BLANCO-DROERIVIER 400kV TRANSMISSION POWER LINE AND SUBSTATION UPGRADE.

AVIFAUNAL SPECIALIST REPORT

Prepared for:

Envirolution Consulting

223 Columbine Avenue, Mondeor, 2019
PO Box 1898, Sunninghill, 2157
Tel: 0861 44 44 99
Fax: 0861 626 222
marinda@envirolution.co.za

Prepared by:

EOH Coastal & Environmental Services

P.O. Box 934
Grahamstown, 6140
046 622 2364
South Africa *Also in East London, Cape Town, Port Elizabeth, Johannesburg and Maputo*

www.cesnet.co.za

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Name	Responsibility	Signature	Date
Craig Sholto-Douglas	Specialist and Report Writer		26/06/2017
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Craig Sholto-Douglas	Specialist and Report Writer		31/08/2016
Michael Bailey	Specialist and Report Writer		31/08/2016
Luke Kemp	Herpetological Input		31/08/2016
Tarryn Martin	Report Reviewer		31/08/2016

THE PROJECT TEAM

Mr Craig Sholto-Douglas, Faunal Specialist

Craig holds a BSc (Env Sci and Zoology) and a BSc (Hons) in Environmental Science. He is currently completing his MSc in Environmental Science, focussing on factors influencing survivorship of *Portulacaria afra (Spekboom)* cuttings, in attempts to restore degraded lands in the Greater Addo Elephant National Park. His academic background includes courses in Urban Forestry and Greening, Non-Timber Forest Products, Community-Based Natural Resource Management and Geographical Information Systems. Research projects include a leopard (*Panthera pardus*) population survey and invasive plant species analyses. Craig has consulting experience in the restoration ecology and natural resource management fields, with focus on the Subtropical Thicket Restoration Project (STRP). Craig has been involved in ECO work, EIA's and a number of faunal specialist studies in South Africa and Mozambique. Relevant experience involving faunal research include: Fairewood Estate Ecological Specialist Study; Ukomeleza Wind Energy Facility Ecological Assessment; PPC Mining Floristic and Faunal Scoping Report; Uhambiso Glen Hurd Road Upgrade Faunal Specialist Study; Kariega River Causeway Ecological Assessment; and Nxuba WEF Ecological Ground-truthing. Craig has conducted avifaunal studies for the Department of Environmental Affairs Quion Point Avifaunal Study; Metals of Africa Avifaunal Assessment, Montepuez, Moozambique; and Kenmare Minerals Faunal and Avifaunal Assessments in Mozambique. Craig has also conducted the post-construction phase bird and bat monitoring for the InnoWind Waainek Wind Energy Facility.

Michael Bailey *MSc,* Faunal Specialist and Report Writer

Michael is a Principal Environmental Consultant at EOH CES in Grahamstown, South Africa. He holds an MSc in Quantitative Conservation Biology from the University of the Witwatersrand, Johannesburg, and a BSc in Biology and Ecology from the University of Ulster (N. Ireland). He is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEW). His professional interests are concentrated on ecological and wildlife conservation and development issues which involve wildlife population surveys, environmental impact assessments, mitigation strategies and monitoring programmes, as well as developing Biodiversity Action Plans (BAPs) and environmental management plans. He has been responsible for managing a number of large ESIAs involving agriculture, renewable energy, and mining developments, all in compliance with IFC Performance Standards, most recently in Zambia, Mozambique, DRC and Lesotho. He has also been the faunal specialist and specialist report writer for various ESIA projects with a particular focus on terrestrial fauna studies in Zambia, Mozambique, Uganda, Lesotho, Liberia and DRC. Most recently Michael has been managing Biodiversity Action Plans (BAP) and Stakeholder Engagement Plans (SEP) for Zambeef's Zambian operations at their five major agricultural production estates situated in Mpika, Mpongwe, Sinazongwe, Chiawa in the Lower Zambezi and Huntley Farm near Lusaka. Michael has also designed and conducted various research projects which range from field-based faunal surveys and monitoring programs in Africa and Ireland, to laboratory-based genetic research initiatives. In the last eight years Michael has had considerable international working experience in Africa and understands the national environmental legislation in countries such as South Africa, Zambia, Lesotho, Mozambique, Liberia, Uganda and Zimbabwe, as well the UK and Ireland.

Luke Kemp, Field Assistant

Luke is a B.Sc. Rhodes student currently working on a project to determine the effects of domestic animal grazing on reptile and amphibian diversity. Luke completed a FGASA accredited Standard and Advanced snake handling course as well as advanced first aid for snake bite through African Snakebite Institute. Luke has conducted reptile and amphibian surveys in the Northern Cape, Eastern Cape and Mpumalanga, mapping reptiles and amphibians and collecting samples for the Port Elizabeth Museum (Bayworld). Luke is currently on the panel of judges for reptile identification on the Animal Demography Unit (ADU). Although Luke has a predominantly herpetological background, he thoroughly enjoys his birding and is regularly involved in bird atlassing projects.

Ms Tarryn Martin, Ecological Specialist and Reviewer

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C_3 and C_4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. She conducts vegetation assessments including vegetation and sensitivity mapping to guide developments and thereby minimise their impacts on sensitive vegetation. Tarryn has conducted a number of vegetation and impact assessments in Mozambique (to IFC standards) which include the Lurio Forestry Project in Nampula, the Syrah Graphite Mine, Triton Ancuabe Graphite Mine and Nicanda Hills Graphite Mine in Cabo Delgado and the Baobab Iron Ore Mine in Tete, Mozambique. Tarryn has also co-designed and implemented the Terrestrial Monitoring Program for Kenmare, MOMA, a heavy minerals mine in Mozambique. This monitoring program includes an assessment of forest health. She has also worked on the Lesotho Highlands Development Authority botanical baseline survey for phase 2 of the Lesotho Highlands Water Project.

EXECUTIVE SUMMARY

EOH Coastal & Environmental Services (CES) has been contracted by Envirolution Consulting to conduct an avifaunal specialist study for the Blanco-Droerivier 400kV Power line and Substation. The project entails the construction of a 200km long 400kV power line from Blanco Substation to the Droerivier Substation at Beaufort West in the Western Cape Province as well as either the upgrade or construction of a transmission substation (Narina substation) near the existing Blanco substation.

The study provides (i) a general description of the avifauna of the project area and adjacent areas, (ii) a review of the avifauna likely to occur in the project area, and likely presence of Species of Conservation Concern (SCC), (iii) an assessment of the habitat associations of the avifaunal components and the potential impacts associated with the construction and operation of the powerline and substations, (iv) and, where possible, provides guidance on the alternative routes based on the resident avifauna and their associated habitats. The investigation focused on a 1km wide corridor for each of the proposed alternative routes, as well as the larger project area to incorporate potential alignment changes.

To give insight into the avifauna of the project area, a desktop assessment used spatial planning tools to identify protected areas and areas of special concern within the greater project area. Identified areas include Formal Protected Areas (NBA, 2011), Critical Biodiversity Areas (CBA's), and Wetlands and Rivers (NFEPA). These were all mapped to spatially reference and relate these areas to the proposed alternative power line routes. Priority areas for birds were identified and mapped using the Succulent Karoo Ecosystem Programme (SKEP) expert map database. BirdLife South Africa's Important Bird Areas (IBAs) was also consulted to map and identify bird priority areas within the project area. Two bird priority areas were identified in the project area.

According to historical records 290 species of birds have distribution ranges which include or are part of the project area (SABAP2 2016). There have been 21 bird species of conservation concern recorded in the project area, of which four (4) are recorded as regionally endangered (EN). Twelve (12) species of bird have been identified as 'powerline priority species' for the proposed development. Powerline priority species are birds most prone to powerline (and associated infrastructure) impacts and include vultures, eagles, cranes, bustards, storks, and flamingos (Smallie *et al.,* 2009), many of which are found within the proposed project area.

The study identified the following areas as highly sensitive from an avifaunal perspective (Figure 1):

- Process areas such as perennial rivers, pristine wetlands and wetland clusters identified by NFEPA that are important for waterbird guilds;
- SKEP identified hotspots for birds;
- Formal Protected Areas and Critical Biodiversity Areas;
- Important Bird Areas (IBAs);
- "koppies" or rocky outcrops; and
- Habitats which are likely to provide refuge/roosting/nesting sites for bird Species of Conservation Concern (SCC).

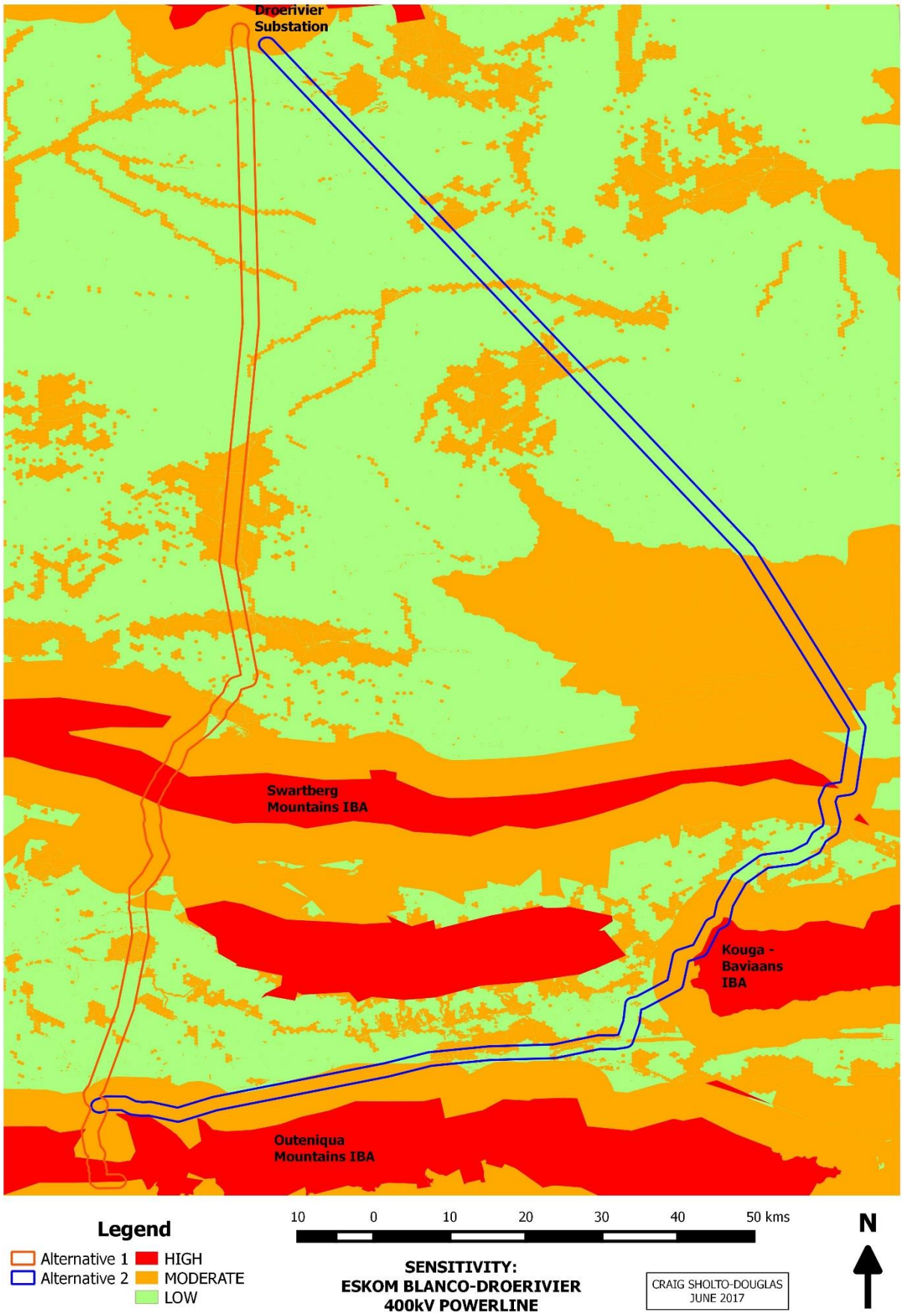

Figure 1: Sensitivity map of the project area

The impacts on avifauna likely to be caused by the construction and operation of the proposed powerline (and associated infrastructure) for the two alternative routes from Blanco to Droerivier and the substation alternatives are summarised in the tables below.

Alternative 1 – Powerline route which runs 178km between Blanco and Droerivier (following an existing powerline)

Impact	Without mitigation	With mitigation
Construction Phase		
1. Loss of Bird Habitat	**55 (Medium)**	**50 (Medium)**
2. Disturbance and Displacement	**36 (Medium)**	**15 (Low)**
3. Loss of Bird Diversity and SCC	**21 (Low)**	**14 (Low)**
Operation Phase		
1. Loss of bird habitat	**18 (Low)**	**18 (Low)**
2. Disturbance and displacement	**30 (Medium)**	**27 (Low)**
3. Loss of Bird Diversity and SCC	**70 (High)**	**48 (Medium)**

Alternative 2 – Power line route of 270km from Blanco to Droerivier via Uniondale (no existing powerline)

Impact	Without mitigation	With mitigation
Construction Phase		
1. Loss of Bird Habitat	**45 (Medium)**	**40 (Medium)**
2. Disturbance and Displacement	**36 (Medium)**	**15 (Low)**
3. Loss of Bird Diversity and SCC	**21 (Low)**	**14 (Low)**
Operation Phase		
1. Loss of bird habitat	**18 (Low)**	**18 (Low)**
2. Disturbance and displacement	**42 (Medium)**	**33 (Medium)**
3. Loss of Bird Diversity and SCC	**70 (High)**	**48 (Medium)**

It is the specialist's opinion that the **Blanco-Droerivier Alternative 1** would have less of an impact on avifauna than Alternative 2, providing the recommended mitigation measures are implemented. Although the preferred route bisects the Swartberg Mountains and Outeniqua Mountains IBAs, it is the significantly shorter of the two options, and there is existing powerline infrastructures which mitigates many of the impacts associated with birds and powerlines. The existing service roads (and shorter route option) will result in less bird habitat being destroyed or fragmented during the construction phase of the project. Furthermore, Alternative 2 separates three IBAs. There is likely to be regular migration of bird SCC (particularly raptors) between these mountainous areas. As there is no existing power line through these areas, birds are less likely to be cautious of large infrastructures in this area, which could lead to higher mortalities of SCC and powerline priority species due to collisions/electrocutions with powerline infrastructures.

Substation 2 is the preferred option from an avifaunal perspective as there is an existing substation in the immediate vicinity and very little sensitive habitat surrounding the site. Option 4 is not recommended as there are sensitive riparian areas which will be impacted on by the construction of a substation. Option 5 is strongly not recommended as it is located within a matrix of alien and fynbos vegetation at the foothills of the Outeniqua Mountains. The proposed substation access road route for option 5 will traverse many sensitive habitats parallel to the Outeniqua Mountain IBA (within 1 km) and a formally protected area.

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CBA:	Critical Biodiversity Area
CITES:	Committee for International Trade in Endangered Species
DAFF:	Department of Agriculture, Forestry and Fisheries
DEA:	Department of Environmental Affairs
ESA:	Ecological Support Area
EIA:	Environmental Impact Assessment
EWT:	Endangered Wildlife Trust
FSR:	Final Scoping Report
IBA:	Important Bird Area (BirdLife SA)
IUCN:	International Convention on the Conservation of Nature
kV:	Kilovolt
NBA:	National Biodiversity Assessment
NEMA:	National Environmental Management Act 107 of 1998 as amended in 2006
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFEPA:	National Freshwater Ecosystem Priority Area
PNCO:	Provincial Conservation Ordinance
NPAES:	National Protect Areas Expansion Strategy
RDB:	Red Data Book
SABAP2:	South African Bird Atlas Project 2
SCC:	Species of Conservation Concern
SKEP:	The Succulent Karoo Ecosystem Programme
STEP:	Sub-tropical Thicket Ecosystem Planning
ToR:	Terms of Reference
SA	South Africa
WCBSP	Western Cape Biodiversity Sector Plan (2017)

1. INTRODUCTION

1.1 Project description and locality

EOH Coastal & Environmental Services has been contracted by Envirolution Consulting to conduct a specialist avifaunal study for the Blanco-Droerivier 400kV Powerline and Substations upgrade. The study comprised of both a desktop study and a detailed field survey in order to fully investigate the potential impact of the proposed powerline on the bird communities and species in the area.

The project will entail the construction of either a 178km long 400kV power line from Blanco Substation to the Droerivier Substation at Beaufort West in the Western Cape Province (Alternative 1) which passes 16.8km east of Oudtshoorn and crosses over the Swartberg Nature Reserve (NR) along a corridor west of the N12, or, Alternative 2, a power line of 270km which runs east to Uniondale before heading north at the eastern end of the Swartberg NR, part of this route falls within the Eastern Cape Province (Figure 1-1).

The corridor investigated for the proposed power lines was 1 km wide, with the proposed powerline options having a servitude of 62 m. However, the desktop portion of this report investigated a larger area to incorporate potential alignment changes following specialist recommendations. Following desktop findings, site investigations for the study area were confined to and concentrated on the areas defined as “sensitive” during the scoping exercise.

In addition, a transmission substation called Narina has been proposed near the existing Blanco substation for which five alternative positions have been proposed. Alternative 2 is at an existing substation and as such this will be upgraded to accommodate the proposed powerlines. Alternatives 1, 3, 4 and 5 will require the construction of a transmission station and the impacts associated with this will therefore be greater.

1.2 Objectives and Terms of Reference

The principal objective of this assignment was to carry out an avifaunal baseline study that will assess environmental/biodiversity impacts associated with the Project and identify specific mitigation measures and actions necessary for the Project to comply with all relevant national and local environmental laws and regulations.

The scope of work of the faunal baseline study included the following tasks:

Task 1 – Desktop Survey

An initial review of all existing relevant documents and information in relation to avifauna and habitats, (e.g. previous desktop studies or other specialist reports, environmental impact assessment reports, environmental licenses, etc.).

Initial studies have used the following databases and spatial planning tools to identify and select sensitive areas which should be assessed during the field survey:

- South African Bird Atlassing Project (SABAP2)
- BirdLife South Africa Important Bird Areas (IBAs)
- Endangered Wildlife Trust Collision/Electrocution Databases
- Western Cape Biodiversity Sector Plan (WCBSP 2017)
- SANBI vegetation map (Mucina and Rutherford, 2012)
- National Freshwater Ecosystem Priority Areas (NFEPA)
- SA Red Data List
- IUCN Red List
- NEM:BA species list (Act 10 of 2004)
- Provincial Nature Conservation Ordinance Act (PNCO) – No.19 of 1974
- The Succulent Karoo Ecosystem Programme (SKEP)

Areas chosen for ground-truthing were based on the presence of avifaunal Species of Conservation Concern (SCC), endemic and protected species within the proposed route alternatives, habitat associations of bird SCC, potential nesting/roosting sites, and the presence of conservation areas and habitats where disturbance should be avoided or minimized based on municipal and national protection plans.

Task 2 – Sampling and collection of primary data during field visits

The faunal specialists collected relevant field data on the avifauna in the Project area from the 22nd-27th of July 2016.

The following objectives have been defined for the avifaunal specialist study:

- To provide a general description of the avifauna of the project area and adjacent areas;
- To review the avifauna likely to occur in the project area for the presence of Species of Conservation Concern (SCC);
- To assess the habitat associations of the avifaunal components, and;
- To provide guidance on the alternative routes based on the resident avifauna and their associated habitats.

Task 3 – Reporting

A Report detailing the results of data collection, impact and risk assessment and suggested mitigation measures needed to address those impacts. If necessary, the powerline route should be revised to incorporate appropriate mitigation measures.

An Avifaunal Specialist Report (this report) was produced and includes the following;

- The identification and assessment of the significance of potential impacts on avifauna resulting from the proposed development both on the footprint and the immediate surrounding area (1km buffer) during construction and operation;
- A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required;
- Identification of any *No-Go* areas;
- An updated sensitivity map based on the findings of the survey; and
- Checklists of birds identified in the region to date, highlighting sensitive species and their possible areas of distribution within the spatial scope of the study.

1.3 Assumptions and Limitations

This report is based on currently available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on a project description taken from design specifications for the proposed power line that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive;
- Descriptions of the avifauna are based on available literature and databases;
- Only birds have been described in this report;
- Fieldwork consisted of six (6) days of surveying during winter;
- The seasonal timing of the survey is not ideal as many summer migrant bird species are not likely to be found on site during the survey period. However, the fieldwork in conjunction with the desktop survey was sufficient to identify and rate impacts.
- Field surveying concentrated on the areas identified as “sensitive” from the desktop study.

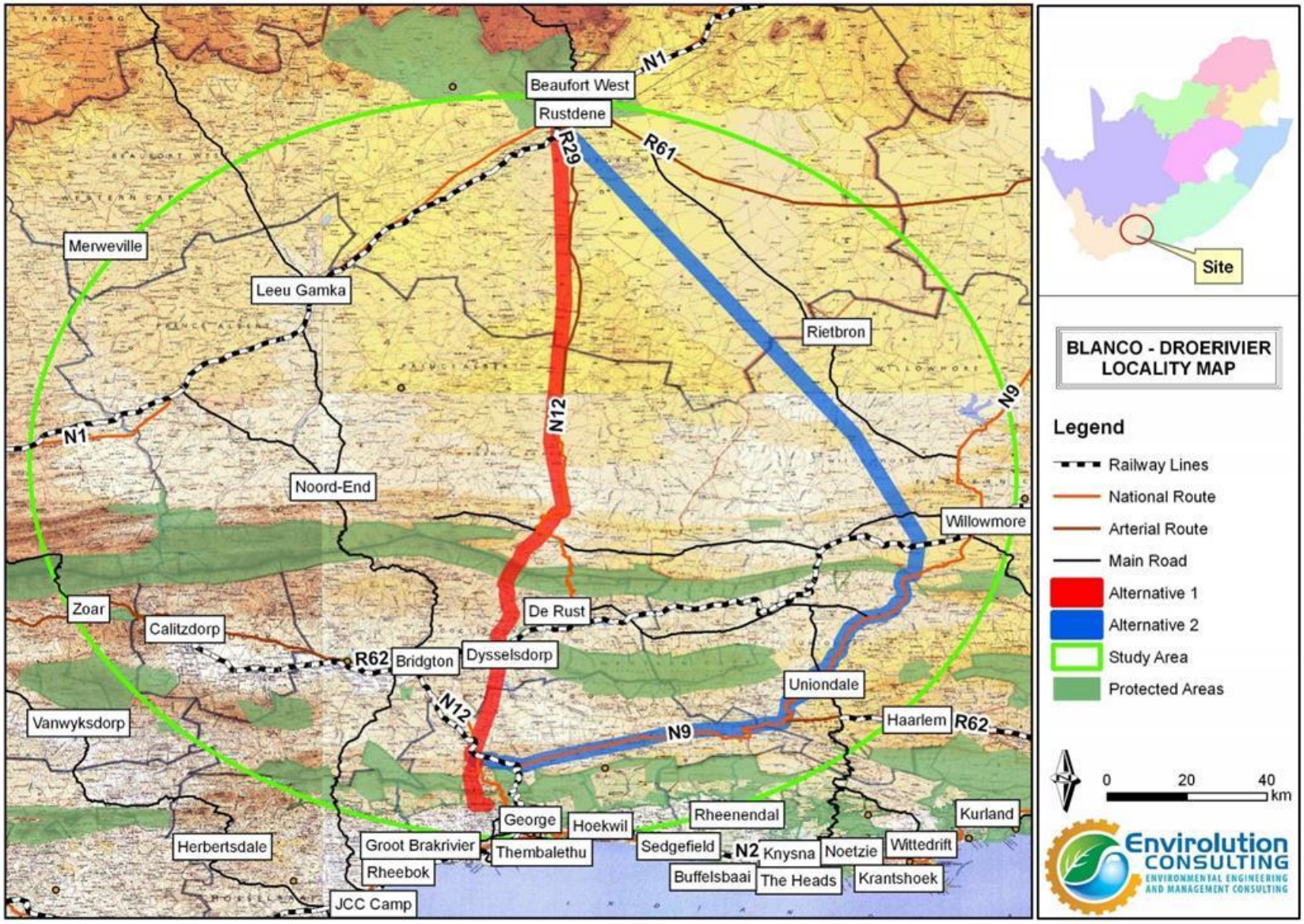


Figure 1-1: Map of the proposed 400kV power line alternatives and study area from Blanco to Droerivier Substations

2. APPROACH

To give insight into the avifaunal components of the project area, the desktop avifaunal assessment used relevant databases and spatial planning tools to identify protected areas and areas of special concern within the greater project area. These included:

- South African Bird Atlassing Project (SABAP2)
- BirdLife South Africa Important Bird Areas (IBAs)
- Endangered Wildlife Trust Collision/Electrocution Databases
- The Succulent Karoo Ecosystem Programme (SKEP) – bird expert maps
- Western Cape Biodiversity Sector Plan (WCBSP 2017)
- SANBI vegetation map (Mucina and Rutherford, 2012)
- National Freshwater Ecosystem Priority Areas (NFEPA)
- South African Red Data List
- IUCN Red List
- NEM:BA species list (Act 10 of 2004)
- Provincial Nature Conservation Ordinance Act (PNCO) – No.19 of 1974.

2.1.1 Protected Areas

Protected and conserved areas are likely to provide habitat refuge for a great diversity and richness of avifaunal species, as well as maintain ecological functioning. Therefore, these areas have been identified as areas of concern from a faunal perspective. Protected Areas within the project area were identified using the National Biodiversity Assessment (NBA) 2011, which is based on the ecosystem protection level which is critical to identify current levels of protection of habitats and biodiversity. The NBA (2011) works in correlation with the National Protect Areas Expansion Strategy (NPAES) to help identify where future conservation efforts should be focused.

2.1.2 Critical Biodiversity Areas

Critical Biodiversity Areas (CBAs) are areas which play an important role for the protection and sustainability of biodiversity, which includes important locations for biodiversity features or rare species (Holness and Bradshaw, 2012). Municipal CBA maps which form part of the Western Cape Biodiversity Sector Plan (WCBSP 2017) were consulted for the sections of the project area which fall within the Western Cape, and the provincial CBA mapping database was investigated for the areas within the Eastern Cape (ECBCP).

CBAs offer guidance to achieve the desired land-use management objectives, highlighting areas which need to be i) maintained, ii) rehabilitated, or iii) managed to prevent further degradation, in order to achieve desired ecological functioning. Functioning ecological systems provide the necessary ecological integrity required to provide habitats which offer protection and refuge for many faunal species.

2.1.3 Wetlands and Rivers

The National Freshwater Ecosystem Priority Areas (NFEPAs) spatial planning tool was used to identify wetlands and rivers within the project area. It was assumed that these would be areas associated with amphibians and waterbirds. The identification of perennial rivers and healthy wetlands aids in identifying potential preferred habitats and sensitive areas for waterbird guilds.

2.1.4 Identified Faunal Hotspots

The Succulent Karoo Ecosystem Programme (SKEP) maps centers of endemism and species richness, unique habitats and key areas for maintenance of biological processes (SKEP, 2002). A comprehensive spatial map was compiled by experts in their respective taxonomic fields. The SKEP database was consulted to identify key areas or hotspots for bird groups, amongst other faunal groups, within the project area.

2.1.5 Bird Species of the Project Area

A literature review was conducted to establish a list of the avifauna which may occur within the project area. Species known from the region, or from adjacent regions whose preferred habitat(s) were known to occur within the study area, were also included. Literature and spatial planning tool sources consulted included:

- South African Bird Atlassing Project (SABAP2);
- BirdLife South Africa Databases;
- The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland; and
- Collision/Electrocution Databases and information supplied by the Endangered Wildlife Trust (EWT).

2.1.6 Species of Conservation Concern

Species that are afforded special protection, notably those that are protected by NEM:BA. Endangered and Protected Fauna in the 1974 Provincial Nature Conservation Ordinance (PNCO), South African Red Data List (SA Red Data List), CITES and the IUCN Red List.

Species of Conservation Concern (SCC) in terms of the project area are defined as:

- **Threatened species:**

Species listed as threatened in the revised South African Red Data Books (The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland); and/or

- Species included in other international lists (e.g., 2015 IUCN Red List of Threatened Animals). Definitions include:
    - *Critically Endangered* (CR) - A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
    - *Endangered* (EN) - A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
    - *Vulnerable* (VU) - A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
    - *Near Threatened* (NT) - A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

- **Sensitive species**: Species not falling in the categories above but listed in:
  Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

- **Endemic species**: Species endemic to the Eastern and Western Cape and/or South Africa (IUCN 2014; NEMBA (2004), PNCO, 1974).

2.1.7 Field survey

A field survey was carried out by the specialists from the 22nd to the 27th of July 2016. Transects were conducted during daylight hours to record all bird species encountered during the survey. Habitats pre-defined as having a high avifaunal sensitivity or known nesting/roosting sites of species of conservation concern were mapped prior to the field trip. These areas were all actively surveyed with the aim of ground-truthing habitats in order to make accurate species composition associations. Apart from the pre-defined sensitive areas, the field survey was conducted using an opportunistic approach to list bird species encountered along the proposed route options.

Areas and habitats surveyed include:

- North and South Facing slopes of the Outeniqua Mountain Range;
- Four sections of the Klein Karoo (proposed alternative 1);
- North and South Facing slopes of the Swartberg Mountain Range;
- Riparian and rocky habitats between the Swartberg and Beaufort West;
- Riparian areas between Beaufort West and Willowmore (proposed alternative 2);
- Rocky outcrops in the Uniondale area;
- And at four locations on the N9 between Uniondale and Outeniqua Pass.

Please refer to the numbers on the sensitivity map (Figure 9-1) and associated field photographs (Table 9-1) captured during the survey.

3. PROTECTED AREAS

The National Biodiversity Assessment (2011) identifies Protected Areas based on the ecosystem protection level which is critical to identify current levels of protection of habitats and biodiversity. The NBA (2011) categorizes protected areas into Formal A and Formal B categories, depending on their level of protection. Both alternatives cross through protected areas that are categorised as Formal B and Formal A protected areas. The Swartberg Mountains are classified as a natural World Heritage Site according to UNESCO, Alternative 1 passes through these mountains. Table 3-1 highlights the categorisation of protected areas relevant to this project.

Table 3-1: Protected Areas which are affected by the proposed powerline alternatives

Route	Comment
B-D Alternative 1	This line crosses the Grootswartberg Mountain Catchment Area (Formal B) and the Groot Swartberg Nature Reserve (Formal A) protected areas in the Swartberg Mountains. The Swartberg Mountains are classified as a natural World Heritage Site according to UNESCO. The line crosses the Ruitersbos Nature Reserve and Doringrivier Wildernis Area (both Formal A protected areas) as it moves south from the Little Karoo through the Outeniqua Mountains. As there is an existing powerline through these areas (including service roads) this route option is less likely to cause habitat fragmentation.
B-D Alternative 2	This line crosses the most eastern section of the Swartberg-Oos Mountain Catchment Area (Formal B), and is located along the northern boundary of the Witfontein Nature Reserve (Formal A) protected area in the Outeniqua Mountain range. Although this route option traverses fewer Protected Areas there is no existing powerline and service road. The construction of a powerline through these areas is likely to cause habitat fragmentation.

The NBA (2011) works in correlation with the National Protect Areas Expansion Strategy (NPAES) to help identify where future conservation efforts should be focused. South Africa's protected area network currently falls short of sustaining biodiversity and ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion for ecological sustainability and adaptation to climate change (BGIS, 2007).

The NPAES sets targets for the expansion of protected areas, provides maps of the most important areas for expansion. It deals with land-based and marine protected areas across all of South Africa's territory. Focus areas for land-based protected area expansions are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence. These areas are suitable for the creation or expansion of large protected areas (BGIS, 2007).

The focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy in 2008. They present the best opportunities for meeting the ecosystem-specific protected area targets (BGIS, 2007).

Figure 3-1 illustrates the Formal Protected and NPAES Areas within the greater project area. The Formal Protected Areas which are directly affected by the alternative power line routes are commented on in Table 3-1 above and illustrated in Figure 3-1 below.

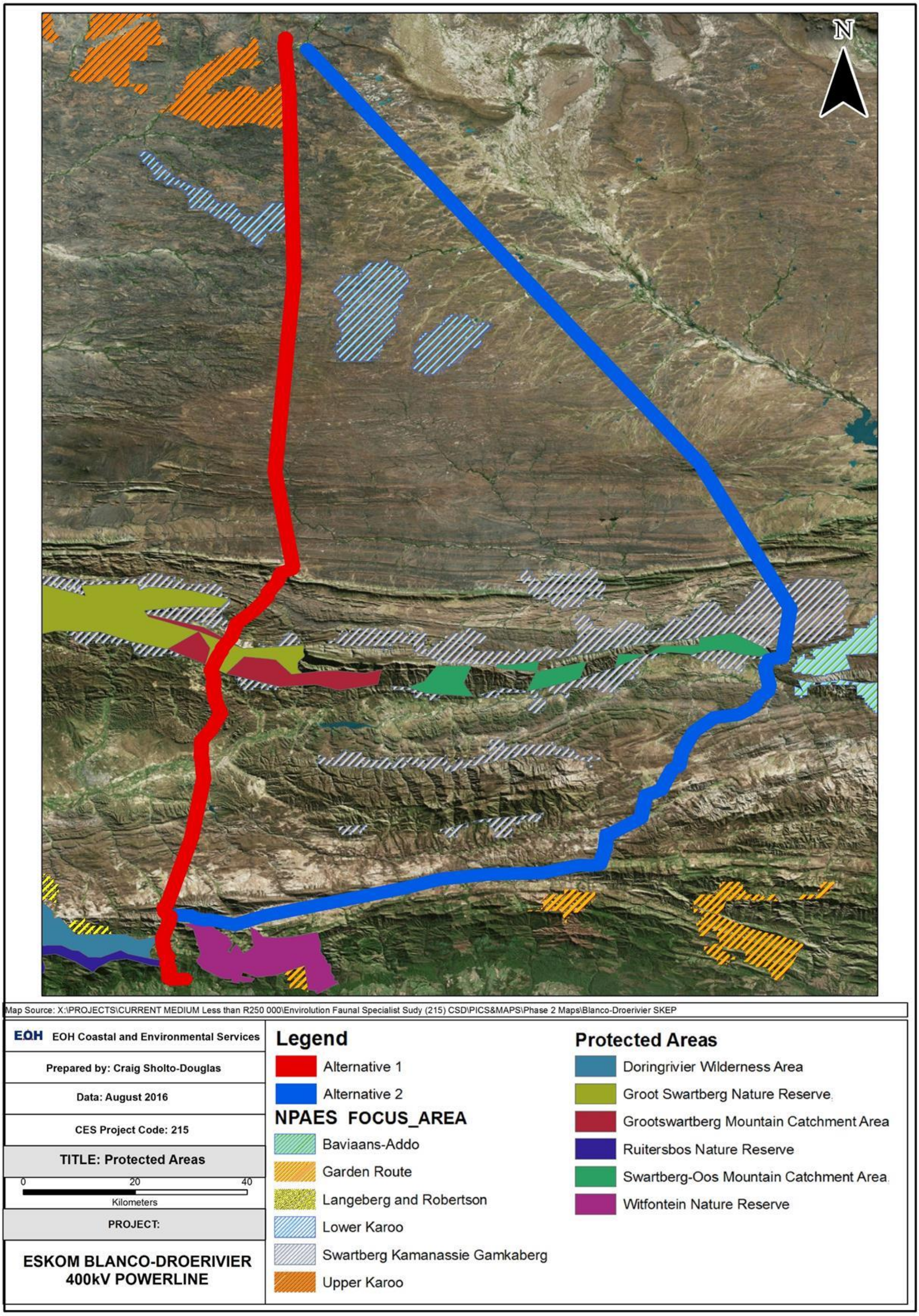


Figure 3-1: Formal Protected Areas and NPAES Areas within the project area

4. CRITICAL BIODIVERSITY AREAS (CBAS)

CBAs incorporate (i) areas that need to be safeguarded to meet national biodiversity thresholds; (ii) areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or (iii) important locations for biodiversity features or rare species (Holnes and Bradshaw, 2010).

Although CBAs are defined using a vast range of ecological factors, faunal species rarity, richness and diversity form key criteria. Furthermore, CBAs aim to maintain or improve the condition of landscapes, which contributes to improved ecological function, enhancing the habitat provision which will sustainably accommodate a rich and diverse faunal component. Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. These may include areas that are degraded or even transformed, if these areas still play an important role in supporting CBAs (Holnes and Bradshaw, 2010).

CBAs are mapped at varying spatial scales (e.g. municipality, district or provincial) depending on the region. Data extracted from the SANBI Biodiversity GIS database (WCBSP, 2017) were used to create a map illustrating the CBAs, Protected Areas and Ecological Support Areas of the proposed project area (Figure 4-1). The following CBA maps were used;

- **Beaufort West** Part 1, 2, and 3 [Vector] 2017.
- **George** [Vector] 2017.
- **Knysna** [Vector] 2017.
- **Mossel Bay** [Vector] 2017.
- **Outshoorn** [Vector] 2017.
- **Prince Albert** [Vector] 2017.
- Eastern Cape Biodiversity Conservation Plan (Department of Economic Development, Environmental Affairs and Tourism).

The above mentioned Biodiversity Frameworks and CBAs integrate key biodiversity information relevant to land-use. This was used to determine the location of critical biodiversity areas within the project area (Figure 4-1). A description of the desired management objectives are presented in Table 4-1 below.

Table 4-1: CBA Map Categories

CBA Map Category	Desired Management Objective	Suggested Land Use
Protected Area Critical Biodiversity Areas (CBA)	Maintain Natural Land. Rehabilitate degraded to natural or near natural. Manage for no further degradation.	Conservation
Ecological Support Area (ESAs)	Maintain ecological processes.	Conservation Game farming Communal livestock
No Natural Areas	Sustainable development and management within general rural land-use principles. Favoured areas for development.	Commercial livestock Dry land cropping Irrigated cropping Dairy farming Timber Settlement

As can be seen in Figure 4-1, all of the proposed alternatives cross through many CBAs and ESAs within the project area. Relatively speaking, B-D Alternative 2 crosses the least CBAs, but does extend through many ESAs. However, during the field survey many of these areas were visited and deemed not to be of “high sensitivity” from a faunal perspective. Therefore, not all areas classified as CBAs have been listed as areas of high avifaunal sensitivity in this report (see Figure 9-1).

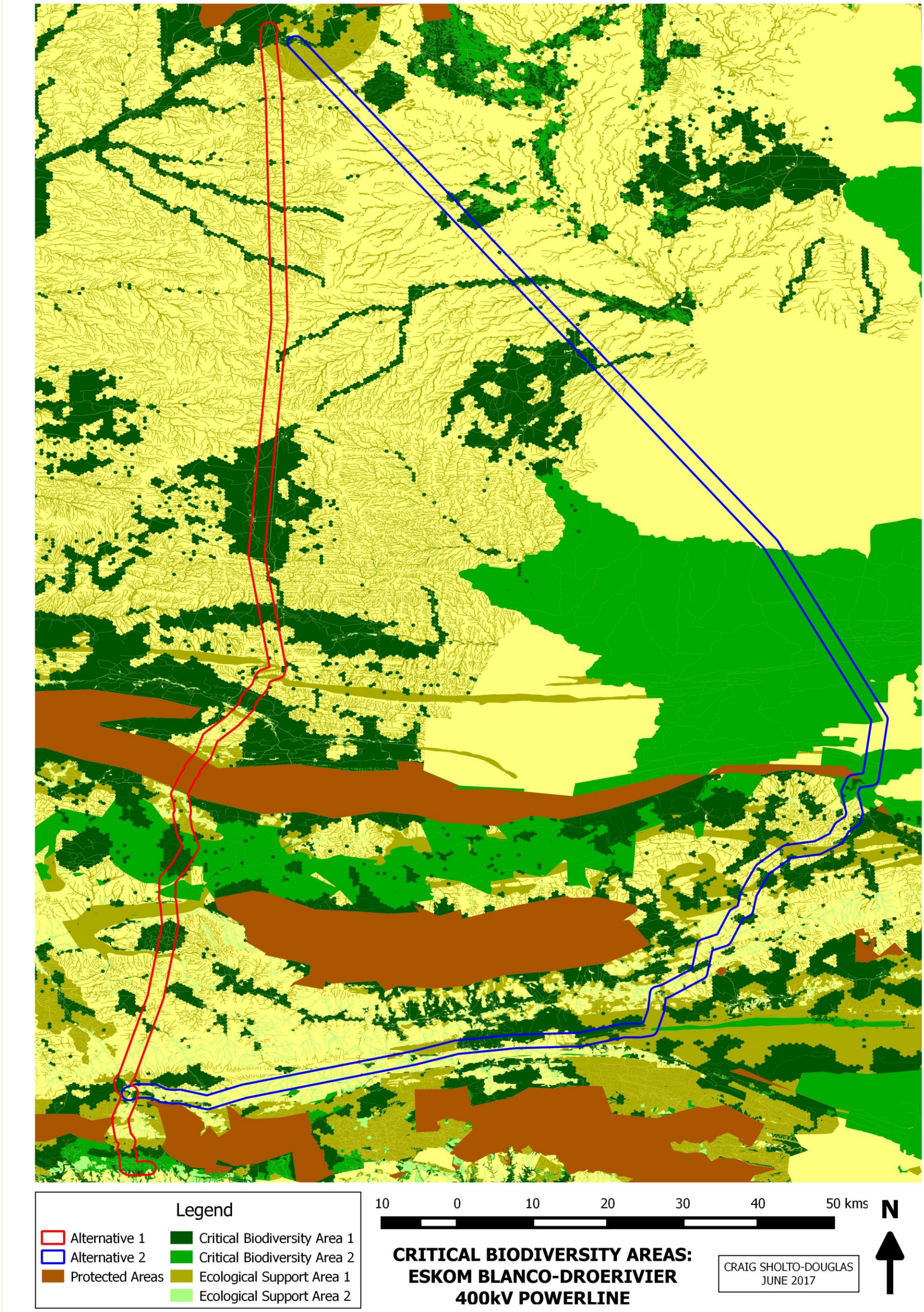


Figure 4-1: Critical Biodiversity Areas within the project area (WCBSP, 2017)

5. WETLANDS AND RIVERS

The NFEPA project aims to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation. Freshwater Ecosystem Priority Areas (FEPAs) are strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources. FEPAs are often tributaries and wetlands that support hard-working large rivers, and are an essential part of an equitable and sustainable water resource strategy. FEPAs need to stay in a good condition to manage and conserve freshwater ecosystems, and to protect water resources for human use. This does not mean that FEPAs need to be fenced off from human use, but rather that they should be supported by good planning, decision-making and management to ensure that human use does not impact on the condition of the ecosystem.

Since terrestrial waterbirds are generally associated with wetlands and rivers, the NFEPA spatial planning tool was used to identify wetlands and rivers within the project area and in so doing this to identify potential sensitive areas for amphibians and waterbirds.

Wetland conditions classified as AB and C are generally considered to be in a natural or good condition, or only slightly modified. These wetlands are likely to provide suitable habitat for a high diversity and richness of amphibian and bird species.

Wetland clusters are groups of wetlands embedded in a relatively natural landscape. In many areas of the country, wetland clusters no longer exist because the surrounding land has become too fragmented by human impacts. However, two regions within the project area (Figure 5-1 inserts) have significant groupings of wetland clusters and should be considered sensitive areas for waterbirds.

Wetland conditions classified as DEF, Z1, Z2, or Z3 are generally considered to be heavily to critically modified, and are therefore considered to be less sensitive from a waterbird perspective.

Table 5-1 comments on the likelihood of each alternative affecting the various wetlands and rivers.

Table 5-1: Likely effects of the alternative powerline routes on wetlands and rivers

Route	Comment
B-D Alternative 1	Alternative 1 avoids major wetlands and wetland clusters. The route does cross many perennial rivers south of the Swartberg. Over-head power lines which cross rivers are likely to cause bird collisions and mortalities.
B-D Alternative 2	This route crosses many pristine wetlands and wetland clusters according to NFEPA, which provide suitable habitat for migratory bird species. Over-head power lines which cross these areas are likely to cause mortalities through collisions.

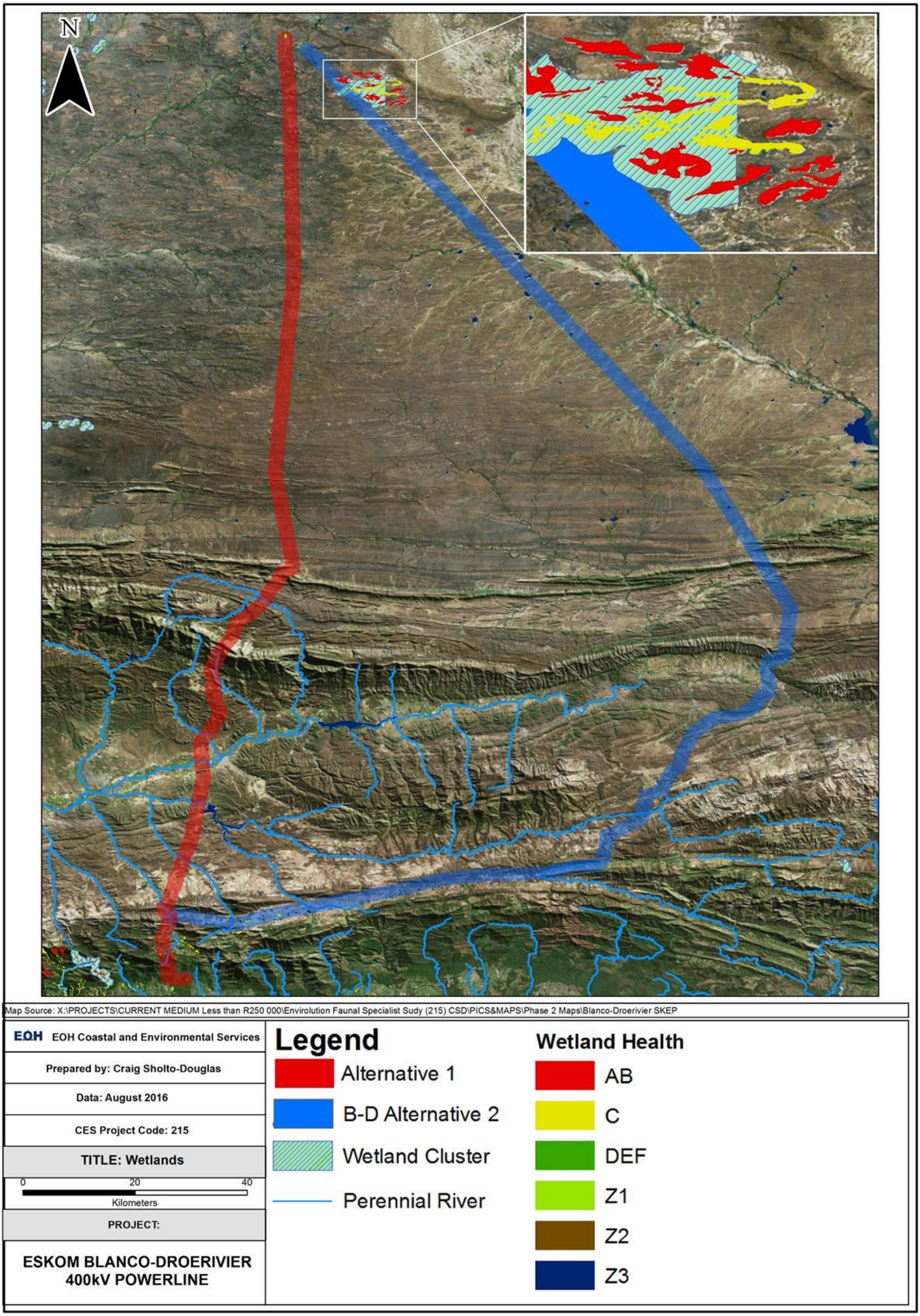


Figure 5-1: NFEPA Wetlands, Wetland Clusters, and Rivers within the project area

6. SUCCULENT KAROO ECOSYSTEM PROGRAMME HOTSPOTS

The Succulent Karoo Ecosystem Programme (SKEP) is a long term, multi-stakeholder bioregional conservation and development programme. SKEP began as a bi-national initiative between Namibia and South Africa, with the aim of defining a way to conserve this ecosystem, and to develop conservation as a land-use rather than instead of land-use.

This approach is encapsulated in the SKEP Twenty Year Strategy developed in 2001/2002, based on the following broad vision: "*The people of the Succulent Karoo take ownership of and enjoy their unique living landscape in a way that maintains biodiversity and improves livelihoods now and into perpetuity*."

As part of the Biodiversity Programme, SKEP involved experts in different taxonomic groups mapped centres of endemism and species richness, unique habitats and key areas for maintenance of biological processes (BGIS, 2007). A comprehensive spatial picture of the area was compiled by experts in their respective fields. Expert mapping was developed for the following taxonomic groups

- Amphibians;
- birds;
- fish;
- invertebrates;
- plants;
- reptiles; and
- small mammals.

SKEP maps were used to identify avifaunal hotspots within the project area. The geographic location of these hotspots is illustrated in Figure 6-1. Comments on how these hotspots will be affected by the proposed alternative routes can be seen in Table 6-1.

Table 6-1: Proposed alternative routes likely influence on SKEP expert bird priority areas

Route	Comment
B-D Alternative 1	The alternative passes through the Swartberg Bird Priority Area. This priority area provides habitat suitable for a high diversity and abundance of birds and bird SCC. Over-head power lines which cross this hotspot are likely to cause mortalities through collisions. The construction of pylons will provide nesting/roosting platforms which may result in electrocutions.
B-D Alternative 2	The route passes in between the Baviaanskloof Bird Priority Area and the Swartberg Bird Priority area. These priority areas provide habitat suitable for a high diversity and abundance of birds and bird SCC. Over-head power lines which cross these areas are likely to cause mortalities through collisions. The construction of pylons will provide nesting/roosting platforms which may result in electrocutions

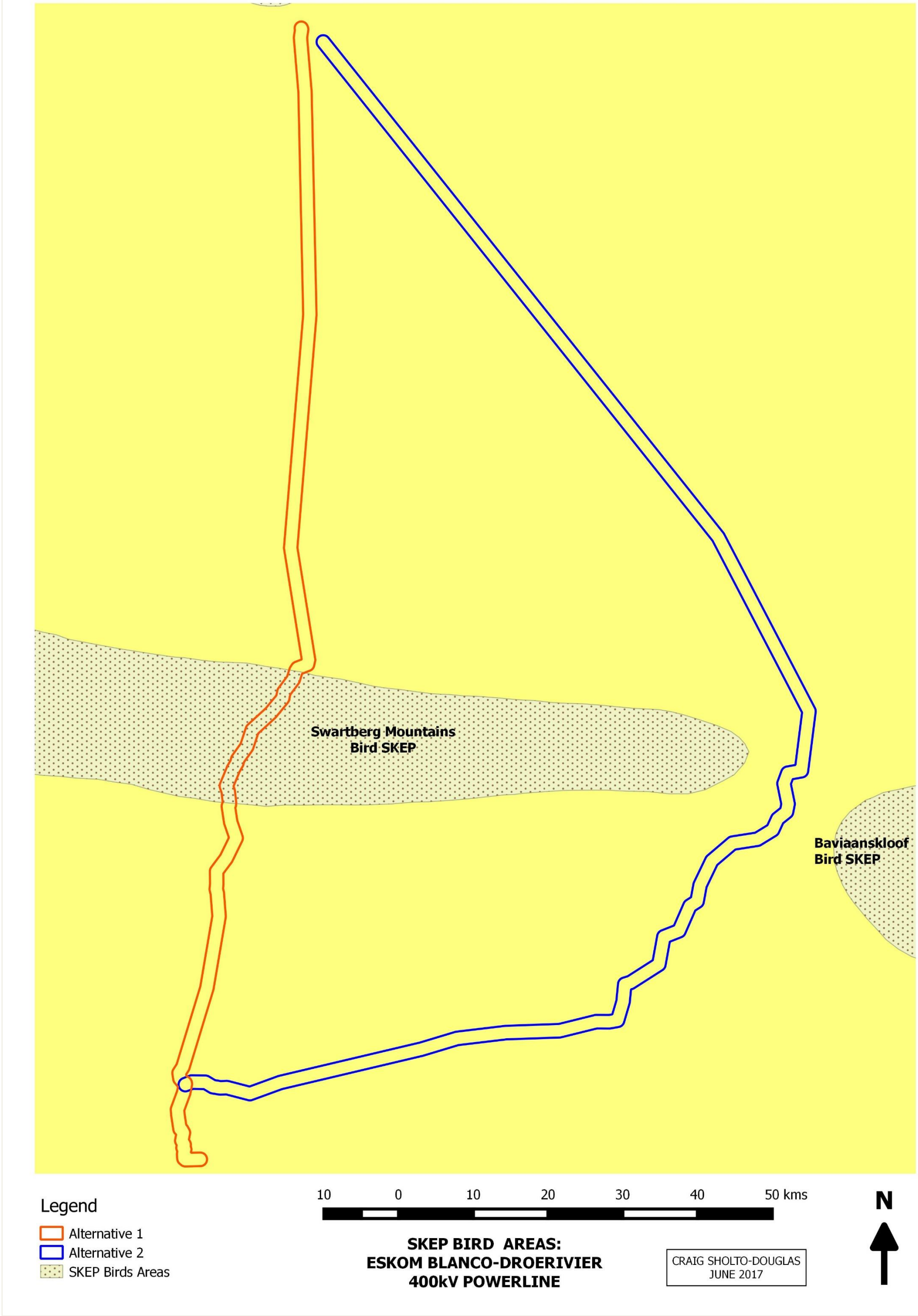


Figure 6-1: SKEP Bird Map of the project area

7. IMPORTANT BIRD AREAS

BirdLife's Important Bird and Biodiversity Area (IBAs) is a concept that has been developed and applied for over 30 years (BirdLife Intl.). Important Bird and Biodiversity Areas (IBAs) are:

- Places of international significance for the conservation of birds and other biodiversity;
- Recognised world-wide as practical tools for conservation;
- Distinct areas amenable to practical conservation action;
- Identified using robust, standardised criteria;
- Sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment (BirdLife Intl.)

The following IBAs are located within the study area:

Outeniqua Mountains IBA

The Outeniqua Mountains contain fynbos, forest and arid-zone birds, including a number of restricted-range and biome-restricted species (BirdLife SA, 2016). A total of 277 species have been recorded for this area during SABAP2. Globally threatened species are Blue Crane (*Anthropoides paradiseus*), Ludwig's Bustard (*Neotis ludwigii*), Denham's Bustard (*Neotis denhami*), Secretarybird (*Sagittarius serpentarius*), Martial Eagle (*Polemaetus bellicosus*), Crowned Eagle (*Stephanoaetus coronatus*), Black Harrier (*Circus maurus*), Hottentot Buttonquail (*Turnix nanus*), Knysna Woodpecker (*Campethera notate*) and Knysna Warbler (*Bradypterus sylvaticus*) have all been recorded within the IBA (BirdLife SA, 2016). Regionally threatened species are Black Stork (*Ciconia nigra*), Verreauxs' Eagle (*Aquila verreauxii*), African Marsh Harrier (*Circus ranivorus*), Lanner Falcon (*Falco biarmicus*), Cape Rockjumper (*Chaetops frenatus*) and Striped Flufftail (*Sarothrura affinis*) (BirdLife SA, 2016).

The IBA spans approximately 145 000 Ha and is Partially Protected with Global IBA statuses A1, A2, and A3 (BirdLife SA, 2016). Different sections of the IBA are under the jurisdiction of a number of government agencies, namely DAFF, CapeNature and SANParks (BirdLife SA, 2016). The size of protected areas in the IBA is being expanded, largely by decommissioning existing State forests (BirdLife SA, 2016). The Garden Route Initiative is currently bringing together stakeholders involved in conservation in this area to complete the formal process to register the IBA as a UNESCO Biosphere Reserve (BirdLife SA, 2016).

Swartberg Mountains IBA

The Swartberg range runs parallel to the Outeniqua Mountains IBA in the east of the Western Cape and these two ranges dominate the landscape at the junction of the Western Cape and Eastern Cape provinces (BirdLife SA, 2016). The IBA is extremely rich in both fynbos and karroid endemic species, supporting several restricted-range and biome-restricted assemblage species (BirdLife SA, 2016). Globally threatened species are Martial Eagle, Black Harrier and Hottentot Buttonquail. Regionally threatened species are Verreauxs' Eagle, Karoo Korhaan (*Eupodotis vigorsii*), Lanner Falcon, Cape Rockjumper and African Rock Pipit (*Anthus crenatus*) (BirdLife SA, 2016).

The IBA spans approximately 180 000 Ha and is Partially Protected with Global IBA statuses A1, A2, and A3 (BirdLife SA, 2016). There are a number of CapeNature reserves and mountain catchment areas covering vast areas of the IBA and the most important mountain habitats (BirdLife SA, 2016). Their status as nature reserves under NEM:PAA ensures this IBA receives the highest level of legislative protection (BirdLife SA, 2016).

Kouga - Baviaanskloof Complex IBA

The IBA supports a remarkable number of avian habitats, making it home to approximately 300 bird species, with a total of 262 having been recorded so far during SABAP2 (BirdLife SA, 2016). All the Cape Fynbos restricted-range and biome-restricted assemblage species are found in the mountain ranges. Globally threatened species found within the IBA are Hottentot Buttonquail, Blue Crane, Knysna Woodpecker, Ludwig's Bustard, Denham's Bustard, Crowned Eagle and Black Harrier. Regionally threatened species are African Marsh Harrier, Cape Rockjumper, Lanner Falcon, Black Stork, Karoo Korhaan and Verreauxs' Eagle (BirdLife SA, 2016).

The IBA contains large areas of mountainous terrain in the western part of the Eastern Cape, covering approximately 172 000 ha in total (BirdLife SA, 2016). The majority of the IBA falls within the boundaries of the Baviaanskloof World Heritage Site, which includes farms in private ownership. Although the Baviaanskloof Nature Reserve is still awaiting formal proclamation as a provincial nature reserve under NEM:PAA, it is actively managed by ECPTA to enhance the biodiversity of the area and to promote ecotourism (BirdLife SA, 2016). The Formosa Nature Reserve forms a potential corridor between the Baviaanskloof and the Tsitsikamma–Plettenberg Bay IBAs - such corridors will be crucial to enable species to adapt and move in response to anticipated effects of climate change (BirdLife SA, 2016). The Eden to Addo Corridor Project is looking to develop such corridors in this area (BirdLife SA, 2016).

Figure 7-1 illustrates the locations of the Important Bird Areas in relation to the proposed alternative route options. The IBAs which the proposed routes will traverse are commented on in Table 7-1.

Table 7-1: Proposed alternative routes likely influence on Important Bird Areas

Route	Comment
B-D Alternative 1	The northern extreme of this proposed alternative is approximately 10 kilometres from the southern tip of the Karoo National Park IBA. Moving south, the proposed alternative crosses the Swartberg Mountains IBA before crossing the Little Karoo. The route then bisects the Outeniqua Mountains IBA before joining at the Narina substation at the south facing foothills of the Outeniqua Mountains. Although this alternative bisects two large IBAs (Swartberg and Outeniqua) the route follows an existing powerline which already fragments the landscape. R
B-D Alternative 2	Like B-D Alternative 1, B-D Alternative 2 starts just below the Karoo National Park IBA. Moving south, the proposed route skirts the eastern boundary of the Swartberg IBA. The route then skirts the north western section of the Kouga-Baviaanskloof IBA, before running parallel to the Outeniqua IBA all the way to the Outeniqua Pass. Although the route does not cross the Outeniqua range, that fact that it runs in close proximity (and parallel) to the IBA for a great distance, is likely to have a significant impact on the birds protected by the IBA status. Large powerlines were only found along short sections of the proposed route.

Plate 7-1: Avifaunal specialist surveying the north facing slopes of the Swartberg IBA during the site visit (note the existing powerline which runs along the proposed B-D Alternative 1 route).

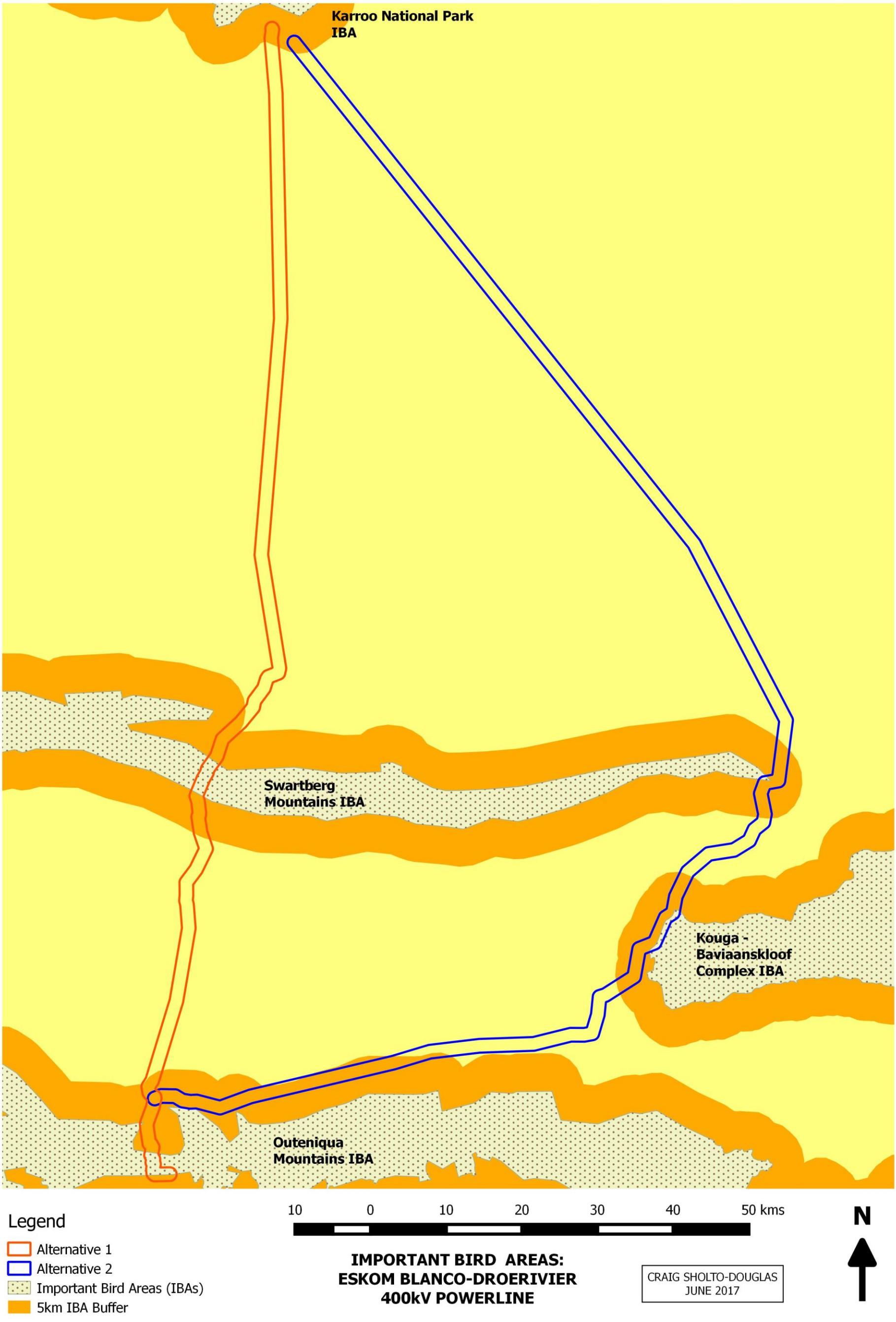


Figure 7-1: Important Bird Areas

8. BIRD SPECIES AND HABITATS

8.1 Birds

8.1.1 Regional Overview of Birds

As result of the wide diversity of habitats found along the route of the proposed powerline there is a considerable number of bird species which have been observed in the region. Bird records from the area have identified 290 bird species and the importance of the region is recognised by the presence of four Important Bird Areas (IBAs): the Karoo National Park, Kouga-Baviaanskloof Complex, the Outeniqua Mountains and the Swartberg Mountains. A total of 133 bird species were recorded during the survey, including 11 bird SCC. Please see Appendix A-1 for a full species list.

8.1.2 Bird SCC

There have been 21 bird species of conservation concern recorded in the area of the proposed powerline and alternative route (Table 8-4) of which four (4) are recorded as regionally endangered (EN).

Table 8-4: Bird SCC recorded along the Blanco-Droerivier powerline routes

Common Name	Scientific name	Global Status	Regional Status	Recorded during survey
Bustard, Denham's	*Neotis denhami*	**NT**	**VU**	✓
Bustard, Kori	*Ardeotis kori*	**NT**	**NT**	✓
Bustard, Ludwig's	*Neotis ludwigii*	**EN**	**EN**	✓
Courser, Burchell's	*Cursorius rufus*	LC	**VU**	-
Crane, Blue	*Anthropoides paradiseus*	**VU**	**NT**	✓
Duck, Maccoa	*Oxyura maccoa*	**NT**	**NT**	-
Eagle, Martial	*Polemaetus bellicosus*	**VU**	**EN**	-
Eagle, Verreaux's	*Aquila verreauxii*	LC	**VU**	✓
Falcon, Lanner	*Falco biarmicus*	LC	**NT**	✓
Flufftail, Striped	*Sarothrura affinis*	LC	**VU**	-
Harrier, Black	*Circus maurus*	**VU**	**EN**	✓
Kingfisher, Half-collared	*Alcedo semitorquata*	LC	**NT**	-
Korhaan, Karoo	*Eupodotis vigorsii*	LC	**NT**	✓
Korhaan, Southern Black	*Afrotis afra*	**VU**	**VU**	✓
Marsh-harrier, African	*Circus ranivorus*	LC	**EN**	✓
Rock-jumper, Cape	*Chaetops frenatus*	LC	**NT**	-
Secretarybird,	*Sagittarius serpentarius*	**VU**	**VU**	✓
Seedeater, Protea	*Crithagra leucopterus*	LC	**NT**	-
Stork, Black	*Ciconia nigra*	LC	**VU**	-
Warbler, Knysna	*Bradypterus sylvaticus*	**VU**	**VU**	-
Woodpecker, Knysna	*Campethera notata*	**NT**	**NT**	-

8.1.3 Powerline Priority Bird Species

The Eskom–Endangered Wildlife Trust Strategic Partnership has identified several interactions between birds and electrical infrastructure, highlighting the significant impacts that electrification can have on birds (Smallie *et al.,* 2009). Research indicates that the birds most prone to powerline (and associated infrastructure) impacts include vultures, eagles, cranes, bustards, storks, and flamingos (Smallie *et al.,* 2009), many of which are found within the proposed project area.

The list of "powerline priority species" found below (Table 8-5) is based on the bird species described in Smallie *et al.,* (2009), as well as electrocution and collision data relevant to the proposed powerline routes supplied by the Endangered WildLife Trust (2016) and Eskom (2016). Although not all species listed are considered SCC, species which have historically been impacted on by powerline developments have been included. The list takes into account the likeliness of priority species to occur within/traverse the proposed alternatives.

Table 8-5: Blanco-Droerivier Powerline Priority Species List

Common Name	Scientific name	Global Status	Regional Status	Electrocutions/collisions recorded by EWT/Eskom
Bustard, Denham's	*Neotis denhami*	**NT**	**VU**	-
Bustard, Kori	*Ardeotis kori*	**NT**	**NT**	✓
Bustard, Ludwig's	*Neotis ludwigii*	**EN**	**EN**	✓
Crane, Blue	*Anthropoides paradiseus*	**VU**	**NT**	✓
Eagle, Martial	*Polemaetus bellicosus*	**VU**	**EN**	✓
Eagle, Verreaux's	*Aquila verreauxii*	LC	**VU**	-
Eagle-owl, Cape	*Bubo capensis*	LC	LC	✓
Eagle-owl, Spotted	*Bubo africanus*	LC	LC	✓
Goose, Spur-winged	*Plectropterus gambensis*	LC	LC	✓
Secretarybird	*Sagittarius serpentarius*	**VU**	**VU**	-
Stork, Black	*Ciconia nigra*	LC	**VU**	-
Stork, White	*Ciconia ciconia*	LC	LC	✓

Bird species most likely to be impacted on by the proposed powerline are described below.

Denham's Bustard (*Neotis denhami*), a regionally Vulnerable species, was recorded in agricultural lands north of the Outeniqua Mountain Range while driving a transect along a section of proposed alternative 2. The species is known to occasionally frequent cultivated fields. As the species distribution range is restricted to the southern part of the project area, proposed alternative 2 is likely to have the greatest impact on the species.

Kori Bustard (*Ardeotis kori*), a globally and regionally Near Threatened species, was recorded in dwarf shrublands near Willowmore on alternative 2. The species is a locally common resident of most habitats within the project area north of the Outeniqua Mountain Range. Both powerline routes are likely to have an impact on the species. Powerline related mortalities for the species have been recorded in the project area (EWT, 2016).

Ludwig's Bustard (*Neotis ludwigii*), a globally and regionally Endangered species, was recorded in two locations along proposed alternative 1, and at one location on proposed alternative 2. The species inhabits semi-arid dwarf shrublands. Both powerline routes are likely to have an impact on the species. Powerline related mortalities for the species have been recorded in the project area (EWT, 2016).

The globally Vulnerable **Blue Crane** (*Anthropoides paradiseus*) was recorded in vast numbers (flocks of over 50 individuals) in cultivated pastures along the southern section of proposed alternative 2. The species is known to frequent agricultural fields, mostly composed of cereal crop fields and planted pastures. As the species have frequent local movements (usually from one agricultural area to another), proposed alternative 2 is likely to have the greatest impact on the species. Powerline related mortalities for the species have been recorded in the project area (EWT, 2016).

The globally Vulnerable and regionally Endangered **Martial Eagle** (*Polemaetus bellicosus*) is rare in mountainous areas, preferring open woodland in flat areas. The species is also known to utilise high-tension pylons as perches (Roberts, 2016). The species is likely to be impacted on by both of the proposed alternatives. Although the species was not recorded during the field survey, powerline related mortalities for the species have been recorded in the project area (EWT, 2016).

The regionally Vulnerable **Verreaux's Eagle** (*Aquila verreauxii*) was recorded during the survey in the Outeniqua and Swartberg Mountain Ranges. The species strictly prefers mountainous areas with steep cliffs (used for nesting). Alternative 1 is likely to have the biggest impact on the species as it traverses both major mountain ranges between Blanco and Droerivier Substations.

The Cape and Spotted **Eagle-Owls** (*Bubo sp*.) are both listed as species of Least Concern on regional and global Red Lists. However, powerline related mortalities for both of the species have been recorded in the project area (EWT, 2016). Spotted Eagle Owls (*Bubo africanus*) are found in a wide variety of habitats. The species is likely to be impacted on by both of the proposed alternatives. Cape Eagle Owls (*Bubo capensis*) roost and nest in caves and crevices associated with rocky habitats. Alternative 1 is likely to have the greatest impact on this species.

Spur-winged Goose (*Plectropterus gambensis*) and **White Stork** (*Ciconia ciconia*) are both listed as species of Least Concern on regional and global Red Lists. However, powerline related mortalities for both species have been recorded in the project area (EWT, 2016). Both species are known to frequent agricultural fields and cultivated lands. Therefore, proposed powerline alternative 2 is likely to have the greatest impact on both species.

Although no powerline related mortalities have been recorded in the area for the regionally Vulnerable **Black Stork** (*Ciconia nigra*) and the globally and regionally Vulnerable **Secretarybird** (*Sagittarius serpentarius*), powerline related mortalities outside the project area have been recorded. Secretarybirds were recorded in dwarf shrublands during the field survey and Black Storks have been recorded during SABAP2. Habitats suitable for both species are found throughout the greater project area, therefore both of the proposed alternatives are likely to have an impact on both species.

Photographs of bird SCC recorded on site can be seen in Plates 8-1, 8-2, 8-3, and 8-4 below.

Plate 8-1: Denham's Bustard (*Neotis denhami*) recorded on alternative 2

Plate 8-2: Blue Crane (*Anthropoides paradiseusi*) recorded on alternative 2.

Plate 8-3: Kori Bustard (*Ardeotis kori*) recorded near Willowmore on alternative 2.

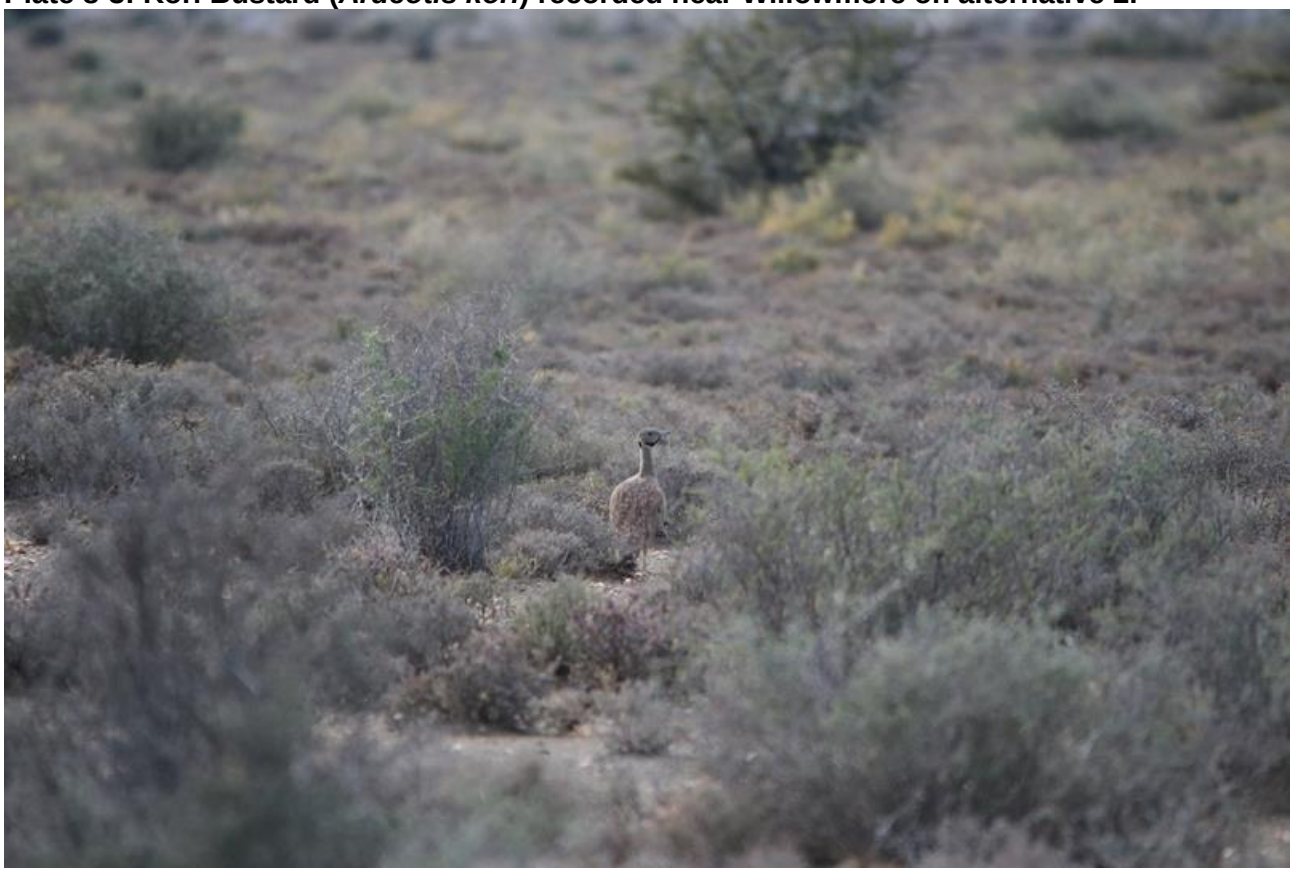


Plate 8-4: Karoo Korhaan (*Eupodotis vigorsiii*) recorded on alternative 2.

9. SENSITIVITY

9.1 Site sensitivity

The sensitivity map illustrated below (Figure 9-1) was developed using available spatial planning tools (e.g. SKEP Bird Areas, NFEPA, IBAs, Protected Areas, CBAs, etc), distribution ranges of SCC, process areas such as perennial rivers and pristine wetlands, and specialist avifaunal knowledge. Areas defined as "sensitive" during the desktop scoping phase were visited during a field survey to verify sensitivities and conduct checklists of species present on site, as well as the likeliness of species to occur within areas due to habitat preferences.

Identified **No-Go** areas for pylon hardstands (unless recommendations and mitigation measures are implemented) include:

- **Rocky outcrops** on the Swartberg Mountain range (IBA) and Outeniqua Mountain range (IBA) which provide suitable breeding/nesting sites for raptors of conservation concern.
- **All breeding and roosting sites** encountered during the construction phase (e.g cormorant and falcon nests – see #2 on the sensitivity map).

Identified areas of **high sensitivity** include:

- Important Bird Areas (IBAs);
- SKEP identified hotspots for birds; and
- Formal Protected Areas.

Areas of **medium sensitivity** include:

- 5km buffer around IBAs;
- Critical Biodiversity Areas; and
- Wetlands and Rivers.

Areas of **low sensitivity** include:

- Areas that are highly impacted by current land use and provide little value to the ecosystem; and
- Highly degraded areas.

An avifaunal sensitivity map has been created to illustrate areas of high, medium and low sensitivity (Figure 9-1). This map has been created as a guide to identify the preferred route for the field survey. **Images associated to the numbers found on the Figure can be seen in Plate 9-1 below.**

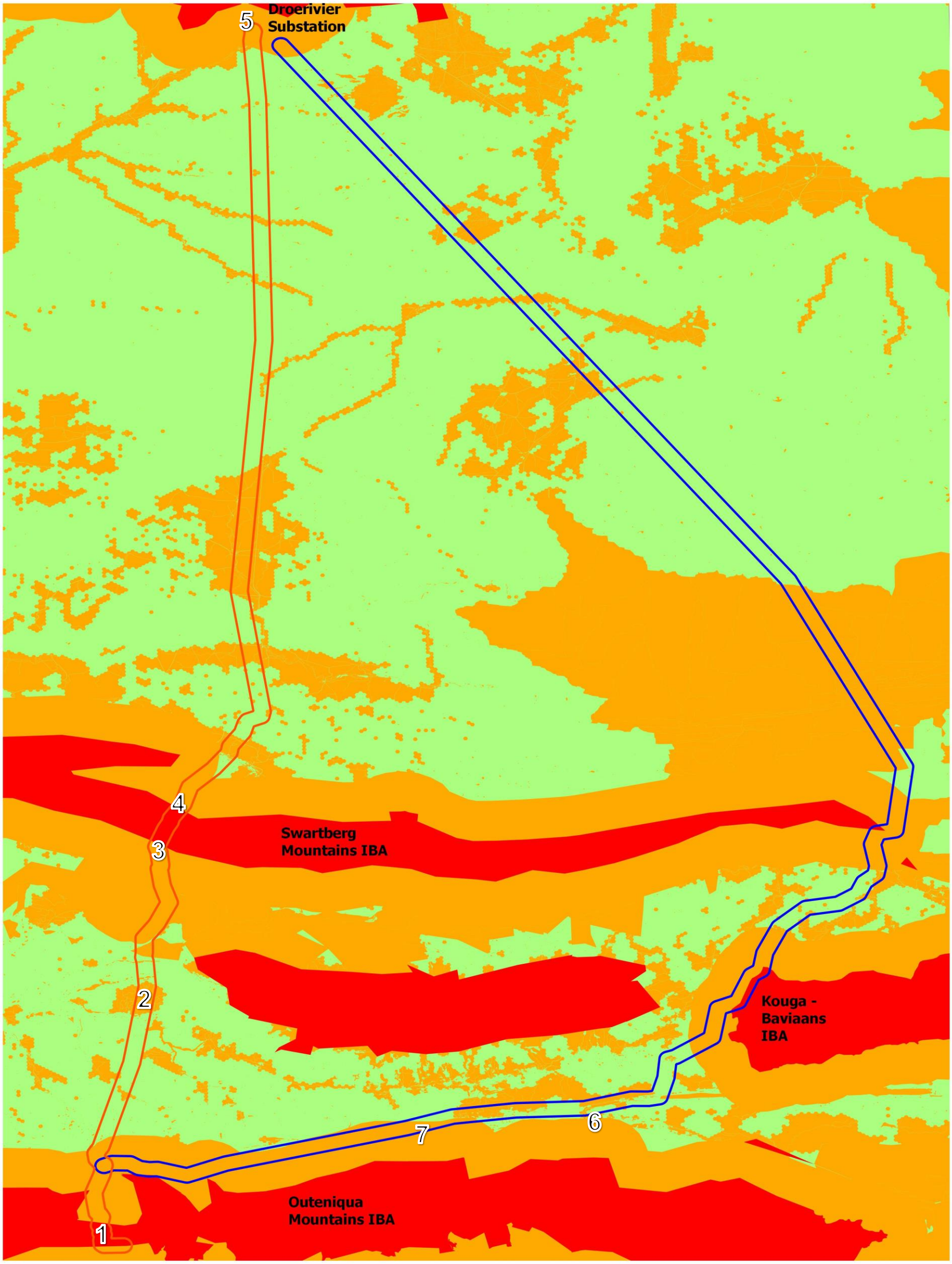
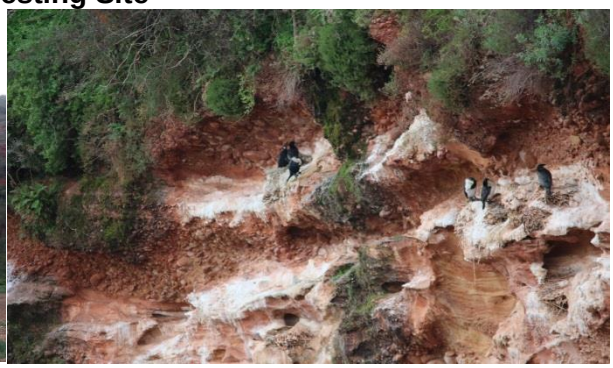


Figure 9-1: Sensitivity map of the project area

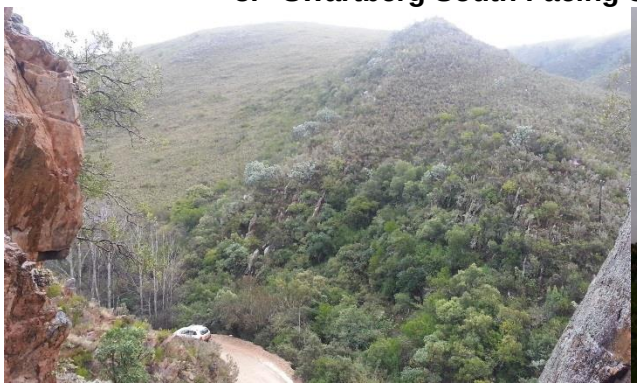
1. **Outeniqua Mountains**



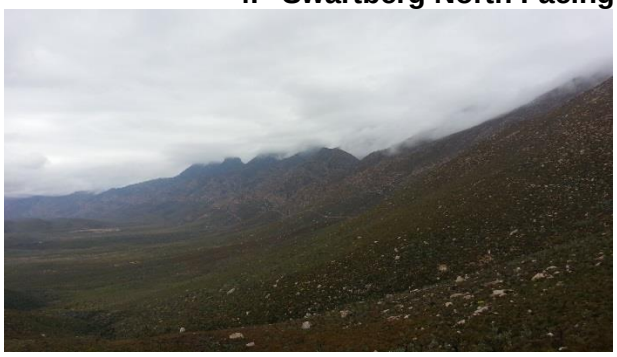

2. **Cormorant and Falcon Nesting Site**

3. **Swartberg South Facing Slope**




4. Swartberg North Facing Slope



5. Droerivier Substation

6. Denhams Bustard

7. Blue Cranes

8. Locations of substations

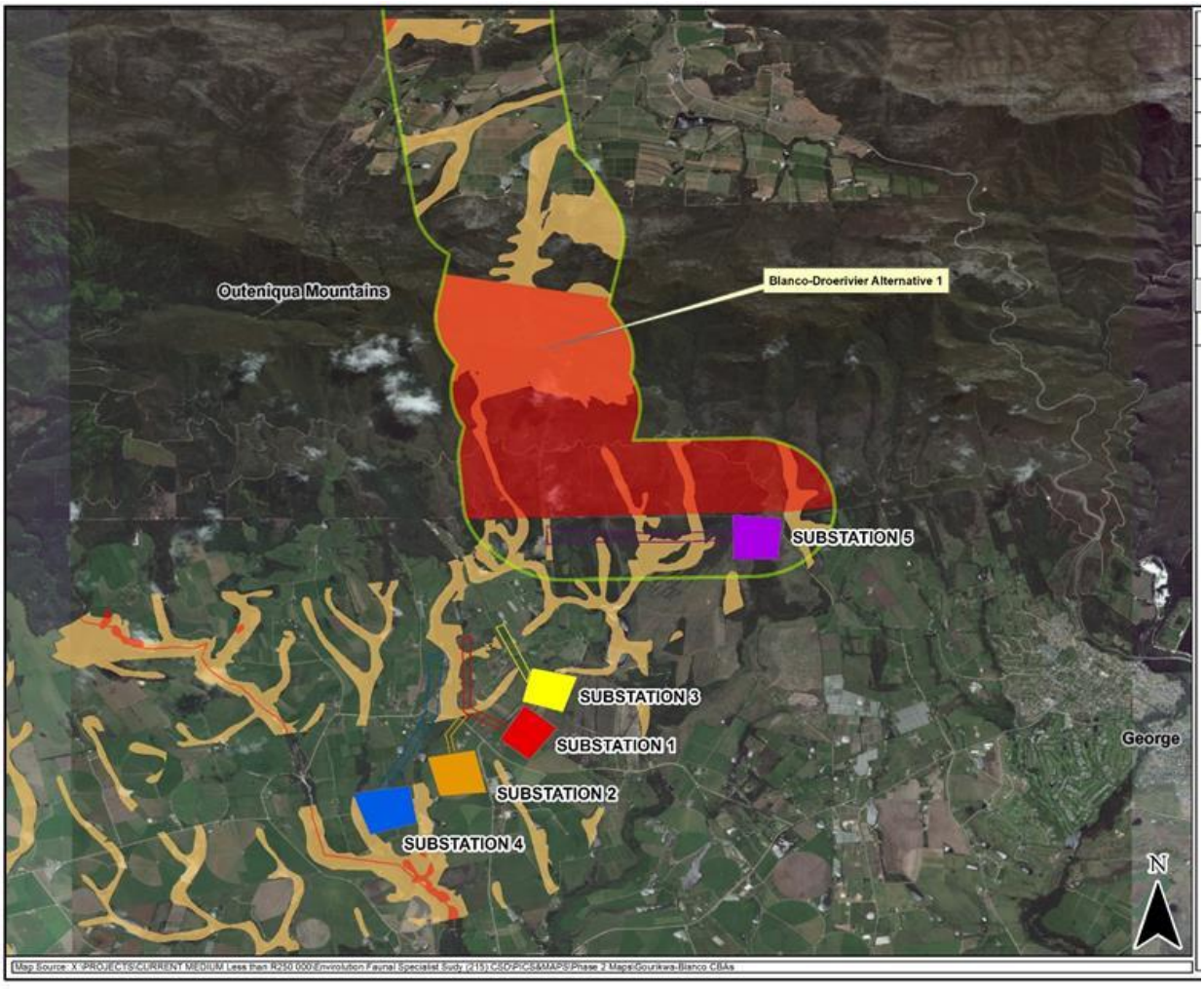


Plate 9-1: Images associated to the numbers illustrated in Figure 9-1.

10. KEY AVIFAUNAL ISSUES AND IMPACT STATEMENT

10.1 Introduction

This chapter details the avifaunal impacts identified by the specialist consultants during the specialist studies phase. For each issue identified, details are provided, followed by the mitigation measures required to minimise the negative impacts associated with the issue. The impact rating methodology used to determine the impacts below is presented in Appendix 1 of this report.

The main impacts likely to be caused by power lines being constructed along either Alternative Route 1 or 2 will include:

1. Loss of Bird Habitat
2. Disturbance and Displacement of Birds
3. Loss of Bird Diversity and SCC

10.2 Alternative 1 – Power line route which runs 178km between Blanco and Droerivier (following an existing power line)

Nature: 1 –Loss of Bird Habitat

Construction: There will be some loss of bird habitat through the clearing of vegetation for service/access roads and the construction of pylon bases. The extent of habitat loss will be dependent on how many new service/access roads need to be made and the number of pylon bases required. This is usually a loss of vegetation (plant communities) that supply food and shelter, but may include abiotic features such as the loss of temporary wetlands, caves or rocky outcrops, which provide suitable nesting or roosting sites.

This route will pass through the Outeniqua and Swartberg Mountains IBAs. As the Swartberg Mountains are classified as a UNESCO World Heritage Site, the destruction of habitat within the Swartberg classifies the impact as having an 'international' extent.

Operation: During operation there will be the need to keep the area beneath the power lines clear which will involve grass cutting and shrub clearance where necessary.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	5 - Definite (regardless of measures to prevent)
Duration	2 – Short Duration (1-2 years)	1 – Very Short Duration (0-1 years)
Extent	5 - International	5 - International
Magnitude	4 – Low , with slight impact on processes	4 - Low , with slight impact on processes
Significance	**55 (Medium)**	**50 (Medium)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	3 - Probable (distinct possibility)	3 - Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	1 - Limited to the site	1 - Limited to the site
Magnitude	0 - Small or no effect	0 - Small or no effect

Significance	**18 (Low)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation:

Construction Phase: Where access roads and/or pylon bases do need to be located within any of the highly sensitive areas identified above then there should be further ground-truthing by an avifaunal specialist to determine exact road routes and pylon base locations so to, where possible, avoid site specific sensitive areas such as nests and roosts

All bird nest/roost sites encountered should be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads.

Wherever possible existing service/access roads should be used.

Clearing of vegetation should be kept to a minimum and all rocky outcrops and wetlands must be avoided.

Construction areas should be demarcated with hazard tape and no clearing to occur outside of these areas. Laydown areas and construction camps must be located in areas of low sensitivity. Where this is not feasible then in areas of medium sensitivity.

An ECO must be employed to monitor the clearing for roads and hardstands.

Operation Phase: Clearing of vegetation for maintenance of the servitude should be kept to a minimum.

Access to all access/service roads should be limited by having locked gates.

Cumulative impacts: The erection of addition power lines will further fragment natural habitats along the route option; including IBAs and the Swartberg Mountains (UNESCO World Heritage Site).

Residual Risks: Maintenance of new service/access roads will prevent habitat regeneration.

Nature: 2 - Disturbance and Displacement of Birds

Construction: Birds will be disturbed by the powerline construction activities (e.g. noise, dust, operation of heavy machinery, anthropogenic activities). There is the potential for some nesting birds to be displaced (particularly breeding eagles) during construction activities where service/access roads and pylon bases are located within a close proximity to nesting sites. This impact will have a regional extent due to the number of bird SCC, including Verreaux's Eagle (*Aquila verreauxii*), which inhabit both the Outeniqua and Swartberg Mountain ranges.

Operation: Birds will utilise pylons to construct nests or to use as roosts. There will be continued disturbance during the operation of the powerline due to maintenance activities. The powerline infrastructures can also act as a barrier for birds in flight, and can influence flight paths of migratory species.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	2 - Short Duration (2-5 year)	1 - Very Short Duration (0 -1

		year)
Extent	3 - Regional	2 - Limited to local area
Magnitude	4 - Low , with slight impact on processes	2 – Minor or no impact on processes
Significance	**36 (Medium)**	**15 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	3 - Probable (distinct possibility)	3 – Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	3 - Regional	2 - Limited to local area
Magnitude	2 - minor and will not result in an impact on processes	2 - minor and will not result in an impact on processes
Significance	**30 (Medium)**	**27 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	YES

Mitigation:

All bird nest/roost sites encountered should be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads.

An avifaunal specialist should be employed during the pre-construction and construction phases to ground-truth the proposed pylon hardstand areas.

Any nests of raptors of SCC encountered during ground-truthing should be avoided – no construction activities must take place within a 500m radius of these areas.

Any birds encountered should be allowed to move away from the construction area.

Driving should be restricted to day-light hour. Driving before sunrise and after sunset should be restricted to emergencies only.

Wherever possible existing service/access roads should be used.

Bird friendly line and pole design must be used – along with industry standard insulation of all conductors and line-pylon attachment infrastructures.

Bird nests on pylon infrastructures must not be removed during the breeding season.

Cumulative impacts**:** There will be a cumulative disturbance due to the additional anthropogenic activities associated with constructing and maintaining an additional powerline along the route. There will be an additional barrier for birds in flight/migratory species.

Residual Risks: The presence of power lines will remain a risk to birds.

Nature: 3 - <u>Loss of Bird Diversity and SCC.</u>

Construction: Some birds, particularly nocturnal species such as owls and night-jars may be killed on the roads if there is an increase in the number of project vehicles using roads at night.

Operation: The main issue during the operation phase is the possibility of bird species colliding with the power lines while in flight or being electrocuted by contacting live parts of the system. As there are numerous bird species of conservation concern which inhabit the project area, the likelihood of collision is high and the potential impact is significant. The length of the power line and the abundance of habitats associated to different bird species compositions further exacerbate the potential impact.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	3 - Probable (distinct possibility)	2 - Improbable (low likelihood)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to the local area	2 - Limited to the local area
Magnitude	4 - Low , with slight impact on processes	4 - Low , with slight impact on processes
Significance	**21 (Low)**	**14 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	5 - Definite (regardless of measures to prevent)	4 - Highly Probable (most likely)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	3 - Regional	3 - Regional
Magnitude	6 – Moderate (processes continue but modified)	4 – Low, with slight impact on processes
Significance	**70 (High)**	**48 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation: During the construction phase there should no construction during the hours of darkness.

Speed restrictions for all project vehicles (40km/h is recommended) should be in place to reduce the impact of birds being killed on the project roads.

Wherever possible existing service/access roads should be used.

Bird flight diverters must be attached to power lines in areas where they pass through IBAs and highly sensitive areas which includes the Swartberg Mountains and Outeniqua Mountains – the spacing intervals must be a **minimum of 5m** apart in these areas (see sensitivity map).

All areas defined as having a medium avifaunal sensitivity must have bird diverters installed (spacing to be determined following ground-truthing). These areas include suitable habitat for numerous powerline priority species (e.g. cranes, bustards, and storks).

The power line should be constructed in close proximity to the existing power line as many birds will be aware of the existing infrastructure which may reduce collisions in low visibility conditions.

Cumulative impacts: The erection of addition power lines will further increase the chances of bird collisions in the area.
Residual Risks: The presence of power lines will remain a risk to flying birds.

10.3 Alternative 2 – Power line route of 270km from Blanco to Droerivier via Uniondale (no existing power line)

This power line route is longer than Alternative 1 and runs for 270km initially east towards Uniondale before heading north at the eastern end of the Swartberg Nature Reserve. This route was designed to avoid crossing sensitive areas of the Swartberg but does cross the Swartberg Kamanassie Gamkaberg NPAES Focus Area. The route runs in between the Swartberg and Outeniqua IBAs, with the buffer intersecting the Kouga-Baviaanskloof Complex IBA and the most easterly section of the Swartberg IBA. Part of this route falls within the Eastern Cape Province.

Nature: 1 –Loss of Bird Habitat

Construction: There will be some loss of bird habitat through the clearing of vegetation for service/access roads and the construction of pylon bases. The extent of habitat loss will be dependent on how many new service/access roads need to be made and the number of pylon bases required. This is usually a loss of vegetation (plant communities) that supply food and shelter, but may include abiotic features such as the loss of temporary wetlands, caves or rocky outcrops, which provide suitable nesting or roosting sites.

This route will pass the most eastern section of the Swartberg Mountains IBA and intersect the Kouga-Baviaanskloof Complex IBA.

Operation: During operation there will be the need to keep the area beneath the power lines clear which will involve grass cutting and shrub clearance where necessary.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	5 - Definite (regardless of measures to prevent)
Duration	2 – Short Duration (1-2 years)	1 – Very Short Duration (0-1 years)
Extent	3 - Regional	3 - Regional
Magnitude	4 – Low , with slight impact on processes	4 - Low , with slight impact on processes
Significance	**45 (Medium)**	**40 (Medium)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	3 - Probable (distinct possibility)	3 - Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	1 - Limited to the site	1 - Limited to the site
Magnitude	0 - Small or no effect	0 - Small or no effect
Significance	**18 (Low)**	**18 (Low)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation:

Construction Phase: The route should be manipulated to avoid the Swartberg Mountains IBA and the Kouga-Baviaanskloof Complex IBA.

Where access roads and/or pylon bases do need to be located within any of the highly sensitive areas identified above then there should be further ground-truthing by an avifaunal specialist to determine exact road routes and pylon base locations so to, where possible, avoid site specific sensitive areas such as nests and roosts

All bird nest/roost sites encountered should be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads.

Wherever possible existing service/access roads should be used.

Clearing of vegetation should be kept to a minimum and all rocky outcrops and wetlands must be avoided.

Construction areas should be demarcated with hazard tape and no clearing to occur outside of these areas. Laydown areas and construction camps must be located in areas of low sensitivity. Where this is not feasible then in areas of medium sensitivity.

An ECO must be employed to monitor the clearing for roads and hardstands.

Operation Phase: Clearing of vegetation for maintenance of the servitude should be kept to a minimum.

Access to all access/service roads should be limited by having locked gates.

Cumulative impacts: The erection of addition power lines within the region will further fragment natural habitats.

Residual Risks: Maintenance of new service/access roads will prevent habitat regeneration.

Nature: 2 - Disturbance and Displacement of Birds

Construction: Birds will be disturbed by the powerline construction activities (e.g. noise, dust, operation of heavy machinery, anthropogenic activities). There is the potential for some nesting birds to be displaced (particularly breeding eagles) during construction activities where service/access roads and pylon bases are located within a close proximity to nesting sites.

Operation: Birds will utilise pylons to construct nests or to use as roosts. There will be continued disturbance during the operation of the powerline due to maintenance activities. The powerline infrastructures can also act as a barrier for birds in flight, and can influence flight paths of migratory species. As there is no existing powerline along this route option, the barrier effect will be greater than alternative 1 as birds will not be accustomed to powerlines along the route. This barrier separates three IBAs (Swartberg, Outeniqua, and Kouga-Baviaanskloof Complex). The migration of bird SCC (particularly raptors) between these IBAs is highly likely.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	2 - Short Duration (2-5 year)	1 - Very Short Duration (0 -1 year)
Extent	3 - Regional	2 - Limited to local area
Magnitude	4 - Low , with slight impact on	2 – Minor or no impact on

	processes	processes
Significance	**36 (Medium)**	**15 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	3 - Probable (distinct possibility)	3 – Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	3 - Regional	2 - Limited to local area
Magnitude	6 – Moderate (processes continue but modified)	4 – Low , with slight impact on processes
Significance	**42 (Medium)**	**33 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	YES

Mitigation:

All bird nest/roost sites encountered should be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads.

An avifaunal specialist should be employed during the pre-construction and construction phases to ground-truth the proposed pylon hardstand areas.

Any nests of raptors of SCC encountered during ground-truthing should be avoided – no construction activities must take place within a 500m radius of these areas.

Any birds encountered should be allowed to move away from the construction area.

Driving should be restricted to day-light hour. Driving before sunrise and after sunset should be restricted to emergencies only.

Wherever possible existing service/access roads should be used.

Bird friendly line and pole design must be used – along with industry standard insulation of all conductors and line-pylon attachment infrastructures.

Bird nests on pylon infrastructures must not be removed during the breeding season.

***Cumulative impacts*:** There will be a cumulative disturbance due to the additional anthropogenic activities associated with constructing and maintaining an additional powerline within the region. There will be an additional barrier for birds in flight/migratory species.

Residual Risks: The presence of power lines will remain a risk to birds.

Nature: 3 - <u>Loss of Bird Diversity and SCC.</u>

Construction: There may be some disturbance of bird species during construction phase but this will probably be limited to very local and short-term disturbance. There may be the possibility of the loss of some nesting birds as a result of vegetation removal. Some birds, particularly nocturnal species such as owls and night-jars may be killed on the roads if there is an increase in the number of project vehicles using roads at night.

Operation: The main issue during the operation phase is the possibility of bird species colliding

with the power lines while in flight or being electrocuted by contacting live parts of the system. As there are numerous bird species of conservation concern which inhabit the project area, the likelihood of collision is high and the potential impact is significant. The length of the power line and the abundance of habitats associated to different bird species compositions further exacerbate the potential impact. Although proposed route Alternative 2 avoids bisecting the Swartberg Important Bird Area (IBA) it does boarder the Kouga-Baviaanskloof Complex IBA. The proposed Alternative 2 is substantially longer than proposed Alternative 1 and so has more power lines for birds to encounter. During the field survey flocks of over 50 of the globally Vulnerable Blue Crane (*Anthropoides paradiseus*) were observed utilising the agricultural lands which run along the northern perimeter of the Outeniqua Mountain Range.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	3 - Probable (distinct possibility)	2 - Improbable (low likelihood)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to the local area	2 - Limited to the local area
Magnitude	4 - Low , with slight impact on processes	4 - Low , with slight impact on processes
Significance	**21 (Low)**	**14 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	5 - Definite (regardless of measures to prevent)	4 - Highly Probable (most likely)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	3 - Limited to the region	3 - Limited to the region
Magnitude	6 – Moderate (processes continue but modified)	4 – Low, with slight impact on processes
Significance	**70 (High)**	**48 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation: During the construction phase there should be no construction during the hours of darkness.

Speed restrictions for all project vehicles (40km/h is recommended) should be in place to reduce the impact of birds being killed on the project roads.

Wherever possible existing service/access roads should be used.

Bird flight diverters must be installed on power lines in areas where they pass within 5 kilometres of IBAs (see buffer on sensitivity map). This is to accommodate the expected highly utilised hunting areas of raptors of SCC which nest on mountains within IBAs, and forage on the slopes and valleys surrounding the IBAs.

The spacing intervals must be decided by an avifaunal specialist following ground-truthing of the final route - a minimum of 5m apart in is suggested. All areas defined as having a medium avifaunal sensitivity must have bird diverters installed (spacing to be determined following ground-truthing). These areas include suitable habitat for numerous powerline priority species (e.g. cranes, bustards, and storks). Furthermore, as there is no existing power line along the proposed alternative birds are less likely to be cautious of large infrastructures in this area.
Cumulative impacts: The construction of service/access roads may provide access to previously remote areas which could cause an increase in anthropogenic activities and impacts within the area.
Residual Risks: The presence of power lines will remain a risk to flying birds.

10.4 Substations – Impact Statements for the proposed Blanco (Narina) substations

Nature: 1 - Impact of substations 1, 2, & 3 on avifauna

Construction: Proposed substations 1, 2, & 3 are all located within agricultural lands in areas defined as having a low faunal sensitivity. Proposed substation 2 is located adjacent to an existing substation. There will be some loss of avifaunal habitats through the clearing of vegetation for the construction of substation infrastructures.

Operation: The main issue during the operation phase is the possibility of bird species being electrocuted by contacting live parts of the substation system. As there are numerous bird species of conservation concern which inhabit the project area.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	3 - Probable (distinct possibility)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to the local area	2 - Limited to the local area
Magnitude	4 - Low , with slight impact on processes	2 - Minor or no impact on processes
Significance	**35 (Medium)**	**15 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	2 - Limited to the local area	1 - Limited to site
Magnitude	4 - Low , with slight impact on processes	2 - Minor or no impact on processes
Significance	**44 (Medium)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate

Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation:

Where possible, all aquatic habitats such as rivers and streams must be avoided.

Wherever possible existing service/access roads should be used.

Vehicle speed should be limited to the lowest possible, and should not exceed 40km/h.

Where possible any material to be transported should be in covered trucks or containers to avoid contamination to the surrounding area.

Speed restrictions for all project vehicles (40km/h is recommended) during the construction and operation phases should be in place to reduce the impact of fauna being killed on the project roads.

Driving should be restricted to day-light hours. Driving before sunrise and after sunset should be restricted to emergencies only.

Clearing of vegetation should be kept to a minimum and all rocky outcrops and wetlands must be avoided.

Construction areas should be demarcated with hazard tape and no clearing to occur outside of these areas. Laydown areas and construction camps must be located in areas of low sensitivity.

An ECO must be employed to monitor the clearing for roads and substation foundations.

Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.

Wherever possible existing service/access roads should be used.

Access to all access/service roads should be limited by having locked gates.

There must be proper storage of all oils and fuels at all construction sites and operational substations so as not to pollute nearby wetlands or waterways.

Bird diverters should be installed on all substation infrastructures.

Nature: 1 - Impact of substation 4 on avifauna

Construction: Substation 4 is located within agricultural lands in an area defined as having a low faunal sensitivity. However, the proposed footprint of the substation overlaps with riparian habitats (including a perennial stream) which has been classified as having a medium sensitivity. There will be some loss of avifaunal habitats through the clearing of vegetation for the construction of substation infrastructures.

Operation: The main issue during the operation phase is the possibility of bird species being electrocuted by contacting live parts of the substation system. As there are numerous bird species of conservation concern which inhabit the project area.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	3 - Probable (distinct possibility)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to the local area	2 - Limited to the local area
Magnitude	6 – Moderate (processes continue but modified)	4 - Low , with slight impact on processes
Significance	**45 (Medium)**	**21 (Low)**

Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	2 - Limited to the local area	1 - Limited to site
Magnitude	4 - Low , with slight impact on processes	2 - Minor or no impact on processes
Significance	**44 (Medium)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation:

Where possible, all aquatic habitats such as rivers and streams must be avoided.

Wherever possible existing service/access roads should be used.

Vehicle speed should be limited to the lowest possible, and should not exceed 40km/h.

Where possible any material to be transported should be in covered trucks or containers to avoid contamination to the surrounding area.

Speed restrictions for all project vehicles (40km/h is recommended) during the construction and operation phases should be in place to reduce the impact of birds being killed on the project roads.

Driving should be restricted to day-light hours. Driving before sunrise and after sunset should be restricted to emergencies only.

Clearing of vegetation should be kept to a minimum and all rocky outcrops and wetlands must be avoided.

Construction areas should be demarcated with hazard tape and no clearing to occur outside of these areas. Laydown areas and construction camps must be located in areas of low sensitivity.

An ECO must be employed to monitor the clearing for roads and substation foundations.

Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.

Wherever possible existing service/access roads should be used.

Access to all access/service roads should be limited by having locked gates.

There must be proper storage of all oils and fuels at all construction sites and operational substations so as not to pollute nearby wetlands or waterways.

Bird diverters should be installed on all substation infrastructures.

Nature: 1 - <u>Impact of substation 5 on avifauna</u>

Construction: Substation 5 is located within a matrix of alien and fynbos vegetation at the foothills of the Outeniqua Mountains. The proposed substation access road route runs through many moderately defined streams parallel to the Outeniqua Mountain IBA (within 1 km) and a formally protected area. There will be some loss of faunal habitats through the clearing of

vegetation for the construction of substation infrastructures.

Operation: The main issue during the operation phase is the possibility of bird species being electrocuted by contacting live parts of the substation system. As there are numerous bird species of conservation concern which inhabit the project area, the likelihood of collision/electrocutions are high without mitigation. Due to the proximity to the Outeniqua Mountains IBA the proposed alternative is likely to have a greater impact on birds than the other proposed alternatives.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	3 - Probable (distinct possibility)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to the local area	2 - Limited to the local area
Magnitude	6 – Moderate (processes continue but modified)	4 - Low , with slight impact on processes
Significance	**45 (Medium)**	**21 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	2 - Limited to the local area	1 - Limited to site
Magnitude	6 – Moderate (processes continue but modified)	4 - Low , with slight impact on processes
Significance	**52 (Medium)**	**30 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation:

Where possible, all aquatic habitats such as rivers and streams must be avoided.

Wherever possible existing service/access roads should be used.

Vehicle speed should be limited to the lowest possible, and should not exceed 40km/h.

Where possible any material to be transported should be in covered trucks or containers to avoid contamination to the surrounding area.

Speed restrictions for all project vehicles (40km/h is recommended) during the construction and operation phases should be in place to reduce the impact of mammals being killed on the project roads.

Driving should be restricted to day-light hours. Driving before sunrise and after sunset should be restricted to emergencies only.

Clearing of vegetation should be kept to a minimum and all rocky outcrops and wetlands must be avoided.

Construction areas should be demarcated with hazard tape and no clearing to occur outside of these areas. Laydown areas and construction camps must be located in areas of low sensitivity.

An ECO must be employed to monitor the clearing for roads and substation foundations.

Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.

Wherever possible existing service/access roads should be used.

Access to all access/service roads should be limited by having locked gates.

There must be proper storage of all oils and fuels at all construction sites and operational substations so as not to pollute nearby wetlands or waterways.

Bird diverters should be installed on all substation infrastructures.

11. AVIFAUNAL SUMMARY AND RECOMMENDATIONS

11.1 Greater Project Area

Consultation of historical records and species distribution data indicates a vast diversity of bird species are likely to be found in a variety of habitats within the greater project area. Furthermore, numerous avifaunal SCC and powerline priority species are likely to be found within the project area. Recommendations for each of the proposed alternatives is given below.

11.1.1 Alternative 1

The power line route runs 178km between Blanco and Droerivier (following an existing power line). The route traverses two Important Bird Areas, namely the Outeniqua Mountains IBA and the Swartberg Mountains IBA. The Swartberg Mountains are classified as a UNESCO World Heritage Site. As the power line route follows an existing power line, access and barrier impacts are mitigated.

Alternative 1

Impact	Without mitigation	With mitigation
Construction Phase		
1. Loss of Bird Habitat	**55 (Medium)**	**50 (Medium)**
2. Disturbance and Displacement	**36 (Medium)**	**15 (Low)**
3. Loss of Bird Diversity and SCC	**21 (Low)**	**14 (Low)**
Operation Phase		
1. Loss of bird habitat	**18 (Low)**	**18 (Low)**
2. Disturbance and displacement	**30 (Medium)**	**27 (Low)**
3. Loss of Bird Diversity and SCC	**70 (High)**	**48 (Medium)**

Recommendations

Where access roads and/or pylon bases need to be located within any areas defined as 'highly sensitive', further ground-truthing by an avifaunal specialist is required to determine exact road routes and pylon base locations so to, where possible, avoid nests and roosts of SCC. All bird nest/roost sites encountered must be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads. No construction works must take place within 500m of nests of large raptors and other SCC. Bird flight diverters must be attached to power lines in areas where they pass through IBAs and highly sensitive areas which includes the Swartberg Mountains and Outeniqua Mountains – the spacing intervals must be a **minimum of 5m** apart in these areas. All areas defined as having a medium avifaunal sensitivity must have bird diverters installed (spacing to be determined following ground-truthing). These areas include suitable habitat for numerous powerline priority species (e.g. cranes, bustards, and storks). Bird diverters should also be considered for perianal river/stream crossings as these watercourses provide isolated refuge for numerous bird species, especially in arid areas of the Karroo and Little Karroo.

11.1.2 Alternative 2

This power line route is longer than Alternative 1 and runs for 270km initially east towards Uniondale before heading north at the eastern end of the Swartberg Nature Reserve. The route runs in between the Swartberg and Outeniqua IBAs, with the buffer intersecting the Kouga-Baviaanskloof Complex IBA and the most easterly section of the Swartberg IBA. Part of this route falls within the Eastern Cape Province. Large flocks of Blue Crane, numerous Bustards, and generally high diversity of birdlife was observed along this section of the powerline. As no existing large scale powerline infrastructure is found along most sections of this route it is likely that the impact on avifauna will be significant.

Impact	Without mitigation	With mitigation
Construction Phase		
4. Loss of Bird Habitat	**45 (Medium)**	**40 (Medium)**
5. Disturbance and Displacement	**36 (Medium)**	**15 (Low)**
6. Loss of Bird Diversity and SCC	**21 (Low)**	**14 (Low)**
Operation Phase		
4. Loss of bird habitat	**18 (Low)**	**18 (Low)**
5. Disturbance and displacement	**42 (Medium)**	**33 (Medium)**
6. Loss of Bird Diversity and SCC	**70 (High)**	**48 (Medium)**

Recommendations

The route should be manipulated to avoid the Swartberg Mountains IBA and the Kouga-Baviaanskloof Complex IBA. Where access roads and/or pylon bases need to be located within any areas defined as 'highly sensitive', further ground-truthing by an avifaunal specialist is required to determine exact road routes and pylon base locations so to, where possible, avoid nests and roosts of SCC. All bird nest/roost sites encountered must be considered **"No-Go"** areas for any pylon hardstands or the construction of access roads. No construction works must take place within 500m of nests of large raptors and other SCC. Bird flight diverters must be installed on power lines in areas where they pass within 5 kilometres of IBAs - this is to accommodate the hunting areas of raptors of SCC which nest on mountains within the IBAs, and forage on the slopes and valleys surrounding the IBAs. The spacing intervals of bird flight diverters must be decided by an avifaunal specialist following ground-truthing of the final route - a minimum of 5m apart in is suggested. All areas defined as having a medium avifaunal sensitivity must have bird diverters installed (spacing to be determined following ground-truthing). These areas include suitable habitat for numerous powerline priority species (e.g. cranes, bustards, and storks). Furthermore, as there is no existing power line along the proposed alternative birds are less likely to be cautious of large infrastructures in this area. This barrier separates three IBAs (Swartberg, Outeniqua, and Kouga-Baviaanskloof Complex). The migration of bird SCC (particularly raptors) between these IBAs is highly likely.

11.1.3 Substations

Although options 1, 2 and 3 have the same impact rating, and are located in an area that will have the least impact on avifauna, substation 2 is the preferred substation option from a faunal perspective as there is an existing substation in the immediate vicinity and very little sensitive habitat surrounding the site. Option 4 is not recommended as there are sensitive riparian areas which will be impacted on by the construction of a substation. Option 5 is strongly not recommended as it is located within a matrix of alien and fynbos vegetation at the foothills of the Outeniqua Mountains. The proposed substation access road for option 5 will traverse many moderately defined streams parallel to the Outeniqua Mountain IBA (within 1 km) and a formally protected area.

Substations

Impact	Without mitigation	With mitigation
Construction Phase		
1. Substations 1, 2, & 3	**35 (Medium)**	**15 (Low)**
2. Substation 4	**45 (Medium)**	**21 (Low)**
3. Substation 5	**45 (Medium)**	**21 (Low)**
Operation Phase		
1. Substation 1, 2, & 3	**44 (Medium)**	**24 (Low)**
2. Substation 4	**44 (Medium)**	**24 (Low)**
3. Substation 5	**52 (Medium)**	**30 (Medium)**

12. CONCLUSION

It is the specialist's opinion that the Blanco-Droerivier Alternative 1 would have less of an impact on avifauna than Alternative 2, providing the recommended mitigation measures are implemented. Although the preferred route bisects the Swartberg Mountains and Outeniqua Mountains IBAs, it is the significantly shorter of the two options, and there is existing powerline infrastructures which mitigates many of the impacts associated with birds and powerlines. The existing service roads (and shorter route option) will result in less bird habitat being destroyed or fragmented during the construction phase of the project. Furthermore, Alternative 2 separates three IBAs. There is likely to be regular migration of bird SCC (particularly raptors) between these mountainous areas. As there is no existing power line through these areas, birds are less likely to be cautious of large infrastructures in this area, which could lead to higher mortalities of SCC and powerline priority species due to collisions/electrocutions with powerline infrastructures.

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APPENDIX A-1: BIRD SPECIES WITH A DISTRIBUTION RANGE INCLUDING THE PROJECT AREA

Common Name	Scientific name	Global Status	Regional Status	Recorded during survey
Apalis, Bar-throated	*Apalis thoracica*	LC	LC	-
Avocet, Pied	*Recurvirostra avosetta*	LC	LC	-
Barbet, Acacia Pied	*Tricholaema leucomelas*	LC	LC	✓
Batis, Cape	*Batis capensis*	LC	LC	✓
Batis, Pririt	*Batis pririt*	LC	LC	-
Bee-eater, European	*Merops apiaster*	LC	LC	-
Bishop, Southern Red	*Euplectes orix*	LC	LC	-
Bishop, Yellow	*Euplectes capensis*	LC	LC	✓
Bittern, Little	*Ixobrychus minutus*	LC	LC	-
Bokmakierie, Bokmakierie	*Telophorus zeylonus*	LC	LC	✓
Boubou, Southern	*Laniarius ferrugineus*	LC	LC	✓
Brownbul, Terrestrial	*Phyllastrephus terrestris*	LC	LC	✓
Bulbul, African Red-eyed	*Pycnonotus nigricans*	LC	LC	-
Bulbul, Cape	*Pycnonotus capensis*	LC	LC	✓
Bunting, Cape	*Emberiza capensis*	LC	LC	✓
Bunting, Cinnamon-breasted	*Emberiza tahapisi*	LC	LC	✓
Bunting, Lark-like	*Emberiza impetuani*	LC	LC	✓
Bush-shrike, Olive	*Telophorus olivaceus*	LC	LC	-
Bustard, Denham's	*Neotis denhami*	**NT**	**VU**	✓
Bustard, Kori	*Ardeotis kori*	**NT**	**NT**	✓
Bustard, Ludwig's	*Neotis ludwigii*	**EN**	**EN**	✓
Buzzard, Forest	*Buteo trizonatus*	LC	LC	✓
Buzzard, Jackal	*Buteo rufofuscus*	LC	LC	✓
Buzzard, Steppe	*Buteo vulpinus*	LC	LC	-
Camaroptera, Green-backed	*Camaroptera brachyura*	LC	LC	-

Canary, Black-headed	*Serinus alario*	LC	LC	
Canary, Black-throated	*Crithagra atrogularis*	LC	LC	-
Canary, Brimstone	*Crithagra sulphuratus*	LC	LC	-
Canary, Cape	*Serinus canicollis*	LC	LC	✓
Canary, Forest	*Crithagra scotops*	LC	LC	-
Canary, White-throated	*Crithagra albogularis*	LC	LC	-
Canary, Yellow	*Crithagra flaviventris*	LC	LC	✓
Chat, Anteating	*Myrmecocichla formicivora*	LC	LC	✓
Chat, Familiar	*Cercomela familiaris*	LC	LC	✓
Chat, Karoo	*Cercomela schlegelii*	LC	LC	✓
Chat, Sickle-winged	*Cercomela sinuata*	LC	LC	-
Chat, Tractrac	*Cercomela tractrac*	LC	LC	-
Cisticola, Cloud	*Cisticola textrix*	LC	LC	-
Cisticola, Grey-backed	*Cisticola subruficapilla*	LC	LC	✓
Cisticola, Levaillant's	*Cisticola tinniens*	LC	LC	✓
Cisticola, Zitting	*Cisticola juncidis*	LC	LC	✓
Coot, Red-knobbed	*Fulica cristata*	LC	LC	✓
Cormorant, Reed	*Phalacrocorax africanus*	LC	LC	✓
Cormorant, White-breasted	*Phalacrocorax carbo*	LC	LC	✓
Coucal, Burchell's	*Centropus burchellii*	LC	LC	✓
Courser, Burchell's	*Cursorius rufus*	LC	**VU**	-
Courser, Double-banded	*Rhinoptilus africanus*	LC	LC	-
Crake, Black	*Amaurornis flavirostris*	LC	LC	-
Crane, Blue	*Anthropoides paradiseus*	**VU**	**NT**	✓
Crested-flycatcher, Blue-mantled	*Trochocercus cyanomelas*	LC	LC	-
Crombec, Long-billed	*Sylvietta rufescens*	LC	LC	-
Crow, Cape	*Corvus capensis*	LC	LC	✓

Crow, Pied	*Corvus albus*	LC	LC	✓
Cuckoo, African Emerald	*Chrysococcyx cupreus*	LC	LC	-
Cuckoo, Black	*Cuculus clamosus*	LC	LC	-
Cuckoo, Diderick	*Chrysococcyx caprius*	LC	LC	-
Cuckoo, Klaas's	*Chrysococcyx klaas*	LC	LC	-
Cuckoo, Red-chested	*Cuculus solitarius*	LC	LC	-
Cuckoo-shrike, Black	*Campephaga flava*	LC	LC	-
Cuckoo-shrike, Grey	*Coracina caesia*	LC	LC	-
Darter, African	*Anhinga rufa*	LC	LC	✓
Dove, Laughing	*Streptopelia senegalensis*	LC	LC	✓
Dove, Lemon	*Aplopelia larvata*	LC	LC	-
Dove, Namaqua	*Oena capensis*	LC	LC	-
Dove, Red-eyed	*Streptopelia semitorquata*	LC	LC	✓
Dove, Rock	*Columba livia*	LC	LC	✓
Dove, Tambourine	*Turtur tympanistria*	LC	LC	-
Drongo, Fork-tailed	*Dicrurus adsimilis*	LC	LC	-
Duck, African Black	*Anas sparsa*	LC	LC	✓
Duck, Hybrid Mallard	*Anas hybrid*	LC	LC	-
Duck, Maccoa	*Oxyura maccoa*	**NT**	**NT**	-
Duck, Mallard	*Anas platyrhynchos*	LC	LC	-
Duck, White-backed	*Thalassornis leuconotus*	LC	LC	-
Duck, White-faced	*Dendrocygna viduata*	LC	LC	-
Duck, Yellow-billed	*Anas undulata*	LC	LC	✓
Eagle, Booted	*Aquila pennatus*	LC	LC	✓
Eagle, Long-crested	*Lophaetus occipitalis*	LC	LC	✓
Eagle, Martial	*Polemaetus bellicosus*	**VU**	**EN**	-
Eagle, Verreaux's	*Aquila verreauxii*	LC	**VU**	-
Eagle-owl, Cape	*Bubo capensis*	LC	LC	-

Eagle-owl, Spotted	*Bubo africanus*	LC	LC	-
Egret, Cattle	*Bubulcus ibis*	LC	LC	✓
Egret, Little	*Egretta garzetta*	LC	LC	-
Egret, Yellow-billed	*Egretta intermedia*	LC	LC	-
Eremomela, Karoo	*Eremomela gregalis*	LC	LC	-
Eremomela, Yellow-bellied	*Eremomela icteropygialis*	LC	LC	-
Falcon, Lanner	*Falco biarmicus*	LC	**NT**	✓
Falcon, Peregrine	*Falco peregrinus*	LC	LC	✓
Finch, Red-headed	*Amadina erythrocephala*	LC	LC	-
Finch, Scaly-feathered	*Sporopipes squamifrons*	LC	LC	-
Firefinch, Red-billed	*Lagonosticta senegala*	LC	LC	✓
Fiscal, Common (Southern)	*Lanius collaris*	LC	LC	✓
Fish-eagle, African	*Haliaeetus vocifer*	LC	LC	✓
Flufftail, Buff-spotted	*Sarothrura elegans*	LC	LC	-
Flufftail, Red-chested	*Sarothrura rufa*	LC	LC	-
Flufftail, Striped	*Sarothrura affinis*	LC	**VU**	-
Flycatcher, African Dusky	*Muscicapa adusta*	LC	LC	✓
Flycatcher, Chat	*Bradornis infuscatus*	LC	LC	-
Flycatcher, Fairy	*Stenostira scita*	LC	LC	-
Flycatcher, Fiscal	*Sigelus silens*	LC	LC	✓
Flycatcher, Spotted	*Muscicapa striata*	LC	LC	-
Francolin, Grey-winged	*Scleroptila africanus*	LC	LC	-
Goose, Egyptian	*Alopochen aegyptiacus*	LC	LC	✓
Goose, Spur-winged	*Plectropterus gambensis*	LC	LC	✓
Goshawk, African	*Accipiter tachiro*	LC	LC	✓
Goshawk, Gabar	*Melierax gabar*	LC	LC	-
Goshawk, Southern Pale Chanting	*Melierax canorus*	LC	LC	✓
Grassbird, Cape	*Sphenoeacus afer*	LC	LC	✓

Grebe, Black-necked	*Podiceps nigricollis*	LC	LC	
Grebe, Great Crested	*Podiceps cristatus*	LC	LC	-
Grebe, Little	*Tachybaptus ruficollis*	LC	LC	✓
Greenbul, Sombre	*Andropadus importunus*	LC	LC	✓
Greenshank, Common	*Tringa nebularia*	LC	LC	-
Guineafowl, Helmeted	*Numida meleagris*	LC	LC	✓
Gull, Grey-headed	*Larus cirrocephalus*	LC	LC	-
Gull, Kelp	*Larus dominicanus*	LC	LC	-
Hamerkop, Hamerkop	*Scopus umbretta*	LC	LC	✓
Harrier, Black	*Circus maurus*	**VU**	**EN**	✓
Harrier-Hawk, African	*Polyboroides typus*	LC	LC	✓
Hawk, African Cuckoo	*Aviceda cuculoides*	LC	LC	✓
Heron, Black-headed	*Ardea melanocephala*	LC	LC	✓
Heron, Grey	*Ardea cinerea*	LC	LC	✓
Heron, Purple	*Ardea purpurea*	LC	LC	-
Honeybird, Brown-backed	*Prodotiscus regulus*	LC	LC	-
Honey-buzzard, European	*Pernis apivorus*	LC	LC	-
Honeyguide, Greater	*Indicator indicator*	LC	LC	-
Honeyguide, Lesser	*Indicator minor*	LC	LC	-
Honeyguide, Scaly-throated	*Indicator variegatus*	LC	LC	-
Hoopoe, African	*Upupa africana*	LC	LC	✓
House-martin, Common	*Delichon urbicum*	LC	LC	-
Ibis, African Sacred	*Threskiornis aethiopicus*	LC	LC	✓
Ibis, Glossy	*Plegadis falcinellus*	LC	LC	-
Ibis, Hadeda	*Bostrychia hagedash*	LC	LC	✓
Jacana, African	*Actophilornis africanus*	LC	LC	-
Kestrel, Greater	*Falco rupicoloides*	LC	LC	-
Kestrel, Lesser	*Falco naumanni*	LC	LC	✓

Kestrel, Rock	*Falco rupicolus*	LC	LC	✓
Kingfisher, Brown-hooded	*Halcyon albiventris*	LC	LC	✓
Kingfisher, Giant	*Megaceryle maximus*	LC	LC	□
Kingfisher, Half-collared	*Alcedo semitorquata*	LC	**NT**	-
Kingfisher, Malachite	*Alcedo cristata*	LC	LC	-
Kingfisher, Pied	*Ceryle rudis*	LC	LC	✓
Kite, Black-shouldered	*Elanus caeruleus*	LC	LC	✓
Kite, Yellow-billed	*Milvus aegyptius*	LC	LC	-
Korhaan, Karoo	*Eupodotis vigorsii*	LC	**NT**	✓
Korhaan, Southern Black	*Afrotis afra*	**VU**	**VU**	✓
Lapwing, Blacksmith	*Vanellus armatus*	LC	LC	✓
Lapwing, Black-winged	*Vanellus melanopterus*	LC	LC	
Lapwing, Crowned	*Vanellus coronatus*	LC	LC	✓
Lark, Cape Clapper	*Mirafra apiata*	LC	LC	-
Lark, Eastern Clapper	*Mirafra fasciolata*	LC	LC	✓
Lark, Karoo	*Calendulauda albescens*	LC	LC	✓
Lark, Karoo Long-billed	*Certhilauda subcoronata*	LC	LC	-
Lark, Large-billed	*Galerida magnirostris*	LC	LC	-
Lark, Red-capped	*Calandrella cinerea*	LC	LC	✓
Lark, Sabota	*Calendulauda sabota*	LC	LC	✓
Lark, Spike-heeled	*Chersomanes albofasciata*	LC	LC	✓
Longclaw, Cape	*Macronyx capensis*	LC	LC	✓
Marsh-harrier, African	*Circus ranivorus*	LC	**EN**	✓
Martin, Banded	*Riparia cincta*	LC	LC	
Martin, Brown-throated	*Riparia paludicola*	LC	LC	✓
Martin, Rock	*Hirundo fuligula*	LC	LC	✓
Masked-weaver, Southern	*Ploceus velatus*	LC	LC	-

Moorhen, Common	*Gallinula chloropus*	LC	LC	✓
Mousebird, Red-faced	*Urocolius indicus*	LC	LC	✓
Mousebird, Speckled	*Colius striatus*	LC	LC	✓
Mousebird, White-backed	*Colius colius*	LC	LC	-
Neddicky, Neddicky	*Cisticola fulvicapilla*	LC	LC	-
Night-Heron, Black-crowned	*Nycticorax nycticorax*	LC	LC	✓
Nightjar, Fiery-necked	*Caprimulgus pectoralis*	LC	LC	-
Olive-pigeon, African	*Columba arquatrix*	LC	LC	-
Openbill, African	*Anastomus lamelligerus*	LC	LC	-
Oriole, Black-headed	*Oriolus larvatus*	LC	LC	✓
Ostrich, Common	*Struthio camelus*	LC	LC	✓
Owl, Barn	*Tyto alba*	LC	LC	-
Oxpecker, Red-billed	*Buphagus erythrorhynchus*	LC	LC	-
Palm-swift, African	*Cypsiurus parvus*	LC	LC	-
Paradise-flycatcher, African	*Terpsiphone viridis*	LC	LC	-
Penduline-tit, Cape	*Anthoscopus minutus*	LC	LC	-
Pigeon, Speckled	*Columba guinea*	LC	LC	✓
Pipit, African	*Anthus cinnamomeus*	LC	LC	✓
Pipit, Long-billed	*Anthus similis*	LC	LC	-
Pipit, Plain-backed	*Anthus leucophrys*	LC	LC	-
Plover, Common Ringed	*Charadrius hiaticula*	LC	LC	-
Plover, Kittlitz's	*Charadrius pecuarius*	LC	LC	-
Plover, Three-banded	*Charadrius tricollaris*	LC	LC	✓
Pochard, Southern	*Netta erythrophthalma*	LC	LC	-
Prinia, Karoo	*Prinia maculosa*	LC	LC	✓
Puffback, Black-backed	*Dryoscopus cubla*	LC	LC	-
Quail, Common	*Coturnix coturnix*	LC	LC	-
Quailfinch, African	*Ortygospiza atricollis*	LC	LC	-

Quelea, Red-billed	*Quelea quelea*	LC	LC	✓
Rail, African	*Rallus caerulescens*	LC	LC	-
Raven, White-necked	*Corvus albicollis*	LC	LC	✓
Reed-warbler, African	*Acrocephalus baeticatus*	LC	LC	-
Robin, White-starred	*Pogonocichla stellata*	LC	LC	-
Robin-chat, Cape	*Cossypha caffra*	LC	LC	✓
Robin-chat, Chorister	*Cossypha dichroa*	LC	LC	-
Rock-jumper, Cape	*Chaetops frenatus*	LC	**NT**	-
Rock-thrush, Cape	*Monticola rupestris*	LC	LC	-
Rock-thrush, Short-toed	*Monticola brevipes*	LC	LC	-
Ruff, Ruff	*Philomachus pugnax*	LC	LC	-
Rush-warbler, Little	*Bradypterus baboecala*	LC	LC	-
Sandgrouse, Namaqua	*Pterocles namaqua*	LC	LC	-
Sandpiper, Common	*Actitis hypoleucos*	LC	LC	-
Sandpiper, Wood	*Tringa glareola*	LC	LC	-
Saw-wing, Black (Southern race)	*Psalidoprocne holomelaena*	LC	LC	-
Scrub-robin, Karoo	*Cercotrichas coryphoeus*	LC	LC	✓
Secretarybird, Secretarybird	*Sagittarius serpentarius*	**VU**	**VU**	✓
Seedeater, Protea	*Crithagra leucopterus*	LC	**NT**	-
Seedeater, Streaky-headed	*Crithagra gularis*	LC	LC	-
Shelduck, South African	*Tadorna cana*	LC	LC	✓
Shoveler, Cape	*Anas smithii*	LC	LC	-
Siskin, Cape	*Crithagra totta*	LC	LC	-
Snipe, African	*Gallinago nigripennis*	LC	LC	-
Sparrow, Cape	*Passer melanurus*	LC	LC	-
Sparrow, House	*Passer domesticus*	LC	LC	✓
Sparrow, Southern Grey-headed	*Passer diffusus*	LC	LC	-
Sparrowhawk, Black	*Accipiter melanoleucus*	LC	LC	-

Sparrowhawk, Little	*Accipiter minullus*	LC	LC	✓
Sparrowhawk, Rufous-chested	*Accipiter rufiventris*	LC	LC	✓
Sparrowlark, Black-eared	*Eremopterix australis*	LC	LC	-
Spoonbill, African	*Platalea alba*	LC	LC	-
Spurfowl, Cape	*Pternistis capensis*	LC	LC	✓
Spurfowl, Red-necked	*Pternistis afer*	LC	LC	-
Starling, Black-bellied	*Lamprotornis corruscus*	LC	LC	-
Starling, Common	*Sturnus vulgaris*	LC	LC	✓
Starling, Pale-winged	*Onychognathus nabouroup*	LC	LC	-
Starling, Pied	*Spreo bicolor*	LC	LC	-
Starling, Red-winged	*Onychognathus morio*	LC	LC	✓
Starling, Wattled	*Creatophora cinerea*	LC	LC	-
Stilt, Black-winged	*Himantopus himantopus*	LC	LC	-
Stint, Little	*Calidris minuta*	LC	LC	-
Stonechat, African	*Saxicola torquatus*	LC	LC	-
Stork, Black	*Ciconia nigra*	LC	**VU**	-
Stork, White	*Ciconia ciconia*	LC	LC	-
Sugarbird, Cape	*Promerops cafer*	LC	LC	✓
Sunbird, Amethyst	*Chalcomitra amethystina*	LC	LC	✓
Sunbird, Dusky	*Cinnyris fuscus*	LC	LC	✓
Sunbird, Greater Double-collared	*Cinnyris afer*	LC	LC	✓
Sunbird, Grey	*Cyanomitra veroxii*	LC	LC	✓
Sunbird, Malachite	*Nectarinia famosa*	LC	LC	✓
Sunbird, Orange-breasted	*Anthobaphes violacea*	LC	LC	✓
Sunbird, Southern Double-collared	*Cinnyris chalybeus*	LC	LC	✓
Swallow, Barn	*Hirundo rustica*	LC	LC	-
Swallow, Greater Striped	*Hirundo cucullata*	LC	LC	-

Swallow, Pearl-breasted	*Hirundo dimidiata*	LC	LC	-
Swallow, White-throated	*Hirundo albigularis*	LC	LC	-
Swamp-warbler, Lesser	*Acrocephalus gracilirostris*	LC	LC	-
Swift, African Black	*Apus barbatus*	LC	LC	-
Swift, Alpine	*Tachymarptis melba*	LC	LC	✓
Swift, Common	*Apus apus*	LC	LC	-
Swift, Horus	*Apus horus*	LC	LC	-
Swift, Little	*Apus affinis*	LC	LC	-
Swift, White-rumped	*Apus caffer*	LC	LC	-
Tchagra, Southern	*Tchagra tchagra*	LC	LC	-
Teal, Cape	*Anas capensis*	LC	LC	-
Teal, Red-billed	*Anas erythrorhyncha*	LC	LC	✓
Tern, Whiskered	*Chlidonias hybrida*	LC	LC	-
Thick-knee, Spotted	*Burhinus capensis*	LC	LC	-
Thrush, Karoo	*Turdus smithi*	LC	LC	✓
Thrush, Olive	*Turdus olivaceus*	LC	LC	-
Tit, Grey	*Parus afer*	LC	LC	-
Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*	LC	LC	-
Tit-babbler, Layard's	*Parisoma layardi*	LC	LC	-
Trogon, Narina	*Apaloderma narina*	LC	LC	-
Turaco, Knysna	*Tauraco corythaix*	LC	LC	-
Turtle-dove, Cape	*Streptopelia capicola*	LC	LC	✓
Wagtail, African Pied	*Motacilla aguimp*	LC	LC	✓
Wagtail, Cape	*Motacilla capensis*	LC	LC	✓
Warbler, Knysna	*Bradypterus sylvaticus*	**VU**	**VU**	-
Warbler, Marsh	*Acrocephalus palustris*	LC	LC	-
Warbler, Namaqua	*Phragmacia substriata*	LC	LC	✓
Warbler, Rufous-eared	*Malcorus pectoralis*	LC	LC	✓
Warbler, Victorin's	*Cryptillas victorini*	LC	LC	-

Warbler, Willow	*Phylloscopus trochilus*	LC	LC	-
Waxbill, Common	*Estrilda astrild*	LC	LC	✓
Waxbill, Swee	*Coccopygia melanotis*	LC	LC	✓
Weaver, Cape	*Ploceus capensis*	LC	LC	✓
Wheatear, Capped	*Oenanthe pileata*	LC	LC	-
Wheatear, Mountain	*Oenanthe monticola*	LC	LC	-
White-eye, Cape	*Zosterops virens*	LC	LC	✓
Whydah, Pin-tailed	*Vidua macroura*	LC	LC	□
Wood-hoopoe, Green	*Phoeniculus purpureus*	LC	LC	✓
Woodland-warbler, Yellow-throated	*Phylloscopus ruficapilla*	LC	LC	-
Wood-owl, African	*Strix woodfordii*	LC	LC	-
Woodpecker, Cardinal	*Dendropicos fuscescens*	LC	LC	-
Woodpecker, Ground	*Geocolaptes olivaceus*	LC	LC	-
Woodpecker, Knysna	*Campethera notata*	**NT**	**NT**	-
Woodpecker, Olive	*Dendropicos griseocephalus*	LC	LC	-

APPENDIX B -1 - IMPACT RATINGS METHODOLOGY

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase have been assessed and quantified using the following a standard impact ratings scale. This is necessary since impacts have a number of parameters that need to be assessed. Factors that need to be considered when assessing the significance of impacts are assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **consequences (magnitude)**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the status, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$$S = (E+D+M)\ P$$

Where : S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are calculated using the following ratings values:

Probability	Duration
1. Very improbable 2. Improbable (low likelihood) 3. Probable (distinct possibility) 4. Highly Probable (most likely) 5. Definite (regardless of measures to prevent)	1. Very Short Duration (0 -1 year) 2. Short Duration (2 -5 years) 3. Medium Term (5 – 15 years) 4. Long Term (>15 years) 5. Permanent (ongoing during lifetime)
Extent	**Magnitude**
1. Limited to site 2. Limited to the local area 3. Limited to the region 4. National 5. International	0. Small or no effect 2. Minor or no impact on processes 4. Low, with slight impact on processes 6. Moderate (processes continue but modified) 8. High (processes altered & stop temporarily) 10. Very High & destructive of pattern with processes permanently stopped)
Significance Score = Magnitude + Duration + Extent x Probability	
Significance	< 30 LOW / 30 - 60 MEDIUM / < 60 High

Each issue and its impact is presented and summarised in the following table:

Nature: [Outline and describe fully the impact anticipated as per the assessment undertaken]		
	Without mitigation	**With mitigation**
Construction Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance	**65 (High)**	**44 (Medium)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability		
Duration		
Extent		

Magnitude		
Significance	**65 (High)**	**44 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?		

Mitigation:

"Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

- Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.

Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity

APPENDIX D – SPECIALISTS CURICULUM VITAE

CRAIG SHOLTO-DOUGLAS

Date of Birth: 16-02-1989

QUALIFICATIONS

2014 – **M.Sc.** Environmental Science (Rhodes University – *on going*)
2013 – **B.Sc. Honours** Environmental Science (Rhodes University)
2012 – **B.Sc.** Zoology & Environmental Science (Rhodes University)

PROFESSIONAL EXPERIENCE

May 2017 – present:
Research technician/ecologist (&Beyond Phinda Private Game Reserve)

January 2015 – April 2017:
Environmental Consultant and Ecological Specialist (EOH Coastal & Environmental Services)

January 2013 – August 2014:
Restoration Ecologist and Project Research Technician (Rhodes Restoration Research Group – R3G)

January 2012 – November 2014:
Graduate Assistant (Rhodes University, Department of Environmental Science)

LEADERSHIP POSITIONS

Project facilitator and technician - Subtropical Thicket Restoration Project (STRP), in partnership with the Department of Environmental Affairs.

Project manager - Numerous Environmental Impact Assessments (EIAs), Basic Assessments (BAs), and Ecological Specialist Studies.

Assistant facilitator - Thicket Forum, Rhodes Restoration Research Group, Grahamstown, South Africa.

Excursion officer - WildREACH community outreach project.

College Prefect and Head of House – Diocesan College (Bishops).

ACADEMIC RESEARCH EXPERIENCE

I have been involved in a number of field and laboratory-based research projects involving both fauna and flora. Research projects include:

- A population census of leopard (*Panthera pardus*) at Kwandwe Private Game Reserve, Eastern Cape, South Africa.
- Monitoring of large terrestrial mammals at Kwandwe Private Game Reserve, Eastern Cape, South Africa.

- The effects of indigenous invasive plant species on species richness, Grahamstown, Eastern Cape, South Africa.
- Factors influencing survivorship of *Portulacaria afra* (spekboom) cuttings, in attempts to restore degraded lands in the Greater Addo Elephant National Park, Eastern Cape, South Africa.
- Vertebrate road count surveys and population estimates, Great Fish River Nature Reserve, Eastern Cape, South Africa.
- Carbon and biodiversity baseline assessments of the Greater Addo Elephant National Park, Eastern Cape, South Africa.

SELECTED CONSULTING EXPERIENCE:

I have conducted, assisted or worked on the following projects:

Ecological Specialist Studies:

Mozambique

- Faunal Specialist Study (lead avifaunal specialist), Metals of Africa, Cabo Delgado. Mozambique.
- Faunal Specialist Study, Kenmare Minerals, Moma, Nampula.
- Ecological Study, Kenmare Minerals, Pilivili, Nampula.
- Ecological Study, Baobab Iron Ore, Tete.
- Faunal Specialist Study, Triton Minerals, Ancuabe.

Western Cape, South Africa

- Avifaunal Impact Assessment (lead specialist), Department of Environmental Affairs, Quoin Point Environmental Impact Assessment.
- Faunal Impact Assessment (lead specialist), Eskom 50km Powerline from Mossel Bay to George.
- Faunal Impact Assessment (lead specialist), Eskom 400km Powerline from George to Beaufort West.

Eastern Cape, South Africa

- Bat Monitoring Specialist (lead specialist), Waainek Wind Energy Facility.
- Bird Monitoring Specialist (lead specialist), Waainek Wind Energy Facility.
- Ecological Assessment, Ukomeleza Wind Energy Facility.
- Faunal Scoping Report, PPC Mining Port Elizabeth.
- Faunal Specialist Study, Uhambiso Glen Hurd Road Upgrade.
- Ecological Impact Assessment (lead specialist), Albany Wind Energy Facility.
- Ecological Impact Assessment, Kariega River Causeway.
- Ecological Ground-truthing, Nxuba Wind Energy Facility.
- SMEC Environmental Status Report Ecological Survey.
- Ecological Impact Assessment, Fairewood Estate.

Geographic Information System (GIS) Mapping:

- Mapping for a number of projects across a variety of sectors using both QGIS and ArcGIS (renewable energy, mining, national parks and private reserves, estates, etc.)
- Vegetation type mapping for a number of projects in Mozambique and South Africa.
- Habitat sensitivity mapping for numerous projects.
- Wetland delineation mapping for numerous projects in Mozambique and South Africa.

- Relocation Action Plan Mapping for Social Impact Assessments in Mozambique.
- River and watercourses mapping for a number of Water Use License Applications.

Other relevant experience:

Environmental and Social Management Plans (EMPs)

- Baobab Iron Ore Environmental and Social Management Plan, Tete, Mozambique.
- Fairewood Estate Development Environmental Management Plan, Grahamstown, Eastern Cape, South Africa.
- InnoWind Waainek Wind Energy Project Environmental Management Plan, Grahamstown, Eastern Cape, South Africa.
- Aurecon Beach Drilling Port Alfred Environmental Management Plan, Port Alfred, Eastern Cape, South Africa.

Environmental Impact Assessments (EIAs) and Basic Assessment (BAs):

- SEDA Prospecting Right Application Basic Assessment, Queenstown, Eastern Cape, South Africa.
- ACSA OR Tambo Internal Airport Filling Station Basic Assessment, Johannesburg, South Africa.
- Fishwater Flats Wastewater Treatment Works Environmental Impact Assessment, Port Elizabeth, South Africa.
- Triton Minerals Ancube Environmental and Social Impact Assessment, Cabo Delgado, Mozambique.
- PRDW Power Barge Environmental Impact Assessment, Port Elizabeth, Eastern Cape, South Africa.

Environmental Control Officer (ECO):

- InnoWind Waainek Wind Energy Project ECO, Grahamstown, Eastern Cape, South Africa.
- Aurecon Pipeline Project ECO, Alexandria and Cannon Rocks, Eastern Cape, South Africa.
- Aurecon Water Treatment Works Project ECO, Port Alfred, Eastern Cape, South Africa.
- Aurecon Beach Drilling Project ECO, Port Alfred, Eastern Cape, South Africa.
- TNPA Vulindlela Site Remediation ECO, Port Elizabeth, Eastern Cape, South Africa.

COURSES

- Community-Based Natural Resource Management (2012), Rhodes University, Grahamstown, South Africa.
- Urban Forestry and Greening (2012), Rhodes University, Grahamstown, South Africa.
- Environmental Impact Assessment (EIA) Short Course (2012), Rhodes University and CES, Grahamstown, South Africa.
- Arid Zone Ecology & Thicket Fusion Forum (2012), Rhodes University, Eastern Cape, South Africa.
- Geographic Information System (GIS) Short Course (2015), Rhodes University, Grahamstown, South Africa.

MEMBERSHIPS

South African Bat Assessors Association (SABAA)
Zoological Society of Southern Africa (ZSSA)
Animal Demographic Unit
BirdLife South Africa

TARRYN MARTIN (M.Sc)

Date of Birth: 17-11-1982

QUALIFICATIONS

- M.Sc Botany with distinction (Rhodes University)
- B.Sc Hons. African Vertebrate Biodiversity (Rhodes University)
- B.Sc Botany and Zoology (Rhodes University)

COURSES

2012 – EIA Short Course, Rhodes University and CES, Grahamstown

MEMBERSHIP

- South African Council of Natural Scientific Professions (SACNASP). Registered as a Professional Natural Scientist (400018/14).
- Member of the South African Association of Botanists (SAAB)
- Member of the Botanical Society
- Member of Golden Key International Honour Society

THESIS

Photosynthetic and evolutionary determinants of the response of selected C_3 and C_4 (NADP-ME) grasses to fire.

AWARDS AND NOTABLE ACHIEVEMENTS

2011 - Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art

2010 - Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa

SELECTED PUBLICATIONS

Taylor, S.; Ripley, B.S.; Martin, T.; De Wet, L-A.; Woodward, F.I.; Osborne, C.P. 2014. Physiological advantages of C_4 grasses in the field: a comparative experiment demonstrating the importance of drought. *Global Change Biology.* 20 (6): 1992-2003.

Ripley, B; Donald, G; Osborne, C; Abraham, T and Martin, T. (2010). Experimental investigation of fire ecology in the C3 and C4 subspecies of *Alloteropsis semialata.* *Journal of Ecology.* 98 (5): 1196 - 1203

South African Association of Botanists (SAAB) conference, Grahamstown.
January 2010 Title: Responses of C3 and C4 Panicoid and non-Panicoid grasses to fire.

South African Association of Botanists (SAAB) conference, Drakensberg.
January 2008. Title: Photosynthetic and Evolutionary determinants of the response of selected C3 and C4 (NADP-ME) grasses to fire.

PROFESSIONAL EXPERIENCE

May 2012 – Present: Environmental Consultant and Botanical Specialist (Coastal and Environmental Services, Grahamstown). Duties include conducting botanical and ecological assessments for local and international EIAs in southern Africa, identifying and mapping vegetation communities and sensitive areas, designing and implementing monitoring plans, designing rehabilitation and biodiversity offset plans, managing project budgets, coordinating specialists and site visits.

October 2011 – January 2012: Accounts Manager (Green Route DMC, Cape Town). Duties included project and staff co-ordination, managing large budgets for incentive and conference groups travelling to southern Africa, creating tailor-made programs for clients, negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

April 2011 – September 2011: Camp Administrator and Project Co-ordinator (Windsor Mountain International Summer Camp, New Hampshire, USA). Co-ordinated staff and camper travel arrangements, coordinated main camp events, assisted with marketing the camp to prospective families.

October 2010 – April 2011: Freelance Project Manager (Green Route DMC, Cape Town). Duties included project and staff co-ordination, managing large budgets for incentive and conference groups travelling to southern Africa, creating tailor-made programs for clients, negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

June 2010 – October 2010: Camp Counselor (Windsor Mountain International Summer Camp, New Hampshire, USA)

April 2009 – May 2010: NERC Research Assistant (Botany Department, Rhodes University, Grahamstown in collaboration with Sheffield University, Sheffield, England). Set up and maintained experiments within a common garden plot experiment, collected, collated and entered data, assisted with the analysis of the data and writing of journal articles.

March 2007 – October 2008: Head Demonstrator (Botany Department, Rhodes University, Grahamstown).

September 2005 – February 2007: Operations Assistant (Green Route DMC, Cape Town). Project co-ordination.

CONSULTING EXPERIENCE

Environmental consulting experience as project manager or team member is broad and covers a number of key areas. Specific experience includes the following:

Forestry Projects

- Lurio Green Resources Plantation Project Botanical Assessment, Vegetation and Sensitivity Mapping, Specialist Co-ordination, Nampula Province, Mozambique.
- Lurio Green Resources Wood Chip Mill and Medium Density Fibre-board Plant, Nampula Province, Project Manager and Ecological Specialist.

Mining Projects

- Toliara Mineral Sands Rehabilitation and Offset Strategy Report, Madagascar (2012)
- Syrah Resources Ecological Assessment, Cabo Delgado, Mozambique (2013)
- Baobab Mining Ecological Assessment, Tete, Mozambique (2013-2014

- Triton Minerals Nicanda Hill Ecological Assessment and Project Manager, Cabo Delgado, Mozambique (2015 – present)
- Triton Minerals Ancuabe Ecological Assessment, Cabo Delgado, Mozambique (2015 – present)
- Nhangonzo Coastal Stream Critical Habitat Biodiversity Assessment, Inhassora, Mozambique (2015 - present).

Ecological Monitoring Projects

- Kenmare Terrestrial Monitoring Program Project Manager and Specialist Survey, MOMA, Mozambique (2012 – present)

Ecological Baseline Surveys

- LHDA Botanical Survey and Impact Assessment, Lesotho (2013-2014)
- iGas Saldanha to Ankerlig Biodiversity Assessment Project Manager (2015-present)

Renewable Energy Projects

- Dassiesridge Wind Energy Facility Project Manager, Eastern Cape, South Africa (2013 – present)
- Tsitsikamma Wind Energy Facility Community Power Line Ecological Assessment, Eastern Cape, South Africa (2012)
- Golden Valley Wind Energy Facility Power Line Ecological Assessment, Eastern Cape, South Africa (2012)
- Middleton Wind Energy Facility Ecological Assessment and Project Management, Eastern Cape, South Africa (2012)
- Mossel Bay Power Line Ecological Assessment, Western Cape, South Africa (2012)
- Biotherm Solar Voltaic Ecological Assessment, Zambia (2014)
- Savannah Nxuba Wind Energy Facility Powerline Ecological Assessment, ground trothing and permit applications (2015).

Ecological Groundtruthing Projects

- Harvestvale botanical groundtruthing assessment, Eastern Cape, South Africa (2013)
- Groundtruthing the turbine sites for the Waainek Wind Energy Facility, Eastern Cape, South Africa (2012)
- Cob Bay botanical groundtruthing assessment, Eastern Cape, South Africa (2014)

Due Diligence

- Solar Capitol Solar Photovoltaic Energy Facility Environmental and Social Compliance Monitoring Project Manager, Northern Cape, South Africa (2014)

Michael JAMES CAMPBELL BAILEY

Date of Birth: 28th June 1961

QUALIFICATIONS

- **M.Sc**. Quantitative Conservation Biology (University of the Witwatersrand, Johannesburg, South Africa)
- **B.Sc. (Hons.)** Biology and Ecology (University of Ulster, N.Ireland)
- **B.Sc.** Biology and Ecology (University of Ulster, N.Ireland)
- **HND** in Combined Sciences (Parasitology and Microbiology) (University of Ulster, N. Ireland)

PROFESSIONAL MEMBERSHIP

Chartered Institute of Ecology and Environmental Management (CIEEM). Full Member since 2007

COURSES

2012 – Environmental Impact Assessment (EIA) Short Course, Rhodes University and CES, Grahamstown

PROFESSIONAL EXPERIENCE

July 2012 – Current: Principal Environmental Consultant (Coastal & Environmental Services, (EOH CES), Grahamstown, South Africa).

September 2011 – May 2012: Private Ecology Consultant (Cork, Ireland)

August.2009 – September 2011: Ireland Manager & Senior Ecologist (ADAS UK Ltd., Dublin, Ireland)

August 2007 – July 2009: Regional Ecologist (ADAS UK Ltd, Oxford, UK)

November 2006 – July 2007: International Manager (Ovelle Ltd, Ireland)

August 2003 – October 2006: Principal Ecologist/Project Manager (Trinity College Dublin, Ireland)

March 1999 – February 2004: Director (Savannah Trails Exclusive Safaris, Luangwa Valley, Zambia)

March 1996 – February 1999: Safari Manager/Senior Safari Guide (Norman Carr Safaris, Luangwa Valley, Zambia)

March 1995 – Feb 1996: Field Biologist, Bangweulu Swamps (WWF Zambia, Luapula Province, Zambia).

October 1992 – October 1994: Scientific Field Officer, Geology and Biology Departments, University of the Witwatersrand, (part of research team on projects in Okavango Delta, Botswana, and Kruger National Park, South Africa).

September 1984 – September 1992: Research Scientist (Genetics Department, Queen's University, Belfast, N. Ireland).

May – August 1984: Scientific Research Officer (Hwange, Zimbabwe National Parks and Wildlife Service).

CONSULTING EXPERIENCE

Environmental consulting experience as project manager or team member is broad and covers a number of key areas. Specific experience includes the following:

Environmental Project Management

- Project Manager for IFC PS compliant ESHIA for a new dam for Olam International (Zambia) at the NCCL coffee plantation in Kasama District, Zambia. Also responsible for terrestrial fauna specialist studies.
- Project Manager overseeing Health Impact, Ground Water and Baseline Ecological Assessments for the refurbishment of a graphite mine in Cabo Delgado province, Mozambique for Graphit Kropfmühl (GK) GmbH, Germany.
- Project Manager for Zambeef (Zambia) Community Engagement & Biodiversity Management Plans – funded by DEG Germany. This project developed a Biodiversity Action Plan for Zambeef's Chiawa Farm in Lower Zambezi, and Stakeholder Engagement Plans (SEPs) for each of Zambeef's five farms around Zambia.
- Project Manager for the development of two solar PV sites (4MW each) in remote areas of eastern Zambia, Petauke and Mfuwe, on behalf of BioTherm Ltd, South Africa.
- Project manager of biological baseline survey and impact assessment for the development of the new Polihali Dam near Mokhotlong, on behalf of the Lesotho Highlands Development Authority (LHDA), Maseru, Lesotho.
- Project Manager for Rapid Site Selection process for determining potential resettlement sites in Palma, northern Mozambique for WorleyParsons (UK) and Anadarko (USA).
- Project manager for IFC PS compliant ESHIA for EcoFarm Organic Sugarcane development project, Chemba, northern Mozambique
- Co-manager on Wind Farm developments for InnoWind Ltd, Eastern Cape, South Africa.
- Project Manager and Principal Consultant; Designed and conducted national Otter survey for Irish Government (Department of the Environment, National Parks and Wildlife Service).

Ecological Impact Assessments and Pre-feasibility Surveys

- Biodiversity Specialist producing specialist reports for an IFC compliant ESHIA for the Bisie Tin Mine Project in North Kivu, DRC, on behalf of Alphamin Resources Corp.
- Faunal Specialist: ESIA for two IFC PS compliant solar PV development sites in eastern Zambia, Petauke and Mfuwe, on behalf of BioTherm Ltd, South Africa.
- Pre-ESHIA survey: full ecological and environmental description and assessment of potential resettlement areas at an oil and gas development near Palma, northern Mozambique; on behalf of WorleyParsons (UK) and Anadarko (USA).
- Ecology and Land Use Specialist for an IFC Performance Standard (PS) (World Bank) compliant ESIA on Palm Oil plantation on Buvuma Island, Lake Victoria, Uganda.
- Ecological assessments and faunal specialist for an IFC PS compliant ESIA at an iron ore mining site in Tete, Mozambique, on behalf of Baobab Resources, Western Australia.
- Ecological specialist for an IFC PS compliant ESHIA for a new organic sugar plantation and beef farm in Chemba, Mozambique following MICOA requirements.
- Ecology Specialist for an IFC PS compliant ESHIA on an Equatorial Palm Oil plantation re-development in Grand Bassa County, Liberia.
- Ecological assessments for various EDF & SSE wind energy developments in UK and Ireland as part of EIA reports.
- Ecological assessments for other renewable energy projects, e.g. MBT and anaerobic digestion plants in UK and Ireland as part of EIA reports.
- Pre-feasibility survey for wind turbines on Sundays River for InnoWind, Eastern Cape, South Africa.

Ecological Constraint Surveys

- Zambian Government compliant (ZEMA) Environmental Project Briefs (EPBs - scoping reports) for solar PV development sites in Zambia.
- Ecological Assessment of Rufunsa Game Management Area, Lower Zambezi, Zambia, to determine hunting and tourism potential.
- Identifying ecological constrains and ecological scoping for the utility companies in UK and Ireland including EDF Energy, SSE, Thames Water, United Utilities.

Ecological Monitoring and Reporting

- Bird and Bat Post-construction monitoring to EWT and Birdlife South Africa best practice standards for InnoWind Wind Ltd. at their Waainek Windfarm, Grahamstown, Eastern Cape
- Development of biodiversity, ecological and natural resource monitoring programmes as part of a Biodiversity Action Plan (BAP) for Chiawa Farm, Lower Zambezi on behalf of Zambeef Products Plc, Lusaka, Zambia.
- On-going ecological terrestrial monitoring of a heavy metals mine project, Kenmare, Nampula Province, Mozambique.
- Baseline ecological survey and biodiversity monitoring of a palm oil plantation, Equatorial Palm Oil, Liberia.
- Monitoring and counting (aerial and driven transects) of large mammals (elephant and hippopotamus) and crocodile numbers in South Luangwa National Park, Zambia for Zambian Wildlife Authority (ZAWA)
- Baseline survey of Otter populations In Ireland
- Bird population counts for WWF, Zambia in the Bangweulu Swamps Zambia.
- Ecological monitoring of projects through project lifecycle, and conducting watching briefs.
- Reporting to Competent Authorities on ecological compliance.
- Monitoring and assessing animal and bird populations before, during and after development projects, e.g. wind farm developments in UK and Ireland.
- Survey and monitoring of animal populations as part of on-going National Park management plans in Ireland, Zambia and Zimbabwe.

Ecological Mitigation and Planning

- Land rehabilitation plan for Kenmare heavy mineral mining project, Mozambique
- Designing mitigation strategies and biodiversity offsets for a palm oil plantation, Equatorial Palm Oil, Liberia.
- Designing mitigation strategies for development projects in UK and Ireland for housing development and renewable energy clients.
- Consulted and advised on the effects of flood prevention schemes on regional and urban Otter populations in Ireland.
- Conducted surveys on and designed mitigation for badgers living in railway embankments in Ireland and UK.
- Working closing with local UK and Irish wildlife groups designing and implementing Biodiversity Action Plans for terrestrial mammals, especially badgers and otters.

Environmental Auditing and Compliance

- Assessment of compliance with IFC Performance Standards 1, 5 and 6 for SilverStreet Capital LLC, UK with regard to a commercial farm in Malawi.
- Development of IFC compliant Biodiversity Action Plans for five beef and crop farms on behalf of Zambeef Products Plc, Zambia.
- Assessment of compliance with RSPO and HCV standards of a palm oil plantation, part of the Vegetable Oil Development Project, Buvuma Island, Lake Victoria, Uganda.

- Sustainability assessment and recommendations for EcoFarm, an organic sugar and beef farm in Chemba, Mozambique.
- IFC Performance Standards deviation assessment for Kalumbila Mining Ltd (First Quantum Mining) Sentinel Deposit copper mining project, North Western Province, Zambia.
- Assessment of compliance with RSPO and HCV standards of a palm oil plantation, Equatorial Palm Oil, Liberia.

Environmental Reviews

- As Principal Consultant and Project Manager, I have reviewed numerous environmental and ecological reports as part of the overall review and quality control process to ensure compliance with all national, international and lender requirements.

RESEARCH & TEACHING EXPERIENCE

I have been involved with a number of field-based and laboratory research projects involving the genetics and distribution of the Eurasian Otter (*Lutra lutra*) in Ireland and Europe. This research has been published in peer-reviewed journals and presented at international workshops on Otter conservation.

I conducted the National Otter Survey of Ireland in fulfillment of the Irish obligation to the EU Habitats Directive. I was responsible for designing and conducting the entire field-based survey including coordinating teams of Irish NPWS rangers who also participated in the survey. This work has been published by the Irish Government.

While based in Luangwa Valley, Zambia I conducted several aerial game counts, particularly for elephant, hippopotamus and crocodile, on behalf of Zambian Wildlife Authority (ZAWA) using fixed-wing aircraft, micro-lights and helicopters.

I have been involved in a number of field-based ecology research projects in the Kruger National Park, South Africa, (monitoring fire initiatives, SAFARI), Hwange National Park, Zimbabwe (part of the elephant culling research team) and in various Irish protected areas researching and monitoring otter and bird population numbers.

While working for Queen's University, Belfast, I was involved in extensive research into Multiple Sclerosis (MS) using advanced genetic investigative techniques; results were published in peer-reviewed journals.

Directorship

From 1999 to 2004, I was a Director of Savannah Trails Plc, Zambia, a safari business based in Lusaka and operating exclusive bush camps in the Luangwa Valley (Kakuli and Mchenja bush camps). I was responsible for the daily operation of the company as well as leading specialist walking safaris in the Luangwa Valley, often in conjunction with Norman Carr Safaris. I also managed and led specialist safaris (notably birding safaris) many other areas of Zambia including North Luangwa, Lower Zambezi, Kafue, West Lunga, and Kasanka National Parks and the Bangweulu Swamps.

During the closed season I was responsible for the business development of the company and participated in marketing events at the World Travel Market in London and promotional events in the USA to further the tourism industry in the country and promote Zambia as an environmentally conscience destination.

CERTIFICATION:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Date: 31st March 2016

APPENDIX E – SPECIALISTS DECLARATION

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Proposed Blanco (Narina)-Droerivier 400kV Transmission Lines & Substation Upgrade

Specialist:	Craig Sholto-Douglas		
Contact person:	Craig Sholto-Douglas		
Postal address:	PO Box 934, Grahamstown		
Postal code:	6140	Cell:	
Telephone:	046 622 2364	Fax:	046 622 6564
E-mail:	c.sholto-douglas@cesnet.co.za		
Professional affiliation(s) (if any)	Zoological Society of Southern Africa (ZSSA), South African Bat Assessment Association (SABAA), BirdLife South Africa		
Project Consultant:	Envirolution Consulting		
Contact person:	Gesan Govender		
Postal address:	PO Box 1898 Sunninghill		
Postal code:	2157	Cell:	0834198905
Telephone:	0861444499	Fax:	0861626222
E-mail:			

4.2 The specialist appointed in terms of the Regulations_

I, Craig Sholto-Douglas, declare that –

General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

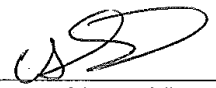
I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

EOH Coastal and Environmental Services

Name of company (if applicable):

23/08/2016

Date:

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEAT/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 718, 2009

PROJECT TITLE

Proposed Blanco (Narina)-Droerivier 400kV Transmission Lines & Substation Upgrade

Specialist:	Michael Bailey		
Contact person:	Michael Bailey		
Postal address:	P O Box 934, Grahamstown		
Postal code:	6140	Cell:	
Telephone:	046 622 2364	Fax:	046 622 6564
E-mail:	m.bailey@cesnet.co.za		
Professional affiliation(s) (if any)	Full member of Chartered Institute of Ecology and Environmental Management (CIEEM)		

Project Consultant:	Envirolution Consulting		
Contact person:	Gesan Govender		
Postal address:	PO Box 1898 Sunninghill		
Postal code:	2157	Cell:	0834198905
Telephone:	0861444499	Fax:	0861626222
E-mail:			

4.2 The specialist appointed in terms of the Regulations_

I, Mike Bailey, declare that –

General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

EOH Coastal and Environmental Services

Name of company (if applicable):

23rd August 2016

Date:

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Proposed Blanco (Narina)-Droerivier 400kV Transmission Lines & Substation Upgrade

Specialist:	EOH Coastal and Environmental Services		
Contact person:	Tarryn Martin		
Postal address:	The Point, Suite 408, 4th Floor, 76 Regent Road, Seapoint		
Postal code:	8001	Cell:	
Telephone:	021 045 0900	Fax:	
E-mail:	T.Martin@cesnet.co.za		
Professional affiliation(s) (if any)	SACNASP and South African Association of Botanists		

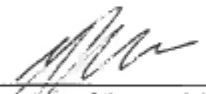
Project Consultant:	Envirolution Consulting		
Contact person:	Gesan Govender		
Postal address:	PO Box 1898 Sunninghill		
Postal code:	2157	Cell:	0834198905
Telephone:	0861444499	Fax:	0861626222
E-mail:			

4.2 The specialist appointed in terms of the Regulations_

I, Tarryn Martin , declare that --

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist

EOH Coastal and Environmental Services

Name of company (if applicable)

23 August 2016

Date

TERMS OF REFERENCE CHECKLIST

Requirements as per the 2014 EIA Regulations EIA REGULATIONS 2014 GNR 982 Appendix 6: CONTENT OF THE SPECIALIST REPORTS		
	Required at EIA Phase	**Cross-reference in your specialist report**
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	**YES**	Appendix E
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Appendix D**	
(c) an indication of the scope of, and the purpose for which, the report was prepared	**Chapter 1**	
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Chapter 1**	
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	**Chapter 1**	
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	**Chapter 2, 3, 4, 5, 6, 7 & 9**	
(g) an identification of any areas to be avoided, including buffers;	**Chapter 9**	
(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	**Chapter 9**	
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Chapter 10**	
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	**Chapter 10**	
(k) any mitigation measures for inclusion in the EMPr	**YES**	