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

UPDATED FAUNAL SPECIALIST REPORT

Prepared for:

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REVISIONS TRACKING TABLE

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Name	Responsibility	Signature	Date
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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; Nxuba WEF Ecological Ground-truthing; Department of Environmental Affairs Quion Point Avifaunal Study; and Metals of Africa and Kenmare Faunal 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, Herpetologist

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).

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 a specialist faunal study for the Gourikwa-Blanco 400kV Power line and Substations upgrade. The study comprised of both a desktop study and a field survey to investigate the potential impact of the proposed powerline and substation upgrades on the faunal communities and species in the area.

The project entails the construction of a 400 kV power line from the Gourikwa Substation at Mossel Bay to the existing Blanco Substation at George for which four alternative routes were assessed. Alternative 1 runs for 57km from the Gourikwa substation in a north-east direction following the Proteus-Droerivier 400kV line to the proposed Narina Transmission Substation. Alternative 2 runs parallel to an existing line south of the first option (Alternative 1). The third option, Alternative 3, is an alternative to Alternative 2 and initially runs east to Hartenbos along an existing line and then joins Alternative 2 on the north side of the Brandwag River. Alternative 4 was later proposed as an additional route option which utilises sections of each of the other three options whereby it follows the route of Alternative 3 to the point where it joins Alternative 2 and follows this route before turning north to join Alternative 1 approximately 20km from the substations at Blanco (Narina).

Five alternative positions for the Narina Transmission Substation 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.

The study provides (i) a general description of the terrestrial vertebrate fauna of the project area and adjacent areas, (ii) a review of the fauna 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 faunal 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 fauna and their associated habitats. The investigation focused on a 1km wide corridor for each of the proposed alternative routes, the proposed Narina substations, as well as the larger project area to incorporate potential alignment changes.

To give insight into the faunal components of the project area, the desktop faunal 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, and Wetlands and Rivers (NFEPA). These were all mapped to spatially reference and relate these areas to the proposed alternative power line routes.

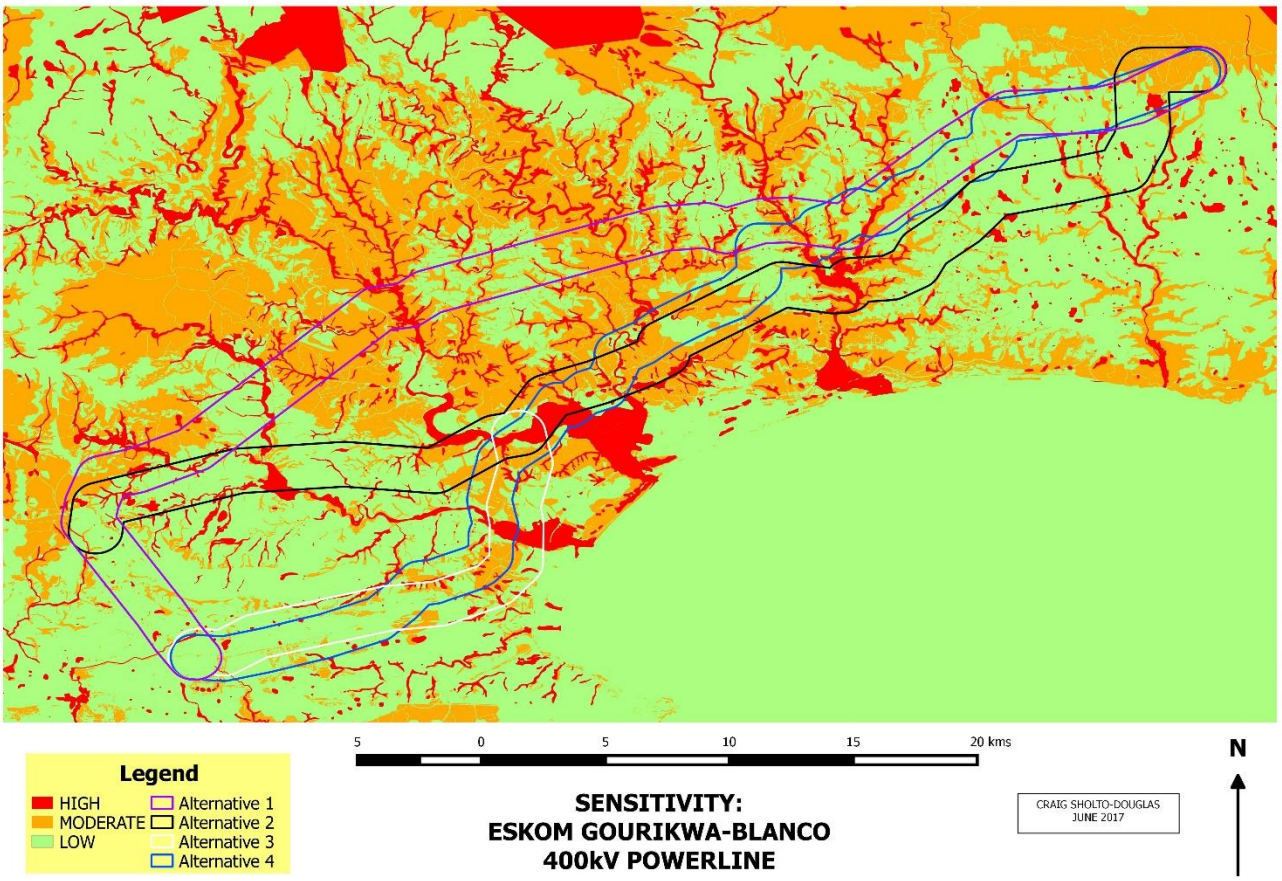
According to historical records, 69 species of reptile, 22 species of frog and toad, and 90 species of mammals have distribution ranges which include or are part of the project area (ADU, 2015; IUCN, 2015). Of the 69 species of reptile, one is listed as Vulnerable on the South African (SA) Red Data List. Three species appear on Appendix II of the Convention on International Trade in Endangered Species (CITES). All lizards and tortoises are listed as a schedule II species on the Provincial Nature Conservation Ordinance (PNCO-1974) lists for the Western Cape Province. The project area contains no Threatened or Protected Species (TOPS) reptilian species as defined and listed on the National Environmental Management: Biodiversity Act (2004).

Of the 22 species of frog and toad likely to occur within the project area, only the Knysna Leaf-Folding Frog (*Afrixalus knysnae*) is listed as Endangered on the SA Red List (ADU, 2015). However, all frogs and toads are listed as Schedule II species on the PNCO list and are therefore protected species that cannot be removed without a permit.

One Endangered, one Protected, and one Vulnerable mammal species have distributions that coincide with the project area and are listed as TOPS species on the National Environmental Management: Biodiversity Act (NEMBA). Additionally, 8 species are listed on the International Union for Conservation of Nature (IUCN) Red Data List under varying statuses.

The study identified the following areas as sensitive from a faunal perspective:

- Process areas such as perennial rivers, pristine wetlands and wetland clusters identified by NFEPA that are important for amphibian habitat and ecosystem functioning;
- Formal Protected Areas and Critical Biodiversity Areas;
- "koppies" or rocky outcrops; and
- Habitats which are likely to provide refuge for faunal SCC based on field surveys and the desktop analysis.



Sensitivity map of the project area

The impacts on terrestrial fauna likely to be caused by the construction and operation of the proposed powerline and substation construction (and associated infrastructure) are summarised below.

Powerline alternatives

Although the impact ratings for the four routes are similar, when using the impact rating scale an assessment of the types of habitats crossed by each of the routes indicates that alternative 1 is likely to have the greatest overall impact on fauna in the area due to i) the number of privately owned game reserves and CBAs which the route will traverse, and ii) the number of pristine perennial rivers and streams along the route. The overall faunal habitat along proposed alternative 1 is in better condition than the other alternatives. Alternative 2 is the preferred alternative from a faunal perspective. Alternative 2 passes through less sensitively defined habitats than alternative 1. An existing powerline traverses certain moderately defined areas along alternative 2 (Botlierskop Game Reserve and Wolwedans Dam) and therefore service road infrastructures are already in place. Alternative 3 is not chosen as the preferred alternative due to the numerous CBAs and pristine wetlands found in the southern section of the route option. Alternative 4 is also not chosen as the preferred route option as it also traverses CBAs and pristine wetlands found in the southern section of the route option, before moving up to sensitively defined areas of route alternative 1 at the foothills of the Outeniqua Mountains.

Gourikwa – Blanco Alternatives

Impact	Without mitigation	With mitigation
Construction Phase		
1. Habitat loss & fragmentation	**35 (Medium)**	**30 (Medium)**
2. Loss of Reptile Diversity	**28 (Low)**	**12 (Low)**
3. Loss of Amphibian Diversity	**28 (Low)**	**12 (Low)**
4. Loss of Mammal Diversity	**21 (Low)**	**14 (Low)**
5. Impact of Noise and Dust	**35 (Medium)**	**20 (Low)**
Operation Phase		
1. Habitat loss & fragmentation	**18 (Low)**	**18 (Low)**
2. Loss of Reptile Diversity	**21 (Low)**	**12 (Low)**
3. Loss of Amphibian Diversity	**16 (Low)**	**12 (Low)**
4. Loss of Mammal Diversity	**8 (Low)**	**8 (Low)**
5. Impact of Noise and Dust	**32 (Medium)**	**18 (Low)**

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 fauna, substation 2 is the preferred 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 route for option 5 will traverse many sensitive habitats parallel to the Outeniqua Mountain 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	**27 (Low)**	**12 (Low)**
2. Substation 4	**33 (Medium)**	**12 (Low)**
3. Substation 5	**39 (Medium)**	**16 (Low)**

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

LIST OF ACRONYMS

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
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
SA	South Africa
SCC:	Species of Special Concern
SKEP:	The Succulent Karoo Ecosystem Programme
STEP:	Sub-tropical Thicket Ecosystem Planning
ToR:	Terms of Reference
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 faunal study for the Gourikwa-Blanco 400kV Powerline and Substations upgrade. The study comprised of both a desktop study and a detailed field survey to investigate the potential impact of the proposed powerline and substation upgrades on the faunal communities and species in the area.

The project entails the construction of a 400 kV power line from the Gourikwa Substation at Mossel Bay to the Blanco Substation at George for which there are three alternative routes which need to be assessed (Figure 1-1). Alternative 1 runs for 57km from the Gourikwa substation in a north-east direction following the Proteus-Droerivier 400Kv line to the proposed Narina Transmission Substation. Alternative 2 runs parallel to an existing line south of the first option (Alternative 1). The third option, Alternative 3, is an alternative to Alternative 2 and initially runs east to Hartenboss along an existing line and then joins Alternative 2 on the north side of the Brandwag River (Figure 1-1).

Following further assessment, a fourth option, Alternative 4 (Figure 1-2), was proposed which utilises sections of each of the other three options whereby it follows the route of Alternative 3 to the point where it joins Alternative 2 and follows this route before turning north to join Alternative 1 approximately 20km from the substation at Blanco.

Five alternative positions for the Narina Transmission Substation 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.

The corridor to be investigated along each of the proposed power lines is 1 km wide. However, the final servitude of the power line will only be 62 m. The desktop investigation focused on a larger area to incorporate potential alignment changes following specialist recommendations during the scoping phase of the EIA. Following desktop findings, , site investigations for the study area were confined to and concentrated on the areas defined as “sensitive” during the scoping exercise.

1.2 Objectives and Terms of Reference

The principal objective of this assignment was to carry out a terrestrial faunal baseline study that assessed environmental/biodiversity impacts associated with the Project and identified 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

A thorough desktop survey was completed by CES in 2015. This included an initial review of all existing relevant documents and information in relation to terrestrial fauna and habitats, (e.g. previous desktop studies or other specialist reports, environmental impact assessment reports, environmental licenses, etc.).

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

- 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 levels of biodiversity, the presence of terrestrial faunal Species of Conservation Concern (SCC), endemic and protected species within the proposed route alternatives, habitat associations of faunal SCC, 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 terrestrial vertebrate fauna in the Project area from the 22nd-27th of July 2016.

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

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

A Faunal Specialist Report (this report) was produced and includes the following;

- The identification and assessment of the significance of potential impacts on fauna 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 animal groups 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 fauna are based on available literature and databases;
- Only reptiles, amphibians, birds and terrestrial mammals have been described in this report;
- Faunal fieldwork consisted of six (6) days of surveying during winter;

- The seasonal timing of the survey is not ideal as many reptiles, amphibians, and mammals 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. It is recommended that an avifaunal walkthrough of the final route option is done prior to construction to determine any sensitive areas that need to be avoided.
- Field surveying concentrated on the areas identified as “sensitive” from the desktop study.

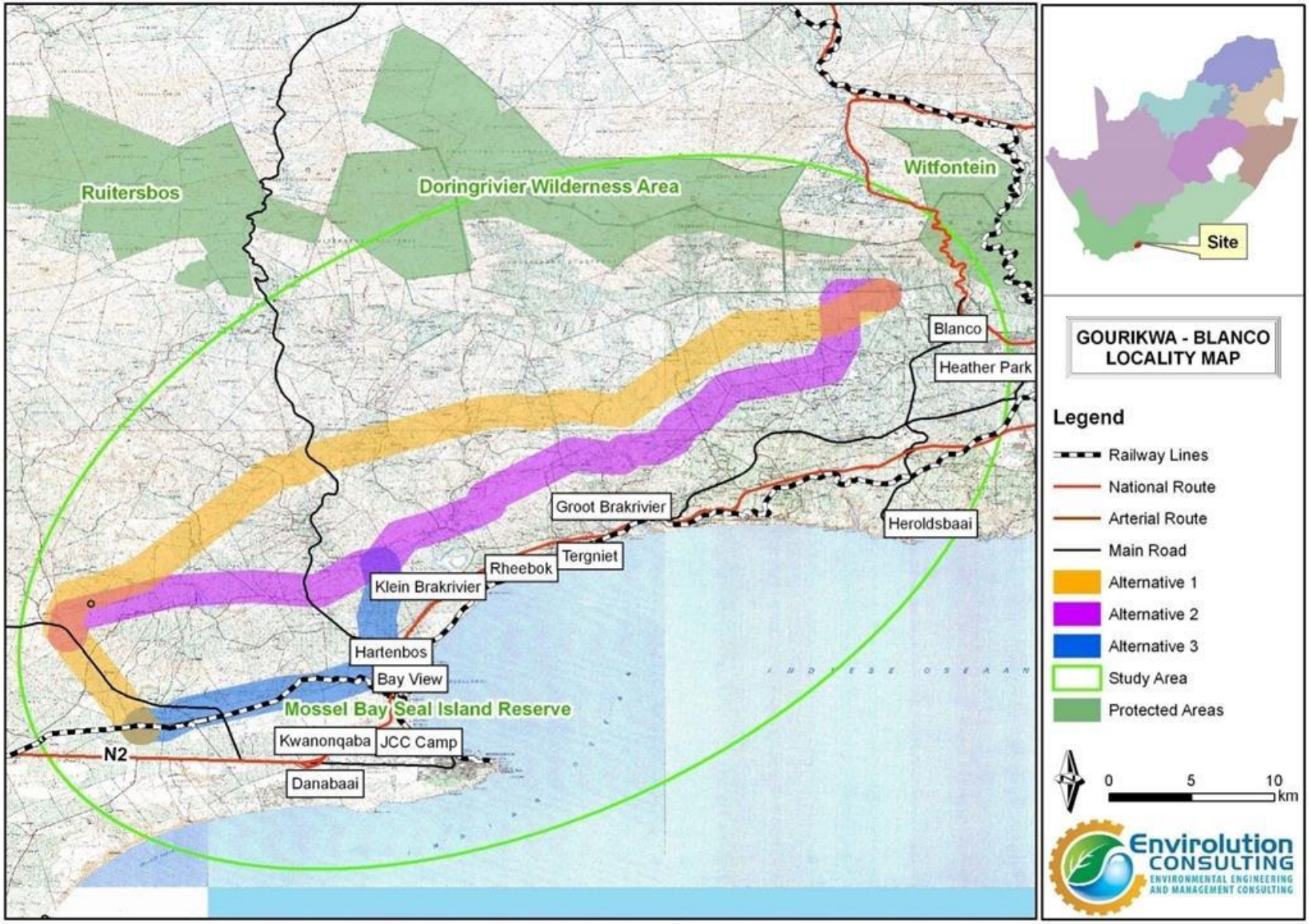


Figure 1-1: Map of the three proposed 400kV power line alternatives and study area from the Gourikwa to Blanco substations

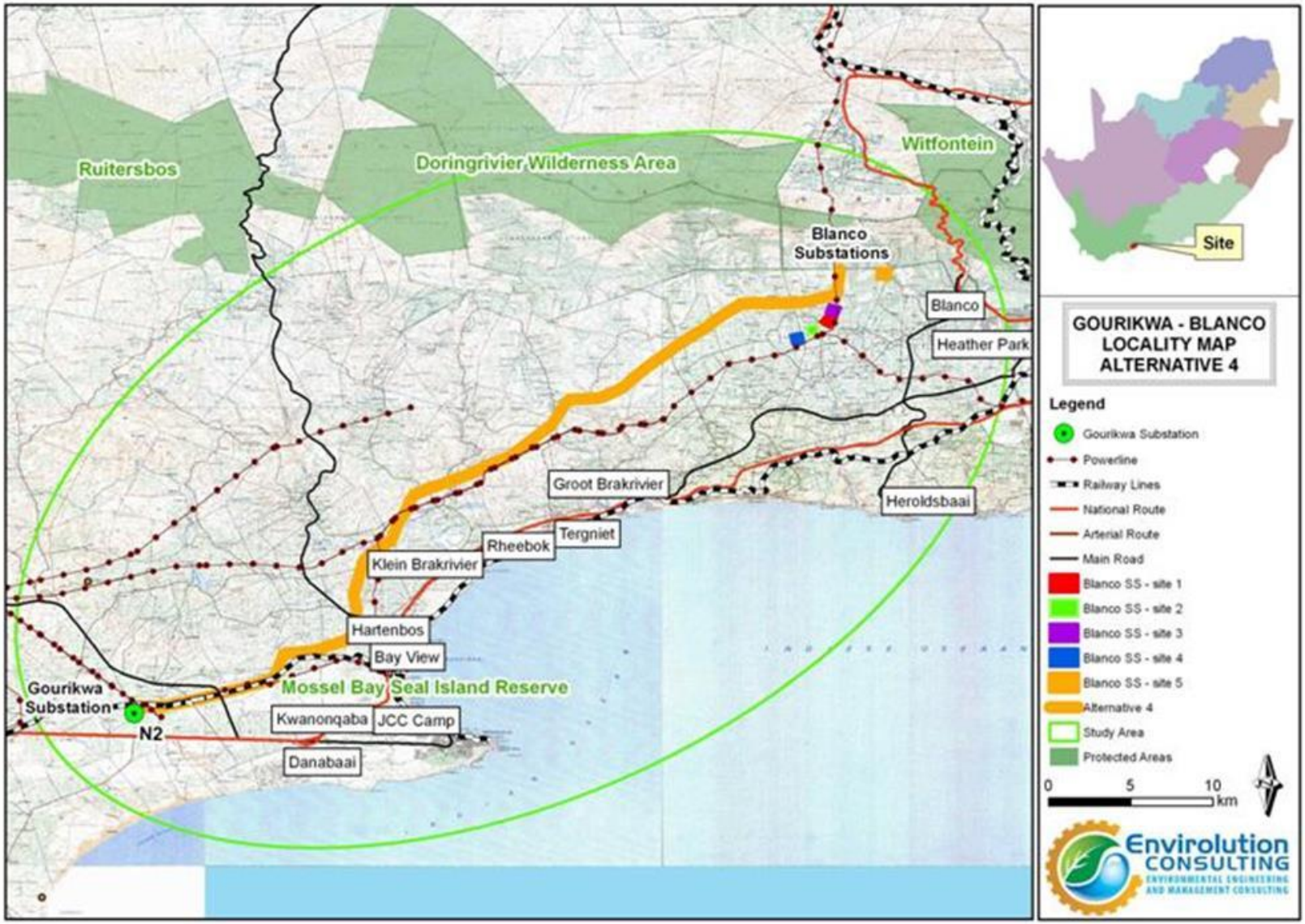


Figure 1-2: Map of the three proposed 400kV power line alternatives and study area from the Gourikwa to Blanco substations

2. APPROACH

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

- Western Cape Biodiversity Sector Plan (WCBSP 2017)
- SANBI vegetation (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.

2.1.1 Protected Areas

Protected and conserved areas are likely to provide habitat refuge for a great diversity and richness of faunal species, as well as maintain ecological functioning. Therefore, these areas have been identified as areas of concern from a faunal perspective. In addition, ecological corridors that support faunal movements have been identified

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.

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. The identification of perennial rivers and healthy wetlands aids in identifying potential preferred habitats and sensitive areas for amphibians.

2.1.4 Faunal Species of the Project Area

A literature review was conducted to establish a list of the terrestrial vertebrate fauna 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:

- Amphibians – Channing (2001), Du Preez & Carruthers (2009), Frost (2014), IUCN (2014), Frog Atlas (Animal Demographic Unit);
- Reptiles – Branch (1998, 2008), Bauer & Branch (2001), Bauer *et al.* (2006a,b), IUCN (2014), Reptile Atlas (Animal Demographic Unit); and
- Mammals – Stuart & Stuart (2001), IUCN (2014), Mammal Atlas (Animal Demographic Unit).

2.1.5 Species of Conservation Concern

Species that are afforded special protection, notably those that are protected by NEMA. Endangered and Protected Fauna in the 1974 Provincial Nature Conservation Ordinance (PNCO), South African Red List of South African (SA Red Data List), 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 (amphibians - du Preez and Carruthers, 2009, Minter et al 2004, Measey 2011; reptiles - Bates et al. 2014, Branch 2014); 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 (amphibians, du Preez & Carruthers, 2009; reptiles, Bates et al 2014; mammals, IUCN 2014; NEMBA (2004), PNCO, 1974).

2.1.6 Field survey

A field survey was carried out by the specialists from the 22nd to the 27th of July 2017. Transects were driven or walked during daylight hours to record all mammal and reptile species encountered during the survey. Herpetological transects were conducted after dark to increase the likelihood of discovering reptile and amphibian species. Habitats pre-defined as having a high faunal sensitivity or known to harbour 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 terrestrial faunal species encountered along the proposed route options.

Areas and habitats surveyed include:

- Gourikwa substation;
- Gondwana Private Game Reserve;
- Hartenbos Game Reserve;
- Hartebeeskuil Dam;
- Klipheuwel Wetland System;
- Wolwedans Dam;
- Grootbrakrivier to Molen Drift Agricultural lands;
- Proposed Narina substation sites; and
- South Facing slopes of the Outeniqua Mountain Range.

Please see sensitivity map (Figure 7-1) for numbers associated to field photographs (Table 7-1) 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.

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 protected area expansion, provides maps of the most important areas for expansion, and makes recommendations on mechanisms these areas. 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 2008 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES (BGIS, 2007).

Figure 3-1 illustrates the Formal Protected and NPAES Areas within the greater project area. None of the four alternatives for the Gourikwa-Blanco power line cross/influence any NPAES or protected areas. However, the Doringrivier Wilderness Area and the Ruitersbos Nature Reserve run parallel to all four proposed alternative routes along the Outeniqua Mountains and are approximately 5 to 10 kilometres from the routes.

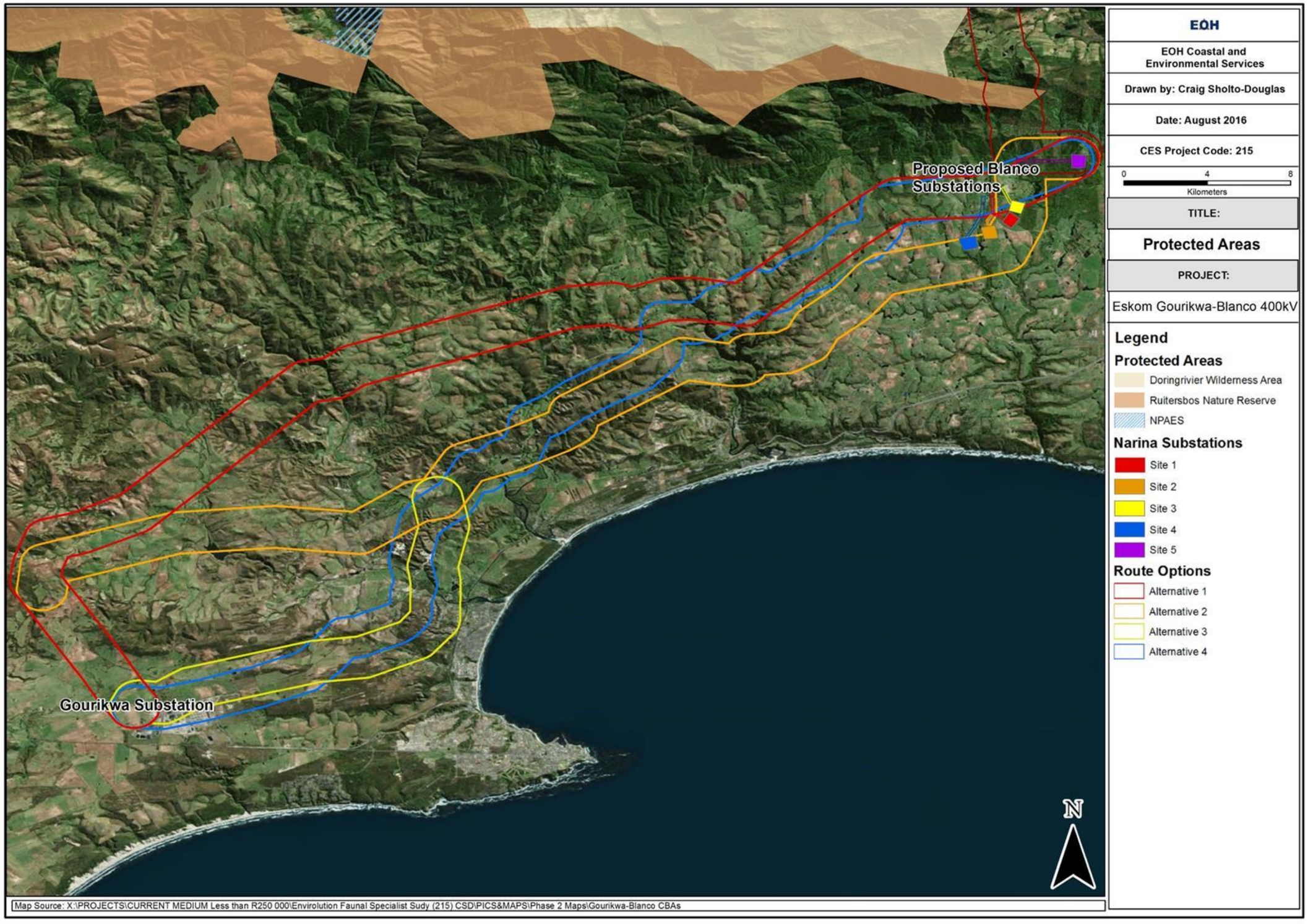


Figure 3-1: Formal Protected and NPAES Areas within the project area

4. CRITICAL BIODIVERSITY AREAS (CBAS)

CBAs incorporate (i) areas that need to be safeguarded in order 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;

- **George** [Vector] 2017.
- **Knysna** [Vector] 2017.
- **Mossel Bay** [Vector] 2017.

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.

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. All four proposed alternative routes from the Gourikwa to Blanco substation cross numerous CBAs and ESAs.

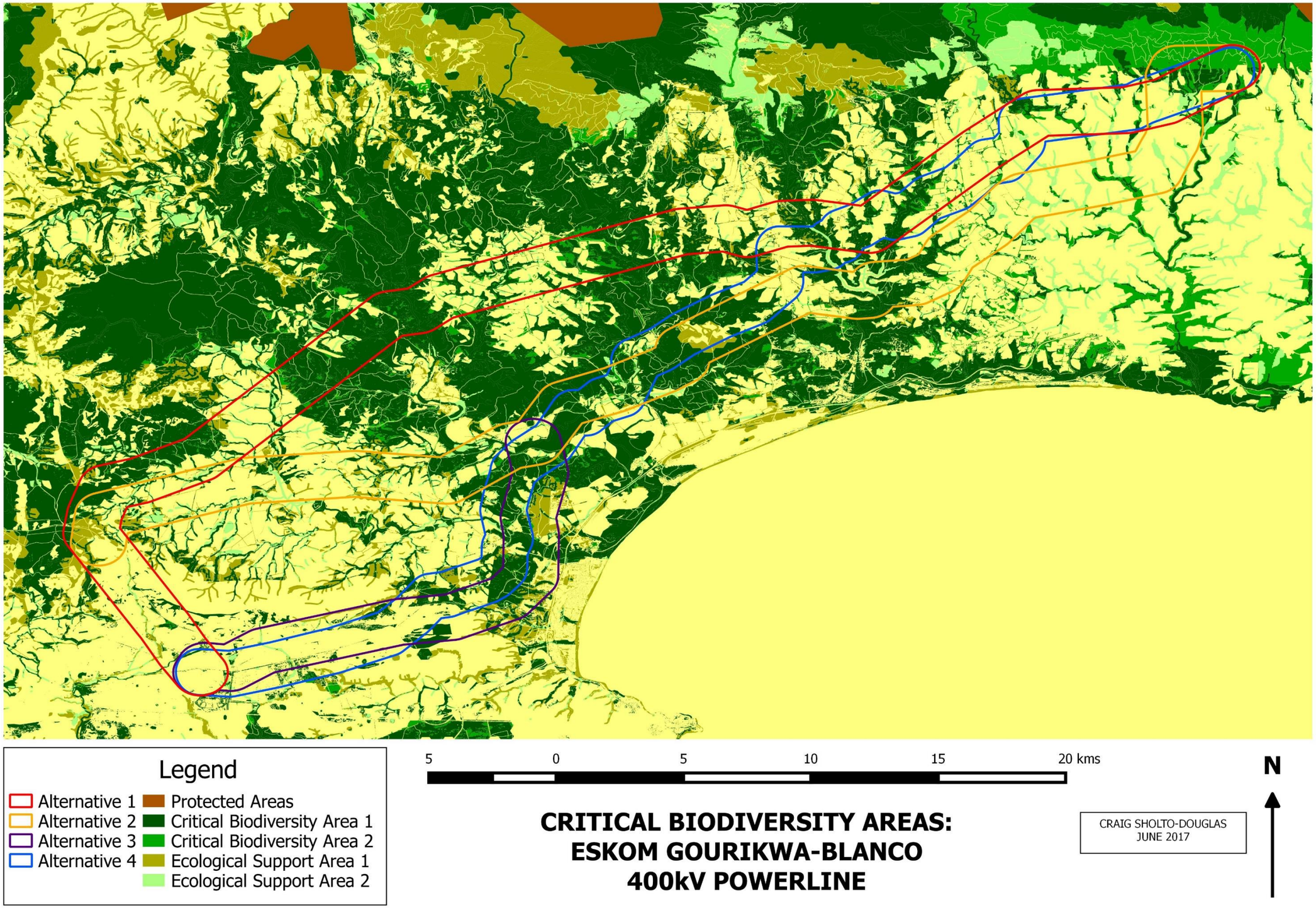


Figure 4-1: Critical Biodiversity Areas within the project area

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 amphibians 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.

Figure 5-1 illustrates these potentially sensitive areas for amphibians. 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 species.

Wetland clusters are groups of wetlands embedded in a relatively natural landscape. This allows for important ecological processes such as migration of frogs between wetlands (BGIS, 2007). In many areas of the country, wetland clusters no longer exist because the surrounding land has become too fragmented by human impacts.

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 an amphibian perspective. The conditions of all wetlands encountered during the field survey was noted and used to determine the classification/sensitivity status necessary to assess the potential impacts on amphibians.

Figure 5-1 also illustrates the perennial rivers which occur within the project area. These areas are also likely to provide habitat for amphibian populations, as well as providing an integrated network for species movement and migration.

Table 5-1 comments on the likelihood of each alternative affecting the various wetlands and rivers, and hence amphibians within the project area.

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

Route	Comment
G-B Alternative 1	This alternative crosses many rivers, wetlands, and wetlands clusters identified by NFEPA. These areas provide habitats suitable for a variety of amphibian species and are vital to maintain ecosystem functioning. Of the three Gourikwa-Blanco alternatives, this one crosses the most perennial rivers due to its proximity to the escarpment. However, these rivers are likely to be fast flowing and less habitable for amphibian species than the lower reaches of the rivers, which would be crossed by the other alternative routes. Alternative 1 will also cross the most natural/pristine wetlands of the alternative routes.
G-B Alternative 2	Alternative 2 will transect more areas identified as wetland clusters than alternative 1. This route will also cross many perennial rivers. Generally, the wetlands classified outside of wetland clusters are in a less natural condition than the other 2 alternatives. However, the Klipheuwel/Grootbrak Wetland System (numbered 5 on the sensitivity map) is a large wetland system which plays a vital role in the functioning of the Grootbrakrivier River System. This system should be avoided.
G-B Alternative 3	This alternative crosses one NFEPA identified wetland clusters and one perennial river. Many of the wetlands in this area are considered degraded. It is more likely that this alternative can avoid pristine wetlands and perennial rivers than the other three alternatives.
G-B Alternative 4	This alternative crosses many rivers, wetlands, and wetlands clusters identified by NFEPA. These areas provide habitats suitable for a variety of amphibian species and are vital to maintain ecosystem functioning. Towards the end of this route it crosses perennial rivers due to its proximity to the escarpment. However, these rivers are likely to be fast flowing and less habitable for amphibian species although it does cross the lower reaches of the rivers when it follows Alternative 1.

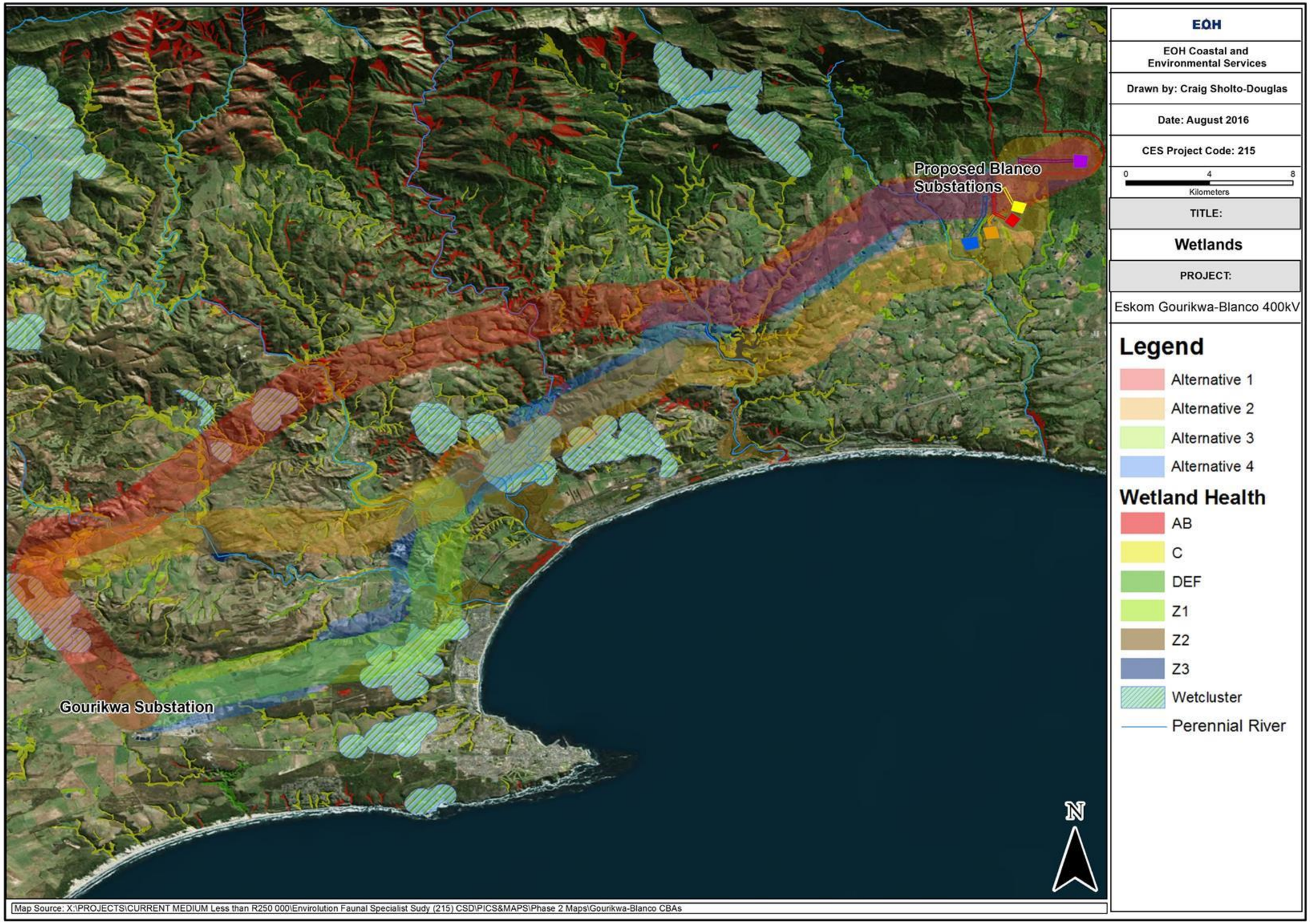


Figure 5-1: NFEPA Wetlands, Wetland Clusters, and Rivers within the project area

6. FAUNAL SPECIES AND HABITATS

6.1 Introduction

The faunal richness of the project area is explained largely by the transitional nature of its location, where western temperate species blend with eastern subtropical ones (Cowling & Peirce, 2009).

Due to the high aridity in the northern parts of the project area, faunal diversity is relatively low, particularly for aquatic species and large herbivores. However, many desert-adapted reptiles are endemic or near-endemic to the region.

Much of the historical large mammal fauna in the region was greatly reduced or even extirpated during the 19th-20th century, although some have subsequently been re-introduced into Private Game Reserves and Protect Parks within the study area.

According to historical records, 69 species of reptile, 22 species of frog and toad, and 90 species of mammals have distribution ranges which include or are part of the project area (ADU, 2015; IUCN, 2015).

6.2 Reptiles

6.2.1 Regional Overview of Reptiles

Reptiles are one of the most diverse and adaptive terrestrial vertebrate groups in the world. However, nineteen percent of all reptile species are currently threatened with extinction (Böhm *et al.* 2013), with the main threats being habitat destruction, invasive alien species and illegal pet trade. The same trends exist for South African reptiles, with 22% being threatened (Branch 2014).

South Africa has one of the highest reptile diversities in the world, and the highest in Africa, with the highest diversity occurring in the more arid parts of the country (Branch, 1998). Of the 435 reptile species recorded from South Africa (Bates *et al*. 2014), the Eastern Cape is home to 133 which include 21 snakes, 27 lizards and eight chelonians (tortoises and turtles). The majority of these are found in Mesic Succulent Thicket and riverine habitats. The Western Cape is home to 142 reptiles which include 42 snakes, 33 lizards and eight Chamaeleonidae (chameleon) species. Most of the Western Cape species are found in Fynbos habitats.

6.2.2 Reptile SCC

Consultation of historical records (Animal Demography Unit Reptile Atlas, IUCN Database) indicates that 69 species of reptiles are likely to have distribution ranges that overlap with the project area. Of these, only one is listed as **Vulnerable**, FitzSimons' Long-tailed Seps (*Tetradactylus fitzsimonsi),* on the SA Red Data List. The Cape Girdled Lizard (*Cordylus cordylus*) appears on both Appendix II of CITES and Schedule II of PNCO. Both Dwarf Chameleon species (*Bradypodion sp.*) are listed on Appendix II of CITES. All lizards and tortoises are listed as a schedule II species on the PNCO list for the Western Province, and will therefore require permits for their removal.

Table 6-1: Reptiles of conservation concern likely to be found within the project area.

Scientific name	Common name	Red list category	CITES	PNCO	Endemic	Recorded during survey
Bradypodion damaranum	Knysna Dwarf Chameleon	Least Concern (SARCA 2014)	**Appendix II**	-	*	✓
Bradypodion gutturale	Little Karoo Dwarf Chameleon	Least Concern (SARCA 2014)	**Appendix II**	-	*	-
Cordylus cordylus	Cape Girdled Lizard	Least Concern (SARCA 2014)	**Appendix II**	**Schedule II**	-	-
Tetradactylus fitzsimonsi	FitzSimon's Long-tailed Seps	**Vulnerable (SARCA 2014)**	-	-	-	-

Fitzsimon's Long-tailed Seps (*Tetradactylus fitzsimonsi)* is a subspecies of *Tetradactylus africanus* which is divided into *T. a. africanus* and *T. a. fitzsimonsi* (IUCN, 2014). *T. a. fitzsimonsi* is listed as Vulnerable due to its patchy, very limited distribution. Recordings of the species confine it to coastal fynbos in the Algoa Bay area, with an isolated population within the project area.

6.2.3 Reptiles recorded during survey

A total of three (3) reptile species (Blue-Spotted Lizard, Knysna Dwarf Chameleon and South African slug eater) were recorded during the survey (see Plate 6-2 below). See Appendix A-1 for a full species list of reptile species which may occur within the project area.

Species: Blue-Spotted lizard (*Ninurta coeruleopunctatus*)

Status: Least Concern, endemic to Eastern and Western Cape provinces with a restricted range. **Schedule II on PNCO.**

Location: North of Molen Drift, George (33°54'42.95"S 22°21'41.44"E). **Found in rocky habitat at proposed Narina Substation 5.**

Species: Knysna Dwarf Chameleon (*Bradypodion damaranum*)

Status: Least Concern, endemic to Eastern and Western Cape provinces with a restricted range. **Appendix II on CITES.**

Location: Molen Drift, George (33°56'44.87"S 22°21'6.40"E). **Found in riparian alien stands within buffer of alternatives 1, 2 and 4** (eastern section of project area).

Species: South African slug-eater (*Duberria lutrix lutrix*)

Status: Least Concern, Widespread. **Schedule II on PNCO**

Location: Found at Wolwedans dam, Wolwedans (33°59'50.07"S 22°12'48.43"E). **Within buffer of alternatives 2 and 4**.

Plate 6-1: Reptile species recorded during survey.

6.3 Amphibians

6.3.1 Regional Overview of Amphibians

Amphibians are an important and often neglected component of terrestrial vertebrate faunas. Currently amphibians are of increasing scientific concern as global reports of declining amphibian populations continue to appear (Phillips 1994; Frost 2012). Although there is no consensus on a single cause for this phenomenon, there is general agreement that the declines in many areas, even in pristine protected parks, are significant and do not represent simple cyclic events (Brand, 2015). Climate, centres of origin and range restrictions are the three main factors that determine species distribution.

Frogs have been aptly called bio-indicator species, whose abundance and diversity is a poignant reflection of the general health and well-being of aquatic ecosystems (Branch, 2015). They are important components of wetland systems, particularly ephemeral systems from which fish are either excluded or are of minor importance. In these habitats, they are dominant predators of invertebrates.

Amphibians are well represented in sub-Saharan Africa, from which approximately 600 species have been recorded (Frost 2014). Southern Africa has a rich diversity of amphibians, comprising 160 species (Du Preez & Carruthers 2009). The eastern coast of South Africa has the highest amphibian diversity and endemicity in the country (Alexander and Marais, 2010).

6.3.2 Frog SCC

According to historical records, 22 species of frog and toad are likely to occur in the project area (see Appendix A-2 for full species list). Of these 22 species, only the **Endangered** Knysna Leaf-Folding Frog (*Afrixalus knysnae*) is listed on the SA Red List (ADU, 2015). However, all frogs and toads are listed as Schedule II species on the PNCO list and will therefore require permits for their removal.

The ***Knysna Leaf-Folding Frog*** (*Afrixalus knysnae*) is listed as **Endangered**, as its Extent of Occurrence is restricted to 1,756 km², its distribution is severely fragmented, and the quality of its habitat, area of occupancy, number of locations and number of mature individuals is continually declining (IUCN, 2014).

According to the IUCN Database (2014), the Knysna Leaf-Folding Frog ranks amongst the species highest in the need for conservation orientated research within South African threatened frogs. Furthermore, IUCN highlights the need to identify management areas, describe breeding phenology and to identify direct threats to the species. According to IUCN (2014), the Area of Occupancy of the species needs to be calculated as well as an assessment of the health of all known sites.

The Knysna Leaf-Folding Frog lives in a coastal mosaic of vegetation types, including mountain fynbos heathland, and forest. It breeds in small dams and shallow semi-permanent water with much emergent vegetation and even in well vegetated ornamental garden ponds (IUCN, 2015).

The field survey discovered most of the preferred habitat types of the species were located at the foothills of the Outeniqua Mountain Range. Therefore, the species is most likely to be encountered along route option 1.

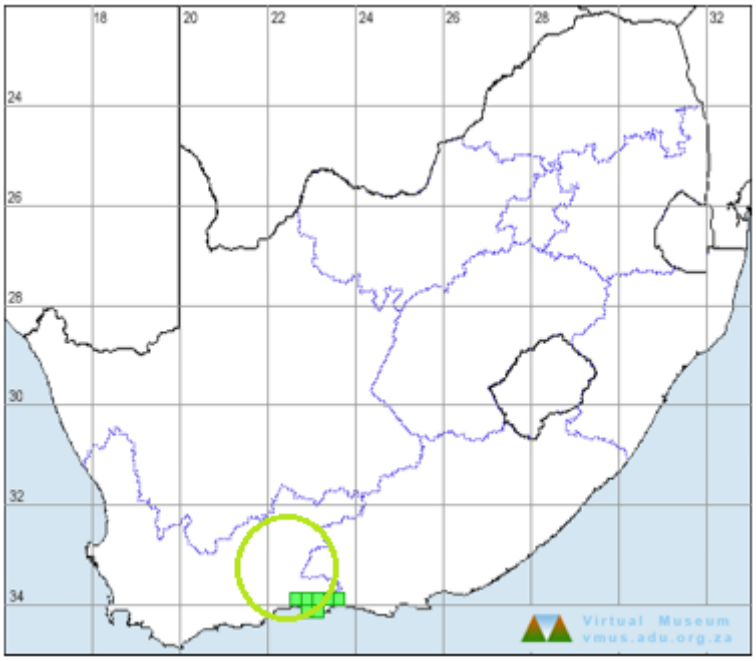


Plate 6-2: Distribution of the Knysna Leaf-Folding Frog (*Afrixalus knysnae*)
(http://vmus.adu.org.za/vm_sp_summary.php)

6.3.3 Amphibians recorded during survey

Four (4) species of amphibians were recorded during the survey. All species of frog and toad appear on Schedule II of the PNCO. Images and the conservation status of all species encountered during the field survey can be found below in Plate 6-3.

Species: Cape river frog (*Amietia fuscigula*)

Status: Least Concern, Widespread

Location: North of Molen Drift, George (33°54'42.95"S 22°21'41.44"E)

Species: Clicking Stream Frog (*Strongylopis grayii*)

Status: Least Concern, Widespread

Location: Molen Drift, George (33°56'39.34"S 22°21'10.05"E)

Species: Boettger's Caco (*Cacosternum boettgeri*)

Status: Least Concern, Widespread

Location: Wolwedans dam, Wolwedans, (34° 0'35.70"S 22°13'2.78"E)

Species: Raucous Toad (*Amietophrynus rangeri*)

Status: Least Concern, Widespread

Location: Wolwedans dam, Wolwedans, (34° 0'35.70"S 22°13'2.78"E)

Plate 6-3: Amphibian species recorded during the survey.

6.4 Mammals

Large game makes up less than 15% of the mammal species in South Africa and a much smaller percentage in numbers and biomass. In developed and farming areas, this percentage is greatly reduced, with the vast majority of mammals present being small or medium-sized. The variation in vegetation and habitat types would provide suitable conditions for many small mammals such rodents, monkeys and small predatory mammals. According to historical records, 90 mammal species have distribution ranges that coincide with the project area (IUCN, 2014; ADU, 2014).

6.4.1 Mammal SCC

One **Endangered**, one **Protected**, and one **Vulnerable** mammal species have distributions that coincide with the project area and are listed on National Environmental Management: Biodiversity Act (NEMBA). NEMBA identifies species that have a high conservation value or national importance that require national protection (DEAT 2007). Additionally, 6 species are listed on the IUCN Red Data List under varying statuses (Table 6-2). For a full list of mammal species with distributions which include the project area, please see appendix A-3.

Table 6-2: Mammals of conservation concern likely to be found within the project area.

Scientific Name	Common Name	IUCN	NEMBA	CITES	PNCO
Amblysomus corriae	Fynbos Golden Mole	**NT**	-	-	-
Ceratotherium simum	White Rhinoceros	**NT**	-	Appendix II	Schedule 1
Chlorotalpa duthieae	Duthie's Golden Mole	**VU**	-	-	-
Diceros bicornis	Black Rhinoceros	**CR**	**Endangered**	Appendix I	Schedule 1
Hyaena brunnea	Brown Hyaena	**NT**	-	-	Schedule II
Mellivora capensis	Honey Badger	**-**	**Protected**	-	Schedule II
Myosorex longicaudatus	Long-tailed Forest Shrew	**VU**	-	-	Schedule II
Mystromys albicaudatus	White-tailed mouse	**EN**	-	-	-
Panthera pardus	Leopard	**NT**	**Vulnerable**	Appendix I	Schedule II

Although the Honey Badger (*Mellivora capensis*) is not protected by IUCN, it is a protected by NEMBA within South Africa due to threats from habitat loss and hunting pressures. The project is unlikely to significantly influence the species as it is found in a wide range of habitats and altitudinal tolerances. Honey Badgers are opportunistic, generalized carnivores, and feed on a range of prey items varying in size from small insect larvae to the young of ungulates. Honey badgers are likely to be found in numerous habitats found within the project area.

The vulnerable White Rhinoceros (*Ceratotherium simum*), and Critically Endangered Black Rhinoceros (*Diceros bicornis*) are both likely to occur within the project area according to historical records and current species distribution spatial tools. However, due to the current state of poaching within South Africa these species will only be found within protected areas and game reserves where they can be monitored. No free roaming rhinoceros species are expected to be found within the project area.

The Brown Hyaena (*Hyaena brunnea*) is an endemic, widespread species within southern Africa, except for a marginal extension into the arid parts of south-western Angola. In recent years the species has been recorded in Gansbaai and Bredasdorp in the Western Cape, suggesting that the

species could also be found in the project area. It is believed that the Brown Hyaena is recolonizing areas following the historical removal of the species in the area due to hunting (Hofer and Mills 1998a). It is found in dry areas along the coast, semi-desert, open scrub and open woodland savanna, favouring rocky, mountainous areas with cover (IUCN, 2014) having the ability to survive close to urban areas. Brown Hyaena are mainly scavengers, but supplement their diets with wild fruits, insects, birds' eggs and the occasional small animal which is killed; their impact on domestic livestock is usually small (Mills 1998; in press). However, outside protected areas, the Brown Hyaena may come into conflict with humans, and they are often shot, poisoned, trapped and hunted with dogs in predator eradication or control programmes, or inadvertently killed in non-selective control programmes (Mills 1998). Although the project area has many habitats suitable for the species, due to historical events described it is unlikely to find an abundance of this species within the project area. It is possible that individuals may visit the project area on occasion.

Leopards (*Panthera pardus*) have habitat tolerances including mountain habitats, coastal scrub, shrubland, semi-desert and desert (IUCN), all of which are found within the project area. Included in their diets are more than 90 species of sub-Saharan Africa fauna, ranging from arthropods to large antelope (Ray *et al.*, 2005). The distribution range of the species is becoming patchy due to predatory control programmes as well as habitat loss. Leopards have been found to occur within the project area, especially in the foothills of the Outeniqua Mountain Range.

6.4.2 Mammals of SCC which have distributions which are restricted to the project area and surrounding habitats.

The Fynbos Golden Mole (*Amblysomus corriae*) is endemic to South Africa. Its natural habitats are fynbos, Mediterranean shrubland vegetation, temperate forests, subtropical or tropical moist lowland forests, moist savanna, temperate shrubland, temperate grassland, subtropical or tropical dry lowland grassland, sandy shores, arable land, pasture land, plantations, rural gardens, urban areas, and introduced vegetation (IUCN, 2104). This species is close to qualifying for Vulnerable (under criterion B), as it is known from a restricted area (only 15 localities, less than 25,000 km²), including areas within the project area. Habitat alteration and loss has occurred historically throughout the range of this species, as a result of agriculture, forestry and urbanization, but it seems to adapt well to transformed habitats providing that the intensity of disturbance is not too intense (IUCN, 2014). Along the eastern coast of the Western Cape, however, tourism developments and increasingly intensive agricultural practices could lead to fragmentation and the isolation of some populations (IUCN, 2014). It is highly likely that the species will occur within the project area. Based on the habitats surveyed during the site visit and the sporadic records of the species, the Fynbos Golden Mole may be found along all of the route options.

The Long-Tailed Forest Shrew's (*Myosorex longicaudatus*) natural habitats are Mediterranean-type shrubby vegetation and swamps (IUCN, 2014). It is found in forests, forests edges, fynbos and boggy grassland as the species requires a moist microhabitat. These habitats are found within the project area. It is listed as Vulnerable because its area of occupancy is less than 2,000 km², its distribution is severely fragmented, and there is continuing decline projected in the extent and quality of its habitat (IUCN, 2014). It is restricted to pristine primary habitat that has not been degraded. Populations of *M. longicaudatus* have been found within the proposed project area. The species is most likely to be encountered along alternative 1 due to the proximity to natural forest habitats.

Duthie's Golden Mole (*Chlorotalpa duthieae*) is an endemic resident, with natural habitats including subtropical or tropical moist lowland forests, moist savanna, temperate grassland, arable land, pastureland, plantations, rural gardens, urban areas, and introduced vegetation (IUCN, 2104). The species is known from only six localities, and the maximum range area is less than 5,000 km² (IUCN, 2014). Although it occurs in several protected areas within the project area, populations outside these areas are threatened by habitat loss mainly due to coastal housing and tourism developments (IUCN, 2014). Hence, the Duthie's Golden Mole is listed as Vulnerable. Duthie's Golden Mole is likely to be encountered along all of the proposed alternative powerline routes.

6.4.3 Mammals recorded during survey

Seventeen (17) mammal species were recorded during the survey. Mammal species were identified by: i) direct observation, ii) scat/pellet identification, iii) identification of tracks (*spoor*). One SCC was recorded, namely the White Rhinoceros (*Ceratotherium simum*), which was observed in a private reserve (which will remain disclosed). See Annexure A-3 for a full species list.

Plate 6- 4: Sable Antelope (*Hippotragus niger*)

Numerous 'exotic' species such as the Sable Antelope (*Hippotragus niger*) seen above have been introduced into the area following the boom in rare game breeding. As many areas throughout the project area have been fenced off by private game farmers, more and more non-native mammal species are being introduced into the project area.

From a mammalian perspective the majority of these species discussed are highly mobile and are unlikely to be impacted on directly or significantly by the proposed powerline development. However, for less mobile species such as the Fynbos Golden Mole (*Amblysomus corriae*), the Long-Tailed Forest Shrew's (*Myosorex longicaudatus*), and Duthie's Golden Mole (*Chlorotalpa duthieae*), impacts are likely to be more significant during the construction phase.

7. SENSITIVITY

7.1 Site sensitivity

The sensitivity map illustrated below (Figure 7-1) was developed using available spatial planning tools (e.g. NFEPA, Protected Areas, CBAs, etc), distribution ranges of SCC, process areas such as perennial rivers and pristine wetlands, and specialist ecological 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 (unless recommendations and mitigation measures are implemented) include:

- **Riparian areas** highlighted in red on the sensitivity map
- **Brandwagrivier Wetland System** (number 5 on the map)

Identified areas of **high sensitivity** include:

- Process areas such as perennial rivers, pristine wetlands and wetland clusters identified by NFEPA that are important for amphibian habitat and ecosystem functioning; and
- Formal Protected Areas.

Areas of **medium sensitivity** include:

- Wetlands according to NFEPA which are not pristine;
- Critical Biodiversity Areas; and
- Non-perennial 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 that are unlikely to harbour any SCC.

A faunal sensitivity map has been created to illustrate areas of high, medium and low sensitivity (Figure 8-1). 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 8-1 below.**

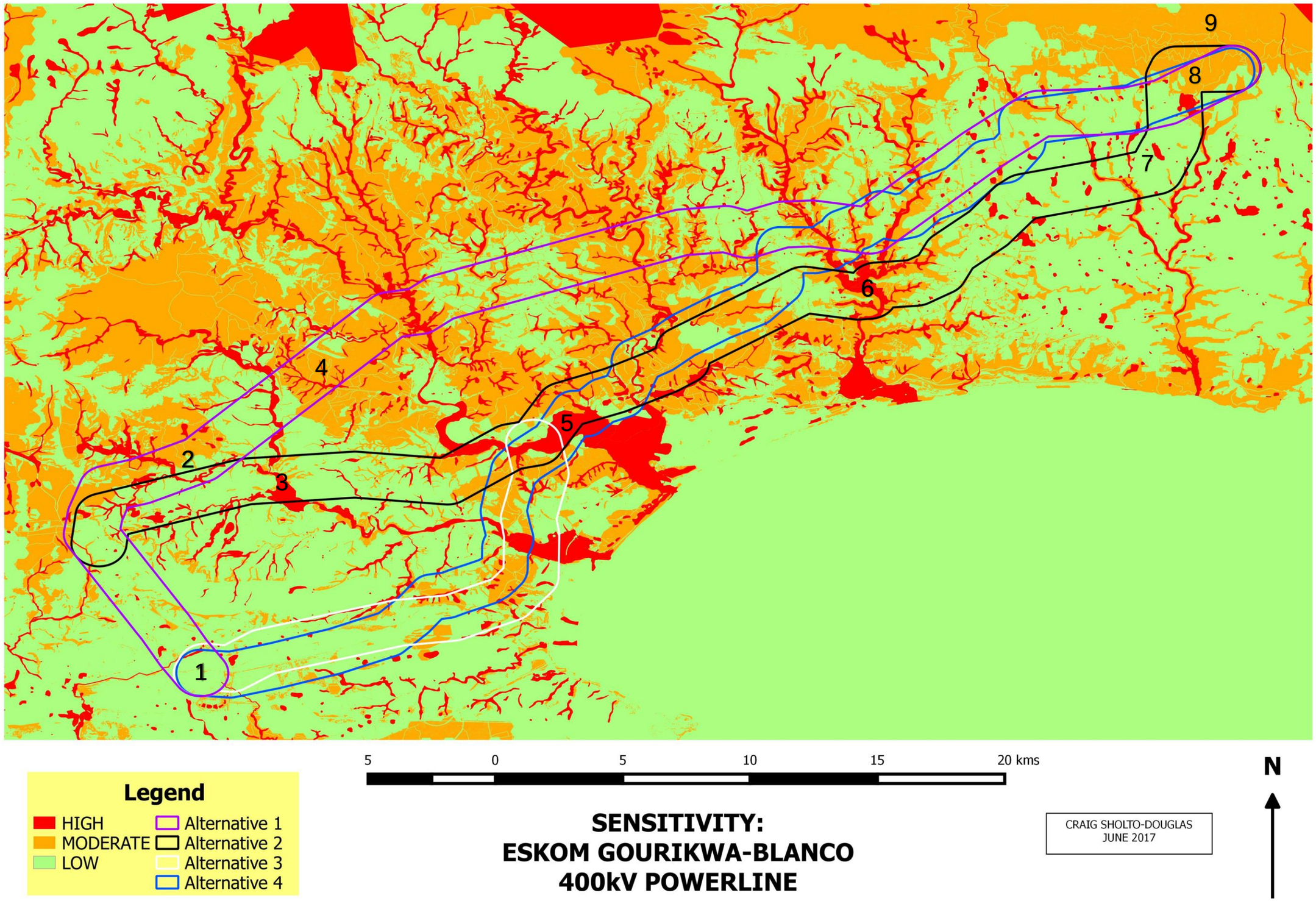
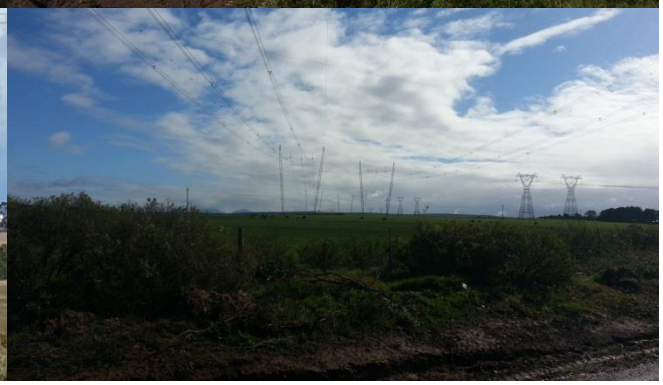


Figure 7-1: Sensitivity map of the project area

1. Gourikwa Substation



2. Gondwana Private Game Reserve

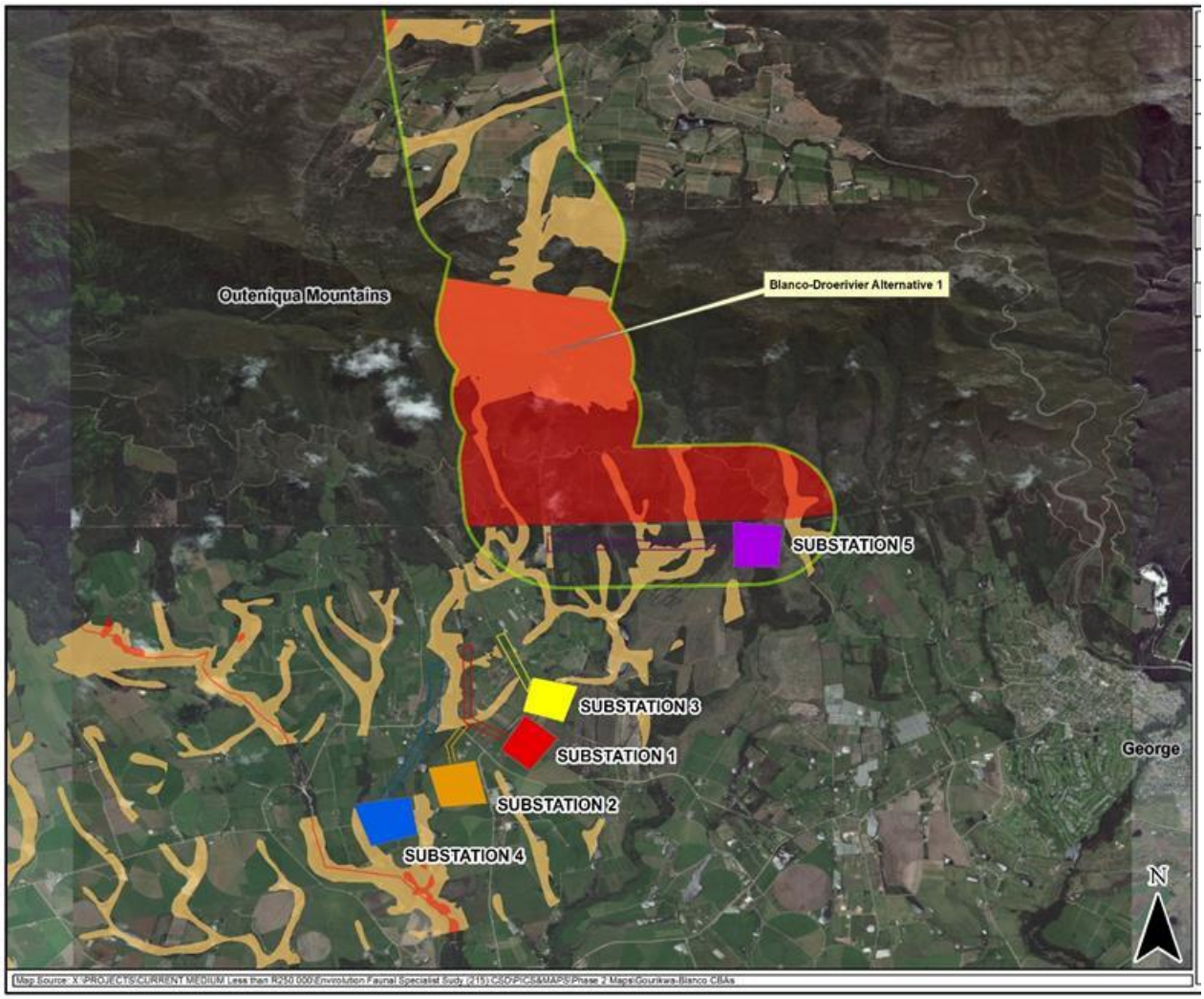

3. Hartebeeskruil Dam


4. Hartenbos Game Reserve

5. Brandwagrivier Wetland cluster

6. Wolwedans Dam

7. Narina Substations



Narina Substation 1

Narina Substation 2

Narina Substation 3

Narina Substation 4

8. Narina Substation 5

9. Outeniqua Mountains

Plate 7-1: Images associated to the numbers illustrated in Figure 7-1.

8. KEY FAUNAL ISSUES AND IMPACT STATEMENT

8.1 Introduction

This chapter details the faunal 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, 2, 3 or 4 will include:

1. Habitat loss and fragmentation
2. Loss of Reptile Diversity
3. Loss of Amphibian Diversity
4. Loss of Mammal Diversity
5. Impact of Dust and Noise

8.2 Alternatives – Power line routes which run between Gourikwa and the proposed Blanco substations

Nature: 1 – Habitat loss and fragmentation

Construction: There will be some loss of faunal habitats 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. This is usually a loss of vegetation (plant communities) that supply food or shelter, but may include abiotic features such as the loss of temporary wetlands, caves or a rocky outcrop.

All routes will pass through numerous private game reserves (Gondwana, Hertenbos, Nyaru, Botlierskop) and CBAs at certain sections of the respective routes. The survey found that alternative 1 will pass through the most 'intact' habitats of all of the proposed route options. Alternative 1 is also the closest route to the Outeniqua Mountains IBA. Various pristine rivers and drainage lines fed by the Outeniqua Mountains will need to be traversed along this route option. Construction of pylon hardstands and road infrastructures through these habitats could have a significant impact on species populations which are already fragmented by numerous game fences and existing powerline. Habitat loss and fragmentation will definitely occur for all 4 route options

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.

The creation of new roads may provide access to previously inaccessible areas which may increase poaching rates or natural resource use.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	5 - Definite (regardless of measures to prevent)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to local area	1 - Limited to the site
Magnitude	4 – Low , with slight impact on processes	4 - Low , with slight impact on processes
Significance	**35 (Medium)**	**30 (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 possible access/service roads and pylon bases should be planned and constructed to avoid being located in highly sensitive areas (e.g. wetlands and rivers) or areas which have been described as valuable habitats for protected faunal species.

Where access roads and/or pylon bases do need to be located within any of highly sensitive areas identified above then there should be further ground-truthing to determine exact road routes and pylon base locations to avoid site specific sensitive areas.

Rivers and drainage lines areas should be treated as **"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 must 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.

Maintain habitat connectivity, via habitat corridors.

Operation Phase: Clearing of vegetation for maintenance of the servitude should be kept to the authorised servitude of 62m

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

Cumulative impacts: The erection of addition power lines will further increase the chances of bird collisions in the area.

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

Nature: 2 - Loss of Reptile Diversity.

Construction: There is the potential for some reptile species to be disturbed and possibly killed by the construction activities where service/access roads and pylon bases impact reptile habitats. The highest abundance of reptiles is likely to be found along alternative 1 due to the amount of forest and taller vegetation types found along this route. The highest abundance of the highly endemic Knysna Dwarf Chameleon is also likely to be found along Alternative 1. The vulnerable FitzSimon's Long-tailed Seps (*Tetradactylus fitzsimonsi*) may be encountered along any of the proposed route options due to the widespread presence of the species preferred habitats.

Operation: There will be a continued risk to reptiles as a result of road kills on the service/access roads.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to local area	1 - Limited to the site
Magnitude	4 - Low , with slight impact on processes	2 – Minor or no impact on processes
Significance	**28 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	3 - Probable (distinct possibility)	2 - Improbable (low likelihood)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	2 - Limited to local area	1 - Limited to the site
Magnitude	0 - Small or no effect	0 - Small or no effect
Significance	**21 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation: All lizards and tortoises are listed as a Schedule II species on the PNCO list for the Western Province, and it is therefore illegal for any construction staff to remove them. It will be difficult to avoid all areas where reptiles may exist but it is recommended that construction staff are educated with regard to reptile conservation and ensure that any reptiles encountered are not killed. Any reptiles encountered should be allowed to move away from the area but any that do need to be moved should be done so in accordance with local legislation.

No reptiles will be allowed to be removed from site.

A rescue plan should be developed for reptiles which could fall into construction pits.

Avoid the construction of pylon hardstand on rocky outcrops.

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 reptiles being killed on the project roads. 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. Access to all access/service roads should be limited by having locked gates. It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.
Cumulative impacts: Any new service/access roads will add to the chances of reptiles being killed on the roads so driving habits and times should be closely adhered to.
Residual Risks: Service/access roads will remain a risk to reptiles and speed restrictions for project vehicles should be maintained to reduce risks of road kills.

Nature: 3 - Loss of Amphibian Diversity.

Construction: There is the potential for some amphibian species to be disturbed and possibly killed by the construction activities where service/access roads and pylon bases impact amphibian habitats. The majority of amphibians are associated with wetland and/or river habitats which are abundant along all of the proposed route alternatives. Alternative 1 has the most pristine watercourses of all the route options. The Endangered Knysna Leaf-Folding Frog (*Afrixalus knysnae*) inhabits a coastal mosaic of vegetation types, including mountain fynbos heathland, and forest. These vegetation types are most abundant along alternative route option 1.

Operation: There should be fewer chances of additional loss of amphibian diversity once operational although the use of service/access roads may cause some amphibians to be killed, and pollution of wetlands and/or rivers may affect amphibian populations.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	4 - Highly Probable (most likely)	3 - Probable (distinct possibility)
Duration	1 - Very Short Duration (0 -1 year)	1 - Very Short Duration (0 -1 year)
Extent	2 - Limited to local area	1 - Limited to the site
Magnitude	4 - Low , with slight impact on processes	2 – Minor or no impact on processes
Significance	**28 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative
Operation Phase		
Probability	2 - Improbable (low likelihood)	2 - Improbable (low likelihood)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	1 - Limited to the site	1 - Limited to the site
Magnitude	2 – Minor or no impact on processes	0 - Small or no effect

Significance	**16 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation: All frogs and toads are listed as schedule 2 species on the PNCO list and it is therefore illegal to remove them.

Where possible pylon bases should not be located in sensitive areas or areas which have been described as valuable habitats for protected amphibian species (e.g. all aquatic habitats).

In the event that amphibians are encountered during construction works, all construction staff should be educated with regard to amphibian conservation to ensure that they are not killed. Any amphibians encountered should be allowed to move away from the area or moved to an area within the same catchment where they will not be disturbed.

No amphibians will be allowed to be removed from site

Avoid the construction of pylon hardstand in wetland areas.

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 amphibians 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.

Vehicles should be well maintained so as not to leak oils and fuels which may pollute nearby wetlands or waterways.

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.

Wherever possible existing service/access roads should be used.

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

It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.

Cumulative impacts: Any new service/access roads will add to the chances of amphibians being killed on the roads so driving habits and times should be closely adhered to.

Residual Risks: Service/access roads will remain a risk to amphibian diversity and speed restrictions for project vehicles should be maintained to reduce risks of road kills.

Nature: 4 - Loss of Mammal Diversity.

Construction: There is a possibility that some mammal species may be impacted as a result of the clearing of vegetation for service/access roads and the construction of pylon bases. Nocturnal mammal species may be killed on the roads if there is an increase in the number of project vehicles using roads at night. The golden moles, which live underground, are likely to be impacted on the most during the construction phase if the powerline crosses through areas inhabited by them.

Operation: There should be few chances of additional loss of mammal diversity once operational although the use of service/access roads may cause some mammals to be killed. The creation of new roads may provide access to new areas which may increase poaching of some mammal species.

	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	1 – Very Improbable	1 – Very Improbable
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	1 - Limited to the local area	1 - Limited to the local area
Magnitude	2 - Minor or no impact on processes	2 - Minor or no impact on processes
Significance	**8 (Low)**	**8 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	YES	-

Mitigation: The proposed route options traverse extensive areas of land which contain numerous large and small mammal species. Most of these, including almost all of the SCC species listed above will tend to avoid areas disturbed during the construction phase. However, there is the possibility that other smaller and more fossorial mammal SCC species such as the Fynbos Golden Mole (*Amblysomus corriae*) and Duthie's Golden Mole (*Chlorotalpa duthieae*) may be unearthed during construction. In this event all construction staff should be educated with regard to mammal conservation to ensure they are not killed and any mammals encountered should be allowed to move away from the area or carefully moved to an area outside of the project activities.

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.

Wherever possible existing service/access roads should be used.

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

It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.

Cumulative impacts: The erection of numerous pylons can provide additional perching sites which raptor can use to spot small prey mammals. This may lead to higher predation rates in

areas where there were previously few perching sites.

Residual Risks: Service/access roads will remain a risk to mammal diversity and speed restrictions for project vehicles should be maintained to reduce risks of road kills.

Nature: 5 - Impact of Dust and Noise.

Construction: The impacts of noise and dust are likely to result from the construction of the various components of the power lines. Roads especially are known to alter physical characteristics of the environment and it is likely that all species may be affected to some extent, the faunal group most likely to be impacted by the increase in dust and noise levels is amphibians. Increased dust levels can cover wetland areas and inhibit amphibian's ability to feed and breed.

Construction and associated vehicle traffic will create noise pollution that can depress local populations of sensitive faunal groups. Animals differ in the degree to which they tolerate such disturbance, and can be expected to have potentially negative and positive impacts on various faunal groups. Increased noise and motor vibrations in wetlands may also impact amphibian breeding choruses, but these impacts will be localised and many amphibian species are surprisingly tolerant of vehicle noise. Noise pollution will occur during all phases (construction, operational, and de-commissioning/closure). Little mitigation is possible.

Operation: While the number of vehicles using the service/access roads during the operation phase will be greatly reduced they will still create dust and noise which could impact faunal populations in the area.

	Without mitigation	**With mitigation**
Construction Phase		
Probability	5 - Definite (regardless of measures to prevent)	4 - Highly Probable (most likely)
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)**	**20 (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	1 - Limited to site	1 - Limited to site
Magnitude	2 - Minor or no impact on processes	0 - Small or no effect
Significance	**32 (Medium)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of	Low	Low

resources?		
Can impacts be mitigated?	YES	-

Mitigation: The impact will be most effectively mitigated by hard paving the main roads, but it is unlikely that the road will be paved. For this reason it is suggested that the area is watered down during dry and/or high wind conditions.

Road speeds in sensitive regions e.g. near wetlands, across drainage lines, and during extreme dry climatic conditions, should be limited to curtail dust production.

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.

8.3 Substations – Impact Statements for the proposed Blanco substations

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

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 faunal habitats through the clearing of vegetation for the construction of substation infrastructures. There is the potential for some reptile species to be disturbed and possibly killed by the construction activities where service/access roads and substation foundations impact reptile habitats. It is highly unlikely that amphibians will be impacted on if construction activities avoid water bodies. Nocturnal mammal species may be killed on the roads if there is an increase in the number of project vehicles using roads at night. There is the possibility that other smaller and more secretive mammal SCC species such as the Fynbos Golden Mole (*Amblysomus corriae*) and Duthie's Golden Mole (*Chlorotalpa duthieae*) may be unearthed during construction.

Operation: The operational phase of the substation is unlikely to have any major impacts on the described terrestrial faunal groups. General impacts associated to increased anthropogenic activities (e.g. poaching, roads mortalities, fuel spills) may occur, but are most likely to be minor and limited to the site.

	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	3 - Probable (distinct possibility)	2 - Improbable (probably will not happen)
Duration	5 - Permanent (ongoing during lifetime)	5 - Permanent (ongoing during lifetime)
Extent	2 - Limited to the local area	1 - Limited to site
Magnitude	2 - Minor or no impact on processes	0 - Small and will have no effect on the environment
Significance	**27 (Low)**	**12 (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.

A rescue plan should be developed for reptiles and amphibians which could fall into construction pits.

Wherever possible existing service/access roads should be used.

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

It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.

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.

Nature: 1 - Impact of substation 4 on fauna

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. For this reason, the construction of access roads and substation infrastructure is likely to have a negative impact on amphibians. There will be some loss of faunal habitats through the clearing of vegetation for the construction of substation infrastructures. There is the potential for some reptile species to be disturbed and possibly killed by the construction activities where service/access roads and substation foundations impact reptile habitats. Nocturnal mammal species may be killed on the roads if there is an increase in the number of project vehicles using roads at night. There is the possibility that other smaller and more secretive mammal SCC species such as the Fynbos Golden Mole (*Amblysomus corriae*) and Duthie's Golden Mole (*Chlorotalpa duthieae*) may be unearthed during construction.

Operation: The operational phase of the substation is unlikely to have any major impacts on the described terrestrial faunal groups. General impacts associated to increased anthropogenic activities (e.g. poaching and roads mortalities) may occur, but are most likely to be minor and limited to the site. The greatest potential impact for the operation of the substation would be fuel spills due to the close proximity of the alternative to a perennial stream.

	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	3 - Probable (distinct possibility)	2 - Improbable (probably will not happen)
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	0 - Small and will have no effect on the environment
Significance	**33 (Medium)**	**12 (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 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.

A rescue plan should be developed for reptiles and amphibians which could fall into construction pits.

Wherever possible existing service/access roads should be used.

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

It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.

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.

Nature: 1 - Impact of substation 5 on fauna

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 Mountains and a formally protected area. There will be some loss of faunal habitats through the clearing of vegetation for the construction of substation infrastructures. There is the potential for some reptile species to be disturbed and possibly killed by the construction activities where service/access roads and substation foundations impact reptile habitats. It is also likely that amphibians will be impacted on during the construction of the access road. Nocturnal mammal species may be killed on the roads if there is an increase in the number of project vehicles using roads at night. There is the possibility that other smaller and more secretive mammal SCC species such as the Fynbos Golden Mole (*Amblysomus corriae*) and Duthie's Golden Mole (*Chlorotalpa duthieae*) may be unearthed during construction.

Operation: General impacts associated to increased anthropogenic activities (e.g. poaching, roads mortalities, fuel spills) may occur. The greatest potential impact for the operation of the substation would be fuel spills due to the close proximity of the alternative to a streams at the foothills of the Outeniqua Mountains.

	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	3 - Probable (distinct possibility)	2 - Improbable (probably will not happen)
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)	2 - Minor or no impact on processes
Significance	**39 (Medium)**	**16 (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.

A rescue plan should be developed for reptiles and amphibians which could fall into construction pits.

Wherever possible existing service/access roads should be used.

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

It is recommended that construction staff are educated with regard to poaching and any such activities must be strictly prohibited.

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.

9. FAUNAL SUMMARY AND RECOMMENDATIONS

9.1 Greater Project Area

Consultation of historical records and species distribution data indicates a vast diversity of reptile, amphibian, and mammal species are likely to be found in a variety of habitats within the greater project area. Furthermore, all discussed faunal groups contain SCC which are likely to be found within the project area. Some of these species are restricted to isolated patches (most amphibian and reptile SCC), whilst others are widespread throughout the project area (most mammals of SCC). Insight and recommendations for each of the proposed alternatives is given below.

9.1.1 Alternatives

Alternative 1 is likely to have the greatest overall impact on fauna in the area due to i) the proximity of the route to the Outeniqua Mountains and protected areas, ii) due the number of privately owned game reserves and CBAs which the route will traverse, and iii) the number of pristine perennial rivers and streams along the route. The overall faunal habitat along proposed alternative 1 is in better condition than the other alternatives. Alternative 2 is the preferred alternative from a faunal perspective. Alternative 2 passes through less sensitively defined habitats than alternative 1. An existing powerline traverses certain moderately defined areas along alternative 2 (Botlierskop Game Reserve and Wolwedans Dam) and therefore service road infrastructures are already in place. Alternative 3 is not chosen as the preferred alternative due to the numerous CBAs and pristine wetlands found in the southern section of the route option. Alternative 4 is also not chosen as the preferred route option as it also traverses CBAs and pristine wetlands found in the southern section of the route option, before moving up to sensitively defined areas of route alternative 1 at the foothills of the Outeniqua Mountains.

Gourikwa – Blanco Alternatives

Impact	Without mitigation	With mitigation
Construction Phase		
1. Habitat loss & fragmentation	**35 (Medium)**	**30 (Medium)**
2. Loss of Reptile Diversity	**28 (Low)**	**12 (Low)**
3. Loss of Amphibian Diversity	**28 (Low)**	**12 (Low)**
4. Loss of Mammal Diversity	**21 (Low)**	**14 (Low)**
5. Loss of Bird Diversity	**21 (Low)**	**14 (Low)**
6. Impact of Noise and Dust	**35 (Medium)**	**20 (Low)**
Operation Phase		
1. Habitat loss & fragmentation	**18 (Low)**	**18 (Low)**
2. Loss of Reptile Diversity	**21 (Low)**	**12 (Low)**
3. Loss of Amphibian Diversity	**16 (Low)**	**12 (Low)**
4. Loss of Mammal Diversity	**8 (Low)**	**8 (Low)**
5. Loss of Bird Diversity	**60 (Medium)**	**44 (Medium)**
6. Impact of Noise and Dust	**32 (Medium)**	**18 (Low)**

Recommendations

Manipulate the power line alignment to avoid rocky outcrops and steep mountainous areas to mitigate against impacting on reptiles and reptiles of SCC. Where possible access/service roads and pylon bases should be planned and constructed to avoid being located in areas defined as highly sensitive or areas which have been described as valuable habitats for protected faunal species. Where access roads and/or pylon bases do need to be located within any of the defined sensitive areas then ground-truthing to determine exact road routes and pylon base locations should be carried out. It must be noted that the Brandwagrivier Wetland System and the intact vegetation surrounding Wolwedans dam must be treated as "**No-go**" areas for roads or pylon hardstands and access/services roads.

9.1.2 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 fauna, 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 Mountains (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	**27 (Low)**	**12 (Low)**
2. Substation 4	**33 (Medium)**	**12 (Low)**
3. Substation 5	**39 (Medium)**	**16 (Low)**

10. CONCLUSION

From a faunal perspective it is recommended that the Gourikwa - Blanco Alternative 2 is the preferred route option for the proposed power line. It must be noted that the Brandwagrivier Wetland System and the intact vegetation surrounding Wolwedans dam must be treated as "**No-go**" areas for roads or pylon hardstands and access/services roads along this alternative route. Substation alternative 2 is the preferred option from a faunal perspective. Proposed substation 5 is likely to have a high impact on fauna if chosen.

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

Scientific name	Common name	Red list category	CITES	PNCO	Endemic	Found on route
Agama atra	Southern Rock Agama	Least Concern (SARCA 2014)	-	-	**-**	**-**
Bradypodion damaranum	Knysna Dwarf Chameleon	Least Concern (SARCA 2014)	**Appendix II**	-	*	✓
Bradypodion gutturale	Little Karoo Dwarf Chameleon	Least Concern (SARCA 2014)	**Appendix II**	-	*	-
Crotaphopeltis hotamboeia	Herald Snake	Least Concern (SARCA 2014)	-	-	-	-
Dasypeltis scabra	Rhombic Egg-eater	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Dispholidus typus typus	Boomslang	Least Concern (SARCA 2014)	-	-	-	-
Philothamnus hoplogaster	Southeastern Green Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Philothamnus natalensis occidentalis	Western Natal Green Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Chamaesaura anguina anguina	Cape Grass Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Cordylus cordylus	Cape Girdled Lizard	Least Concern (SARCA 2014)	**Appendix II**	**Schedule II**	**-**	**-**
Hemicordylus capensis	Cape Cliff Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Karusasaurus polyzonus	Southern Karusa Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	**-**	-
Ninurta coeruleopunctatus	Blue-spotted Lizard	Least Concern (SARCA 2014)		**Schedule II**		✓
Pseudocordylus microlepidotus microlepidotus	Cape Crag Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	**-**
Hemachatus haemachatus	Rinkhals	Least Concern (SARCA 2014)	-	-	-	**-**
Naja Nivea	Cape Cobra	Least Concern (SARCA 2014)	-	-	**-**	**-**
Afrogecko poryphyreus	Marbled Leaf-toed Gecko	Least Concern (SARCA 2014)	-	-	**-**	**-**
Chondrodactylus bibronii	Bibron's Gecko	Least Concern (SARCA 2014)	-	-	**-**	**-**

Hemidactylus mabouia	Common Tropical House Gecko	Least Concern (SARCA 2014)	-	-	-	-
Lygodactylus capensis capensis	Common Dwarf Gecko	Least Concern (SARCA 2014)	-	-	-	-
Pachydactylus geitje	Ocellated Gecko	Least Concern (SARCA 2014)	-	-	-	-
Pachydactylus kladaroderma	Thin-skinned Gecko	Least Concern (SARCA 2014)	-	-	-	-
Pachydactylus maculatus	Spotted Gecko	Least Concern (SARCA 2014)	-	-	-	-
Pachydactylus oculatus	Golden Spotted Gecko	Least Concern (SARCA 2014)	-	-	-	-
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Tetradactylus fitzsimonsi	FitzSimon's Long-tailed Seps	**Vulnerable (SARCA 2014)**	-	-	-	-
Tetradactylus seps	Short-legged Seps	Least Concern (SARCA 2014)	-	-	-	-
Tetradactylus tetradactylus	Cape Long-tailed Seps	Least Concern (SARCA 2014)	-	-	-	-
Nucrus lalandii	Delalande's Sandveld Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Nucrus tessellata	Western Sandveld Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Pedioplanis burchelli	Burchell's Sand Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Pedioplanis lineoocellata pulchella	Common Sand Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Tropidosaura gularis	Cape Mountain Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Tropidosaura montana montana	Common Mountain Lizard	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Homoroselaps lacteus	Spotted Harlequin Snake	Least Concern (SARCA 2014)	-	-	-	-
Boaedon capensis	Brown House Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Lamprophis aurora	Aurora House Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Lamprophis fuscus	Yellow-bellied Snake	Least Concern (SARCA 2014)	-	-	-	-
Lycodonomorphus inornatus	Olive Snake	Least Concern (SARCA 2014)	-	-	-	-
Lycodonomorphus rufulus	Brown Water Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-

Lycophidion capense capense	Cape Wolf Snake	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Psammophis crucifer	Cross-marked Grass Snake	Least Concern (SARCA 2014)	-	-	-	-
Psammophis notostictus	Karoo Sand Snake	Least Concern (SARCA 2014)	-	-	-	-
Psammophylax rhombeatus rhombeatus	Spotted Grass Snake	Least Concern (SARCA 2014)	-	-	**-**	-
Amplorhinus multimaculatus	Many-spotted Snake	Least Concern (SARCA 2014)	-	-	-	-
Duberria lutrix lutrix	South African Slug-eater	Least Concern (SARCA 2014)	-	**Schedule II**	-	✓
Prosymna sundevallii	Sundevall's Shovel-snout	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Pseudaspis cana	Mole Snake	Least Concern (SARCA 2014)		**Schedule II**		-
Leptotyphlops nigricans	Black Thread Snake	Least Concern (SARCA 2014)	-	-	**-**	-
Pelomedusa subrufa	Marsh Terrapin	Least Concern (SARCA 2014)	-	-	-	**-**
Acontias meleagris	Cape Legless Skink	Least Concern (SARCA 2014)	-	-	-	-
Trachylepis capensis	Cape Skink	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Trachylepis homalocephala	Red-sided Skink	Least Concern (SARCA 2014)	-	-	-	-
Trachylepis occidentalis	Western Three-striped Skink	Least Concern (SARCA 2014)	-	-	-	-
Trachylepis sulcate sulcata	Western Rock Skink	Least Concern (SARCA 2014)	-	-	-	-
Trachylepis variegata	Variable Skink	Least Concern (SARCA 2014)	-	-	**-**	-
Scelotes bipes	Silvery Dwarf Burrowing Skink	Least Concern (SARCA 2014)	-	-	-	-
Chersina angulata	Angulate Tortoise	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Homopus areolatus	Parrot-beaked Dwarf Tortoise	Least Concern (SARCA 2014)	-	**Schedule II**	-	-
Psammobates tentorius sp.	Tent tortoise	Least Concern (SARCA 2014)	-	**Schedule II**	**-**	**-**
Stigmochelys pardalis	Leopard Tortoise	Least Concern (SARCA 2014)	-	**Schedule II**	-	**-**
Rhinotyphlops lalandei	Delaland's Beaked Blind Snake	Least Concern (SARCA 2014)	-	-	-	**-**

Varanus albigularis albigularis	Southern Rock Monitor	Least Concern (SARCA 2014)	-	-	-	-
Bitis arietans arietans	Puff Adder	Least Concern (SARCA 2014)	-	-	-	-
Bitis atropos	Berg Adder	Least Concern (SARCA 2014)	-	-	-	-
Causus rhombeatus	Rhombic Night Adder	Least Concern (SARCA 2014)	-	-	-	-
Bitis rubida	Red Adder	Least Concern (SARCA 2014)	-	-	-	-
Bitis caudalis	Horned Adder	Least Concern (SARCA 2014)	-	-	-	-
Causus rhombeatus	Rhombic Night Adder	Least Concern (SARCA 2014)	-	-	-	-

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APPENDIX A-2: AMPHIBIAN SPECIES WITH A DISTRIBUTION RANGE INCLUDING THE PROJECT AREA

Family	Scientific name	Common name	Red List statues	PNCO	Found on route
Brevicipitidae	*Breviceps fuscus*	Plain Rain Frog	Least concern	**Schedule II**	-
Brevicipitidae	*Breviceps montanus*	Cape Mountain Rain Frog	Least concern	**Schedule II**	-
Bufonidae	*Ameitophrynus rangeri*	Raucous Toad	Least concern	**Schedule II**	✓
Bufonidae	*Ameitophrynus pardalis*	Eastern Leopard Toad	Least concern	**Schedule II**	-
Bufonidae	*Capensibufo tradouwi*	Tradouw Mountain Toadlet	Least concern	**Schedule II**	-
Bufonidae	*Vandijkophrynus angusticeps*	Cape Sand Frog	Least concern	**Schedule II**	-
Bufonidae	*Vandijkophrynus garriepensis*	Karoo Toad	Least concern	**Schedule II**	-
Heleophrynidae	*Heleophryn regis*	Southern Ghost Frog	Least concern	**Schedule II**	-
Hyperoliidae	*Afrixalus knysnae*	Knysna Leaf-folding Frog	**Endangered**	**Schedule II**	-
Hyperoliidae	*Hyperolius horstocki*	Arum Lily Frog	Least concern	**Schedule II**	-
Hyperoliidae	*Hyperolius marmoratus verrucosus*	Painted Reed Frog	Least concern	**Schedule II**	**-**
Hyperoliidae	*Semnodactylus wealii*	Rattling Frog	Least concern	**Schedule II**	-
Pipidae	*Xenopus laevis*	Common Platanna	Least concern	**Schedule II**	-
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least concern	**Schedule II**	✓
Pyxicephalidae	*Amietia quecketti*	Common River Frog	Least concern	**Schedule II**	-
Pyxicephalidae	*Cacosternum boettgeri*	Boettger's Caco	Least concern	**Schedule II**	✓
Pyxicephalidae	*Cacosternum nanum*	Bronze Caco	Least concern	**Schedule II**	**-**
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	Least concern	**Schedule II**	**-**
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	Least concern	**Schedule II**	**-**
Pyxicephalidae	*Strongylopus bonaespei*	Banded Stream Frog	Least concern	**Schedule II**	**-**
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	Least concern	**Schedule II**	**-**
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	Least concern	**Schedule II**	✓

APPENDIX A-3: MAMMAL SPECIES WITH A DISTRIBUTION RANGE INCLUDING THE PROJECT AREA

Family	Scientific name	Common names	Red List status	PNCO	
BATHYERGIDAE	*Bathyergus suillus*	Cape Dune Mole Rat	LC	-	-
BATHYERGIDAE	*Cryptomys hottentotus*	African Mole Rat	LC	-	-
BATHYERGIDAE	*Georychus capensis*	Cape Mole Rat	LC	-	-
BOVIDAE	*Alcelaphus buselaphus*	Hartebeest	LC	-	✓
BOVIDAE	*Damaliscus pygargus*	Blesbok/bontebok	LC	-	-
BOVIDAE	*Pelea capreolus*	Common Rhebok	LC	-	-
BOVIDAE	*Philantomba monticola*	Blue Duiker	LC	-	-
BOVIDAE	*Raphicerus campestris*	Steenbok	LC	-	✓
BOVIDAE	*Raphicerus melanotis*	Cape Grysbok	LC	-	✓
BOVIDAE	*Redunca fulvorufula*	Mountain Reedbuck	LC	-	✓
BOVIDAE	*Sylvicapra grimmia*	Common Duiker	LC	-	✓
BOVIDAE	*Syncerus caffer*	African Buffalo	LC	-	✓
BOVIDAE	*Tragelaphus oryx*	Common Eland, Eland	LC	-	✓
BOVIDAE	*Tragelaphus scriptus*	Bushbuck	LC	-	✓
BOVIDAE	*Tragelaphus strepsiceros*	Greater Kudu	LC	-	✓
CANIDAE	*Canis mesomelas*	Black-backed Jackal	LC	-	-
CANIDAE	*Otocyon megalotis*	Bat-eared Fox	LC	-	-
CANIDAE	*Vulpes chama*	Cape Fox	LC	-	-
CERCOPITHECIDAE	*Chlorocebus pygerythrus*	Vervet Monkey	LC	-	✓
CERCOPITHECIDAE	*Papio ursinus*	Baboon	LC	-	✓

CHRYSOCHLORIDAE	*Chlorotalpa sclateri*	Sclater's Golden Mole	LC	-	-
CHRYSOCHLORIDAE	*Amblyso muscorriae*	Fynbos Golden Mole	**NT**	-	-
CHRYSOCHLORIDAE	*Chlorotalpa duthieae*	Duthie's Golden Mole	**VU**	-	-
FELIDAE	*Caracal caracal*	African Caracal	LC	-	-
FELIDAE	*Felis silvestris*	Wildcat, Wild Cat	LC	-	-
FELIDAE	*Leptailurus serval*	Serval	LC	-	-
FELIDAE	*Panthera pardus*	Leopard	**NT**	-	-
GLIRIDAE	*Graphiurus murinus*	Woodland Dormouse	LC	-	-
GLIRIDAE	*Graphiurus ocularis*	Spectacled Dormouse	LC	-	-
HERPESTIDAE	*Atilax paludinosus*	Water Mongoose	LC	-	-
HERPESTIDAE	*Cynictis penicillata*	Yellow Mongoose	LC	-	✓
HERPESTIDAE	*Herpestes ichneumon*	Egyptian Mongoose	LC	-	-
HERPESTIDAE	*Herpestes pulverulentus*	Cape Grey Mongoose	LC	-	✓
HERPESTIDAE	*Suricata suricatta*	Meerkat	LC	-	-
HYAENIDAE	*Proteles cristata*	Aardwolf	LC	-	-
HYAENIDAE	*Hyaena brunnea*	Brown Hyaena	**NT**	-	-
HYSTRICIDAE	*Hystrix africaeaustralis*	Cape Porcupine	LC	-	-
LEPORIDAE	*Lepus capensis*	Cape Hare	LC	-	-
LEPORIDAE	*Lepus saxatilis*	Scrub Hare	LC	-	✓
LEPORIDAE	*Pronolagus saundersiae*	Hewitt's Red Rock Hare	LC	-	-
MACROSCELIDIDAE	*Elephantulus pilicaudus*	Karoo Rock Elephant-shrew	DD	**Schedule II**	-
MACROSCELIDIDAE	*Elephantulus edwardii*	Cape Elephant Shrew	LC	**Schedule II**	-
MACROSCELIDIDAE	*Elephantulus rupestris*	Western Rock Elephant	LC	**Schedule II**	-

		Shrew			
MACROSCELIDIDAE	*Macroscelides proboscideus*	Round-eared Elephant Shrew	LC	**Schedule II**	-
MURIDAE	*Acomys subspinosus*	Cape Spiny Mouse	LC	-	-
MURIDAE	*Aethomys granti*	Grant's Rock Mouse, Grant's Rock Rat	LC	-	-
MURIDAE	*Aethomys namaquensis*	Namaqua Rock Rat	LC	-	-
MURIDAE	*Dasymys incomtus*	African Marsh Rat	LC	-	-
MURIDAE	*Desmodillus auricularis*	Cape Short-eared Gerbil	LC	-	-
MURIDAE	*Gerbilliscus afra*	Cape Gerbil	LC	-	-
MURIDAE	*Gerbilliscus afra*	Cape Gerbil	LC	-	-
MURIDAE	*Gerbillurus paeba*	Hairy-footed Gerbil	LC	-	-
MURIDAE	*Mastomys coucha*	Southern Multimammate Mouse	LC	-	-
MURIDAE	*Mus minutoides*	Pygmy Mouse	LC	-	-
MURIDAE	*Mus musculus*	House Mouse	LC	-	-
MURIDAE	*Myomyscus verreauxii*	Verreaux's Mouse	LC	-	-
MURIDAE	*Otomys irroratus*	Southern African Vlei Rat	LC	-	-
MURIDAE	*Otomys saundersiae*	Saunder's Vlei Rat	LC	-	-
MURIDAE	*Parotomys brantsii*	Brants's Whistling Rat	LC	-	-
MURIDAE	*Parotomys littledalei*	Littledale's Whistling Rat	LC	-	-
MURIDAE	*Rattus rattus*	Black Rat	LC	-	-
MURIDAE	*Rhabdomys pumilio*	Four-striped Grass Mouse	LC	-	-
MUSTELIDAE	*Aonyx capensis*	African Clawless Otter	LC	-	-
MUSTELIDAE	*Ictonyx striatus*	Striped Polecat	LC	-	-

MUSTELIDAE	*Mellivora capensis*	Honey Badger	LC	-	-
MUSTELIDAE	*Poecilogale albinucha*	African Striped Weasel	LC	-	-
NESOMYIDAE	*Mystromys albicaudatus*	White-tailed Mouse	**EN**	-	-
NESOMYIDAE	*Dendromus melanotis*	Gray African Climbing Mouse	LC	-	-
NESOMYIDAE	*Dendromus mesomelas*	Brant's Climbing Mouse	LC	-	-
NESOMYIDAE	*Malacothrix typica*	Gerbil Mouse	LC	-	-
NESOMYIDAE	*Petromys cuscollinus*	Pygmy Rock Mouse	LC	-	-
NESOMYIDAE	*Saccostomus campestris*	Pouched Mouse	LC	-	-
NYCTERIDAE	*Nycteris thebaica*	Egyptian Slit-faced Bat	LC	**Schedule II**	-
ORYCTEROPODIDAE	*Orycteropus afer*	Aardvark	LC	-	-
PROCAVIIDAE	*Procavia capensis*	Rock Dassie	LC	-	✓
RHINOCEROTIDAE	*Diceros bicornis*	Black Rhinoceros	CR	-	-
RHINOCEROTIDAE	*Ceratotherium simum*	White Rhinoceros	**NT**	**Schedule 1**	✓
RHINOLOPHIDAE	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	**NT**	**Schedule II**	-
SORICIDAE	*Crocidura cyanea*	Reddish-grey Musk Shrew	LC	**Schedule II**	-
SORICIDAE	*Crocidura flavescens*	Greater Red Musk Shrew	LC	**Schedule II**	-
SORICIDAE	*Myosorex varius*	Forest Shrew	LC	**Schedule II**	-
SORICIDAE	*Suncus varilla*	Lesser Dwarf Shrew	LC	**Schedule II**	-
SORICIDAE	*Myosorex longicaudatus*	Long-tailed Forest Shrew	**VU**	**Schedule II**	-
SUIDAE	*Potamochoerus larvatus*	Bushpig	LC	-	-
VESPERTILIONIDAE	*Pipistrellus capensis*	Cape Serotine Bat	LC	-	-
VESPERTILIONIDAE	*Pipistrellus hesperidus*	African Pipstrelle	LC	-	-

VIVERRIDAE	*Genetta genetta*	Common Genet	LC	-	-
VIVERRIDAE	*Genetta tigrina*	Large-spotted Genet	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 C-1: AMPHIBIANS PHOTOGRAPHED DURING FIELD SURVEY

	**Species**: Cape river frog (*Amietia fuscigula*) **Status:** Least Concern, Widespread **Location**: North of Molen Drift, George (33°54'42.95"S 22°21'41.44"E)
	**Species**: Clicking Stream Frog (*Strongylopis grayii*) **Status:** Least Concern, Widespread **Location**: Molen Drift, George (33°56'39.34"S 22°21'10.05"E)
	**Species**: Cape river frog (*Amietia fuscigula*) **Status:** Least Concern, Widespread **Location**: Molen Drift, George (33°56'39.34"S 22°21'10.05"E)
	**Species**: Clicking Stream Frog (*Strongylopis grayii*) **Status:** Least Concern, Widespread **Location**: North of Molen Drift, George (33°54'42.95"S 22°21'41.44"E)

	**Species**: Cape River Frog (*Amietia fuscigula*) **Status:** Least Concern, Widespread **Location**: North of Molen Drift, George (33°54'48.08"S 22°20'5.47"E)
	**Species**: Boettger's Caco (*Cacosternum boettgeri*) **Status:** Least Concern, Widespread **Location**: Wolwedans dam, Wolwedans, (34° 0'35.70"S 22°13'2.78"E)
	**Species**: Raucous Toad (*Amietophrynus rangeri*) **Status:** Least Concern, Widespread **Location**: Wolwedans dam, Wolwedans, (34° 0'35.70"S 22°13'2.78"E)

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

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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:	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 Gourikwa-Blanco (Narina) 400kV Transmission Lines EIA

Specialist:	Craig Sholto-Douglas		
Contact person:	Craig Sholto-Douglas		
Postal address:	P O 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 Gourikwa-Blanco (Narina) 400kV Transmission Lines EIA

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 Gourikwa-Blanco (Narina) 400kV Transmission Lines EIA

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 (SAAB)		

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 + 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	
	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;	**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**
(g) an identification of any areas to be avoided, including buffers;	**Chapter 7**
(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 7**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Chapter 8**
(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 8**
(k) any mitigation measures for inclusion in the EMPr	**Chapter 8**