DECEMBER 2021

LOMOND-SAFARI 88KV POWER LINE PROJECT

AVIFAUNAL IMPACT ASSESSMENT REPORT

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PROFESSIONAL EXPERIENCE

Ms. Megan Diamond Megan completed a Bachelor of Science degree in Environmental Management from the University of South Africa and has been involved in conservation for 20 years. She has 15 years' worth of experience in the field of bird interactions with electrical infrastructure and during this time has completed impact assessments for over 140 projects. During her tenure at the Endangered Wildlife Trust's Wildlife & Energy Programme and the Programme's primary project (i.e. the Eskom-EWT Strategic Partnership) from 2006 to 2013, Megan was responsible for assisting the energy industry and the national utility in minimising the negative impacts, associated with the construction and operation of electrical infrastructure, on wildlife through the provision of strategic guidance, risk and impact assessments, training and research. Megan (SACNASP Environmental Science Registration number 300022/14) currently owns and manages *Feathers Environmental Services* and is tasked with providing guidance to industry through the development of best practice procedures and avifaunal specialist studies for various developments including renewable energy facilities, power lines, power stations and substation infrastructure in addition to railway infrastructure and residential properties within South Africa and elsewhere within Africa. Megan has attended and presented at several conferences and facilitated workshops, as a subject expert, since 2007. Megan has authored and co-authored several academic papers, research reports and energy industry related guidelines, including the *BirdLife South Africa/ Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa* and the *Avian Wind Farm Sensitivity Map for South Africa* (2015), and played an instrumental role in facilitating the endorsement of these two products by the South African Wind Energy Association (SAWEA), IAIAsa (International Association for Impact Assessment South Africa) and Eskom. She chaired the Birds and Wind Energy Specialist Group in South Africa (2011/2012) and the IUCN/SSC Crane Specialist Group's Crane and Powerline Network (2013-2015), a working group comprised of subject matter experts from across the world, working in partnership to share lessons, develop capacity, pool resources, and accelerate collective learning towards finding innovative solutions to mitigate this impact on threatened crane populations. She is currently a member of the IUCN Stork, Ibis and Spoonbill Specialist Group and the Eskom-EWT Strategic Partnership Ludwig's Bustard Working Group.

DECLARATION OF INDEPENDENCE

I, Megan Diamond, in my capacity as a specialist consultant, hereby declare that I:

- Act as an independent specialist to MuTingati Environmental and Projects for this project.
- Do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Amendment to Environmental Impact Assessment Regulations, 2017.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed development, but aim to present facts and our best scientific and professional opinion with regard to the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Amendment to Environmental Impact Assessment Regulations, 2017.

INDEMNITY

- This avifaunal impact assessment report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using the available information and data related to the site to be affected and a one-day, single season site visit to the study area on 8 December 2021. No long-term investigation or monitoring has been conducted.
- The Precautionary Principle has been applied throughout this assessment.
- The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information at the time of study.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist investigator reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
- Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist investigator as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

30 December 2021

EXECUTIVE SUMMARY

Electricity to the South African Nuclear Energy Corporation SOC Limited (NECSA) is supplied through 88kV oil-filled underground cables that supply the Safari Rural 88/11kV Substation. The quality of the supply is at times compromised with a loss of pressure in the cables. In order to improve the operation of the existing network, *Eskom Distribution North West Operating Unit* propose to construct a new 88kV overhead power line and refurbish the Safari Rural 88/11kV Substation. The proposed Lomond-Safari 88kV power line alignment is confined within the NECSA property, located on Portion 0 of Farm Weldaba 567JQ, within the Madibeng Local Municipality, in the Bojanala District Municipality, in the North West Province.

The proposed study area is considered to have a MEDIUM Animal Species sensitivity, based on the possible presence of African Grass Owl *Tyto capensis*. A site sensitivity verification was conducted through the use of a desktop analysis and a field survey, which concurs with the MEDIUM sensitivity rating assigned to the study area, however this is based on the confirmed presence of Cape Vulture *Gyps coprotheres*, a species that is particularly vulnerable to power line interactions and not the presence of African Grass Owl. The study area does not contain habitat that will support African Grass Owl.

A total of 381 bird species have been recorded within the relevant pentads during the SABAP2 atlassing period to date. The presence of these species in the broader area provides an indication of the diversity of species that could potentially occur within the areas earmarked for the proposed Lomond-safari 88kV power line project. Of the 381 species, 26 of these are considered to be of regional conservation concern i.e. regional Red List species (Taylor et al, 2015) and five are endemic to South Africa, Lesotho and Swaziland.

It is important to note that with the exception of Verreaux's Eagle *Aquila verreauxii* (n=51), Lanner Falcon *Falco biarmicus* (n=26), Greater Flamingo *Phoenicopterus roseus* (n=53), Yellow-billed Stork *Mycteria ibis* (n=33), Caspian Tern *Hydroprogne caspia* (n=65) and Cape Vulture (n=226), the remaining 20 Red List species have been recorded in very low numbers, with 1-15 individual birds being recorded over the fourteen-year survey period. It is also important to note that Cape Vulture and Abdim's Stork are the only Red List species that have been observed in the SABAP2 pentad within which the proposed alignment is located (2545_2755). This is a more accurate reflection of the diversity of Red List species that are likely to be found within the area surrounding the proposed 88kV power line given the habitat present in the study area. This premise is confirmed with Cape Vulture being the only Red List species observed during the field survey.

The site visit produced a combined list of 35 species, covering both the study area and to a limited extent, the surrounding area. Cape Vulture is the only Red List species observed with the proposed study area. The majority of observations were of passerine species that are common to this area. Each of these species has the potential to be displaced by the construction of proposed Lomond-Safari 88kV power line project as a

result of habitat transformation and disturbance. However, these species have persisted despite existing disturbance (i.e. industrial activity) within the study area. This resilience, coupled with the fact that similar habitat is available throughout the broader area, means that the displacement impact will not be of regional or national significance

The proposed Lomond-Safari 88kV power line alignment and surrounding study area are located within a single primary vegetation division namely the Savanna Biome, specifically the Gauteng Shale Mountain Bushveld vegetation unit . The savanna/woodland biome contains a large variety of bird species (it is the most species-rich community in southern Africa) but very few bird species are restricted to this biome. It is also relatively well conserved compared to the grassland biome. Savanna is particularly rich in raptors and forms the stronghold for priority species such as Martial Eagle *Polemaetus bellicosus*, Wahlberg's Eagle *Hieraaetus wahlbergi,* Black-chested Snake-Eagle *Circaetus pectoralis,* Brown Snake-Eagle *Circaetus cinereus*, Lappet-faced Vulture *Torgos tracheliotos*, White-backed Vulture *Gyps africanus* and a multitude of medium-sized raptors, for example Jackal Buzzard *Buteo rufofuscus*, Steppe Buzzard *Buteo vulpinus*, African Harrier Hawk (Gymnogene) *Polyboroides typus* and African Hawk Eagle *Aquila spilogaster*. Apart from raptors, woodland in its undisturbed state is suitable for a wide range of other, non-raptorial sensitive species i.e. Secretarybird *Sagittarius serpentarius*, Abdim's Stork *Ciconia abdimii*, Marabou Stork *Leptoptilos crumenifer*.

It is important to note that the broader study area has experienced significant transformation in the form of urbanisation and industrial activity which dominate the landscape and fairly significant levels of disturbance persist within the study area in the form of urban and industrial related activities and vehicle traffic in the immediate surrounds. SABAP2 reporting rates for the majority of Red List avifauna potentially occurring in savanna habitat in the study area are low and the absence of these species within the study area is an indication of the significant levels of human activity and disturbance. Therefore, the potential displacement impacts as a result of habitat loss and disturbance associated with the construction and operation of the proposed 88kV power line are likely to be moderate to low for the aforementioned species.

In conclusion, the habitat within which the proposed study area is located is low to moderately sensitive from a potential bird impact perspective. The construction of the proposed Lomond-Safari 88kV power line will result in impacts of MODERATE significance to birds occurring in the vicinity of the new infrastructure, which can be reduced through the application of mitigation measures. It is anticipated that the proposed Lomond-Safari 88kV power line can be constructed within the study area with acceptable levels of impact on the resident avifauna, subject to the following recommendations:

* Construction activities (i.e. all staff, vehicle and machinery) should be restricted to the immediate footprint of the infrastructure. The recommendations of the botanical study must be strictly implemented.
* Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of avifaunal species.

* Maximum use should be made of existing roads and the construction of new roads must be kept to a minimum. New roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats.
* The 88kV power lines must be constructed using a bird friendly structure (i.e. DT 7641/7649)
* Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must also be implemented.
* Dead animals/carcasses found at/close to the Lomond-Safari 88kV power line during routine power line patrols and/or maintenance by Eskom must be removed from the property and donated to VulPro to ensure that the Cape Vultures utilising the study area are fed in a safe environment.
* The historical vulture restaurant/feeding site on the NECSA property must remain closed.
* If collision or electrocution impacts are recorded once the 88kV power lines are operational, it is recommended that an avifaunal specialist investigate the mortalities and provide recommendations for site-specific mitigation to be applied reactively.
* In addition to this, the normal suite of environmental good practices should be applied, such as ensuring strict control of staff, vehicles and machinery on site and limiting the creation of new roads as far as possible.

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1. INTRODUCTION

Electricity to the South African Nuclear Energy Corporation SOC Limited (NECSA) is supplied through two 88kV oil-filled underground cables that supply the Safari Rural 88/11kV Substation from the Lomond Main Transmission Substation (MTS). The quality of the supply is at times compromised with a loss of pressure in the cables. In addition, the isolators, busbar and volume breakers within the substation are not operating according to standard or redundant due to age and the unavailability of parts. In order to improve the operation of the existing network, *Eskom Distribution North West Operating Unit (Eskom)* proposes to construct a new 88kV overhead power line and refurbish the Safari Rural 88/11kV Substation. The project is located within the North West province.

The National Environmental Management Act (NEMA) (Act 107 of 1998) requires that an impact assessment be conducted for any development which could have a significant effect on the environment, with the objective to identify, predict and evaluate the actual and potential impacts of these activities on ecological systems; identify alternatives; and provide recommendations for mitigation to minimize the negative impacts. In order to meet the Basic Assessment requirements as outlined in Regulations 19 – 20 of the Amendment to Environmental Impact Assessment Regulations of 2017, *Eskom* require detailed specialist studies that will document any potential fatal flaws and the impacts of the project and recommend measures to manage (maximise positive and minimise negative) and monitor those impacts.

2. THIS REPORT

2.1 Scope of Work

Feathers Environmental Services CC (Feathers) was appointed by *MuTingati Environmental and Projects (MuTingati)* to compile a specialist avifaunal assessment report for the proposed Lomond-Safari 88kV power line and Safari Rural Substation refurbishment project. This report is based on a desktop review of the proposed Lomond-Safari 88kV power line alignment and a site visit conducted over a one-day period, which uses a set methodology and various data sets to determine which avian species regularly occur within the proposed study area, the availability of bird micro habitats (i.e. avifaunal sensitive areas), the possible impacts of the proposed 88kV power line and their significance and the provision of recommendations for the mitigation of the anticipated impacts.

Feathers has conducted this avifaunal impact assessment according to the following terms of reference:

* Conduct a site sensitivity verification through the use of a desk top analysis, using satellite imagery and other available and relevant information, in addition to an on-site inspection;

- Assess various avifaunal datasets, including but not limited to Important Bird Areas (IBAs) and describe the avifaunal communities (particularly with reference to Red List species) most likely to impacted on by the proposed Lomond-Safari 88kV power line;
- Identify and confirm avifaunal microhabitats within the Lomond-Safari 88kV power line study area and assess these for their suitability to support Red List and non-Red List priority species, in terms of breeding, roosting and foraging;
- Describe the avifaunal communities (both Red List and non-Red List priority species) most likely to be impacted, based on data collected as part of a systematic and quantified data collection process;
- Provide a detailed description of the impacts associated with the construction and operation and of the proposed Lomond-Safari 88kV power line;
- Assess the significance (rated according to a pre-determined set of criteria of the identified direct, indirect and cumulative impacts, during the construction and operation phases of the proposed Lomond-Safari 88kV power line, based on data collected in-field;
- Consider the proposed alignment plan for the Lomond-Safari 88kV power line and advise possible changes to the alignment;
- Recommend practical mitigation measures for the management of the identified impacts, at each stage of the development process, for inclusion in the draft Environmental Management Programme (EMPr);
- Propose a monitoring programme for the sensitive areas, species or receptors (if necessary); and
- Describe the gaps in baseline data and an indication of the confidence levels. The best available data sources will be used to predict the impacts.

2.2 Structure of this report

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 (as amended) all specialist studies must comply with Appendix 6 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014).

Table 1: Information to be included in specialist reports

Legal Requirement		Relevant Section in Specialist study
(1)	A specialist report prepared in terms of these Regulations must contain-	
(a)	details of-	
	(i) the specialist who prepared the report; and	Professional Experience and Appendix 5

Legal Requirement		Relevant Section in Specialist study
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Professional Experience and Appendix 5
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Declaration of Independence
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 2
(cA)	an indication of the quality and age of base data used for the specialist report;	Section 5
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 7
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 5
(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 8
(g)	an identification of any areas to be avoided, including buffers;	Section 8
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 8
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 12
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 7
(k)	any mitigation measures for inclusion in the EMPr;	Section 9
(l)	any conditions for inclusion in the environmental authorisation;	Section 10 Section 11
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10

Legal Requirement		Relevant Section in Specialist study
(n)	a reasoned opinion	Section 11
	whether the proposed activity, activities or portions thereof should be authorised;	Section 11
	regarding the acceptability of the proposed activity or activities; and	Section 11
	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 9 Section 10 Section 11
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not Applicable
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not Applicable
(q)	any other information requested by the competent authority.	Not Applicable
(2)	Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Not Applicable

3. PROJECT LOCATION

The proposed Lomond-Safari 88kV power line alignment is confined within the NECSA property, located on Portion 0 of Farm Weldaba 567JQ, within the Madibeng Local Municipality, in the Bojanala District Municipality, in the North West Province (FIGURE 1).

4. PROJECT OVERVIEW

The project consists of the following project components:

* Construction of an 88kV Chickadee power line (approximately 2.3km in length) extending from the existing Lomond MTS to the existing Safari Rural Substation.
* Refurbishment of the existing Safari Rural Substation.

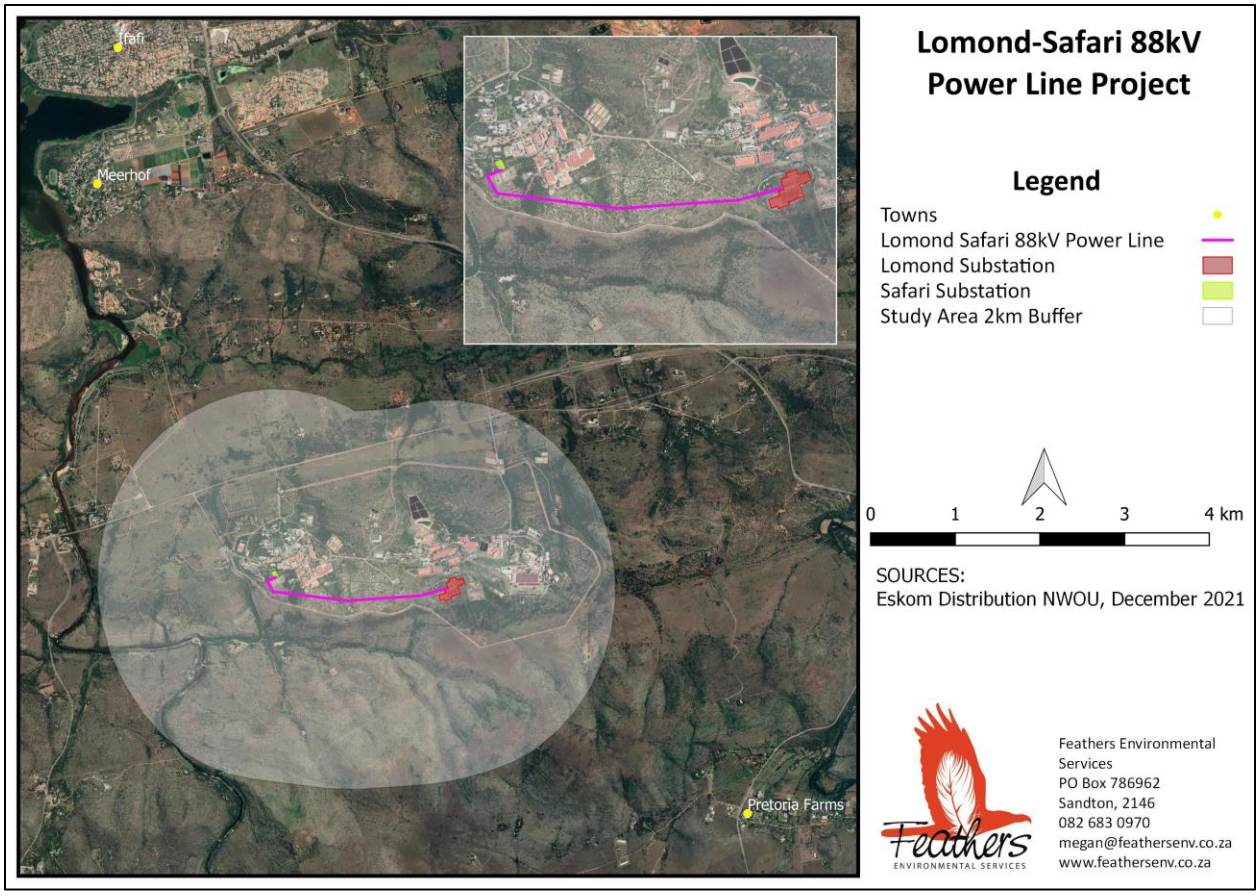

FIGURE 1: Regional map detailing the location of the proposed Lomond-Safari 88kV power line alignment and existing Safari Rural and Lomond Substations, located within the Madibeng Local Municipality, North West Province.

5. APPROACH AND METHODOLOGY

5.1 Methodology

The following methodology was employed to compile this avifaunal impact assessment report:

- Collect and examine various avifaunal data sets (detailed in section 5.2) at a desktop level to determine the presence of sensitive Red List, as well as non-Red List priority species, that may be vulnerable to the impacts associated with the proposed Lomond-Safari 88kV power line;
- Suitable avifaunal habitats and potential sensitive areas within the immediate surrounds of the proposed Lomond-Safari 88kV power line, where impacts are likely to occur, were identified using various Geographic Information System (GIS) layers and Google Earth imagery and confirmed based on personal observations made during the site visit on 8 December 2021 (FIGURE 2);

* Primary bird data was collected by means of a field survey to ground truth the information gleaned from secondary data sources and to collect primary bird occurrence data at the project site and its immediate surrounds;
* The potential impacts, associated with the construction and operation of the proposed Lomond-Safari 88kV power line on the avifaunal community, and the significance were predicted and assessed according to quantitative criteria (APPENDIX 3); and
* Practical recommendations for the management and mitigation of potentially significant impacts, related to the construction and operation of the proposed Lomond-Safari 88kV power line, are provided in Section 9 for inclusion in the draft EMPr.

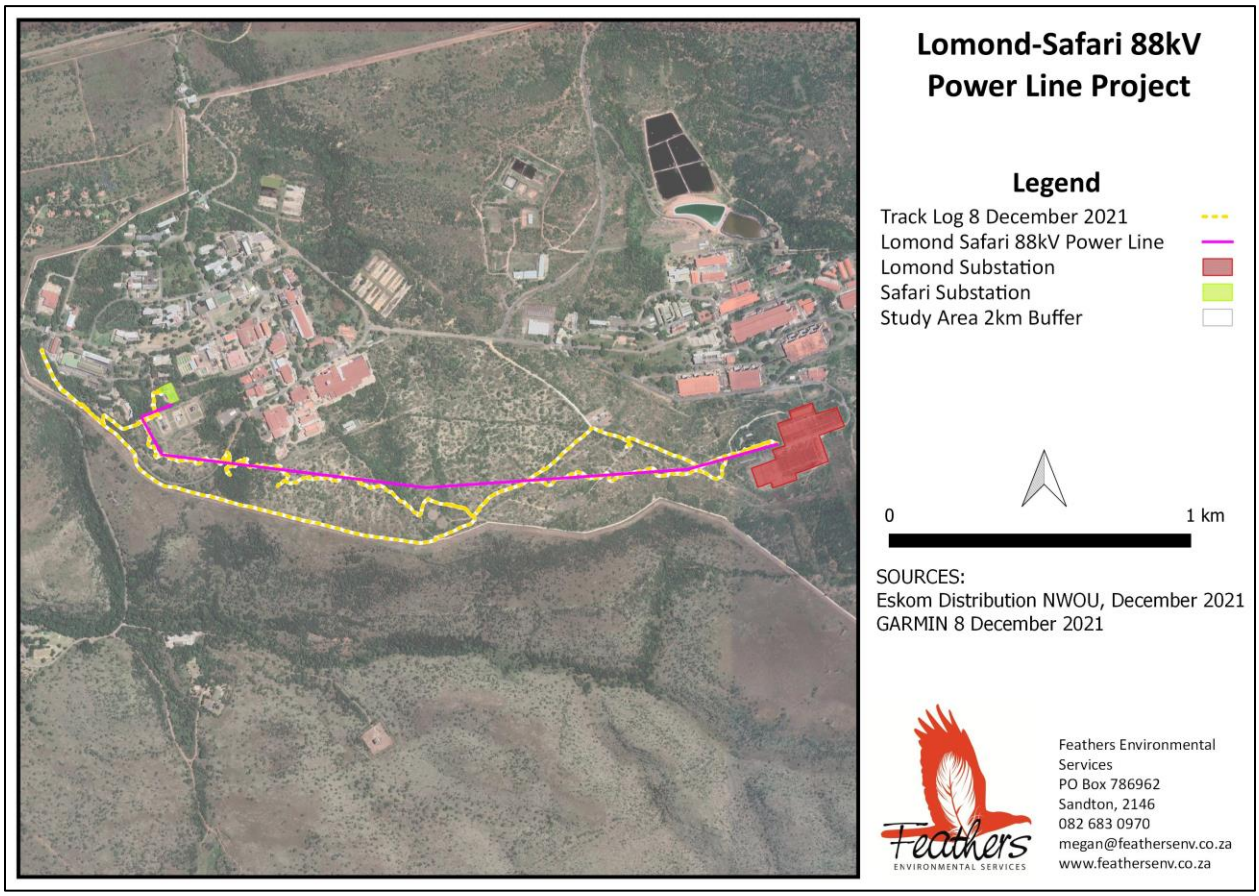

FIGURE 2: Regional map detailing the route surveyed during the field survey to the study area conducted on 8 December 2021.

5.2 Data sources used

The following data sources and reports were used in varying levels of detail for this study:

- Screening Report for an Environmental Authorisation as required by the 2014 EIA Regulations - Proposed Site Environmental Sensitivity: Lomond-Safari 88kV Power Line Project compiled by *EARTHnSKY Environmental (EARTHnSKY)* on 22 September 2021;
- Bird distribution data of the South African Bird Atlas 2 (SABAP 2) was obtained from the Animal Demography Unit of the University of Cape Town on 7 December 2021 as a means to ascertain which species occur within the broader area, based on nine pentad grid cells surrounding the proposed Lomond-Safari 88kV power line alignment. Each pentad is approximately 8 × 7.6 km. Between 2007 and 2021, a total of 1527 full protocol cards (i.e. 1527 bird surveys lasting a minimum of two hours each) have been completed across the nine pentads: 2540_2750; 2540_2755; 2540_2800; 2545_2750; 2545_2755; 2545_2800; 2550_2750; 2550_2755 and 2550_2800 (FIGURE 3);
- The Important Bird Areas (IBAs) report (Marnewick et al. 2015) was consulted to determine the location of the nearest IBAs and their importance for this study. The study area is located within the Magaliesberg IBA (FIGURE 4);
- Co-ordinated Waterbird Count Database (CWAC – Taylor et al. 1999) was consulted determine if large concentrations of water birds, associated with South African wetlands, may occur within the study area. The study area does not contain CWAC sites, however the Hartbeespoort Dam is located within a 5km radius of the proposed Lomond-Safari 88kV power line project study area (FIGURE 4) and may have relevance to this study;
- Coordinated Avifaunal Roadcount project database (CAR – Young et al, 2003) - was consulted to obtain relevant data on large terrestrial bird report rates in the area. There are no CAR routes within the proposed study area;
- The conservation status and endemism information of all bird species occurring in the aforementioned pentads was then determined with the use of the Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al. 2015) and the IUCN Red List of Threatened Species Version 2021-1 (http://www.iucnredlist.org) and the most recent and comprehensive summary of southern African bird biology (Hockey et al. 2005);
- The latest vegetation classification described in the Vegetation Map of South Africa (South African National Biodiversity Institute, 2012 and Mucina & Rutherford, 2006) was consulted in order to determine which vegetation types occur within the proposed study area;
- High-resolution Google Earth ©2021 imagery was used to examine the microhabitats within the proposed study area;
- KMZ. shapefiles detailing the location of the proposed proposed Lomond-Safari 88kV power line alignment, provided by *Eskom* on 29 November 2021;

* A one-day field visit to the proposed Lomond-Safari 88kV power line study area was conducted on 8 December 2021 (summer survey) to form a first-hand impression of avifaunal species presence and micro-habitat occurring within the larger study area surrounding the proposed Lomond-Safari 88kV power line alignment (FIGURE 2). This information, together with the SABAP2 data was used to compile a comprehensive list of species that could occur in the study area; and
* Personal observations made during the aforementioned site visit to the proposed Lomond-Safari 88kV power line study area coupled with the author's experience gained from assessing various electrical infrastructure development projects in the Free State region have been used to formulate a professional opinion of the species likely to occur in the study area and the likely impacts that the proposed Lomond-Safari 88kV power line may have on the resident avifaunal community.

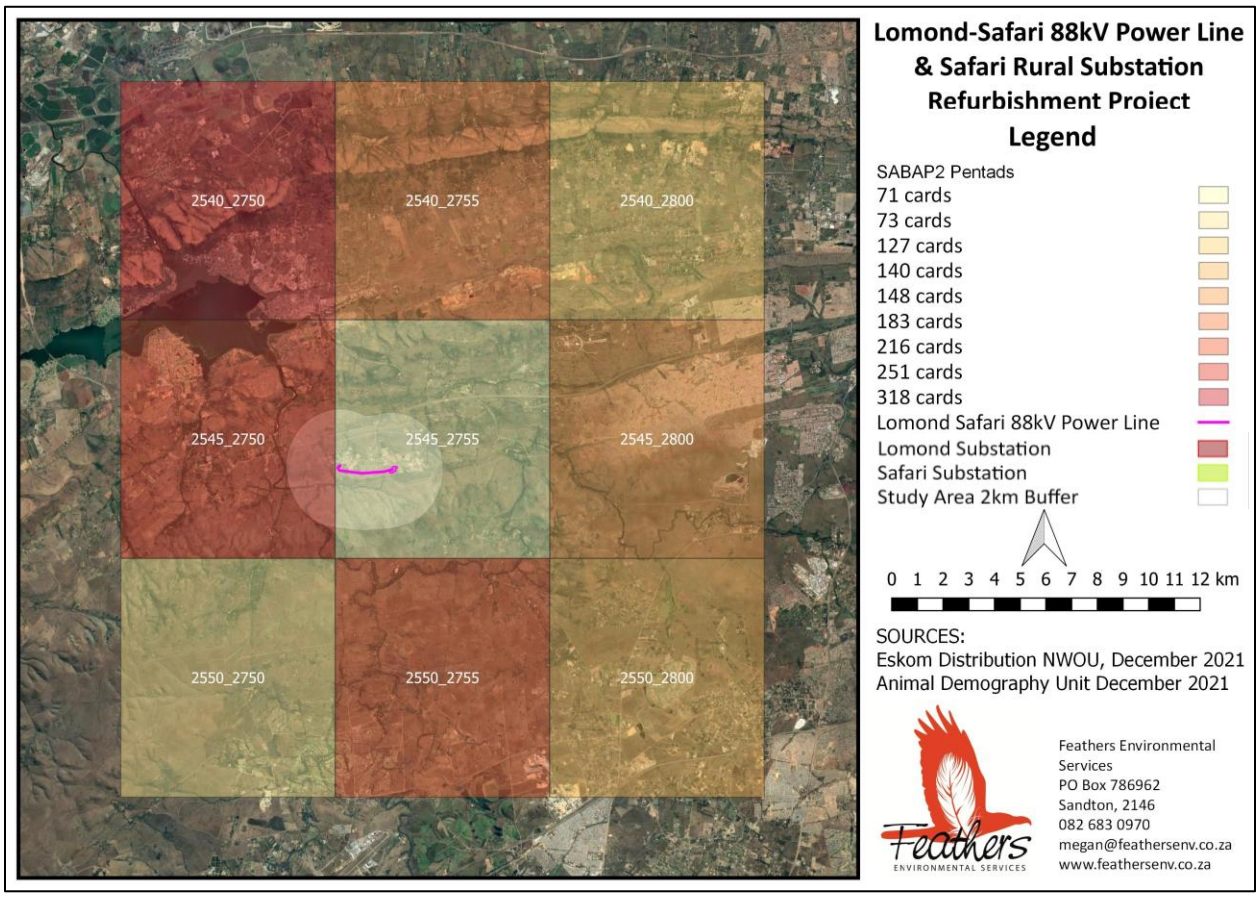

FIGURE 3: Location of the nine South African Bird Atlas Project 2 (SABAP2) pentad grid cells that were considered for the proposed Lomond-Safari 88kV power line project.

6. APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

The following pieces of legislation are applicable to this assessment:

6.1 The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is an international convention (to which South Africa is a signatory) and represents a commitment to sustainable development. The Convention has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (http://www.cbd.int/convention/guide/). The convention makes provision (in a general policy guideline) for keeping and restoring biodiversity. In addition to this the CBD is an ardent supporter of thorough assessment procedures (Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs)) and requires that Parties apply these processes when planning activities that will have a biodiversity impact. An important principle encompassed by the CBD is the precautionary principle which essentially states that where serious threats to the environment exist, lack of full scientific certainty should not be used as a reason for delaying management of these risks. The burden of proof that the impact will *not* occur lies with the proponent of the activity posing the threat. In addition, the Aichi Biodiversity Targets (CBD 2011) address several priority issues i.e. the loss of biodiversity and its causes; reducing direct pressure on biodiversity; safeguarding ecosystems, species and genetic diversity and participatory planning to enhance implementation of biodiversity conservation. Each of these is relevant in the case of energy infrastructure and bird conservation through all project phases from planning to the implementation of mitigation measures for existing developments.

6.2 The Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) is an intergovernmental treaty and is the most appropriate instrument to deal with the conservation of terrestrial, aquatic and avian migratory species. The convention includes policy and guidelines with regards to the impacts associated with man-made infrastructure. CMS requires that Parties (South Africa is a signatory) take measures to avoid migratory species from becoming endangered (Art II, par. 1 and 2) and to make every effort to prevent the adverse effects of activities and obstacles that seriously impede or prevent the migration of migratory species (Art III, par. 4b and 4c). At CMS/CoP7 (2002) Res. 7.2 on Impact Assessment and Migratory Species was accepted, requesting Parties to apply appropriate SEA and EIA procedures for all proposed developments. An agreement developed in the framework of CMS, in force since November 1999, brings the 119 Range States of the Africa Eurasian Waterbird Agreement (AEWA) region together in a common policy to protect migratory waterbirds that use the flyway from the Arctic to southern Africa. The agreement contains a number of obligations that are relevant to migratory waterbirds and energy infrastructure. AEWA has also published a series of practical guidelines that enable Parties to effectively address conservation issues influencing the status of migratory waterbirds. The most relevant guideline for migratory birds and energy

infrastructure is the *Guideline on how to avoid, minimise or mitigate impact of infrastructural developments and related disturbance affecting waterbirds* (Tucker & Treweek, 2008).

6.3 The Agreement on the Conservation of African-Eurasian Migratory Water Birds

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds and even the South African penguin. The core activities carried out under AEWA are described in its Action Plan, which is legally binding for all countries that have joined the Agreement. The AEWA Action Plan details the various measures to be undertaken by Contracting Parties (South Africa included) to guarantee the conservation of migratory waterbirds within their national boundaries. These include species and habitat protection, and the management of human activities, as well as legal and emergency measures.

6.4 The National Environmental Management Act 107 of 1998 (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) creates the legislative framework for environmental protection in South Africa and is aimed at giving effect to the environmental right in the Constitution. It sets out a number of guiding principles that apply to the actions of all organs of state that may significantly affect the environment. Sustainable development (socially, environmentally and economically) is one of the key principles, and internationally accepted principles of environmental management, such as the precautionary principle and the polluter pays principle, are also incorporated. NEMA also provides that a wide variety of listed developmental activities, which may significantly affect the environment, may be performed only after an environmental impact assessment has been done and authorization has been obtained from the relevant authority. Many of these listed activities can potentially have negative impacts on bird populations in a variety of ways. The clearance of natural vegetation, for instance, can lead to a loss of habitat and may depress prey populations, while erecting structures needed for generating and distributing energy, communication, and so forth can cause mortalities by collision or electrocution.

6.5 The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations)

The National Environmental Management: Biodiversity Act (No. 10 of 2004), (NEMBA) regulations on Threatened and Protected Species (TOPS) provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. The national Act provides for among other things, the management and

conservation of South Africa's biodiversity; protection of species and ecosystems that necessitate national protection and the sustainable use of indigenous biological resources.

6.6 The National Environmental Management: Protected Areas Act 57 of 2003

The National Environmental Management: Protected Areas Act (No. 57 of 2003), as amended in 2014, provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. The Act also provides for the establishment of a national register of all national, provincial and local protected areas that are managed in accordance with national norms and standards; and to endure intergovernmental co-operation and public consultation in matters concerning protected areas. Protected areas are declared in order to regulate the area as a buffer zone for protection of a special nature reserve, world heritage site or nature reserve; to enable owners of land to take collective action to conserve biodiversity on their land and to seek legal recognition therefor; to protect the area if the area is sensitive to development due to its- (i) biological diversity; (ii) natural characteristics; (iii) scientific, cultural, historical, archeological or geological value; (iv) scenic and landscape value; or (v) provision of environmental goods and services; to protect a specific ecosystem outside of a special nature reserve, world heritage site or nature reserve; to ensure that the use of natural resources in the area is sustainable. This Act explicitly states that no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority.

6.7 The National Environmental Management Act 107 of 1998 (NEMA) Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal and or Avifaunal Species

This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on terrestrial animal and/or avifaunal species for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations. The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool) for terrestrial animal species. The relevant terrestrial animal species data in the screening tool has been provided by the South African National Biodiversity Institute (SANBI).

7. DESCRIPTION OF THE BASELINE CONDITIONS

7.1 Site Sensitivity Verification

A screening report for the proposed Lomond-Safari 88kV power line project study area was generated on 22 September 2021. The proposed study area does not intersect with an Environmental Management Framework

area. The proposed study area is considered to have a MEDIUM Animal Species sensitivity, based on the possible presence of African Grass Owl *Tyto capensis*. A site sensitivity verification was conducted through the use of a desktop analysis and a field survey, which concurs with the MEDIUM sensitivity rating assigned to the study area, however this is based on the confirmed presence of Cape Vulture *Gyps coprotheres*, a species that is particularly vulnerable to power line interactions and not the presence of African Grass Owl. The study area does not contain habitat that will support African Grass Owl.

7.2 Relevant Bird Populations

7.2.1. Important Bird Areas

Some sites are exceptionally important for maintaining the taxa dependent upon the habitats and ecosystems in which they occur. Vigorous protection of the most critical sites is one important approach to conservation. Many species may be effectively conserved by this means. Patterns of bird distribution are such that, in most cases, it is possible to select sites that support many species. These sites, carefully identified on the basis of the bird numbers and species complements they hold (i.e. globally threatened, range restricted and or migratory or congregatory species) are termed Important Bird Areas (IBAs). IBAs are selected such that, taken together, they form a network throughout the species' biogeographic distributions. IBAs are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network.

The proposed Lomond-Safari 88kV power line study area is located within the Magaliesberg IBA (SA025). This IBA consists mainly of the Magaliesberg mountain range, which extends in an arc from just north-west of Rustenburg in the west to the N1 in the east near Pretoria. To the south, the Witwatersberg mountain range runs parallel to the Magaliesberg, extending from the town of Magaliesburg in the west to Hartbeespoort Dam in the east.

The most important trigger species in this IBA is the globally threatened Cape Vulture, *which breeds at* Nooitgedacht and at Skeerpoort (the larger of the two colonies, with a fairly stable population of between 200 and 250 breeding pairs). Many other raptor species occur within the Magaliesberg IBA, including White-backed Vulture *Gyps africanus*, Lappet-faced Vulture *Torgos tracheliotus* and Lanner Falcon *Falco biarmicus,* although most records are of individual birds. Verreauxs' Eagle *Aquila verreauxii* breeds in the Magaliesberg with African Grass Owl and Secretarybird *Sagittarius serpentarius* regularly observed. Long-crested Eagle *Lophaetus occipitalis* is a more recent coloniser of the range. White-bellied Korhaan *Eupodotis senegalensis* is found in grassland at the top of the Magaliesberg, as well on the Witwatersberg. A single pair of Black Stork *Ciconia nigra* also breeds at Skeerpoort, and there is a possibility that more birds may occur in the broader area. The densely wooded valleys along overgrown, slow-flowing streams hold Half-collared Kingfisher *Alcedo semitorquata*, with African Finfoot *Podica senegalensis* being recorded regularly along the Hennops and Magalies rivers within the IBA. The surrounding woodland support several biome-restricted

species i.e. White-bellied Sunbird *Cinnyris talatala*, Kurrichane Thrush *Turdus libonyanus*, White-throated Robin-chat *Cossypha humeralis*, Kalahari Scrub Robin *Erythropygia paena* and Barred Wren-Warbler *Calamonastes fasciolatus*. Other passerine species that feature regularly within the IBA include Striped Kingfisher *Halcyon chelicuti*, Burnt-necked Eremomela *Eremomela usticollis*, Marico Flycatcher *Bradornis mariquensis*, Crimson-breasted Shrike *Laniarius atrococcineus*, Scaly-feathered Finch *Sporopipes squamifrons*, Violet-eared Waxbill *Uraeginthus granatinus*, Black-faced Waxbill *Estrilda erythronotos*, Striped Pipit *Anthus lineiventris* and Short-toed Rock Thrush *Monticola brevipes*. A significant and ever-growing threat to the aforementioned trigger species in this IBA is the expansion of commercial, recreational and housing developments, which have decreased the area of breeding, roosting and foraging habitat available for each of these species (Marnewick et al. 2015).

Although three of the aforementioned species were observed along the proposed route alignment, the construction and operation activities associated with the proposed Lomond-Safari 88kV power line will not have a significant negative impact on the IBA and the species it supports.

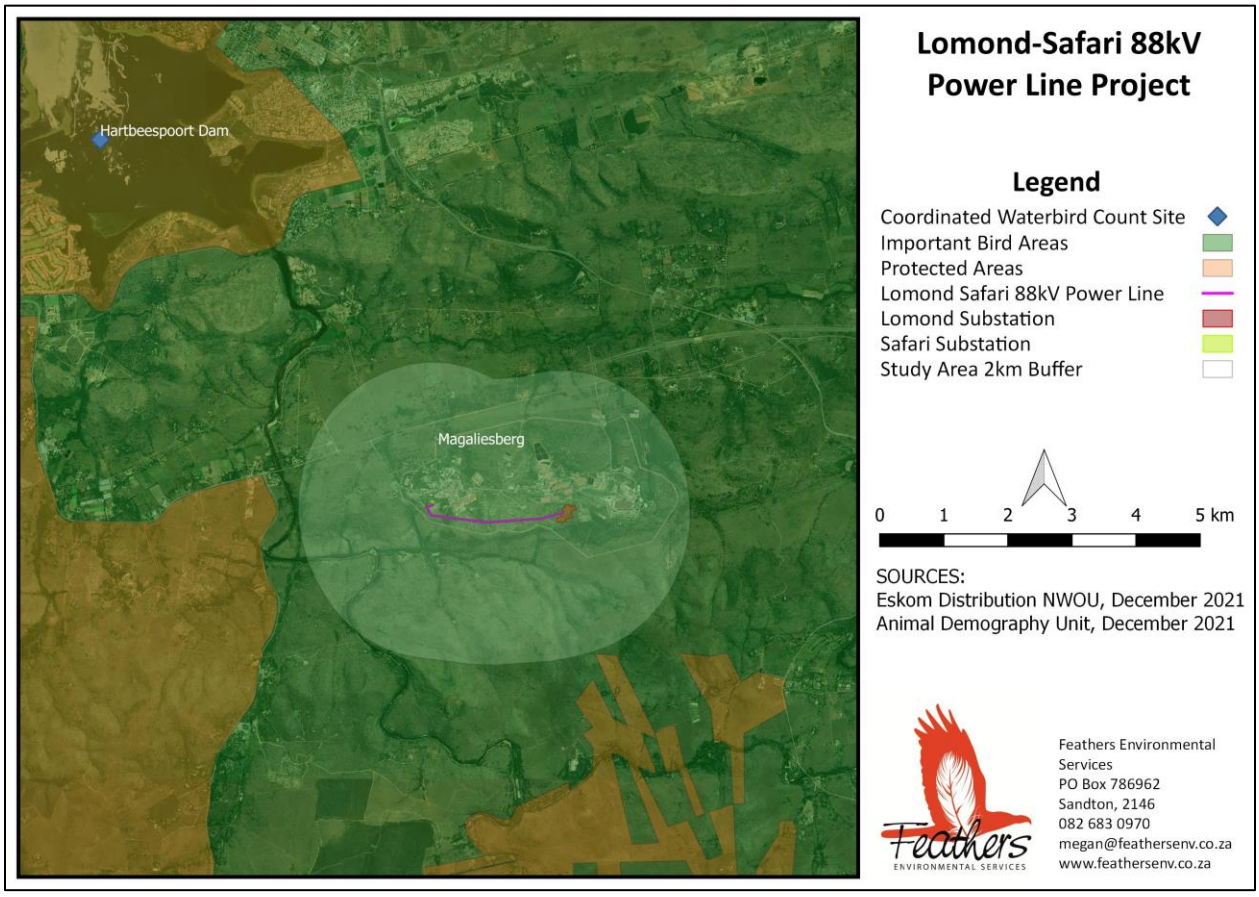

FIGURE 4: Regional map detailing the location of the proposed Lomond-Safari 88kV power line project in relation to Protected Areas, Important Bird Areas (IBAs) and Coordinated Waterbird Count (CAWC) Sites.

7.2.2. Protected Areas

Four protected areas are located within a 10km radius of the proposed study area (FIGURE 4). These areas are protected by law and managed for biodiversity conservation, providing much needed habitat that can potentially support a diversity and abundance of avifaunal species. Similarly, to IBAs these areas may provide an indication of the avifaunal species that are likely to occur in similar habitats found within the study area. It is unlikely that the disturbance associated with the construction of the proposed Lomond-Safari 88kV power line will have a significant negative impact on the surrounding protected areas and the species they supports. However, without the appropriate mitigation, the collision and electrocution impacts, specifically with regards to vultures, are likely to negatively affect the populations that breed and utilise the protected areas spaces.

7.2.3. Coordinated Avifaunal Roadcount (CAR) Routes

Cranes, bustards, storks and other large birds that spend most of their time on the ground, need wide, open spaces and are certainly not restricted to protected areas. Agricultural habitats are used extensively for feeding, roosting and breeding, often because no natural, pristine habitats are available, and sometimes because the agricultural habitats are especially attractive to birds. Because of their size and conspicuous nature, these birds can be monitored using a relatively simple technique i.e. the road count. The Coordinated Avifaunal Roadcounts (CAR) project monitors the populations of 36 species of large terrestrial birds in agricultural habitats, in addition to gamebirds, raptors and corvids along 350 fixed routes covering over 19 000km (http://car.adu.org.za/). Although CAR road counts do not give an absolute count of all the individuals in a population, they do provide a measure of relative abundance in a particular area. There are no CAR routes located within the confines of the development and broader study area and therefore CAR data was not used as a criterion to assess the sensitivity and anticipated impacts within the project area.

7.2.4. Coordinated Waterbird Count (CWAC) Sites

A CWAC site is any body of water, other than the oceans, which supports a significant number (set at approximately 500 individual waterbirds, irrespective of the number of species) of birds which use the site for feeding, and/or breeding and roosting (Harrison et al, 2004). This definition includes natural pans, vleis, marshes, lakes, rivers, as well as a range of manmade impoundments (i.e. sewage works). The presence of a CWAC site within the study area is an indication of a large number of waterbird species occurring there and the overall sensitivity of the area.

There are no CWAC sites located along the proposed power line route alignment. The closest CWAC site, Hartbeespoort Dam, is located within a 5km radius of the proposed Lomond-Safari 88kV power line project study area (FIGURE 4). This partially protected CWAC site supports 89 species according to counts conducted between 1995 and 2019. Seven of which are Red List species i.e. Greater Flamingo *Phoenicopterus roseus*, Lesser Flamingo *Phoeniconaias minor,* African Marsh Harrier *Circus ranivorus*, Half-collared Kingfisher, African

Grass Owl, Yellow-billed Stork *Mycteria ibis* and Caspian Tern *Hydroprogne caspia*. None of the 89 species recorded have been observed in significant numbers, which is an indication of the significant level of disturbance from human activities such as boating, water-skiing and fishing. As a result the water quality has degraded to such an extent that it is unable to support the number and diversity of species synonymous with a body of water of this nature.

While these CWAC sites may provide an indication of the waterbird species that could be supported by natural and artificial impoundments located along the proposed power line route alignment, however there are no surface waterbodies that match the scale of the dam within the confines of the study area. In addition the waterbody/wetland that is present is unlikely to support any of the aforementioned Red List species. The presence of the Hartbeespoort Dam within the broader study area will not have a significant impact on the sensitivity rating for the proposed Lomond-Safari 88kV power line project.

7.2.5. South African Bird Atlas Project 2 Data (SABAP2)

A total of 381 bird species have been recorded within the proposed Lomond-Safari 88kV power line project study area pentads respectively during the SABAP2 atlassing period to date (APPENDIX 1). The presence of these species in the broader area provides an indication of the diversity of species that could potentially occur within the areas earmarked for the proposed Lomond-Safari 88kV power line project. Of the 381 species, 26 of these are considered to be of regional conservation concern i.e. regional Red List species (Taylor et al, 2015) and five are endemic to South Africa, Lesotho and Swaziland.

It is important to note that with the exception of Verreaux's Eagle (n=51), Lanner Falcon (n=26), Greater Flamingo (n=53), Yellow-billed Stork (n=33), Caspian Tern (n=65) and Cape Vulture (n=226), the remaining 20 Red List species have been recorded in very low numbers, with 1-15 individual birds being recorded over the fourteen-year survey period. It is also important to note that Cape Vulture and Abdim's Stork *Ciconia abdimii* are the only Red List species that have been observed in the SABAP2 pentad within which the proposed alignment is located (2545_2755). This is a more accurate reflection of the diversity of Red List species that are likely to be found within the area surrounding the proposed 88kV power line given the habitat present in the study area. This premise is confirmed with Cape Vulture being the only Red List species observed during the field survey.

Although this report focuses on Red List species, since the impacts associated with the construction and operation of the proposed Lomond-Safari 88kV power line project are likely to be more biologically significant for these species, the impact on non-Red List species is also assessed, albeit in less detail. Furthermore, Red List species can often be used as surrogate species for the others in terms of impacts and the necessary mitigation. The non-Red List priority species that have been considered for this assessment include korhaan, buzzards, kestrels, falcons, herons, geese, ibis and water dependent species. Each Red List species' potential

for occurring in a specific habitat class is indicated in TABLE 1, in addition to the type of impact that could potentially affect each species, specific to the location of this Project.

7.2.6. Vulture Colonies, Nest Locations, Movement & Restaurant Data

Despite being a remarkable part of South Africa's rich and celebrated diversity, vultures are one of a handful of species that are largely ignored and have been saddled with the rather poor reputation of being creatures of the afterlife (Wolter et al, 2013). Their contribution to the environment is enormous - they reduce the spread of diseases such as anthrax and keep rabies in check by minimising contact of the virus with mammalian predators (Sharp, 2001; Mudur, 2001; Hugh-Jones and de Vos, 2002) as well as reduce blow-fly populations. Six of South Africa's vultures are threatened, so their conservation through a variety of mechanisms is an absolute must. The broader study area has undergone fairly significant land use changes in recent years, with the establishment of dense human settlement resulting in a loss of habitat, and a reduction in ungulate populations, key threats to this family of birds.

Vultures are a far-ranging species and may forage extensively across the broader study area, as carcasses become available (Wolter et al 2010). There are at least five known Cape Vulture colonies located within a 50km radius of the proposed project. The closest of these colonies are the Skeerpoort and Nooitgedacht colonies, located approximately 15km north west of the proposed Lomond-Safari 88kV power line (FIGURE 5).

Cape Vulture are capable of traversing large distances - individuals captured in the Eastern Cape, covered an area of approximately 366 km^2 (Pfeiffer et al. 2015) while those captured in the North West Province and Namibia foraged over much larger areas, approximately 90 845 km^2 and 21 320 km^2 respectively (Bamford et al. 2007, Phipps et al. 2013b). As a communal cliff-nesting raptor, Cape Vultures form large breeding colonies on suitable rock formations (Benson 2015) and also congregate at overnight roosts (cliffs, on power line poles/towers, or in trees) to sleep (Mundy et al. 1992, Dermody et al. 2011, Pfeiffer et al. 2015). As adult breeding Cape Vulture usually forage within a certain area around a central colony (Boshoff & Minnie 2011), the risk of impact is likely to be greatest closest to these sites. Cape Vulture can be expected to regularly use the air-space within 50km around their roosts and breeding locations, based on fixed kernel density estimates (Venter et al, 2018). Vultures will occur well beyond these zones, but there is a lower probability of them occurring regularly beyond these core foraging ranges. Research suggests that Cape Vulture movement patterns and core foraging ranges are closely associated with the spatial distribution of power lines (Phipps *et al.* 2013). The vultures' ability to traverse vast distances and the high proportion of time they spend foraging outside protected areas and particularly in the vicinity of power lines makes them especially vulnerable to negative interactions (both collision and electrocution) with the expanding power line network across the region and in particular the power line infrastructure that forms part of this project. Continued, unmitigated mortality of adult breeding birds on the power line infrastructure will undoubtedly affect breeding success at breeding locations.

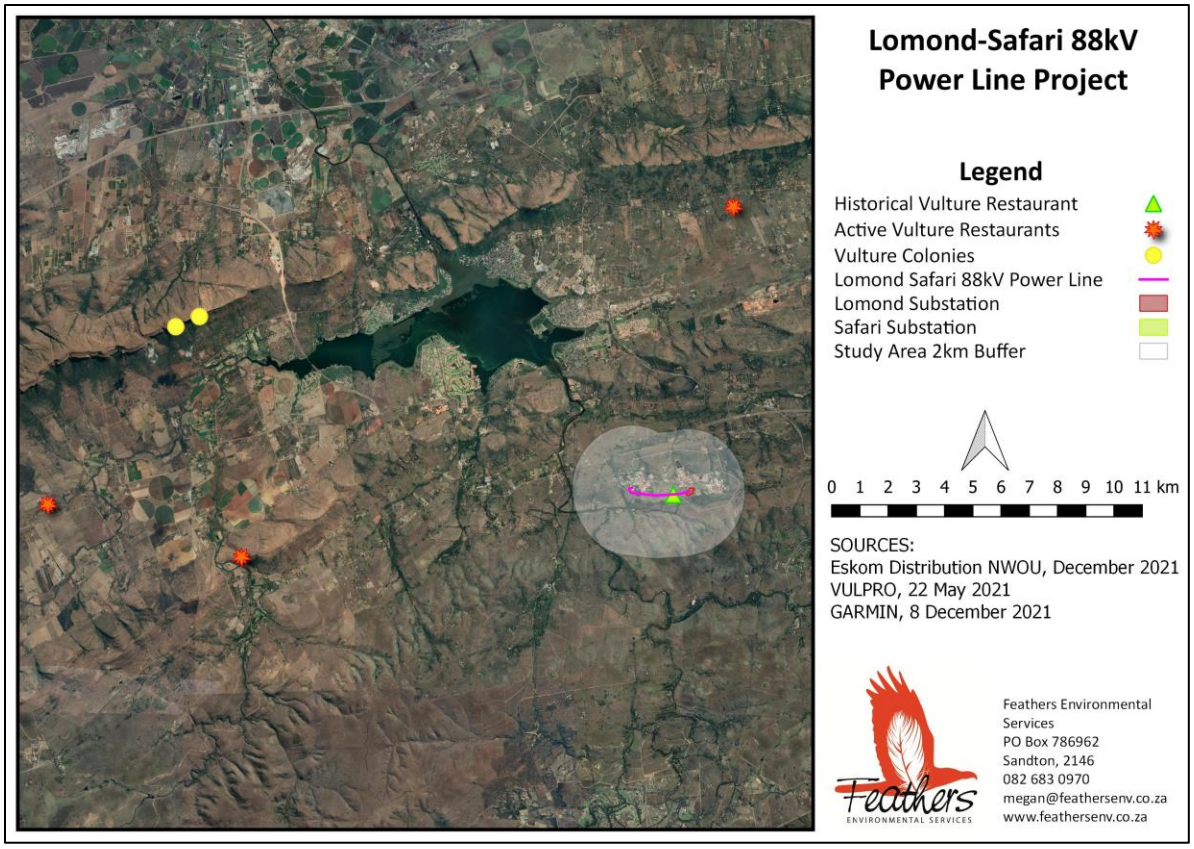

FIGURE 5: Cape Vulture Colonies, active Vulture Restaurants and historical Vulture Restaurants in relation of the proposed Lomond-Safari 88kV power line project.

To promote the survival of these high-flying scavengers, the practice of supplemental feeding of vultures in so called vulture restaurants, was initiated and today there are 236 documented vulture restaurants scattered throughout South Africa (Wolter et al, 2013). In this system of supplementary feeding, carcasses donated by stock farmers and hunters in the surrounding area are routinely placed out at selected sites, assisting in the continued survival of vultures. At least three active vulture restaurant have been established within a 50km radius of the project location (FIGURE 5). Evidence of a historical feeding site (FIGURE 5 and APPENDIX 2: FIGURE 6) was observed along the proposed route alignment. The location of this site was confirmed by VulPro (pers. comms. Kerri Wolter, December 2021). Feeding in areas that are traversed by power line infrastructure increases the risk of collision and electrocution.

7.2.7. Primary Data Collection

A single summer survey was conducted on 8 December 2021 within the area earmarked for proposed Lomond-Safari 88kV power line project. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available within the study area. All species encountered (observed and heard) during the site visit were noted and are indicated (highlighted in grey) in APPENDIX 1.

The site visit produced a combined list of 35 species, covering both the study area and to a limited extent, the surrounding area. Cape Vulture is the only Red List species observed with the proposed study area. The majority of observations were of passerine species that are common to this area. Each of these species has the potential to be displaced by the construction of proposed Lomond-Safari 88kV power line project as a result of habitat transformation and disturbance. However, these species have persisted despite existing disturbance (i.e. industrial activity) within the study area. This resilience, coupled with the fact that similar habitat is available throughout the broader area, means that the displacement impact will not be of regional or national significance.

TABLE 1: Annotated list of regional Red List, southern African Endemic species that have been recorded in the relevant pentads surrounding the proposed Lomond-Safari 88kV power line project study area.

Family name	Scientific name	Red List Regional	Report Rate	No. of Birds	Bushveld	Wetland/ Swamp	Habitat Loss	Disturbance	Collision	Electrocution
Crane, Blue	*Anthropoides paradiseus*	NT	0.3	4	-	-	-	-	-	-
Duck, Maccoa	*Oxyura maccoa*	NT	0.2	3	-	-	-	-	-	-
Eagle, Martial	*Polemaetus bellicosus*	EN	0.1	2	x	-	x	x	x	x
Eagle, Verreaux's	*Aquila verreauxii*	VU	3.3	51	foraging	-	-	x	x	x
Falcon, Lanner	*Falco biarmicus*	VU	1.7	26	open	-	x	x	x	-
Falcon, Red-footed	*Falco vespertinus*	NT	0.1	2	x	-	x	x	x	-
Finfoot, African	*Podica senegalensis*	VU	0.4	6	-	-	-	-	-	-
Flamingo, Greater	*Phoenicopterus roseus*	NT	3.5	53	-	-	-	-	-	-
Flamingo, Lesser	*Phoeniconaias minor*	NT	0.5	8	-	-	-	-	-	-
Grass-Owl, African	*Tyto capensis*	VU	0.5	8	-	-	-	-	-	-
Kingfisher, Half-collared	*Alcedo semitorquata*	NT	0.8	12	-	-	-	-	-	-
Korhaan, White-bellied	*Eupodotis senegalensis*	VU	0.8	12	-	-	-	-	-	-
Painted-snipe, Greater	*Rostratula benghalensis*	NT	0.1	2	-	-	-	-	-	-
Pelican, Great White	*Pelecanus onocrotalus*	VU	0.3	4	-	-	-	-	-	-
Pratincole, Black-winged	*Glareola nordmanni*	NT	0.1	2	-	-	-	-	-	-
Roller, European	*Coracias garrulus*	NT	0.4	6	x	-	x	x	-	-
Sandgrouse, Yellow-throated	*Pterocles gutturalis*	NT	1.0	15	x	-	x	x	-	-
Secretarybird	*Sagittarius serpentarius*	VU	0.1	2	x	-	x	x	x	-
Stork, Abdim's	*Ciconia abdimii*	NT	0.8	12	x	-	-	-	x	-
Stork, Black	*Ciconia nigra*	VU	0.1	1	-	-	-	-	x	-
Stork, Marabou	*Leptoptilos crumenifer*	NT	0.7	10	-	-	-	-	x	-
Stork, Yellow-billed	*Mycteria ibis*	EN	2.2	33	-	-	-	-	x	-
Tern, Caspian	*Hydroprogne caspia*	VU	4.3	65	-	-	-	-	-	-
Vulture, Cape	*Gyps coprotheres*	EN	14.8	226	foraging	-	-	x	x	x
Vulture, Lappet-faced	*Torgos tracheliotos*	EN	0.1	1	x	-	x	x	x	x
Vulture, White-backed	*Gyps africanus*	CR	0.9	13	x	-	x	x	x	x

7.3 Avifaunal Habitats

Vegetation is one of the primary factors determining bird species distribution and abundance in an area. It is widely accepted within ornithological circles that vegetation structure is more important in determining which bird species will occur there. The classification of vegetation types is from Mucina & Rutherford (2006 and 2012), while from an avifaunal perspective, the Atlas of southern African Birds (SABAP1) recognises six primary vegetation divisions or biomes within South Africa, namely (1) Fynbos (2) Succulent Karoo (3) Nama Karoo (4) Grassland (5) Savanna and (6) Forest (Harrison et al. 1997). Whilst much of the distribution and abundance of bird species can be attributed to the broad vegetation types present in an area, it is the smaller spatial scale habitats (micro habitats) that support the requirements of a particular bird species that need to be examined in greater detail. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food availability, and various anthropogenic factors all of which will either attract or deter birds and are critically important in mapping the site in terms of avifaunal sensitivity and ultimately informing mitigation requirements. assessment of the proposed Lomond-Safari 88kV power line alignment and its immediate surrounds revealed at three broadly described avifaunal micro habitats i.e. bushveld, waterbody/wetland and built-up (industrial) areas (FIGURE 6) with APPENDIX 2 providing a photographic record of the bird habitats.

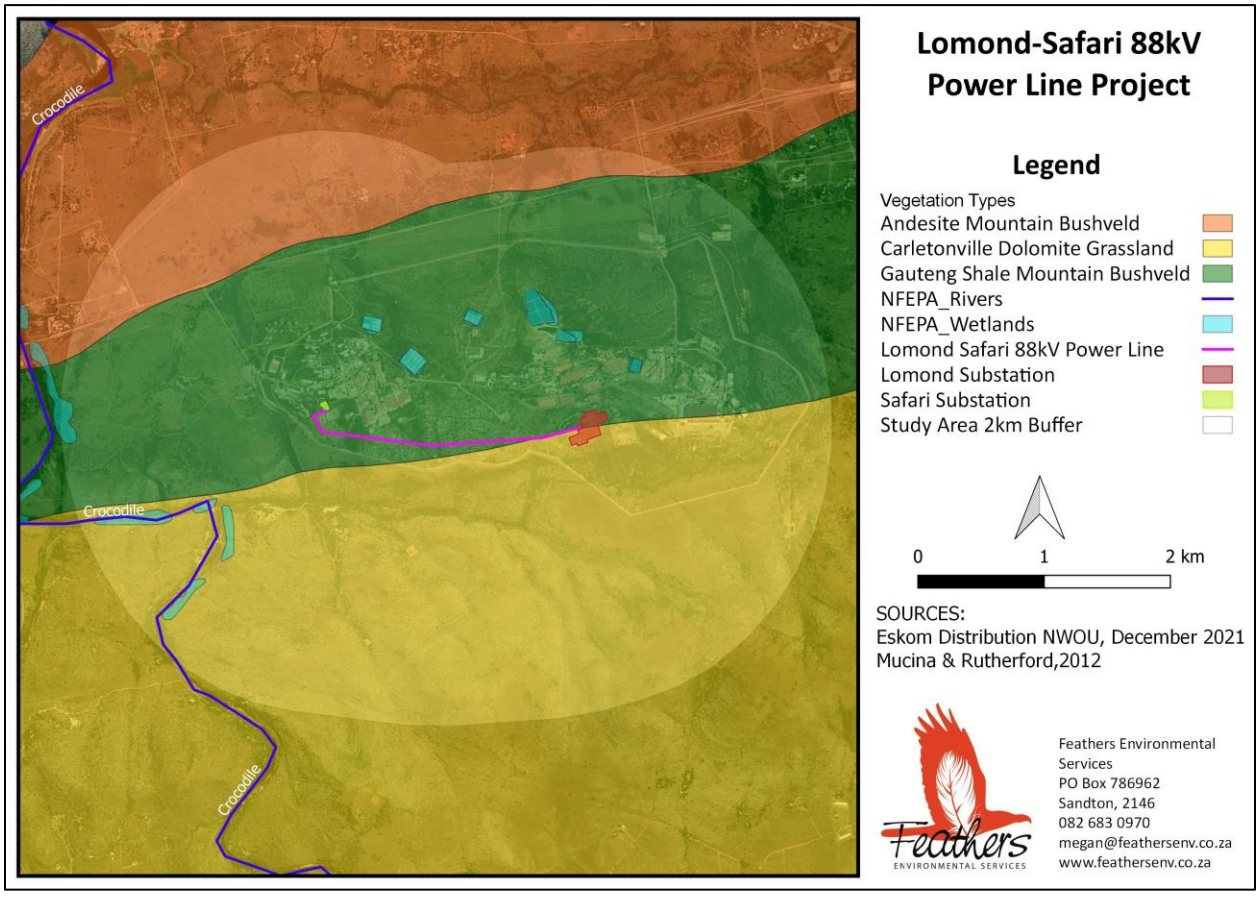

FIGURE 6: Regional map detailing the various vegetation types and river systems occurring within the proposed Lomond-Safari 88kV power line route alignment study area.

7.3.1. Bushveld

The proposed Lomond-Safari 88kV power line alignment and surrounding study area are located within a single primary vegetation division namely the Savanna Biome, specifically the Gauteng Shale Mountain Bushveld vegetation unit (South African National Biodiversity Institute, 2012 and Mucina & Rutherford, 2006). Gauteng Shale Mountain Bushveld occurs within the Gauteng province, mainly on the ridge of the Gatsrand south of Carletonville – Westonaria – Lenasia. It also occurs as a narrow band along the ridge that runs from a point between Tarlton and Magaliesberg in the west, through Sterkfontein, Pelindaba, Atteridgeville to Klapperkop and Southeastern Pretoria in the east. Altitude varies between 1300 and 1750m. The landscape is comprised of low, broken ridges varying in steepness and with high surface rock cover. Vegetation is a short, semi-open thicket dominated by a variety of woody species. The understory is dominated by a variety of grasses. Some of the ridges form plateaus above the northern slopes that carry scrubby grassland with high surface rock cover (Mucina & Rutherford 2006).

The savanna/woodland biome (APPENDIX 2: FIGURES 1 and 2) contains a large variety of bird species (it is the most species-rich community in southern Africa) but very few bird species are restricted to this biome. It is also relatively well conserved compared to the grassland biome. Savanna is particularly rich in raptors and forms the stronghold for priority species (recorded in the broader project area by SABAP2) such as Martial Eagle *Polemaetus bellicosus*, Wahlberg's Eagle *Aquila,* Black-chested Snake-Eagle *Circaetus pectoralis,* Brown Snake-Eagle *Circaetus cinereus,* Lappet-faced Vulture, White-backed Vulture and a multitude of medium-sized raptors, for example Jackal Buzzard *Buteo rufofuscus*, Steppe Buzzard *Buteo vulpinus*, African Harrier Hawk (Gymnogene) *Polyboroides typus* and African Hawk Eagle *Aquila spilogaster*. Apart from raptors, woodland in its undisturbed state is suitable for a wide range of other, non-raptorial sensitive species i.e. Secretarybird, Abdim's Stork, Marabou Stork *Leptoptilos crumenifer*.

It is important to note that the broader study area has experienced significant transformation in the form of urbanisation and industrial activity which dominate the landscape and fairly significant levels of disturbance persist within the study area in the form of urban and industrial related activities and vehicle traffic in the immediate surrounds. SABAP2 reporting rates for the majority of Red List avifauna potentially occurring in savanna habitat in the study area are low (see TABLE 1) and the absence of these species within the study area is an indication of the significant levels of human activity and disturbance. Therefore, the potential displacement impacts as a result of habitat loss and disturbance associated with the construction and operation of the proposed 88kV power line are likely to be moderate to low for the aforementioned species.

7.3.2. Wetland

Wetlands are characterized by slow flowing seasonal water (or permanently wet) and tall emergent vegetation (rooted or floating) and provide habitat for many water birds. The conservation status of many of the bird species that are dependent on wetlands reflects the critical status of wetlands worldwide, with many having

already been destroyed. There is an example of localized wetland within the study area (APPENDIX 2: FIGURE 3), however it is highly unlikely that this wetland will provide attractive foraging habitat for the sensitive wetland dependent species such as Blue Crane *Anthropoides paradiseus*, Black Stork and White Stork *Ciconia ciconia* that have been recorded in the broader study area. The more common ibis and heron species may utilise the wetland for their foraging needs.

7.3.3. Built-up Areas

These areas include surface infrastructure such as buildings and roads (APPENDIX 2: FIGURE 5). Built-up areas generally are of little value to sensitive Red List bird species due to their degraded nature and the associated disturbance factor. They do however play an important role in providing safe refuge and foraging opportunities for small passerine species that have become common in urban environments.

TABLE 1 details the micro habitats that each of the Red List bird species (recorded by SABAP2) will typically frequent in the study area. It must be stressed that birds can and will, by virtue of their mobility, utilise almost any areas in a landscape from time to time. However, the analysis in TABLE 1 represents each species' most preferred or normal habitats. These locations are where most of the birds of that species will spend most of their time which in turn provides an indication of where impacts on those species will be most significant.

8. IMPACT ASSESSMENT

Poorly sited or designed facilities and infrastructure can negatively impact not only vulnerable species and habitats, but also entire ecological processes. The effects of any development on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and diversity of species present. With so many variables involved, the impacts of each development must be assessed individually. Each of these potential effects can interact, either increasing the overall impact on birds or, in some cases, reducing a particular impact (for example where habitat loss and disturbance causes a reduction in birds using an area which may then reduce the risk of collision). The principal areas of concern for Red List and non-Red List priority species related to the proposed Lomond-Safari 88kV power line project are listed include:

8.1 Construction Phase

8.1.1. Displacement as a result of habitat loss or transformation

This impact is dependent on the location and the scale of the facility. Relevant to this project, vegetation (habitat) may need to be cleared to accommodate the required power line infrastructure, reducing the amount of habitat available to birds for foraging, roosting and breeding (Smallie, 2013). The effect of the vegetation

clearing is always more marked in woodland areas, where construction necessitates the removal of woody plants, and especially large trees. Relevant to this project, the loss of habitat will more significant in densely wooded area surrounding the wetland (APPENDIX 2: FIGURE 2) . The proposed Lomond-Safari 88kV power line traverses largely across degraded and heavily disturbed bushveld habitat (APPENDIX 2: FIGURE 4) which is likely to result in minimal habitat loss if the construction activity is restricted to the immediate footprint of the infrastructure and strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. The loss of habitat may potentially be more significant for the more common passerine species with small home ranges as entire territories could be removed during construction activities. While each of these species has the potential to be displaced by the construction of the power line infrastructure, identical habitat features prominently in the surrounding areas providing alternate foraging, roosting and breeding areas for the species observed.

8.1.2. Displacement as a result of disturbance

Excavation and construction activities are a source of significant disturbance particularly as a result of the machinery and construction personnel that are present on site for the duration of the construction of the proposed Lomond-Safari 88kV power line. For most bird species, construction activities are likely to be a cause of temporary disturbance impacting on foraging, and roosting behaviours but in more extreme cases, construction may impact on the breeding success of certain species particularly if the disturbance happens during a critical part of the breeding cycle, resulting in temporary breeding failure or permanent nest abandonment. The proposed route alignment is already subjected to a degree of disturbance in the form of industrial activities along certain sections of the proposed route which is likely to result in the temporary displacement as opposed to permanent displacement of species from the area.

8.1.3. Direct mortality as a result of construction activities

Bird mortality as a result of construction activities is improbable because birds are incredibly mobile and able to move out of harm's way. If mortality does occur, it is likely to be confined to a localised area and restricted to immobile species e.g. nestlings. No terrestrial bird species (ground) nest locations were observed during the site visit to the study area.

8.2 Operational Phase

8.2.1. Mortality due to collisions with the 88kV power line conductors

Collisions are the biggest single threat posed by power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001). Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. A potential impact of the proposed

88kV power line is collisions with the overhead conductors. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because a number of variables play a role in determining the risk, for example weather, rainfall, wind, age, flocking behaviour, power line height, light conditions, topography, population density and so forth. However, from incidental record keeping by the Endangered Wildlife Trust: Wildlife & Energy Programme it is possible to give a measure of what species are likely to be impacted upon (see FIGURE 7 below - Jenkins et al. 2010). This only gives a measure of the general susceptibility of the species to power line collisions, and not an absolute measurement for any specific line.

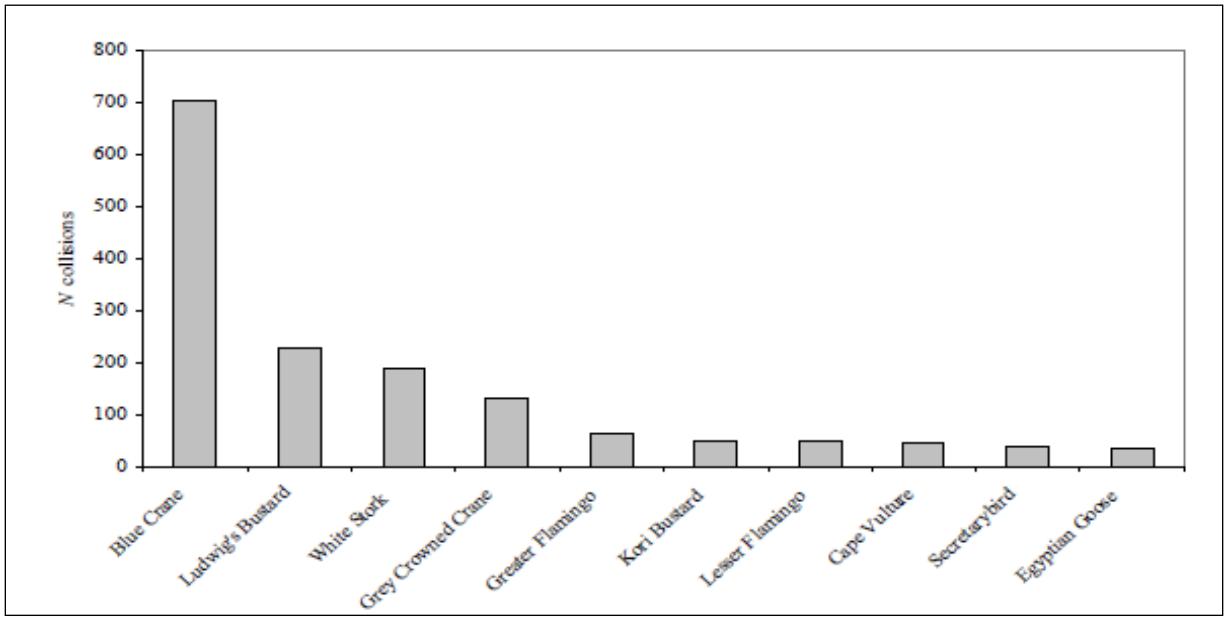

FIGURE 7: The top ten collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/EWT Strategic Partnership central incident register 1996 - 2007 (Jenkins et al. 2010)

Relevant to this development, collisions unlikely given the woodland habitat, the species observed and existing disturbance in the study area. Several ungulate species occur on the NECSA property should these animals die as a result of natural causes or as part of a management procedure, the presence of carcasses wills attract vultures which will result in an increased risk of collision, should the carcasses be in close proximity to the proposed 88kV power line.

8.2.2. Mortality due to electrocutions on the 88kV power line infrastructure

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Electrocution risk is strongly influenced by the power line voltage and design of the tower/pole structure and mainly affects larger, perching species that are capable of spanning the spaces between energized components. This is particularly likely when more than one bird attempts to sit

on the same pole, a behaviour that is typical of gregarious species (i.e. Cape Vulture) when perching or roosting. Although the proposed power line has a voltage size of 88kV, the power line will be constructed using the 132kV tower specifications. The clearance distances between the live components and/or live and earthed components of the 132kV tower structure should be sufficient to reduce the risk of electrocutions for most raptor species. Relevant to this development, Cape Vulture are susceptible to electrocution on the power line infrastructure. The best possible mitigation is the construction of the power line using an *Eskom* approved bird friendly pole/tower design (DT 7641/7649) accordance with the Distribution Technical Bulletin relating to bird friendly structures. Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers is also required. The NECSA property is home to many ungulate species which may become a source of food for Cape Vulture that utilise the surrounding areas extensively. It is further recommended that carcasses be removed from the property entirely and donated to VulPro to ensure that the resident Cape Vultures are fed in a safe environment. It is also vitally important that the historical vulture restaurant/feeding site on the NECSA property remain closed.

8.2.3. Impact on the quality of electrical supply

Although this does not form part of the brief, it is important to mention that birds could have an impact on the proposed power line infrastructure. Both bird streamers and bird pollution occur as a result of birds perching and defecating on the pole tops and, often directly above live conductors causing electrical faults on power lines. The more faults that occur on a line, the poorer the quality of electrical supply to the end users. Site specific mitigation can be applied reactively should this impact occur.

Bird nests may also cause faults through nest material, protruding into the air gap between live components on the power line infrastructure. Crows in particular often incorporate wire and other conductive material into their nests. When nests cause flashovers, the nesting material may catch fire. This in turn can lead to equipment damage or a general veld fire. Apart from the cost of replacing damaged equipment, the resultant veld fire can lead to claims for damages from landowners. Power line poles in turn provide nesting substrate for certain bird species, some of which might benefit through the increased availability of nesting substrates on the power line infrastructure. Site specific mitigation can be applied reactively should this impact occur.

8.3 Impact Assessment

A quantitative methodology was used to describe, evaluate and rate the significance of the aforementioned impacts associated with the construction and operation of the proposed Lomond-Safari 88kV power line project. This assessment is presented in tabular format below (TABLE 2 - 6) for both pre- and post-mitigation according to set criteria described in APPENDIX 3.

TABLE 2: Assessment of the habitat loss and/or transformation caused by the construction of the proposed Lomond-Safari 88kV power line

Activity:	Construction of the 88kV power line infrastructure				
Impact:	Displacement of Red List species as a result of habitat loss & transformation				
Significance rating:	Magnitude	Duration	Scale	Probability	Significance
Pre-Mitigation	4	4	2	4	MODERATE
Post-Mitigation	2	3	2	2	LOW
Is the Impact Reversible?	• Medium reversibility - The construction of the infrastructure is likely to require the removal of woodland vegetation within the project footprint.				
Residual impacts:	• Species are likely return once the construction activity is completed and the vegetation reestablishes itself.				

TABLE 3: Assessment of the disturbance impact caused by the construction of the proposed Lomond-Safari 88kV power line

Activity:	Construction of the 88kV power line infrastructure				
Impact:	Displacement of Red List species as a result of disturbance				
Significance rating:	Magnitude	Duration	Scale	Probability	Significance
Pre-Mitigation	4	2	2	4	MODERATE
Post-Mitigation	4	2	2	3	LOW
Is the Impact Reversible?	• High reversibility - After the construction activities, have ceased, the source of displacement will cease.				
Residual impacts:	• The majority of species observed in the study area may return once the construction activity is completed				

TABLE 4: Assessment of mortality due to collision with the Lomond-Safari 88kV power line infrastructure

Activity:	Operation of the 88kV power line infrastructure				
Impact:	Mortality due to collision with the 88kV power line infrastructure				
Significance rating:	Magnitude	Duration	Scale	Probability	Significance
Pre-Mitigation	4	4	2	2	LOW
Post-Mitigation	2	4	2	2	LOW
Is the Impact Reversible?	• High reversibility - If the 88kV power line is mitigated and/or de-commissioned the collision risk will disappear				
Residual impacts:	• It is envisaged that mitigation, if required, will reduce but not eliminate collision mortality.				

TABLE 5: Assessment of mortality due to electrocution on the Lomond-Safari 88kV power line infrastructure

Activity:	Operation of the 88kV power line infrastructure				
Impact:	Mortality as a result of electrocution on the 88kV power line infrastructure				
Significance rating:	Magnitude	Duration	Scale	Probability	Significance
Pre-Mitigation	8	4	2	3	MODERATE
Post-Mitigation	4	4	2	2	LOW
Is the Impact Reversible?	• High reversibility - If the 88kV power line is constructed using a bird-friendly structure, mitigated using appropriate insulating sleeves and/or de-commissioned the electrocution risk will disappear				
Residual impacts:	• Mitigation will reduce electrocution mortality to negligible levels.				

TABLE 6: Assessment of nesting on the Lomond-Safari 88kV power line infrastructure

Activity:	Operation of the 88kV power line infrastructure				
Impact:	Nesting on the PV panels and ancillary infrastructure (POSITIVE)				
Significance rating:	Magnitude	Duration	Scale	Probability	Significance
Pre-Mitigation	6	4	2	3	POSITIVE
Post-Mitigation	4	4	2	3	POSITIVE
Is the Impact Reversible?	• N/A				
Residual impacts:	• N/A				

9. PROPOSED IMPACT MITIGATION ACTIONS

Based on the anticipated impacts described above the following recommendations are provided regarding practical mitigation measures for potentially significant impacts to be included in the Environmental Management Programme (EMPr).

OBJECTIVE: Mitigate the displacement and direct mortality impacts caused by the construction and operation of the proposed Lomond-Safari 88kV power line.

Project component/s	88kV Chickadee power line
Potential Impact	Permanent displacement and mortality of local populations of Red List and non-Red List species caused by habitat loss, disturbance, collisions with the overhead conductors and electrocutions on the power line infrastructure.

Activity/risk source	* Construction of the proposed Lomond-Safari 88kV power line within sensitive avifaunal habitat. * Unmitigated construction and operational activities.
Mitigation: Target/Objective	Limit avifaunal mortality and displacement as far as practically possible for the duration of the operational life span of the Lomond-Safari 88kV power line.

Mitigation: Action/control	Responsibility	Timeframe
CONSTRUCTION PHASE		
Displacement as a result of habitat loss: * Avoid removal of sensitive vegetation types. The recommendations of the botanical study must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned. * Construction activity should be restricted to the immediate footprint of the infrastructure in areas of HIGH sensitivity. * All construction activities should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. * All temporary disturbed areas should be rehabilitated according to the site's rehabilitation plan, following construction. * Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.	Construction Manager and Environmental Control Officer	From the commencement of construction (inclusive of all project components to the completion of construction.
Displacement as a result of disturbance: * Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. * Measures to control noise should be applied according to current best practice in the industry.	Construction Manager and Environmental Control Officer	From the commencement of construction (inclusive of all project components to the completion of construction.
OPERATIONAL PHASE		
Mortality as a result of electrocutions on the 88kV power line infrastructure * The 88kV power line must be constructed using a bird friendly structure (i.e. (DT 7641/7649)	Eskom Environmental Manager, Line and Servitude Manager, Environmental	For the duration of the operational life-span of the Lomond-Safari 88kV power line

* Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must be applied * Dead animals/carcasses found at/close to the Lomond-Safari 88kV power line during routine power line patrols and/or maintenance by Eskom must be removed from the property entirely and donated to VulPro to ensure that the Cape Vultures utilising the study area are fed in a safe environment. * It is also vitally important that the historical vulture restaurant/feeding site on the NECSA property remain closed. * Eskom line and servitude managers are requested to report all bird electrocutions encountered during routine line patrols of the Lomond-Safari 88kV power line to the Eskom-Endangered Wildlife Trust Strategic Partnership. * Insulating material (if applied) to be maintained during the operational life span of the Lomond-Safari 88kV power line.	Control Officer and Eskom-Endangered Wildlife Trust Strategic Partnership	
Collision Mortality (88kV Power Line): * Eskom line and servitude managers are requested to report all bird collisions encountered during routine line patrols of the Lomond-Safari 88kV power line to the Eskom-Endangered Wildlife Trust Strategic Partnership. * If power line marking is required, bird flight diverters must be installed according to industry standard guidelines. Bird flight diverters to be maintained on sections of power line during the operational life span of the Lomond-Safari 88kV power line	Eskom Environmental Manager, Line and Servitude Manager, Environmental Control Officer and Eskom-Endangered Wildlife Trust Strategic Partnership.	For the duration of the operational life-span of the Lomond-Safari 88kV power line.
Nest building on the 88kV power line infrastructure: * If on-going impacts are recorded once the Lomond-Safari 88kV power line is operational, it is recommended that these impacts be assessed by Eskom-Endangered Wildlife Trust Strategic Partnership and	Eskom Environmental Manager, Line and Servitude Manager, Environmental Control Officer and Eskom-Endangered Wildlife Trust	For the duration of the operational life-span of the Lomond-Safari 88kV power line

	site-specific mitigation be applied reactively. * While it is not illegal to remove an unoccupied nest that is posing a quality of supply risk, the removal of nests that contain eggs or chicks will require a permit to do so. Nest management strategies to be identified and implemented reactively, if required.	Strategic Partnership.	
Performance Indicator	* The size and extent of sensitive habitat present at the start of construction remains intact at end of construction phase. * Sustainable levels of mortalities are reported on a monthly basis and the necessary mitigation measures are implemented timeously.		

10. PROPOSED MONITORING ACTIONS

The Eskom Environmental officials and/or line servitude staff to conduct regular inspections of the Lomond-Safari 88kV power line to record the number of mortalities, nesting activity and faecal matter fouling and determine the effectiveness of the mitigation actions taken.

11. ENVIRONMENTAL IMPACT STATEMENT

11.1 Conditions to be included in the Environmental Authorisation

In conclusion, the habitat within which the proposed study area is located is low to moderately sensitive from a potential bird impact perspective. The construction of the proposed Lomond-Safari 88kV power line will result in impacts of MODERATE significance to birds occurring in the vicinity of the new infrastructure, which can be reduced to through the application of mitigation measures. It is anticipated that the proposed Lomond-Safari 88kV power line can be constructed within the study area with acceptable levels of impact on the resident avifauna, subject to the following recommendations:

* Construction activities (i.e. all staff, vehicle and machinery) should be restricted to the immediate footprint of the infrastructure. The recommendations of the botanical study must be strictly implemented.
* Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of avifaunal species.
* Maximum use should be made of existing roads and the construction of new roads must be kept to a minimum. New roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats.
* The 88kV power lines must be constructed using a bird friendly structure (i.e. DT 7641/7649)

* Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must also be implemented.
* Dead animals/carcasses found at/close to the Lomond-Safari 88kV power line during routine power line patrols and/or maintenance by Eskom must be removed from the property and donated to VulPro to ensure that the Cape Vultures utilising the study area are fed in a safe environment.
* The historical vulture restaurant/feeding site on the NECSA property must remain closed.
* If collision or electrocution impacts are recorded once the 88kV power lines are operational, it is recommended that an avifaunal specialist investigate the mortalities and provide recommendations for site-specific mitigation to be applied reactively.
* In addition to this, the normal suite of environmental good practices should be applied, such as ensuring strict control of staff, vehicles and machinery on site and limiting the creation of new roads as far as possible.

11.2 Specialist Opinion

In accordance with the outcomes of the impact assessment detailed in Section 8, in conjunction with the baseline conditions as presented in Section 7 and the impact management measures in Section 9, the proposed Lomond-Safari 88kV power line is not deemed to present significant negative environmental issues or impacts. It is this specialist's opinion that the proposed Lomond-Safari 88kV power line can be constructed within the preferred route alignment with acceptable levels of impact on the resident avifauna subject to the aforementioned mitigation and management measures.

12. ASSUMPTIONS, UNCERTAINTIES & GAPS IN KNOWLEDGE

The avifaunal specialist assumed that the sources of information used for this assessment are reliable. However, it must be noted that there are limiting factors and these may potentially detract from the accuracy of the predicted results.

* The report is the result of a short-term study and is based on a one-day site visit to the proposed study area. No long-term, seasonal monitoring was conducted by the avifaunal specialist. This assessment relies upon secondary data sources with regards to bird occurrence and abundance such as the SABAP2 and IBA projects. These comprehensive datasets provide a valuable baseline against which any changes in species presence, abundance, and distribution can be monitored. However, primary information on bird habitat and avifaunal species occurrence collected during the site visit and together with professional judgement, based on extensive field experience since 2006, was used directly in determining which species of conservation importance are likely to occur within suitable

avifaunal habitat types within the proposed study area. Based on these findings, the specialist was able to identify and assess the anticipated impacts and provide recommendations for mitigation;

* The site visit to the proposed Lomond-Safari 88kV power line project study area and the resultant observations were made in a single season (austral summer), during which time nesting raptors could not have observed and assessed;
* The focus of this assessment is primarily on the potential impacts on regional Red List and priority species i.e., species that are vulnerable to the displacement, collision and electrocution impacts associated with the construction and operation of the proposed Lomond-Safari 88kV power line project. The impact on non-Red List species is also assessed, albeit in less detail. Furthermore, much of the mitigation recommended for Red List species will also protect non-Red List species in the study area.
* Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the avifaunal specialist field since 2006. However, bird behaviour can't be reduced to formulas that will hold true under all circumstances. It must also be noted that, it is often not possible to entirely eliminate the risk of the disturbance and displacement impacts associated with the construction and operational activities. Our best possible efforts can probably not ensure zero impact on birds. Assessments such as this attempt to minimise the risk as far as possible, and although the displacement impacts associated with the proposed Lomond-Safari 88kV power line project will be unavoidable, they are likely to be temporary and of moderate significance.

The above limitations need to be stated as part of this assessment so that the reader fully understands the complexities. However, they do not detract from the confidence that this author has in the findings of this impact assessment report and subsequent recommendations for this project.

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APPENDIX 1: SOUTH AFRICAN BIRD ATLAS PROJECT DATA (SABAP2) FOR THE PROPOSED LOMOND-SAFARI 88KV POWER LINE

Family name	Scientific name	Red List Global	Red List Regional	Endemicity SA, Lesotho & Swaziland	Endemicity Southern Africa	Report Rate	No. of Birds
Avocet, Pied	*Recurvirostra avosetta*					6.1	93
Babbler, Arrow-marked	*Turdoides jardineii*					44.5	679
Babbler, Southern Pied	*Turdoides bicolor*				Endemic	0.1	1
Barbet, Acacia Pied	*Tricholaema leucomelas*				Near-endemic	10.4	159
Barbet, Black-collared	*Lybius torquatus*					72.2	1,102
Barbet, Crested	*Trachyphonus vaillantii*					79.4	1,213
Batis, Chinspot	*Batis molitor*					30.7	469
Bee-eater, European	*Merops apiaster*					23.5	359
Bee-eater, Little	*Merops pusillus*					1.7	26
Bee-eater, White-fronted	*Merops bullockoides*					14.7	225
Bishop, Southern Red	*Euplectes orix*					53.6	819
Bishop, Yellow-crowned	*Euplectes afer*					5.4	82
Bittern, Dwarf	*Ixobrychus sturmii*					0.1	2
Bittern, Little	*Ixobrychus minutus*					1.6	24
Bokmakierie	*Telophorus zeylonus*				Near-endemic	16.0	244
Boubou, Southern	*Laniarius ferrugineus*				Endemic	74.9	1,144
Brubru	*Nilaus afer*					6.2	94
Bulbul, African Red-eyed	*Pycnonotus nigricans*				Near-endemic	0.2	3
Bulbul, Dark-capped	*Pycnonotus tricolor*					91.9	1,404
Bunting, Cape	*Emberiza capensis*				Near-endemic	3.5	54
Bunting, Cinnamon-breasted	*Emberiza tahapisi*					21.7	332
Bunting, Golden-breasted	*Emberiza flaviventris*					6.9	105
Bunting, Lark-like	*Emberiza impetuani*				Near-endemic	0.1	1
Bush-shrike, Grey-headed	*Malaconotus blanchoti*					9.2	141
Bush-shrike, Orange-breasted	*Chlorophoneus sulfureopectus*					10.1	154
Buttonquail, Kurrichane	*Turnix sylvaticus*					1.0	16
Buzzard, Jackal	*Buteo rufofuscus*			Near endemic	Endemic	0.7	10
Buzzard, Lizard	*Kaupifalco monogrammicus*					0.3	4
Buzzard, Steppe	*Buteo buteo*					11.5	175
Camaroptera, Grey-backed	*Camaroptera brevicaudata*					9.9	151
Canary, Black-throated	*Crithagra atrogularis*					42.4	648
Canary, Yellow	*Crithagra flaviventris*				Near-endemic	1.1	17

Family name	Scientific name	Red List Global	Red List Regional	Endemicity SA, Lesotho & Swaziland	Endemicity Southern Africa	Report Rate	No. of Birds
Canary, Yellow-fronted	*Crithagra mozambica*					43.5	664
Chat, Anteating	*Myrmecocichla formicivora*				Endemic	0.4	6
Chat, Familiar	*Cercomela familiaris*					23.8	364
Cisticola, Cloud	*Cisticola textrix*			Near endemic	Near-endemic	8.1	123
Cisticola, Desert	*Cisticola aridulus*					8.9	136
Cisticola, Lazy	*Cisticola aberrans*					11.7	179
Cisticola, Levaillant's	*Cisticola tinniens*					24.8	379
Cisticola, Rattling	*Cisticola chiniana*					10.9	167
Cisticola, Wailing	*Cisticola lais*					3.6	55
Cisticola, Wing-snapping	*Cisticola ayresii*					3.5	53
Cisticola, Zitting	*Cisticola juncidis*					34.7	530
Cliff-Chat, Mocking	*Thamnolaea cinnamomeiventris*					14.1	216
Cliff-Swallow, South African	*Petrochelidon spilodera*			Endemic	Breeding-endemic	6.1	93
Coot, Red-knobbed	*Fulica cristata*					42.7	652
Cormorant, Reed	*Phalacrocorax africanus*					44.4	678
Cormorant, White-breasted	*Phalacrocorax lucidus*					30.8	471
Coucal, Burchell's	*Centropus burchellii*				Near-endemic	22.5	344
Courser, Bronze-winged	*Rhinoptilus chalcopterus*					0.1	2
Courser, Temminck's	*Cursorius temminckii*					0.8	12
Crake, African	*Crecopsis egregia*					0.4	6
Crake, Black	*Amaurornis flavirostra*					13.0	198
Crane, Blue	*Anthropoides paradiseus*	VU	NT		Endemic	0.3	4
Crombec, Long-billed	*Sylvietta rufescens*					20.8	317
Crow, Cape	*Corvus capensis*					0.1	1
Crow, Pied	*Corvus albus*					64.8	990
Cuckoo, African	*Cuculus gularis*					0.3	4
Cuckoo, Black	*Cuculus clamosus*					12.8	196
Cuckoo, Diederik	*Chrysococcyx caprius*					29.7	454
Cuckoo, Great Spotted	*Clamator glandarius*					0.6	9
Cuckoo, Jacobin	*Clamator jacobinus*					1.0	15
Cuckoo, Klaas's	*Chrysococcyx klaas*					4.8	73
Cuckoo, Levaillant's	*Clamator levaillantii*					2.9	44
Cuckoo, Red-chested	*Cuculus solitarius*					23.2	355
Cuckooshrike, Black	*Campephaga flava*					6.5	100

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Darter, African	*Anhinga rufa*					26.6	406
Dove, Laughing	*Streptopelia senegalensis*					85.8	1,31
Dove, Namaqua	*Oena capensis*					1.4	21
Dove, Red-eyed	*Streptopelia semitorquata*					78.7	1,201
Dove, Rock	*Columba livia*					22.1	338
Drongo, Fork-tailed	*Dicrurus adsimilis*					36.5	557
Duck, African Black	*Anas sparsa*					21.2	324
Duck, Comb	*Sarkidiornis melanotos*					0.9	14
Duck, Domestic	*Anas platyrhynchos*					0.5	7
Duck, Fulvous	*Dendrocygna bicolor*					1.6	25
Duck, Maccoa	*Oxyura maccoa*	VU	NT			0.2	3
Duck, Mallard	*Anas platyrhynchos*					0.3	5
Duck, Mallard	*Anas platyrhynchos*					3.3	51
Duck, Muscovy	*Cairina moschata*					0.1	1
Duck, Unidentified	*N/A N/A*					0.1	1
Duck, White-backed	*Thalassornis leuconotus*					0.5	8
Duck, White-faced	*Dendrocygna viduata*					28.0	427
Duck, Wood	*Aix sponsa*					0.1	1
Duck, Yellow-billed	*Anas undulata*					39.9	609
Eagle, Booted	*Hieraaetus pennatus*					0.4	6
Eagle, Long-crested	*Lophaetus occipitalis*					2.7	41
Eagle, Martial	*Polemaetus bellicosus*	VU	EN			0.1	2
Eagle, Verreaux's	*Aquila verreauxii*	LC	VU			3.3	51
Eagle, Wahlberg's	*Hieraaetus wahlbergi*					0.4	6
Eagle-Owl, Spotted	*Bubo africanus*					2.8	43
Egret, Cattle	*Bubulcus ibis*					62.4	953
Egret, Great	*Egretta alba*					10.0	153
Egret, Little	*Egretta garzetta*					16.6	253
Egret, Yellow-billed	*Egretta intermedia*					2.6	40
Eremomela, Burnt-necked	*Eremomela usticollis*					0.7	10
Eremomela, Yellow-bellied	*Eremomela icteropygialis*					0.1	1
Falcon, Amur	*Falco amurensis*					3.5	53
Falcon, Lanner	*Falco biarmicus*	LC	VU			1.7	26
Falcon, Peregrine	*Falco peregrinus*					0.5	8

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Falcon, Red-footed	*Falco vespertinus*	NT	NT			0.1	2
Finch, Cuckoo	*Anomalospiza imberbis*					1.0	16
Finch, Cut-throat	*Amadina fasciata*					9.5	145
Finch, Red-headed	*Amadina erythrocephala*				Near-endemic	2.1	32
Finch, Scaly-feathered	*Sporopipes squamifrons*				Near-endemic	0.5	7
Finfoot, African	*Podica senegalensis*	LC	VU			0.4	6
Firefinch, African	*Lagonosticta rubricata*					2.3	35
Firefinch, Jameson's	*Lagonosticta rhodopareia*					17.7	271
Firefinch, Red-billed	*Lagonosticta senegala*					2.7	41
Fiscal, Common	*Lanius collaris*					67.8	1,035
Fish-Eagle, African	*Haliaeetus vocifer*					13.2	202
Flamingo, Greater	*Phoenicopterus roseus*	LC	NT			3.5	53
Flamingo, Lesser	*Phoeniconaias minor*	NT	NT			0.5	8
Flufftail, Red-chested	*Sarothrura rufa*					2.1	32
Flycatcher, Fairy	*Stenostira scita*			Near endemic	Endemic	1.6	25
Flycatcher, Fiscal	*Sigelus silens*			Near endemic	Endemic	29.3	448
Flycatcher, Marico	*Bradornis mariquensis*				Near-endemic	0.5	8
Flycatcher, Pale	*Bradornis pallidus*					0.1	2
Flycatcher, Southern Black	*Melaenornis pammelaina*					12.6	193
Flycatcher, Spotted	*Muscicapa striata*					18.4	281
Francolin, Coqui	*Peliperdix coqui*					14.2	217
Francolin, Crested	*Dendroperdix sephaena*					15.8	242
Francolin, Orange River	*Scleroptila gutturalis*					4.3	66
Francolin, Red-winged	*Scleroptila levaillantii*					4.1	62
Francolin, Shelley's	*Scleroptila shelleyi*					0.3	4
Go-away-bird, Grey	*Corythaixoides concolor*					78.1	1,193
Goose, Domestic	*Anser anser*					0.9	14
Goose, Egyptian	*Alopochen aegyptiaca*					55.3	844
Goose, Spur-winged	*Plectropterus gambensis*					4.6	70
Goshawk, Gabar	*Melierax gabar*					1.0	16
Grassbird, Cape	*Sphenoeacus afer*			Near endemic	Endemic	11.3	173
Grass-Owl, African	*Tyto capensis*	LC	VU			0.5	8
Grebe, Great Crested	*Podiceps cristatus*					7.0	107
Grebe, Little	*Tachybaptus ruficollis*					28.2	430

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Greenbul, Yellow-bellied	*Chlorocichla flaviventris*					0.5	8
Green-Pigeon, African	*Treron calvus*					10.6	162
Greenshank, Common	*Tringa nebularia*					1.4	21
Guineafowl, Helmeted	*Numida meleagris*					64.1	979
Gull, Grey-headed	*Chroicocephalus cirrocephalus*					15.4	235
Hamerkop	*Scopus umbretta*					8.8	134
Harrier-Hawk, African	*Polyboroides typus*					3.1	47
Hawk, African Cuckoo	*Aviceda cuculoides*					0.5	8
Hawk-eagle, African	*Aquila spilogaster*					0.3	5
Helmet-shrike, White-crested	*Prionops plumatus*					0.1	1
Heron, Black	*Egretta ardesiaca*					5.1	78
Heron, Black-headed	*Ardea melanocephala*					31.9	487
Heron, Goliath	*Ardea goliath*					6.0	92
Heron, Green-backed	*Butorides striata*					8.4	129
Heron, Grey	*Ardea cinerea*					28.2	431
Heron, Purple	*Ardea purpurea*					9.2	141
Heron, Squacco	*Ardeola ralloides*					9.5	145
Hobby, Eurasian	*Falco subbuteo*					0.3	4
Honeybird, Brown-backed	*Prodotiscus regulus*					4.5	69
Honey-buzzard, European	*Pernis apivorus*					1.8	27
Honeyguide, Greater	*Indicator indicator*					5.7	87
Honeyguide, Lesser	*Indicator minor*					10.5	161
Hoopoe, African	*Upupa africana*					44.5	679
Hornbill, African Grey	*Tockus nasutus*					49.8	760
Hornbill, Southern Yellow-billed	*Tockus leucomelas*				Near-endemic	0.4	6
House-Martin, Common	*Delichon urbicum*					4.4	67
Ibis, African Sacred	*Threskiornis aethiopicus*					54.1	826
Ibis, Glossy	*Plegadis falcinellus*					14.1	215
Ibis, Hadeda	*Bostrychia hagedash*					84.2	1,285
Indigobird, Dusky	*Vidua funerea*					0.7	10
Indigobird, Purple	*Vidua purpurascens*					3.4	52
Indigobird, Village	*Vidua chalybeata*					1.0	16
Jacana, African	*Actophilornis africanus*					9.9	151
Kestrel, Greater	*Falco rupicoloides*					6.0	91

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Kestrel, Lesser	*Falco naumanni*					0.3	5
Kestrel, Rock	*Falco rupicolus*					2.5	38
Kingfisher, Brown-hooded	*Halcyon albiventris*					45.5	695
Kingfisher, Giant	*Megaceryle maxima*					9.4	144
Kingfisher, Half-collared	*Alcedo semitorquata*	LC	NT			0.8	12
Kingfisher, Malachite	*Alcedo cristata*					7.1	108
Kingfisher, Pied	*Ceryle rudis*					15.0	229
Kingfisher, Striped	*Halcyon chelicuti*					0.6	9
Kingfisher, Woodland	*Halcyon senegalensis*					12.3	188
Kite, Black	*Milvus migrans*					0.8	12
Kite, Black-shouldered	*Elanus caeruleus*					44.0	672
Kite, Yellow-billed	*Milvus aegyptius*					7.3	112
Korhaan, Northern Black	*Afrotis afraoides*				Endemic	19.4	296
Korhaan, White-bellied	*Eupodotis senegalensis*	LC	VU			0.8	12
Lapwing, African Wattled	*Vanellus senegallus*					41.5	633
Lapwing, Blacksmith	*Vanellus armatus*					63.7	972
Lapwing, Crowned	*Vanellus coronatus*					67.7	1,034
Lark, Eastern Clapper	*Mirafra fasciolata*				Near-endemic	4.2	64
Lark, Eastern Long-billed	*Certhilauda semitorquata*			Endemic	Endemic	0.5	7
Lark, Flappet	*Mirafra rufocinnamomea*					4.8	74
Lark, Melodious	*Mirafra cheniana*	LC	LC	Near endemic	Endemic	2.4	36
Lark, Red-capped	*Calandrella cinerea*					1.2	19
Lark, Rufous-naped	*Mirafra africana*					35.9	548
Lark, Sabota	*Calendulauda sabota*				Near-endemic	0.3	5
Lark, Spike-heeled	*Chersomanes albofasciata*				Near-endemic	1.2	19
Longclaw, Cape	*Macronyx capensis*				Endemic	20.8	318
Mannikin, Bronze	*Lonchura cucullata*					32.5	497
Martin, Banded	*Riparia cincta*					2.0	30
Martin, Brown-throated	*Riparia paludicola*					21.0	321
Martin, Rock	*Hirundo fuligula*					27.0	412
Martin, Sand	*Riparia riparia*					0.4	6
Masked-weaver, Lesser	*Ploceus intermedius*					2.4	36
Masked-Weaver, Southern	*Ploceus velatus*					86.5	1,321
Moorhen, Common	*Gallinula chloropus*					34.3	524

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Moorhen, Lesser	*Gallinula angulata*					0.1	1
Mousebird, Red-faced	*Urocolius indicus*					50.9	777
Mousebird, Speckled	*Colius striatus*					55.7	850
Mousebird, White-backed	*Colius colius*				Endemic	0.7	10
Myna, Common	*Acridotheres tristis*					80.2	1,224
Neddicky	*Cisticola fulvicapilla*					51.3	784
Night-Heron, Black-crowned	*Nycticorax nycticorax*					3.2	49
Nightjar, Fiery-necked	*Caprimulgus pectoralis*					7.3	111
Nightjar, Freckled	*Caprimulgus tristigma*					5.6	86
Nightjar, Rufous-cheeked	*Caprimulgus rufigena*					1.1	17
Olive-Pigeon, African	*Columba arquatrix*					12.0	184
Oriole, Black-headed	*Oriolus larvatus*					12.0	183
Osprey, Western	*Pandion haliaetus*					0.2	3
Ostrich, Common	*Struthio camelus*					5.0	76
Owl, Barn	*Tyto alba*					2.9	44
Owl, Marsh	*Asio capensis*					4.1	62
Owlet, Pearl-spotted	*Glaucidium perlatum*					4.6	71
Oxpecker, Red-billed	*Buphagus erythrorynchus*					0.6	9
Painted-snipe, Greater	*Rostratula benghalensis*	LC	NT			0.1	2
Palm-Swift, African	*Cypsiurus parvus*					58.5	893
Paradise-Flycatcher, African	*Terpsiphone viridis*					22.7	347
Paradise-Whydah, Long-tailed	*Vidua paradisaea*					1.4	22
Parakeet, Rose-ringed	*Psittacula krameri*					0.9	14
Pelican, Great White	*Pelecanus onocrotalus*	LC	VU			0.3	4
Petronia, Yellow-throated	*Gymnoris superciliaris*					1.2	19
Pigeon, Speckled	*Columba guinea*					41.9	640
Pipit, African	*Anthus cinnamomeus*					29.5	451
Pipit, Buffy	*Anthus vaalensis*					1.4	22
Pipit, Bushveld	*Anthus caffer*					0.7	10
Pipit, Long-billed	*Anthus similis*					8.3	127
Pipit, Plain-backed	*Anthus leucophrys*					3.7	56
Pipit, Striped	*Anthus lineiventris*					5.3	81
Plover, Kittlitz's	*Charadrius pecuarius*					0.2	3
Plover, Three-banded	*Charadrius tricollaris*					16.5	252

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Pochard, Red-crested	*Netta rufina*					0.1	1
Pochard, Southern	*Netta erythrophthalma*					5.8	89
Pratincole, Black-winged	*Glareola nordmanni*	NT	NT			0.1	2
Prinia, Black-chested	*Prinia flavicans*				Near-endemic	29.4	449
Prinia, Tawny-flanked	*Prinia subflava*					74.1	1,132
Puffback, Black-backed	*Dryoscopus cubla*					33.5	512
Pygmy-Kingfisher, African	*Ispidina picta*					0.3	5
Pytilia, Green-winged	*Pytilia melba*					1.2	19
Quail, Common	*Coturnix coturnix*					1.0	15
Quailfinch, African	*Ortygospiza fuscocrissa*					11.2	171
Quelea, Red-billed	*Quelea quelea*					14.9	227
Rail, African	*Rallus caerulescens*					0.2	3
Reed-Warbler, African	*Acrocephalus baeticatus*					12.3	188
Reed-Warbler, Great	*Acrocephalus arundinaceus*					3.1	48
Robin-Chat, Cape	*Cossypha caffra*					61.2	934
Robin-Chat, White-throated	*Cossypha humeralis*				Endemic	14.1	215
Rock-Thrush, Cape	*Monticola rupestris*			Endemic	Endemic	3.3	51
Rock-Thrush, Short-toed	*Monticola brevipes*				Near-endemic	7.3	112
Roller, European	*Coracias garrulus*	LC	NT			0.4	6
Roller, Lilac-breasted	*Coracias caudatus*					1.4	22
Roller, Purple	*Coracias naevius*					0.1	2
Ruff	*Philomachus pugnax*					2.4	36
Rush-Warbler, Little	*Bradypterus baboecala*					17.4	265
Sandgrouse, Yellow-throated	*Pterocles gutturalis*	LC	NT			1.0	15
Sandpiper, Common	*Actitis hypoleucos*					5.5	84
Sandpiper, Curlew	*Calidris ferruginea*	NT	LC			0.1	1
Sandpiper, Marsh	*Tringa stagnatilis*					0.7	11
Sandpiper, Wood	*Tringa glareola*					5.8	88
Scimitarbill, Common	*Rhinopomastus cyanomelas*					0.3	4
Scops-Owl, African	*Otus senegalensis*					1.4	21
Scops-Owl, Southern White-faced	*Ptilopsis granti*					0.9	14
Scrub-Robin, Kalahari	*Erythropygia paena*				Near-endemic	0.5	8
Scrub-Robin, White-browed	*Erythropygia leucophrys*					20.6	315

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Secretarybird	*Sagittarius serpentarius*	VU	VU			0.1	2
Seedeater, Streaky-headed	*Crithagra gularis*					27.7	423
Shelduck, South African	*Tadorna cana*				Endemic	1.7	26
Shikra	*Accipiter badius*					0.9	14
Shoveler, Cape	*Anas smithii*				Near-endemic	9.2	140
Shrike, Crimson-breasted	*Laniarius atrococcineus*				Near-endemic	12.8	195
Shrike, Lesser Grey	*Lanius minor*					1.4	22
Shrike, Magpie	*Corvinella melanoleuca*					0.6	9
Shrike, Red-backed	*Lanius collurio*					7.9	121
Snake-Eagle, Black-chested	*Circaetus pectoralis*					5.2	80
Snake-Eagle, Brown	*Circaetus cinereus*					0.8	12
Snipe, African	*Gallinago nigripennis*					2.5	38
Sparrow, Cape	*Passer melanurus*				Near-endemic	52.1	796
Sparrow, House	*Passer domesticus*					34.2	522
Sparrow, Southern Grey-headed	*Passer diffusus*					61.6	940
Sparrowhawk, Black	*Accipiter melanoleucus*					2.3	35
Sparrowhawk, Little	*Accipiter minullus*					3.9	59
Sparrowhawk, Ovambo	*Accipiter ovampensis*					5.2	80
Sparrowlark, Chestnut-backed	*Eremopterix leucotis*					0.1	1
Sparrow-Weaver, White-browed	*Plocepasser mahali*					15.8	241
Spoonbill, African	*Platalea alba*					4.8	73
Spurfowl, Natal	*Pternistis natalensis*				Near-endemic	18.9	289
Spurfowl, Swainson's	*Pternistis swainsonii*					33.9	517
Starling, Cape Glossy	*Lamprotornis nitens*					53.5	817
Starling, Common	*Sturnus vulgaris*					0.1	2
Starling, Pied	*Lamprotornis bicolor*			Endemic	Endemic	2.8	42
Starling, Red-winged	*Onychognathus morio*					31.9	487
Starling, Violet-backed	*Cinnyricinclus leucogaster*					8.3	126
Starling, Wattled	*Creatophora cinerea*					1.8	27
Stilt, Black-winged	*Himantopus himantopus*					6.2	94
Stint, Little	*Calidris minuta*					1.2	18
Stonechat, African	*Saxicola torquatus*					33.7	515
Stork, Abdim's	*Ciconia abdimii*	LC	NT			0.8	12
Stork, Black	*Ciconia nigra*	LC	VU			0.1	1

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Stork, Marabou	*Leptoptilos crumenifer*	LC	NT			0.7	10
Stork, White	*Ciconia ciconia*					2.4	36
Stork, Yellow-billed	*Mycteria ibis*	LC	EN			2.2	33
Sunbird, Amethyst	*Chalcomitra amethystina*					50.9	778
Sunbird, Greater Double-collared	*Cinnyris afer*			Endemic	Endemic	0.1	2
Sunbird, Malachite	*Nectarinia famosa*					1.2	19
Sunbird, Marico	*Cinnyris mariquensis*					0.7	10
Sunbird, White-bellied	*Cinnyris talatala*					67.2	1,026
Swallow, Barn	*Hirundo rustica*					37.3	569
Swallow, Greater Striped	*Cecropis cucullata*					37.7	575
Swallow, Lesser Striped	*Cecropis abyssinica*					45.2	690
Swallow, Pearl-breasted	*Hirundo dimidiata*					14.4	220
Swallow, Red-breasted	*Cecropis semirufa*					9.5	145
Swallow, White-throated	*Hirundo albigularis*					35.1	536
Swamphen, African Purple	*Porphyrio madagascariensis*					7.7	118
Swamp-Warbler, Lesser	*Acrocephalus gracilirostris*					26.3	401
Swift, African Black	*Apus barbatus*					2.5	38
Swift, Alpine	*Tachymarptis melba*					0.3	4
Swift, Common	*Apus apus*					2.4	37
Swift, Horus	*Apus horus*					1.4	22
Swift, Little	*Apus affinis*					28.8	440
Swift, White-rumped	*Apus caffer*					31.1	475
Tchagra, Black-crowned	*Tchagra senegalus*					28.2	430
Tchagra, Brown-crowned	*Tchagra australis*					27.0	413
Teal, Cape	*Anas capensis*					5.8	89
Teal, Hottentot	*Anas hottentota*					1.3	20
Teal, Red-billed	*Anas erythrorhyncha*					13.6	208
Tern, Caspian	*Hydroprogne caspia*	LC	VU			4.3	65
Tern, Whiskered	*Chlidonias hybrida*					1.6	25
Tern, White-winged	*Chlidonias leucopterus*					1.3	20
Thick-knee, Spotted	*Burhinus capensis*					33.1	506
Thrush, Groundscraper	*Turdus litsitsirupa*					18.3	280
Thrush, Karoo	*Turdus smithi*			Near endemic	Endemic	55.1	841
Thrush, Kurrichane	*Turdus libonyanus*					40.6	620

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Tinkerbird, Yellow-fronted	*Pogoniulus chrysoconus*					44.1	674
Tit, Ashy	*Parus cinerascens*				Near-endemic	0.1	2
Tit, Southern Black	*Parus niger*					1.1	17
Tit-Babbler, Chestnut-vented	*Sylvia subcaerulea*				Near-endemic	18.8	287
Tit-Flycatcher, Grey	*Myioparus plumbeus*					0.7	11
Turtle-Dove, Cape	*Streptopelia capicola*					49.2	751
Vulture, Cape	*Gyps coprotheres*	EN	EN		Near-endemic	14.8	226
Vulture, Lappet-faced	*Torgos tracheliotos*	EN	EN			0.1	1
Vulture, Palm-nut	*Gypohierax angolensis*					0.1	1
Vulture, White-backed	*Gyps africanus*	CR	CR			0.9	13
Wagtail, African Pied	*Motacilla aguimp*					7.6	116
Wagtail, Cape	*Motacilla capensis*					42.1	643
Warbler, Dark-capped Yellow	*Iduna natalensis*					0.1	1
Warbler, Garden	*Sylvia borin*					1.3	20
Warbler, Icterine	*Hippolais icterina*					0.1	2
Warbler, Marsh	*Acrocephalus palustris*					3.7	56
Warbler, Sedge	*Acrocephalus schoenobaenus*					0.3	4
Warbler, Willow	*Phylloscopus trochilus*					16.2	247
Waxbill, Black-faced	*Estrilda erythronotos*					0.7	10
Waxbill, Blue	*Uraeginthus angolensis*					40.3	616
Waxbill, Common	*Estrilda astrild*					22.3	340
Waxbill, Orange-breasted	*Amandava subflava*					7.1	109
Waxbill, Swee	*Coccopygia melanotis*			Near endemic	Endemic	0.1	1
Waxbill, Violet-eared	*Uraeginthus granatinus*					0.1	2
Weaver, Cape	*Ploceus capensis*			Near endemic	Endemic	9.0	138
Weaver, Thick-billed	*Amblyospiza albifrons*					32.6	498
Weaver, Village	*Ploceus cucullatus*					2.8	42
Wheatear, Capped	*Oenanthe pileata*					12.0	183
Wheatear, Mountain	*Oenanthe monticola*				Near-endemic	2.5	38
White-eye, Cape	*Zosterops virens*			Near endemic	Endemic	66.4	1,014
Whitethroat, Common	*Sylvia communis*					0.2	3
Whydah, Pin-tailed	*Vidua macroura*					27.0	413
Widowbird, Fan-tailed	*Euplectes axillaris*					0.3	5
Widowbird, Long-tailed	*Euplectes progne*					11.5	175

Family name	Scientific name	Red List Global	Red List Regional	Endemicity SA, Lesotho & Swaziland	Endemicity Southern Africa	Report Rate	No. of Birds
Widowbird, Red-collared	*Euplectes ardens*					21.2	323
Widowbird, White-winged	*Euplectes albonotatus*					32.6	498
Wood-Dove, Emerald-spotted	*Turtur chalcospilos*					1.0	15
Wood-Hoopoe, Green	*Phoeniculus purpureus*					41.3	631
Woodpecker, Bearded	*Dendropicos namaquus*					2.0	30
Woodpecker, Bennett's	*Campethera bennettii*					0.1	1
Woodpecker, Cardinal	*Dendropicos fuscescens*					17.6	268
Woodpecker, Golden-tailed	*Campethera abingoni*					19.4	297
Wryneck, Red-throated	*Jynx ruficollis*					12.0	183

APPENDIX 2: AVIFAUNAL HABITAT OBSERVED WITHIN THE PROPOSED LOMOND-SAFARI 88KV POWER LINE STUDY AREA

FIGURE 1: Open woodland/bushveld habitat

FIGURE 2: Dense woodland/bushveld habitat surrounding the wetland/swamp area along the alignment

FIGURE 3: The wetland/swamp area

FIGURE 4: degraded woodland/bushveld habitat

FIGURE 5: NECSA buildings

FIGURE 6: Historical vulture feeding site

APPENDIX 3: METHOD OF ASSESSING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

The impact assessment was undertaken using a matrix selection process, the most used methodology, for determining the significance of potential environmental impacts/risks. This methodology is based on the minimum requirements as outlined in Appendix 3 of the EIA Regulations of 2014. The methodology incorporates four aspects for assessing the potential significance of impacts, namely direction, severity, probability of occurrence, and reversibility, which are further sub-divided as follows.

Table 1: Impact assessment factors

Direction	Severity			Probability	Reversibility
Positive/ negative	Magnitude	Duration	Scale/extent	Probability of occurrence	Reversible/ irreversible

To determine the significance of each potential impact/risk, the following four ranking scales are used

Table 2: Impact assessment scoring methodology

Value	Description
Magnitude	
10	Very high/unknown (of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural, and economic activities of communities are disrupted to such an extent that these come to a halt).
8	High
6	Moderate (impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and easily possible. Social, cultural, and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required).
4	Low (impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.)
2	Minor
Duration	
5	Permanent (Permanent or beyond closure)
4	Long term (more than 15 years)
3	Medium-term (5 to 15 years)
2	Short-term (1 to 5 years)

Value	Description
1	Immediate (less than 1 year)
Scale	
5	International
4	National
3	Regional
2	Local
1	Site only
0	None
Probability	
5	Definite/unknown (impact will definitely occur)
4	Highly probable (most likely, 60% to 90% chance)
3	Medium probability (40% to 60% chance)
2	Low probability (5% to 40% chance)
1	Improbable (less than 5% chance)
0	None

Significance = (Magnitude + Duration + Scale) x Probability

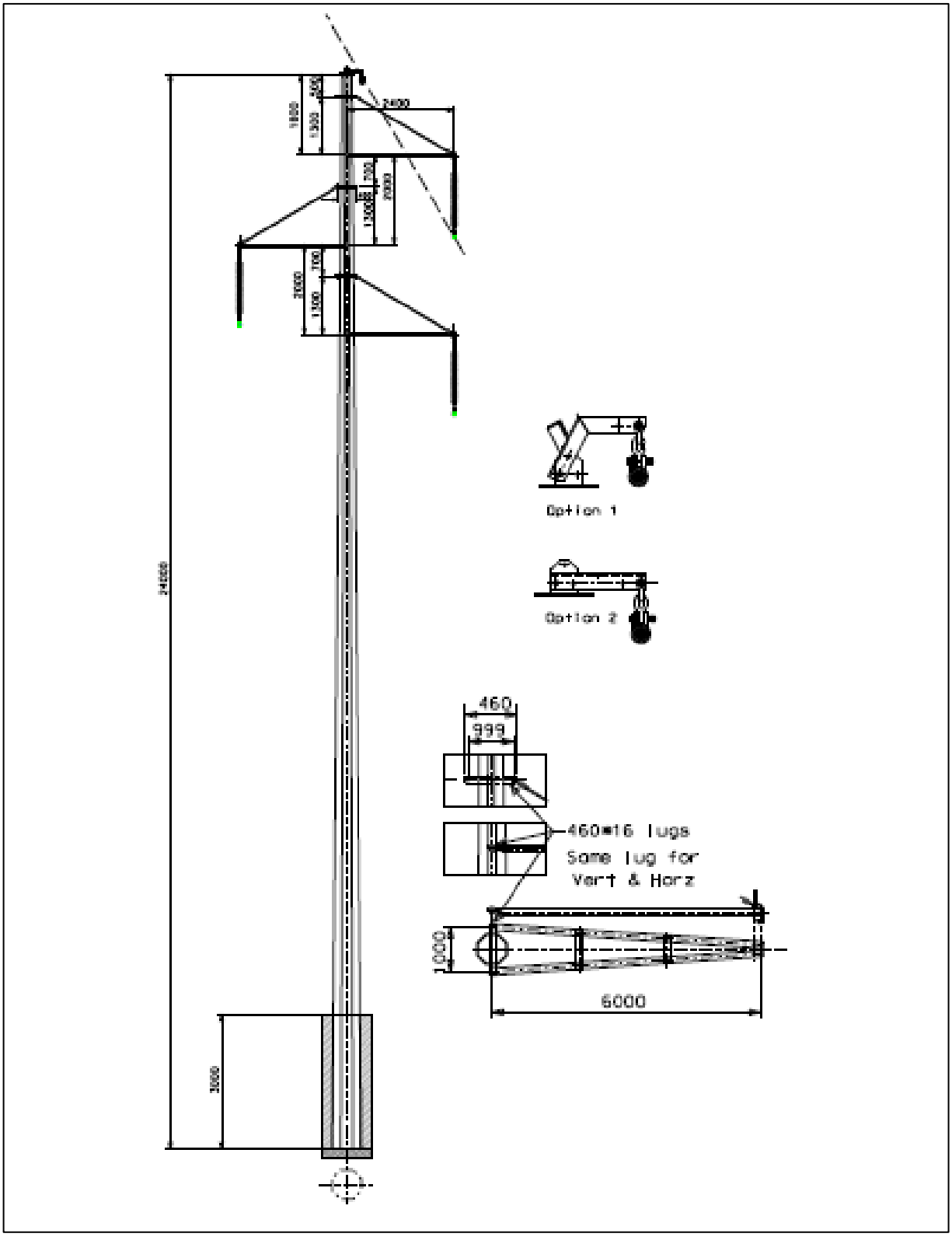
Table 3: Significance of impact based on point allocation

Points	Significance	Description
SP>75	High environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 - 75	Moderate environmental significance	An impact or benefit which is sufficiently important to require management, and which could have an influence on the decision unless it is mitigated.
SP<30	Low environmental significance	Impacts with little real effect and which will not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

For the methodology outlined above 2), the following definitions were used:

- Direction of an impact may be positive, neutral, or negative with respect to the impact
- Magnitude is a measure of the degree of change in a measurement or analysis (e.g., the severity of an impact on human health, well-being, and the environment), and is classified as none/negligible, low, moderate, high, or very high/unknown
- Scale/geographic extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international
- Duration refers to the length of time over which an environmental impact may occur i.e., immediate/transient, short-term, medium term, long-term, or permanent
- Probability of occurrence is a description of the probability of the impact occurring as improbable, low probability, medium probability, highly probable or definite
- Reversibility of an impact, which may be described as reversible or irreversible

APPENDIX 4: RECOMMENDED 132KV STRUCTURE TYPE (DT 7641/7649)



APPENDIX 5: CURRICULUM VITAE

MEGAN DIAMOND

PERSONAL DETAILS

Date of Birth | *7 December 1978*

Driver's License | *Code A and B*

Home Language | *English*

Other Languages | *Afrikaans*

EDUCATION

BSc Environmental Management | *University of South Africa (UNISA)* 2002 – 2009

ACCREDITATION

South African Council for Natural Scientific Professions | *Environmental Science*

Registration Number: 300022/14

EXPERIENCE

Owner & Avifaunal Specialist | *Feathers Environmental Services*

July 2013 – Present

- Perform specialist avifaunal assessment studies to minimise the impact of industrial infrastructure on birds and their habitats;
- Provide strategic guidance to industry through the development of best practice procedures and guidelines;
- Review and comment on methodologies, specialist studies and EIA reports for Renewable Energy projects;
- Provide input into renewable energy and power line developments elsewhere in Africa and across the globe;
- Manage the collection and collation of relevant and complete desktop and/or field datasets;
- Manage pre- and post-construction avifaunal monitoring data collected at wind and solar energy facilities;
- Site assessments, either as part of the project team or independently;
- Preparation of reports according to project deadlines, including the use of Geographic Information Systems (GIS) to portray data;
- Attendance of specialist integration meetings; and

- Liaison with stakeholders where necessary.

Wildlife & Energy Programme Manager | *Endangered Wildlife Trust*

October 2006 – June 2013

Programme management

- Annually review the programme's conservation and research strategic objectives and update in accordance with the EWT's and programme's vision and mission including work plans for staff etc.;
- Ensure timeous, professional delivery on all aspects of Wildlife & Energy Programme activities;
- Formulate, prioritise and approve relevant research and conservation projects;
- Ensure acceptable quality of all research projects and their outputs;
- Participate in international network liaison as and when required;
- Produce regular popular articles & media releases on the Wildlife & Energy Programme projects and outputs & contribute to the EWT publications;
- Establish & maintain a network with relevant national & international stakeholders;
- Deliver presentations at relevant meetings, functions, workshops & conferences on behalf of the programme;
- Assist with compilation of newsletters, updating of webpage, compilation of press articles, any advocacy issues;
- Identify & establish partnerships to achieve Wildlife & Energy Programme conservation goals.

Eskom –EWT Strategic Partnership

- Ensure that this partnership is managed effectively and sustainably against its goals. Manage staff in this division;
- Develop and maintain relationships with Eskom;
- Negotiate the terms of reference for the annual service level agreements between EWT and Eskom, to ensure the sustainability of the relationship;
- Compile annual report to Eskom Corporate Environment and Sustainability;
- Produce monthly reports to Eskom's regional grids on the status of incident follow-up;
- Attend applicable forums to interact with Eskom stakeholders;
- Participate in international network liaison as and when required;
- Maintain a network with all relevant local and regional level stakeholders (meetings, forums, workshops, etc.);
- Identify research needs relating to the management of wildlife interaction with power lines;
- Conduct research projects on wildlife and power line interaction and present the results at national and international conferences and workshops;
- Development and implementation of training for Eskom field services staff (at various levels) in the management of wildlife interactions; and
- Conduct special investigations on power lines relating to wildlife induced faulting.

Environmental Impact Assessment Division

- Ensure that this division operates effectively and efficiently at all times and manage staff in this division; and
- Conduct specialist avifaunal studies for new power lines developments including: tendering/quoting for the projects, conducting field work, preparing reports, presenting results & negotiating the acceptance of recommendations, final "walk through" as part of Environmental Management Plans; general project management, all liaison with clients, Eskom, authorities, Interested and Affected Parties etc.

Management and administration

- Ensure all programme staff have relevant terms of reference;
- Ensure that all programme staff are performance appraised against their terms of reference;
- Compile and manage programme budgets, monthly reports, work plans and strategy;
- Monitor expenditure and take corrective action if necessary; and
- Ensure timely delivery on all projects to all stakeholders.

CONFERENCE ATTENDANCE

- *Society for Conservation Biology 21st Annual Meeting (1-5 July 2007)*
- *The 6th TAWIRI Scientific Conference (3 – 6 December 2007) Presented a paper titled* "Co-operative management of wildlife and power line conflicts: an African solution"
- Pan-African Ornithological Congress (7-12 September 2008)
- International Conference on Overhead Lines, Design, Construction, Inspection & Maintenance, Fort Collins Colorado USA. (29 March – 1 April 2010) Presented a paper titled "Bird's eye view: how birds see is key to avoiding power line collision"
- Windaba 2011 – Implementing South African Wind Energy (27-29 September 2011)
- Pan African Vulture Summit (16-20 April 2012) Presented a paper titled "Electrification in Africa – Are our vultures being strung along"
- 4th Wind Power Africa Conference & Renewable Energy Exhibition (28-30 May 2012) Presented a paper titled "Wind Energy in Africa – what does this really mean for our continent's birds"
- 13th Pan-African Ornithological Congress (14-21 October 2012) Presented a paper titled "Stringing South Africa's Terrestrial Birds Along - Monitoring of Bird Interactions with Power Line and Experimental Testing of Bird Collision Mitigation at the Karoo Long Term Monitoring Site"
- AEWA Single Species Action-Planning Workshop for the Conservation of the Grey Crowned Crane (10-13 September 2013) Presented and participated in the workshop as a subject expert (energy and bird interactions)

AUTHORED & CO-AUTHORED PAPERS

Jenkins, A.R., Smallie, J. & Diamond, M. 2009. Balls, flashers, flappers and coils: South African perspectives on a global search for ways to prevent avian collisions with overhead lines. In: Harebottle, D.M., Craig, A.J.F.K., Anderson, M.D., Rakatomonana, H. & Muchai, M. (eds). Proceedings of the 12th Pan-African Ornithological Congress, 2008. Cape Town, Animal Demography Unit.

Smallie, J., Diamond, M. & Jenkins, A. 2009. Lighting up the African continent – what does it mean for our birds? pp. 38–43. In: Harebottle, D.M., Craig, A.J.F.K., Anderson, M.D., Rakotomanana, H. & Muchai. (eds). *Proceedings of the 12th Pan-African Ornithological Congress, 2008.* Cape Town, Animal Demography Unit.

Jenkins, A. R., Smallie, J.J and Diamond, M. 2010 Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International, page1 of16.

Retief, E.F., Diamond, M., Anderson, M.D., Smit, H.A., Jenkins, A.R., Brooks, M. 2011. Avian Wind Farm Sensitivity Map for South Africa.

Jenkins, A.R., Van Rooyen, C.S., Smallie, J.J., Harrison, J.A., Diamond, M. And Smit, H.A. 2012. BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.

Jenkins, A.R., De Goede, K.H., Sebele, L. and Diamond, M. 2013. Brokering a settlement between eagles and industry: sustainable management of large raptors nesting on power infrastructure. Bird Conservation International (2013) 23:232 – 246.

Diamond, M., Harris, J., Mirande, C. and Austin, J. 2014. People of a feather flock together: A global initiative to address crane and power line interactions. 13th North American Crane Workshop Summary. Lafayette, Louisiana.

Page-Nicholson, S., Tate, G., Hoogstad, C., Murison, M., Diamond, M., Blofield, A., Pretorius, M., Michael, M.D. 2018. Mitigating the Impact of Large Mammals on Wooden Electrical Distribution Poles in the Kruger National Park, South Africa. African Journal of Wildlife Research.

Diamond, M. and Hoogstad, C. (in press) Collisions and habitat loss associated with utility lines and wind turbines. IUCN SSC Crane Specialist Group – Crane Conservation Strategy.