*	LC	LC		PG		x	2	x	x	3
Black Sparrowhawk	*Accipiter melanoleucus*	LC	LC		PG		x	1	x	x	2
Common (Steppe) Buzzard	*Buteo buteo*	LC	LC		PG		x	1	x	x	12
Forest Buzzard	*Buteo trizonatus*	NT	LC		PG	E	x	3			2
Jackal Buzzard	*Buteo rufofuscus*	LC	LC		PG	NE	x	1	x	x	14
Verreaux's Eagle	*Aquila verreauxii*	LC	VU		PG		x	1	x	x	2
Booted Eagle	*Hieraaetus pennatus*	LC	LC		PG		x	1	x	x	
Martial Eagle	*Polemaetus bellicosus*	EN	EN	EN	PG		x	1	x	x	1
Crowned Eagle	*Stephanoaetus coronatus*	NT	VU		PG		x	4			
Secretarybird	*Sagittarius serpentarius*	EN	VU		PG		x	1	x	x	9

Lesser Kestrel	*Falco naumanni*	LC	LC		PG		x	2	x	x	1
Rock Kestrel	*Falco rupicolus*	LC	LC		PG		x	1	x	x	9
Greater Kestrel	*Falco rupicoloides*	LC	LC		PG		x	1	x	x	1
Red-footed Falcon	*Falco vespertinus*	VU	NT		PG		x	1			2
Amur Falcon	*Falco amurensis*	LC	LC		PG		x	1	x	x	14
Eurasian Hobby	*Falco subbuteo*	LC	LC		PG		x	3			
Lanner Falcon	*Falco biarmicus*	LC	VU		PG		x	1	x	x	7
Little Grebe	*Tachybaptus ruficollis*	LC	LC		PG			1	x	x	7
African Darter	*Anhinga rufa*	LC	LC		PG			1			1
Reed Cormorant	*Microcarbo africanus*	LC	LC					1	x	x	11
White-breasted Cormorant	*Phalacrocorax lucidus*	LC	LC					2		x	4
Black Heron	*Egretta ardesiaca*	LC	LC		PG			4			
Little Egret	*Egretta garzetta*	LC	LC		PG			1	x	x	2
Yellow-billed (Intermediate) Egret	*Ardea intermedia*	LC	LC		PG			1	x	x	4
Great Egret	*Ardea alba*	LC	LC		PG			1	x	x	1
Grey Heron	*Ardea cinerea*	LC	LC		PG			1	x	x	6
Black-headed Heron	*Ardea melanocephala*	LC	LC		PG			1	x	x	16
Goliath Heron	*Ardea goliath*	LC	LC		PG			3			
Purple Heron	*Ardea purpurea*	LC	LC		PG			2	x	x	
Western Cattle Egret	*Bubulcus ibis*	LC	LC		PG			1	x	x	14
Squacco Heron	*Ardeola ralloides*	LC	LC		PG			2			
Green-backed (Striated) Heron	*Butorides striata*	LC	LC		PG			3			
Black-crowned Night Heron	*Nycticorax nycticorax*	LC	LC		PG			4			
Little Bittern	*Ixobrychus minutus*	LC	LC		PG			4			
Eurasian Bittern	*Botaurus stellaris*	LC	LC		PG			4			
Hamerkop	*Scopus umbretta*	LC	LC		PG			1	x	x	8
Glossy Ibis	*Plegadis falcinellus*	LC	LC		PG			1	x	x	2
Hadeda (Hadada) Ibis	*Bostrychia hagedash*	LC	LC		PG			1	x	x	16
Southern Bald Ibis	*Geronticus calvus*	VU	VU	VU	PG	E	x	1	x	x	16
African Sacred Ibis	*Threskiornis aethiopicus*	LC	LC		PG			1	x	x	7
African Spoonbill	*Platalea alba*	LC	LC		PG			1	x	x	4
Yellow-billed Stork	*Mycteria ibis*	LC	EN		PG		x	2	x	x	
Black Stork	*Ciconia nigra*	LC	VU		PG		x	1	x	x	1

Abdim's Stork	*Ciconia abdimii*	LC	NT	PG		x	2			
White Stork	*Ciconia ciconia*	LC	LC	PG		x	3	x	x	7
Marabou Stork	*Leptoptilos crumenifer*	LC	NT	PG		x	4			
Fork-tailed Drongo	*Dicrurus adsimilis*	LC	LC	PG			1	x	x	5
African Paradise Flycatcher	*Terpsiphone viridis*	LC	LC	PG			2	x	x	3
Brubru	*Nilaus afer*	LC	LC	PG			3	x	x	
Southern Boubou	*Laniarius ferrugineus*	LC	LC	PG			1	x	x	6
Bokmakierie	*Telophorus zeylonus*	LC	LC	PG			1	x	x	17
Orange-breasted Bush-Shrike	*Chlorophoneus sulfureopectus*	LC	LC	PG			4			
Olive Bush-Shrike	*Chlorophoneus olivaceus*	LC	LC	PG			3			1
Cape Batis	*Batis capensis*	LC	LC	PG			3	x	x	2
Chinspot Batis	*Batis molitor*	LC	LC	PG			3			
Cape Crow	*Corvus capensis*	LC	LC				1	x	x	17
Pied Crow	*Corvus albus*	LC	LC				1	x	x	10
White-necked Raven	*Corvus albicollis*	LC	LC			x	1	x	x	3
Red-backed Shrike	*Lanius collurio*	LC	LC	PG			2	x	x	1
Southern (Common) Fiscal	*Lanius collaris*	LC	LC	PG			1	x	x	17
Black Cuckooshrike	*Campephaga flava*	LC	LC	PG			2			
Sand Martin	*Riparia riparia*	LC	LC	PG			2			1
Brown-throated Martin	*Riparia paludicola*	LC	LC	PG			2	x	x	10
Banded Martin	*Neophedina cincta*	LC	LC	PG			1	x	x	16
Barn Swallow	*Hirundo rustica*	LC	LC	PG			1	x	x	16
White-throated Swallow	*Hirundo albigularis*	LC	LC	PG			1	x	x	12
Greater Striped Swallow	*Cecropis cucullata*	LC	LC	PG			1	x	x	16
Lesser Striped Swallow	*Cecropis abyssinica*	LC	LC	PG			2	x	x	1
South African Cliff Swallow	*Petrochelidon spilodera*	LC	LC	PG	E		1	x	x	13
Rock Martin	*Ptyonoprogne fuligula*	LC	LC	PG			1	x	x	12
Common House Martin	*Delichon urbicum*	LC	LC	PG			1			3
Dark-capped Bulbul	*Pycnonotus tricolor*	LC	LC				1	x	x	15
African Red-eyed Bulbul	*Pycnonotus nigricans*	LC	LC				4			1
Fairy Flycatcher	*Stenostira scita*	LC	LC	PG	NE		1	x	x	
Cape Grassbird	*Sphenoeacus afer*	LC	LC	PG	NE		1	x	x	4
Long-billed crombec	*Sylvietta rufescens*	LC	LC	PG			4			

Little Rush Warbler	*Bradypterus baboecala*	LC	LC	PG			2	x	x	3
Barratt's Warbler	*Bradypterus barratti*	LC	LC	PG	NE	x	2	x	x	2
Common Reed Warbler	*Acrocephalus scirpaceus*	LC	LC	PG			3			1
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	LC	LC	PG			2	x	x	3
Willow Warbler	*Phylloscopus trochilus*	LC	LC	PG			1			2
Arrow-marked Babbler	*Turdoides jardineii*	LC	LC	PG			4			
Bush Blackcap	*Sylvia nigricapillus*	VU	VU	PG	E	x	3	x	x	1
Cape White-eye	*Zosterops virens*	LC	LC	PG	NE		1	x	x	10
Orange River White-eye	*Zosterops pallidus*	LC	LC	PG			3			1
Lazy Cisticola	*Cisticola aberrans*	LC	LC	PG			2	x	x	2
Wailing Cisticola	*Cisticola lais*	LC	LC	PG			1	x	x	9
Levaillant's Cisticola	*Cisticola tinniens*	LC	LC	PG			1	x	x	14
Neddicky	*Cisticola fulvicapilla*	LC	LC	PG			1	x	x	9
Zitting Cisticola	*Cisticola juncidis*	LC	LC	PG			1	x	x	12
Desert Cisticola	*Cisticola aridulus*	LC	LC	PG			3			2
Cloud Cisticola	*Cisticola textrix*	LC	LC	PG	N-end		1	x	x	12
Pale-crowned Cisticola	*Cisticola cinnamomeus*	LC	LC	PG			1	x	x	6
Wing-snapping Cisticola	*Cisticola ayresii*	LC	LC	PG			1	x	x	15
Tawny-flanked Prinia	*Prinia subflava*	LC	LC	PG			1	x	x	1
Black-chested Prinia	*Prinia flavicans*	LC	LC	PG			1	x	x	3
Drakensberg Prinia	*Prinia hypoxantha*	LC	LC	PG	E		1	x	x	8
Bar-throated Apalis	*Apalis thoracica*	LC	LC	PG			2	x	x	2
Melodious Lark	*Mirafra cheniana*	LC	LC	PG	NE	x	2	x	x	1
Rufous-naped Lark	*Mirafra africana*	LC	LC	PG			3	x	x	2
Eastern clapper Lark	*Mirafra fasciolata*	LC	LC	PG			1	x	x	4
Rudd's Lark	*Heteromirafra ruddi*	EN	EN	PG	E	x	1	x	x	2
Spike-heeled Lark	*Chersomanes albofasciata*	LC	LC	PG			1	x	x	8
Eastern Long-billed Lark	*Certhilauda semitorquata*	LC	LC	PG	E		1	x	x	9
Red-capped Lark	*Calandrella cinerea*	LC	LC	PG			1	x	x	14
Botha's Lark	*Spizocorys fringillaris*	EN	EN	PG	E	x	2	x	x	1
Cape Rock Thrush	*Monticola rupestris*	LC	LC	PG	E	x	1	x	x	5
Sentinel Rock Thrush	*Monticola explorator*	NT	LC	PG	E	x	1	x	x	3
Groundscraper Thrush	*Turdus litsitsirupa*	LC	LC	PG			2		x	1

Olive Thrush	*Turdus olivaceus*	LC	LC	PG			2	x	x	3
Southern Black flycatcher	*Melaenornis pammelaina*	LC	LC	PG			2			
Fiscal Flycatcher	*Melaenornis silens*	LC	LC	PG	NE		2	x	x	1
Spotted flycatcher	*Muscicapa striata*	LC	LC	PG			2			
African Dusky Flycatcher	*Muscicapa adusta*	LC	LC	PG			2			1
Cape Robin-Chat	*Cossypha caffra*	LC	LC	PG			1	x	x	14
White-browed Robin-Chat	*Cossypha heuglini*	LC	LC	PG			3	x	x	
Chorister Robin-Chat	*Cossypha dichroa*	LC	LC	PG	E	x	4			1
African StoneChat	*Saxicola torquatus*	LC	LC	PG			1	x	x	17
Buff-streaked Chat	*Campicoloides bifasciatus*	LC	LC	PG	E		1	x	x	8
Mountain Wheatear	*Myrmecocichla monticola*	LC	LC	PG			1	x	x	12
Sickle-winged Chat	*Emarginata sinuata*	LC	LC	PG	NE	x	1	x	x	
Familiar Chat	*Oenanthe familiaris*	LC	LC	PG			1	x	x	9
Ant-eating Chat	*Myrmecocichla formicivora*	LC	LC	PG			1	x	x	16
Mocking Cliff Chat	*Thamnolaea cinnamomeiventris*	LC	LC				1	x	x	3
Red-winged Starling	*Onychognathus morio*	LC	LC				1	x	x	10
Cape Glossy (Cape) Starling	*Lamprotornis nitens*	LC	LC	PG			1	x	x	13
Pied Starling	*Lamprotornis bicolor*	LC	LC		E	x	1	x	x	16
Common Myna	*Acridotheres tristis*	LC	LC				2	x	x	
Amethyst Sunbird	*Chalcomitra amethystina*	LC	LC	PG			1	x	x	1
Malachite Sunbird	*Nectarinia famosa*	LC	LC	PG			1	x	x	11
Greater Double-collared Sunbird	*Cinnyris afer*	LC	LC	PG	E		2	x	x	1
White-browed Sparrow-Weaver	*Plocepasser mahali*	LC	LC				2	x	x	2
Lesser Masked Weaver	*Ploceus intermedius*	LC	LC				2	x	x	
Cape Weaver	*Ploceus capensis*	LC	LC		NE		1	x	x	16
Southern Masked Weaver	*Ploceus velatus*	LC	LC				1	x	x	16
Village Weaver	*Ploceus cucullatus*	LC	LC				2	x	x	
Red-billed Quelea	*Quelea quelea*	LC	LC				1	x	x	13
Yellow-crowned Bishop	*Euplectes afer*	LC	LC				1	x	x	14
Southern Red Bishop	*Euplectes orix*	LC	LC				1	x	x	16
Yellow Bishop	*Euplectes capensis*	LC	LC				2	x	x	5
Fan-tailed Widowbird	*Euplectes axillaris*	LC	LC				2	x	x	5
White-winged Widowbird	*Euplectes albonotatus*	LC	LC				2	x	x	2

Red-collared Widowbird	*Euplectes ardens*	LC	LC				3			4
Long-tailed Widowbird	*Euplectes progne*	LC	LC				1	x	x	16
Orange-breasted Waxbill	*Amandava subflava*	LC	LC	PG			1	x	x	1
African Quail-finch	*Ortygospiza atricollis*	LC	LC	PG			1	x	x	14
Red-headed Finch	*Amadina erythrocephala*	LC	LC	PG			2			
Swee Waxbill	*Coccopygia melanotis*	LC	LC	PG	NE		1	x	x	1
Common Waxbill	*Estrilda astrild*	LC	LC	PG			1	x	x	14
African Firefinch	*Lagonosticta rubricata*	LC	LC	PG			3			1
Pin-tailed Whydah	*Vidua macroura*	LC	LC	PG			1	x	x	14
Shaft-tailed Whydah	*Vidua regia*	LC	LC	PG			3			1
Cuckoo Finch	*Anomalospiza imberbis*	LC	LC				3			
Cape Sparrow	*Passer melanurus*	LC	LC				1	x	x	11
Southern Grey-headed Sparrow	*Passer diffusus*	LC	LC	PG			1	x	x	12
Yellow-throated Petronia	*Gymnoris superciliaris*	LC	LC	PG			2		x	
Cape Wagtail	*Motacilla capensis*	LC	LC	PG			1	x	x	15
Cape Longclaw	*Macronyx capensis*	LC	LC	PG			1	x	x	17
Yellow-breasted Pipit	*Anthus chloris*	VU	VU	PG	E	x	1	x	x	5
African Rock Pipit	*Anthus crenatus*	LC	NT	PG	E	x	1	x	x	4
African Pipit	*Anthus cinnamomeus*	LC	LC	PG			1	x	x	16
Plain-backed Pipit	*Anthus leucophrys*	LC	LC	PG			1	x	x	3
Buffy Pipit	*Anthus vaalensis*	LC	LC	PG			2			5
Nicholson's Pipit	*Anthus nicholsoni*	LC	LC	PG			1	x	x	1
Short-tailed Pipit	*Anthus brachyurus*	LC	VU	PG		x	3			
Cape Canary	*Serinus canicollis*	LC	LC	PG			1	x	x	16
Yellow-fronted Canary	*Crithagra mozambica*	LC	LC	PG			1	x	x	2
Black-throated Canary	*Crithagra atrogularis*	LC	LC	PG			1	x	x	6
Forest Canary	*Crithagra scotops*	LC	LC	PG	E	x	2			1
Yellow Canary	*Crithagra flaviventris*	LC	LC	PG			2	x	x	1
Brimstone Canary	*Crithagra sulphurata*	LC	LC	PG			2			1
Streaky-headed Seedeater	*Crithagra gularis*	LC	LC	PG			2	x	x	1
Lark-like Bunting	*Emberiza impetuani*	LC	LC	PG			3			2
Cinnamon-breasted Bunting	*Emberiza tahapisi*	LC	LC	PG			2	x	x	1
Cape Bunting	*Emberiza capensis*	LC	LC	PG			1	x	x	12

Golden-breasted Bunting	*Emberiza flaviventris*	LC	LC	**PG**			2	x	x	
Yellow-billed Kite	*Milvus aegyptius*	LC	LC	**PG**		x	2	x	x	1
Peregrine Falcon	*Falco peregrinus*	LC	LC	**PG**		x	2	x	x	

Key: Status: CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NA = Not Assessed; NT = Near Threatened; OG = Ordinary Game; PG = Protected Game; PS = Protected Species; VU = Vulnerable. Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate. Sources: Taylor et al. (2015); BirdLife South Africa (2016); SABAP 2 (2022)