TERRESTRIAL ECOLOGICAL ASSESSMENT AS PART OF THE ENVIRONMENTAL ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED 765kv TRANSMISSION LINE FROM THE KAPPA SUBSTATION NEAR BREEDE RIVER TO THE GAMMA SUBSTATION WESTERN CAPE

Prepared for

Nzumbululo Heritage Solutions (Pty) Ltd.

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Declaration

This report has been prepared according to the requirements of Section 32 (3b) of the Environmental Impact Assessments Regulations, 2010 (GNR 543). We (the undersigned) declare the findings of this report free from influence or prejudice.

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EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a faunal and floral assessment as part of the environmental assessment and authorisation process for the proposed transmission line development from the Kappa sub-station near the Breede River to the Gamma sub-station near the town of Victoria West. Three alternative corridors for the transmission line were identified and will be referred to as 'option 1', 'option 2' and 'option 3' within this document. The estimated length of the various options is approximately 400km for option 1, 372km for option 2 and 366km for option 3, with a servitude proposed of 2 km on either side. The larger area comprising all options with immediate surroundings will be referred to as the 'study area'.

This report, after consideration and description of the ecological integrity of the different options, must guide the Environmental Assessment Practitioner (EAP), authorities and proponent, by means of presentation of the results discussions and recommendations, as to the most viable option in terms of ecological conservation and must provide an indication of the measures required in order to minimise the impact of the proposed development on the receiving environment.

If all findings are taken into consideration option 1 is considered the least sensitive in terms of faunal and floral conservation, followed by option 2 and then option 3. However, all options do traverse sensitive habitat and it is recommended that an option be chosen that follows an existing transmission line corridor. Furthermore, it is recommended that support structure placement be ground truthed prior to construction by means of a site walk down within areas considered to be of increased conservational value in order to attempt to avoid the disturbance of smaller niche habitat such as koppies, outcrops and rivers as far as possible which invariably plays host to more endemic and sensitive taxa that are of conservation concern.

All data gathered during the desktop as well as field assessment was used to divide each proposed corridor according to Ecological Importance and Sensitivity. Key indicators of degree of sensitivity included formally protected areas and critically endangered ecosystems (Threatened Ecosystem Status) as well as natural habitat and CBAs (Fine Scale Plans). Within areas where several of the previously mentioned areas overlap the area was demarcated to be of Very High sensitivity. The degree of sensitivity where then lowered as the presence of these areas became less or absent. The percentage composition of each sensitivity class in relation to the total length of each option was then calculated. This was done in order to determine which option will traverse the largest distance of sensitive areas and would therefore result in the highest impact significance rating. The impact assessment was then based on the areas of sensitivity in relation to the percentage calculated for each option, rather than incorporating all degrees of sensitivity into one assessment for each option. This method of approach was chosen due to the extent of each option, resulting in ground truthing of entire extent of each corridor with servitudes not being feasible.

Based on the impact assessment results, it is evident that there are several possible impacts on the floral and faunal ecology within each area of sensitivity. The table below summarises the findings indicating the significance of the impact before management takes place and the likely impact if management and mitigation takes place. In the consideration of mitigation it is assumed that a high level of mitigation takes place in line with best practice protocols but which does not lead to prohibitive costs.

Table A: A summary of the results obtained from the assessment of floral and faunal ecological impacts.

Impact	Degree of sensitivity of segment along corridor	Impact significance prior to mitigation	Impact significance post mitigation
Floral Ecology			
LOSS OF INTACT FLORAL HABITAT TO MEET CONSERVATION TARGETS	Very High	High	Medium Low
	High	Medium High	Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low

Impact	Degree of sensitivity of segment along corridor	Impact significance prior to mitigation	Impact significance post mitigation
LOSS OF UNIQUE AND ENDEMIC FLORAL HABITAT	Very High	Medium High	Low
	High	Medium High	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
FRAGMENTATION OF SENSITIVE HABITAT	Very High	Medium High	Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT FOR SCC	Very High	Medium High	Low
	High	Medium Low	Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT AND INDIVIDUALS DUE TO VEGETATION CLEARING	Very High	High	Medium High
	High	Medium High	Medium High
	Moderate	Medium Low	Low
	Low	Very Low	Very Low
Faunal Ecology			
LOSS OF FAUNAL HABITAT	Very High	Medium Low	Very Low
	High	Low	Very Low
	Moderate	Very Low	Very Low
	Low	Very Low	Very Low
LOSS OF FAUNAL DIVERSITY AND COMMUNITY INTEGRITY	Very High	Medium Low	Very Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT FOR THREATENED FAUNAL SPECIES	Very High	Medium Low	Very Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF MIGRATORY CONNECTIVITY	Very High	Medium Low	Very Low
	High	Low	Very Low
	Moderate	Very Low	Very Low
	Low	Very Low	Very Low

Based on the above assessment it is evident that there are several possible impacts on the faunal and floral ecology with varying levels of significance based on the degree of sensitivity of each segment of the various corridor options. The most significant impact in terms of floral ecology is loss of habitat due to vegetation clearing prior to construction of support structures that will most likely be lost permanently if impact is not effectively mitigated. However, with adequate planning of the corridor in order to avoid areas of increased sensitivity, impact on floral habitat can be significantly reduced. Many of the floral species in the region are very habitat specific and grow extremely slowly, therefore rescue and

relocation may not prove feasible for all species. Therefore, it will be necessary to undertake a walk down of the proposed support structure locations of the selected development corridor and associated construction corridor in order to identify niche floral habitat supporting cryptic species that could be avoided during the planning and construction phases.

Impact on faunal ecology would most likely be less significant in comparison to floral ecology. Fauna are more mobile and can therefore move away from areas where construction is taking place. However, many faunal species such as reptiles and amphibians do require specialised habitat such as rocky outcrops and riverine habitats that, if impacted upon by the proposed activities, could result in loss of individuals as well as long term loss of habitat.

As with the walk down of the high sensitivity floral habitat a walk down of high sensitivity faunal habitat would also reduce the impact significance. In addition, sensitive faunal species encountered during construction activities should be rescued by a qualified person and released into similar surrounding habitat.

In order to determine which alternative would be the most ecologically viable option, a synthesis was generated taking into consideration the sum of determined impact significance ratings for all floral and faunal impacts in relation to percentage calculated for the extent of each sensitivity class within each option. From the results it is evident that Option 3 can be considered the least preferred option, followed by Option 1 and Option 2. After mitigation Option 3 remains the least preferred option, followed by Option 1 and Option 2 for flora and fauna, respectively. It should be noted that the difference calculated for the option 1 and option 2 final scores are marginal. It is therefore recommended that option 1 be considered to most preferred option. Option 1, presently, is located the closest to urban development and would therefore have the least possibility of significant impact on intact indigenous floral and faunal assemblages.

After conclusion of the faunal and floral assessments, and taking into consideration that expansion of power supply in South Africa is a necessary requirement for socio-economic development, it is the opinion of the ecologist that the proposed development of the transmission line be considered favourably, provided that the recommendations below are strictly adhered to:

- All footprint areas should remain as small as possible and vegetation removal kept to a minimum. In this regard specific mention is made of the need to avoid site clearing between tower positions in order to minimise the impact footprint of the proposed development. This is particularly important in areas of high and very high ecological sensitivity;
- A sensitivity map has been developed for each option, indicating portions of each corridor option considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance and sensitivity. It is recommended that this sensitivity map be considered during all development phases, with special mention of layout design, to aid in the conservation of floral habitat within the Western Cape province;
- It is recommended that the sensitivity map be refined after the final option is selected by undertaking a walk down of the proposed corridor to assess the proposed support structures locations within areas considered of very high and high sensitivity, highlighting important floral and faunal habitat playing host to more cryptic species that could potentially be avoided during the planning of the corridor;
- All SCC (Species of Conservational Concern) and plants considered to be of medicinal value should be marked during the walk down of the preferred corridor, prior to commencement of construction activities. Marking of SCC should be undertaken by a suitably qualified and appropriately experienced Botanist;
- Relevant permits should be obtained for rescue and relocation of any SCC and protected floral species identified;
- All SCC individuals encountered during the walk down or construction phase of the development should be rescued and relocated to the nearest similar habitat to that from which it was taken, by a suitably qualified specialist;
- Care should be taken if chemical methods (herbicides) are to be utilised for both vegetation clearing prior to construction as well as alien vegetation removal post construction. Spill or indiscriminate use of herbicides could result in the loss of indigenous floral individuals or habitat;
- All areas surrounding construction footprints should be kept off-limits to construction vehicles and personnel;

- Wherever possible, develop crossings of sensitive areas (wetlands, ridges and mountains) at 90 degree angles to the features to prevent the extent of the areas disturbed;
- Wherever possible, the transmission line should follow existing transmission line corridors. Where formal or informal protected areas will be crossed it is recommended that the line be constructed as close to the property boundary as possible;
- Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled as needed based on sound monitoring to prevent their spread beyond the footprint;
- Specific eradication recommendations for alien and weed species:
  - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;
  - Footprint areas should be kept as small as possible when removing alien plant species; and
  - No indiscriminate driving of vehicles through open veld should be allowed during the eradication of alien and weed species.
- Prevent run-off from work areas entering floral habitats within surrounding areas;
- Impacts on wetland features should be managed to minimise impacts with special mention of erosion and sedimentation;
- Implement waste management as contemplated in the Environmental Management Programme in order to prevent construction related waste from entering the wetland environment;
- Provide a sufficient amount of dustbins near construction camps to ensure no littering takes place;
- Provide appropriate sanitation facilities for the duration of the proposed development and remove all waste to an appropriate facility;
- Service and refuel construction vehicles in a designated area or off site;
- All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project;
- All soils compacted as a result of construction activities falling outside of the servitude and construction footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat;
- As far as possible existing roads should be utilised for access roads; where the need is identified for the development of temporary tracks cognisance should be taken of the following:
  - Design tracks to cross open veld at 90 degree angles to avoid as much natural vegetation as possible;
  - Tracks should not traverse wetlands, rivers or outcrops; and
  - Instate a speed limit of 40km/h where tracks cross open veld to reduce the amount of dust created.
- It is recommended that a speed limit of 40km/h is implemented on all access roads in order to minimise risk to fauna from vehicles;
- No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place;
- Ensure that migratory connectivity is maintained where appropriate, especially where temporary tracks need to cross sensitive faunal habitat;
- Rescue and relocate faunal species prior to construction within areas earmarked for support structures as well as temporary tracks. Relocation should be done by a qualified person to ensure individuals are not harmed during the rescue process; and
- No fire should be allowed during any phase of the development.

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Glossary of Terms

Alien vegetation	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally.
Biome	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.
Exotic vegetation	Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Ex situ conservation	Where a plant (or community) cannot be allowed to remain in its original habitat and is removed and cultivated to allow for its ongoing survival.
Extrinsic	Factors that have their origin outside of the system.
Indigenous vegetation	Vegetation occurring naturally within a defined area.
In situ conservation	Where a plant (or community) is allowed to remain in its natural habitat with an allocated buffer zone to allow for its ongoing survival.
Pioneer species	A plant species that is stimulated to grow after a disturbance has taken place. This is the first step in natural veld succession after a disturbance has taken place.
Rare	Organisms with small populations at present.
Remnant	A small remaining quantity of vegetation representative of a vegetation type.
Species of Conservation Concern	(SCC) Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), and Vulnerable (VU) categories of ecological status.

Acronyms

BGIS	Biodiversity Geographic Information Systems.
CARA	Conservation of Agricultural Resources Act.
CBA	Critical Biodiversity Area.
CE	Critically Endangered.
CFR	Cape Floristic Region.
CoCT	*BioNet* - City of Cape Town Biodiversity Network.
CR	Critically Endangered.
CREW	Custodian of Rare and Endangered Wildflowers.

DD	Data Deficient.
DEA	Department of Environmental Affairs.
EAP	Environmental Assessment Practitioner.
EN	Endangered.
EW	Extinct in the Wild.
EIA	Environmental Impact Assessment.
EIR	Environmental Impact Report.
EIS	Ecological Integrity Score.
°C	Degrees Celsius.
CSIR	Council for Scientific and Industrial Research.
GIS	Geographic Information System.
ha	Hectares.
IUCN	International Union for Conservation of Nature and Natural Resources.
LC	Least Concern.
LT	Least Threatened.
m	Metres.
mm	Millimetres.
NBA	National Biodiversity Assessment.
NEMA	National Environmental Management Act.
NPAES	National Protected Area Expansion Strategy.
NSBA	National Spatial Biodiversity Assessment.
NT	Near Threatened.
NWA	National Water Act.
PES	Present Ecological State.
POC	Probability of occurrence.
PRECIS	Pretoria Computer Information Systems.
QDS	Quarter degree square (1:50,000 topographical mapping references).
RDL	Red Data Listed.
SABCA	South African Butterfly Conservation Assessment
SAFAP	Southern African Frog Atlas Project.
SANBI	South African National Biodiversity Institute.
SANParks	South African National Parks.
SARCA	Southern African Reptile Conservation Assessment.
SAS	Scientific Aquatic Services.
SKEP	Succulent Karoo Ecosystem Program.
SKR	Succulent Karoo Region.
SCC	Species of Conservation Concern.
TSP	Threatened Species Programme.
WCP	Western Cape Province.
WCPSB	Western Cape Province State of Biodiversity.
VU	Vulnerable.

1. INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct a faunal and floral assessment as part of the environmental assessment and authorisation process for the proposed transmission line development from the Kappa sub-station near the Breede River to the Gamma sub-station near the town of Victoria West. Three alternative corridors for the transmission line were identified and will be referred to as 'option 1', 'option 2' and 'option 3' within this document. The estimated length of the options is approximately 400km for option 1, 372km for option 2 and 366km for option 3. The larger area comprising all options with immediate surroundings will be referred to as the 'study area'.

The proposed development would entail the following activities:

- Site preparation and bush clearing;
- Earthworks (excavations, etc.);
- Construction of the support towers and associated infrastructure;
- Stringing of the towers; and
- Rehabilitation of the development site after construction.

This report, after consideration and description of the ecological integrity of the different options, must guide the Environmental Assessment Practitioner (EAP), authorities and proponent, by means of presentation of the results discussions and recommendations, as to the most viable option in terms of ecological conservation and must provide an indication of the measures required in order to minimise the impact of the proposed development on the receiving environment.

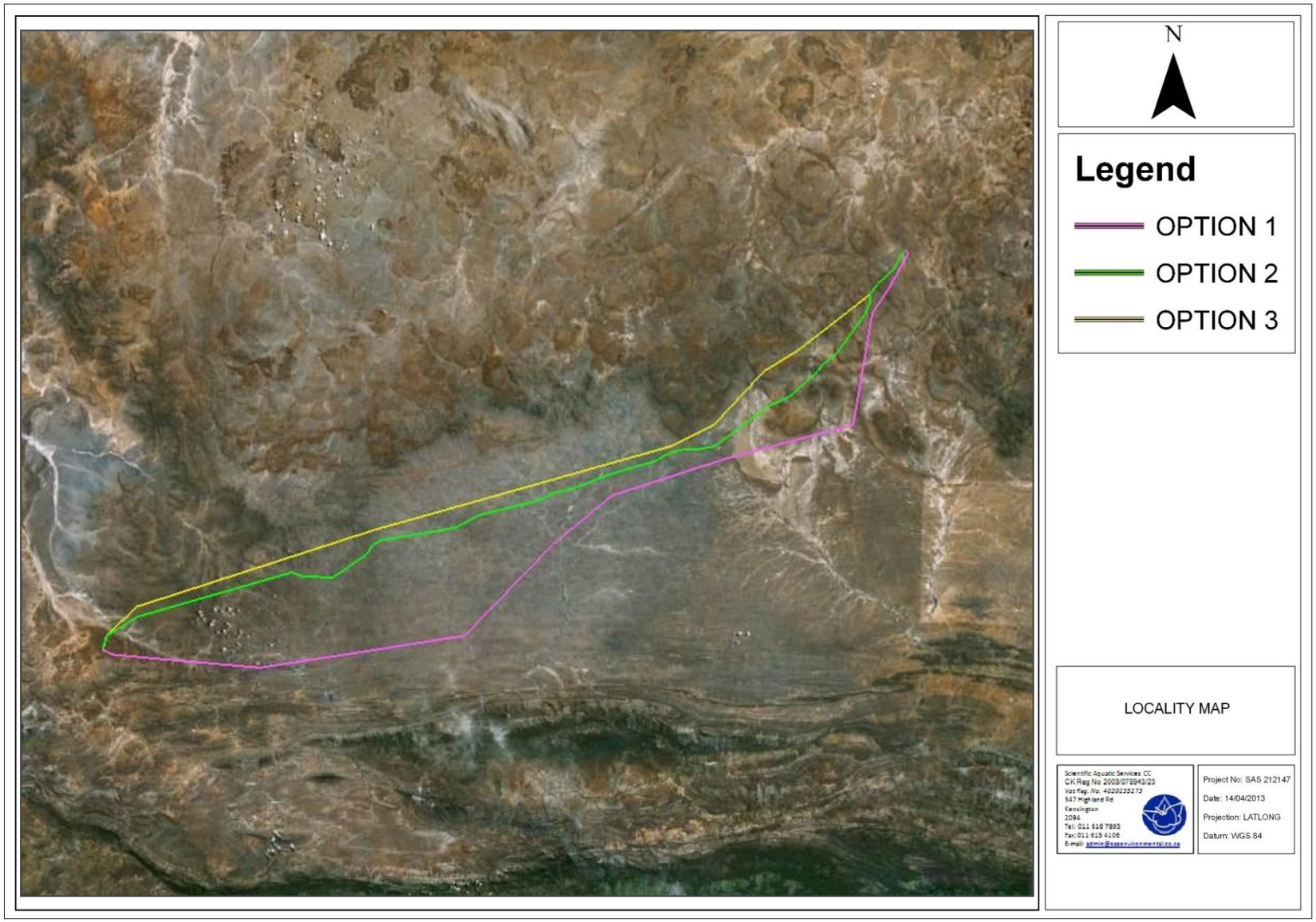

Figure 1: Digital satellite image depicting the locations of each of the options in relation to surrounding areas.

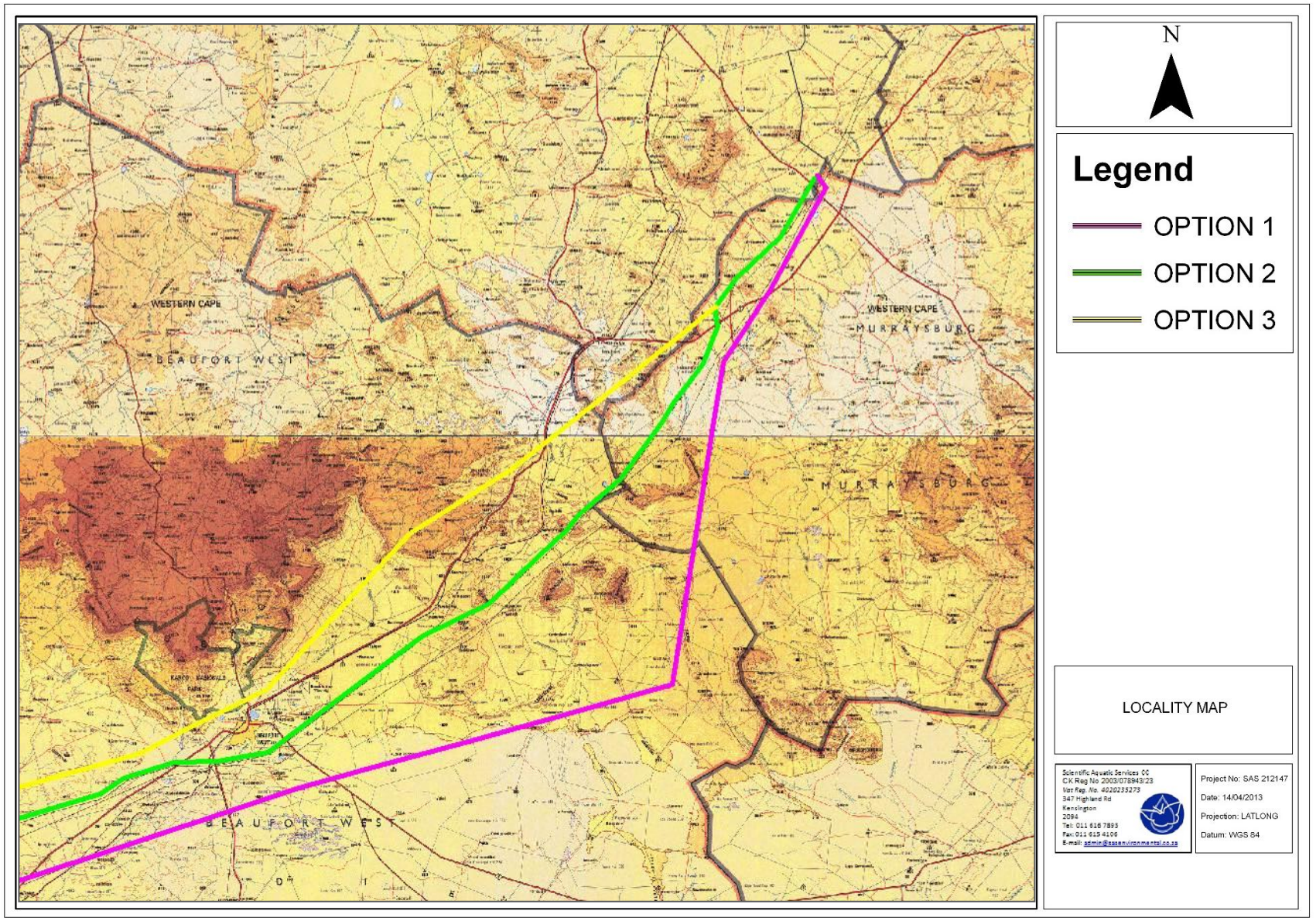

Figure 2: 1:250 000 Topographical map; north eastern portions.

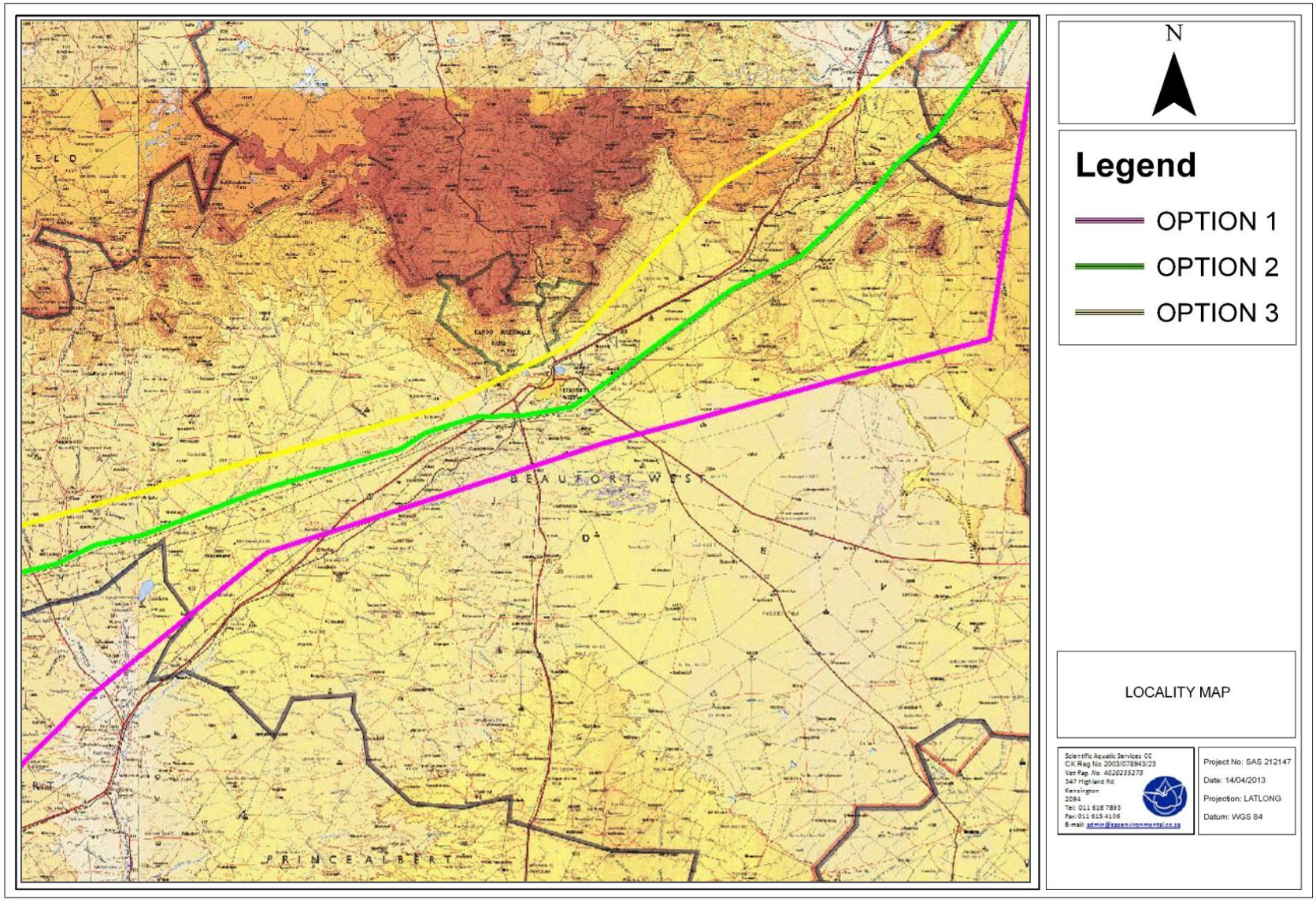

Figure 3: 1:250 000 Topographical map; centre portions.

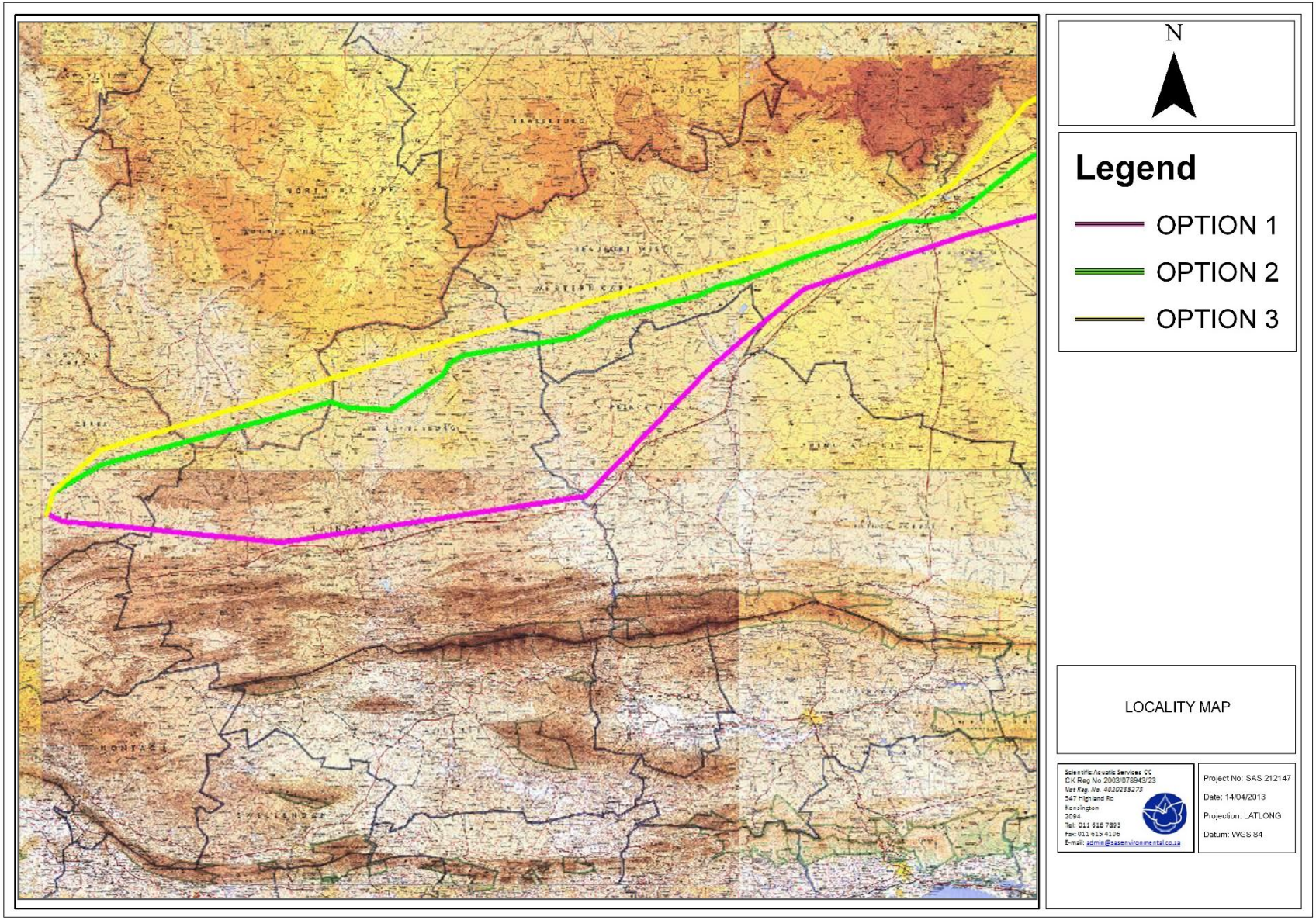

Figure 4: 1:250 000 Topographical map; south western portions.

1.2 Surrounding Properties/land uses

The proposed options extend over approximately 360km. As a result of the coverage the options traverse areas which have been transformed such as grazing pastures. However the proposed options also traverse areas that have seen less anthropogenic activity such as open veld, Succulent Karoo and larger river systems.

1.3 Scope

The scope of the faunal and floral study includes both a desktop review and a field work component with the aim being the identification of the most ecologically viable option for the proposed construction of the transmission line. Background information was collected in order to identify areas with varying degrees of importance in terms of faunal and floral assemblages as well as habitat provision for endemic species or SCC (Species of Conservational Concern). Background information e.g. topographical and digital satellite images as well as national and provincial databases was also used to identify "segments of increased ecological interest or concern" regarded as representative of the different habitat units along each option. Each segment of interest was ground truthed during a brief site visit undertaken during September 2013. Based on the findings during the baseline study, a detailed impact assessment on all identified significant risks was compiled. Recommendations on management and mitigation measures (including opportunities and constraints) in order to manage and mitigate impacts on the ecology of the area during the construction and operation of the proposed development were also provided.

1.4 Legislation

Legal framework considered during the assessment of the study area includes:

- ***National Environmental Management Act (1998); (NEMA)***

The guiding principles of NEMA refer specifically to biodiversity management in the following Clause:

(4) (a) *Sustainable* development requires the consideration of all relevant factors including the following:

(i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.

- ***The Constitution of South Africa Act of 1996 (Act No. 108 of 1996)***

Everyone in South Africa has the right to the environment being protected, for the benefit of present and future generations; through reasonable legislative and other measures that-
(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development

- ***National Environmental Management: Biodiversity Act (2004)***

The objectives of this act are (within the framework of the National Environmental Management Act) to provide for:

- the management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- the use of indigenous biological resources in a sustainable manner; and
- the fair and equitable sharing among stakeholders of benefits arising from bio prospecting involving indigenous biological resources;
- to give effect to‘ ratified international agreements relating to biodiversity which are binding to the Republic;
- to provide for co-operative governance in biodiversity management and conservation; and
- to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of benefits arising from indigenous biological resources.

Furthermore a person may not carry out a restricted activity involving either:
a) a specimen of a listed threatened or protected species
b) specimen of an alien species; or
c) a specimen of a listed invasive species without a permit.

Permits for b) and c) may only be issued after an assessment of risks and potential impacts on biodiversity is carried out. Before issuing a permit, the issuing authority may in writing require the applicant to furnish it, at the applicant's expense, with such independent risk assessment or expert evidence as the issuing authority may determine. The Minister may also prohibit the carrying out of any activity which may

negatively impact on the survival of a listed threatened or protected species or prohibit the carrying out of such activity without a permit. Provision is made for appeals against the decision to issue/refuse/cancel a permit or conditions thereof.

- ***The Protected Areas Act (Act 57 of 2003) (In conjunction with the National Environmental Management: Biodiversity Act of 2004)***

To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

This act as with the forestry act alludes to the fact that the conservation status of all vegetation types needs to be considered when any development is taking place to ensure that the adequate conservation of all vegetation types is ensured.

- ***Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983)***

Amendments to regulations under the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) ensures that landowners are legally responsible for the control of invasive alien plants on their properties. The CARA legislation divides alien plants into weeds and invader plants, with *weeds* regarded as alien plants with no known useful economic purpose, while *invader plants* may serve useful purposes as ornamentals, as sources of timber and may provide many other benefits, despite their aggressive nature. In the legislation, 198 alien invader species were listed as declared weeds and invaders, and divided into three categories.

Category 1: Prohibited weeds that must be controlled in all situations[1];

Category 2: Plants with commercial value that may be planted in demarcated areas subject to a permit providing steps are taken to control spread; and[2]

Category 3: Ornamental plants that may no longer be planted or traded, but may remain in place provided a permit is obtained and steps taken to control their spread.[3]

[1] Regulation 15A regarding the "combating of category 1 plants" in the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983).
[2] Regulation 15B regarding the "combating of category 2 plants" in the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983).
[3] Regulation 15B regarding the "combating of category 3 plants" in the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983).

➢ *National Water Act (1998)*

The National Water Act (NWA) defines not only that actual water but also the entire aquatic ecosystem as the ecosystem requiring protection. The purpose of this Act is to ensure that the national water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- meeting the basic human needs of present and future generations:
- promoting equitable access to water;
- redressing the results of past racial and gender discrimination;
- promoting the efficient, sustainable and beneficial use of water in the public interest;
- facilitating social and economic development;
- providing for growing demand for water use;
- protecting aquatic and associated ecosystems and their biological diversity;
- reducing and preventing pollution and degradation of water resources;
- meeting international obligations;
- promoting dam safety;
- managing floods and droughts;

The Reserve, which consists of two parts - the basic human needs reserve and the ecological reserve. The basic human needs reserve Provides for the essential needs of individuals served by the water resource in question and includes water for drinking, for food preparation and for personal hygiene. The ecological reserve relates to the water required to protect the aquatic ecosystems of the water resource. The Reserve refers to both the quantity and quality of the water in the resource, and will vary depending on the class of the resource.

As with the biodiversity act, the NWA alludes to the fact that water resource management must take place to ensure that the biodiversity of surrounding areas are not negatively impacted upon by any activity being undertaken, and in order to ensure the fair and equitable sharing among stakeholders of benefits arising from indigenous biological resources. The act further indicates that water resources need to be managed in such a way as to ensure that water resources are managed in such a way that their use is sustainable.

➢ *National Forests Act (1998)*

Principles to guide decisions affecting forestry resources applicable to land development management are contained in the following principle:

Principle 3

3) The principles are that—

(a) natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits;

(b) a minimum area of each woodland type should be conserved and forests must be developed and managed to -

(i) conserve biological diversity, ecosystems and habitats;

(ii) sustain the potential yield of their economic, social and environmental benefits.

This section of the act alludes to the fact that the conservation status of all vegetation types needs to be considered when any development is taking place to ensure that the adequate conservation of all vegetation types is ensured.

Principle 6

(6) Criteria and indicators may include but are not limited to, those for determining—

(a) the level of maintenance and development of—

(i) forest resources:

(ii) biological diversity in forests:

(iii) the health and vitality of forests:

(iv) the productive functions of forests:

(v) the protective and environmental functions of forests; and

(vi) the social functions of forests:

➢ *Convention on Biological Diversity (1995)*

A multilateral, multi-national binding agreement where countries, including South Africa, undertake to identify and conserve areas of high biodiversity and ecological importance, in areas of their own jurisdiction. The convention also includes measures relating to sustainable development and protection of natural heritage.

➢ *World Summit for Sustainable Development (2002)*

Hosted by South Africa in 2002 and led by the United Nations, where all nations present pledged their commitment to sustainable development and conservation of biodiversity in their respective states.

➢ *Northern Cape Nature Conservation Bill, 2008*

To ensure sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered species of Wild Fauna and Flora; to provide a mechanism for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected to therewith.

With specific reference to Chapter 6

[49. (1)] sustainable utilisation of plants; no person shall without a permit pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected plant or protected plant;

[51. (1)] No person may, without a permit, pick an indigenous plant

(a) on a public road;

(b) on land next to a public road within a distance of 100 meters measured from the centre of the road;

(c) within an area bordering any natural water coarse, whether wet or dry, up to and within a distance of 100 meters from the middle of the river on either side of the natural water course.

[51. (2)] No person may, without a permit, pick any indigenous plant in such a manner that it constitutes large-scale harvesting or for commercial purposes;

[51. (3)] No person may collect firewood, or pick, transport or remove any indigenous plant on land of which such person is not the owner without the owners written permission.

[52. (1)] Any person may apply in writing to the Director for a nursery permit in respect to the whole or any portion of his or her land.

[52. (2) (a)] Any application made in terms of subsection (1) must –

(a) in the case of agricultural land, include a full description of the land in respect of which application is made, including but not limited to proof of ownership, the farm name, farm number, magisterial district, the farms boundaries and size and habitat assessment reflecting the current state of the vegetation thereon;

(e) set out the activities applied for;

[52. (5) (a)] A nursery permit is valid for the period specified therein;

- ***National Forest and Fire Laws Amendment Act, 2001***

The aim of the National Veld and Forest Fire Act is to prevent and combat veld, forest and mountain fires throughout the Republic. This Act places the duty on every owner on whose land a veld fire may start or burn, or from whose land it may spread, to prepare and maintain a fire break on his or her side of the boundary between his or her land and the adjoining land. Fires causing damage to neighbouring land may result in claims to the landowner if the requirements of this Act are not implemented adequately.

- ***Western Cape Nature Conservation Board Act 15 of 1998***

The aim of the Western Cape Nature Conservation Act is to administer statutory responsibility for biodiversity conservation in the Western Cape. Cape Nature drives this Act and is mandated to: promote and ensure nature conservation; render services and provide facilities for research and training; and generate income within the Western Cape Province.

- ***Western Cape Nature Conservation Laws Amendment Act, (Act No. 3 of 2000***

In terms of Section 62. (1):

Subject to the provisions of this ordinance, no person shall without a permit, be in possession of, sell, buy, donate, receive as a donation, pick, or import into, export from or transport in or through the Province, any endangered flora.

1.5 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The sensitivity map is based on relatively coarse spatial data verified during a brief site visit of points considered representative of the preselected segments of interest, there may therefore be inaccuracies in the location of boundaries between different sensitivity classes;
- The survey was based on a single site visit conducted during September 2013;
- Due to the extent of each option, only dominant floral species are listed for each representative point assessed within each segment of interest. Areas considered to be important in terms of habitat conservation for SCC were documented;
- Faunal species are secretive and the compilation of a comprehensive species list would require a significant amount of hours at each segment of interest. Therefore, the broad faunal habitat encountered at each area assessed within a segment of interest is discussed in the results;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked; and
- Due to the extent of the proposed options it was assumed that there would be a correlation between degree of faunal and floral integrity and the consequent terrestrial biodiversity of a specific portion of an option. Floral and faunal desktop and field assessment data where therefore used in combination to ascertain sensitivity to the options.

1.6 Indemnity and Terms of Use of this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and Scientific Aquatic Services CC and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2 METHOD OF ASSESSMENT

2.1 Literature Review

A desktop study was compiled with all relevant information as presented by the South African National Biodiversity Institute (SANBI) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org), including available regional information. It should be noted that some of the databases have been updated, however to ensure that the most accurate conclusions could be drawn from the literature available, all available information is presented. Information resources taken into consideration during the desktop assessment included:

- SANBI: Threatened species programme (TSP) and Pretoria Computer Information Systems (PRECIS);
- National Spatial Biodiversity Assessment (NSBA; 2004);
- Western Cape Province State of Biodiversity (WCPSB) 2007 report;
- National Protected Area Expansion Strategy 2008 (NPAES);
- National Land Cover (2009);
- National Biodiversity Assessment (NBA; 2011);
- National list of threatened terrestrial ecosystems for South Africa (2011);
- Regional fine scale plans (www.sanbi.bgis.org);
- SANBI data from the National Herbarium, PRECIS for each quarter degree grid (QDS);
- Information as supplied by Custodian of Rare and Endangered Wildflowers (CREW); and

- International Union for Conservation of Nature and Natural Resources (IUCN).

2.2 Floral Assessment Methodology

Prior to the field assessment, use was made of topographical and aerial maps as well as national and provincial databases, where available, to identify "segments of interest" regarded as representative of the different habitat units along each option and an attempt to assess representative points in these segments was made wherever access allowed. Special emphasis was placed on potential areas that may support SCC.

2.3 Faunal Assessment Methodology

Prior to the faunal field assessment, use was made of topographical and aerial maps to identify "segments of interest" regarded as representative of the different habitat units along each alternative corridor and an attempt to assess representative points in these segments was made wherever access allowed. Attention was afforded to data from national and provincial databases, such as the WCPSB (2007)[4] report and the recent NBA (2011) report (which includes the recent BGIS dataset which has been compiled by SANBI). Special emphasis was placed on habitat that may support faunal species of concern that are listed in the WCPSB (2007), NBA 2011 report and IUCN.

The faunal RDL (Red Data Listed) species, listed within the WCPSB (2007) report's distribution ranges was cross referenced with each option. By doing this, areas of higher priority along each alternative corridor were identified.

2.4 Ecological Integrity Score (EIS)

Each of the points within a segment of interest was investigated on foot to determine the Present Ecological State (PES) and allocate an Ecological Integrity Score (EIS). The EIS was allocated according to perceived ecological condition and the likelihood of a section supporting a diverse or a unique floral assemblage; where 5 would be the highest score that can be allocated and 0 representative of a as land use where habitat is lost completely. The bullets below summarise the key aspects considered during the allocation of an EIS score to a representative point within a segment of interest:

EIS = 5 : Pristine or point with almost no impact evident;

[4] The WCPSB (2012) report was in the final stages of being completed during the scoping phase of this project therefore WCPSB (2007) was used to inform the study (Dr A Veldtman, personal communication, Cape Nature and SANBI entomologist).

EIS = 4 : Marginal impact evident, however majority of the point still considered in high PES;

EIS 2 or 3 : Impact has resulted in a loss of faunal and floral habitat and ecological condition and functioning was considered moderate; and

EIS 0 or 1 : Complete transformation of vegetation and landscape units mainly as a result of crop cultivation.

2.5 Ecological Impact Assessment Methodology

In order for the EAP to allow for sufficient consideration of all environmental impacts, environmental impacts was assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method used for assessing risks/impacts is outlined in the sections below.

The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[5]. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or well being, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.

[5] The definition has been aligned with that used in the ISO 14001 Standard.

- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the below. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigation is necessary[6].

The assessment of significance is undertaken twice. Initial significance is based only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

The model outcome of the impacts will then be assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act (No. 108 of 1997) in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances where a variable or outcome

[6] Some risks/impacts that have low significance will however still require mitigation

requires rational adjustment due to model limitations, the model outcomes will be adjusted.

LIKELIHOOD DESCRIPTORS

Probability of impact	**RATING**
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**RATING**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

CONSEQUENCE DESCRIPTORS

Severity of impact	**RATING**
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function Largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**RATING**
Activity specific	1
Development specific/ within the site boundary	2
Local area/ within 1 km of the site boundary	3
Regional within 5 km of the site boundary	4
Entire habitat unit / Entire system	5
Duration of impact	**RATING**
One day to one month	1
One month to one year	2
One year to five years	3
Life of operation or less than 20 years	4
Permanent	5

Table 1: Significance Rating Matrix.

	CONSEQUENCE (Severity + Spatial Scope + Duration)														
LIKELIHOOD (Frequency of activity + Frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 2: Positive/Negative Mitigation Ratings.

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Improve current management	Maintain current management
High	101-125	Improve current management	Maintain current management
Medium-high	76-100	Improve current management	Maintain current management
Medium-low	51-75	Maintain current management	Improve current management
Low	26-50	Maintain current management	Improve current management
Very low	1-25	Maintain current management	Improve current management

The following points were considered when the assessment was undertaken:

- Risks and impacts was analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the client and its contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts was assessed for all stages of the project cycle including:
  - Construction;
  - Operation; and
  - Rehabilitation.
- If applicable, trans boundary or global effects was assessed;
- Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status was assessed; and
- Particular attention was paid to describing any residual impacts that will occur post-development.

2.5.1 Mitigation Measure Development

The following points present the key concepts that were considered in the development of mitigation measures for the proposed development:

- *Mitigation* and *performance improvement measures* and actions that address the risks and impacts[7] was identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimization, mitigation or compensation.
- Desired outcomes was defined, and was developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation*.

2.6 Sensitivity Mapping

All results obtained during the literature review as well as field assessments were used to map each option according to sensitivity. ARC GIS 10.1 software was used to project these features onto aerial photographs and topographic maps. The percentage composition of each sensitivity class in relation to the total length of each option was then calculated. This was done in order to determine which option will traverse the largest distance of sensitive areas and would therefore result in the highest impact significance rating. This method of approach was chosen due to the extent of each option, resulting in ground truthing of entire corridors with servitudes not being feasible. It should be noted that isolated areas along each option for example gravel roads and severely overgrazed vegetation can be considered within a low or very low sensitivity class, however these areas are considered marginal compared to the entire length of each option. It was therefore not deemed feasible to map low and very low sensitivity class areas and the extent of these areas were included in other sensitivity classes. However, it was deemed important to assess the impact significance of areas considered to fall within the low and very low sensitivity classes and these were therefore included within the impact assessment.

2.7 Recommendations

A recommendation was made as to the option considered to be the most viable in terms of faunal and floral ecology. Recommendations were also developed to address and mitigate impacts associated with the proposed development. These

[7] Mitigation measures should address both positive and negative impacts

recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures were developed to address issues in all phases throughout the life of the operation from planning, through construction, operation and through to after care and maintenance.

3 GENERAL IMPORTANCE OF SUBJECT PROPERTY

The proposed corridor alternatives for the Gamma Kappa transmission line will largely be restricted to the Western Cape Province. However, approximately 4km of option 2 and 3 are located within the Northern Cape Province. The western portions of all three options are located within the Succulent Karoo Region (SKR). The SKR is a floristic unit of higher rank which contains a number of areas with concentrations of endemic species. The SKR is also considered one of the earth's 34 hotspots – geographical areas which contain the world's greatest plant and animal diversity. This region is one of two of the world's only arid hotspots (van Wyk and Smith, 2001; http://www.conservation.org).

General importance documented for the Western Cape Province and more specifically for the region proposed for the transmission line is discussed below.

3.1 Department of Environmental Affairs and Tourism

Sensitive features are indicated by
Figure 5 (www.environment.gov.za, 2000). Areas considered of higher sensitivity are restricted to the south western portions of all three options as well as the area north of Beaufort West. The area north of Beaufort West coincides with a protected area namely the Karoo National Park. Dominant land use indicated along each of the options includes vacant/unspecified, cultivation as well as protected areas.

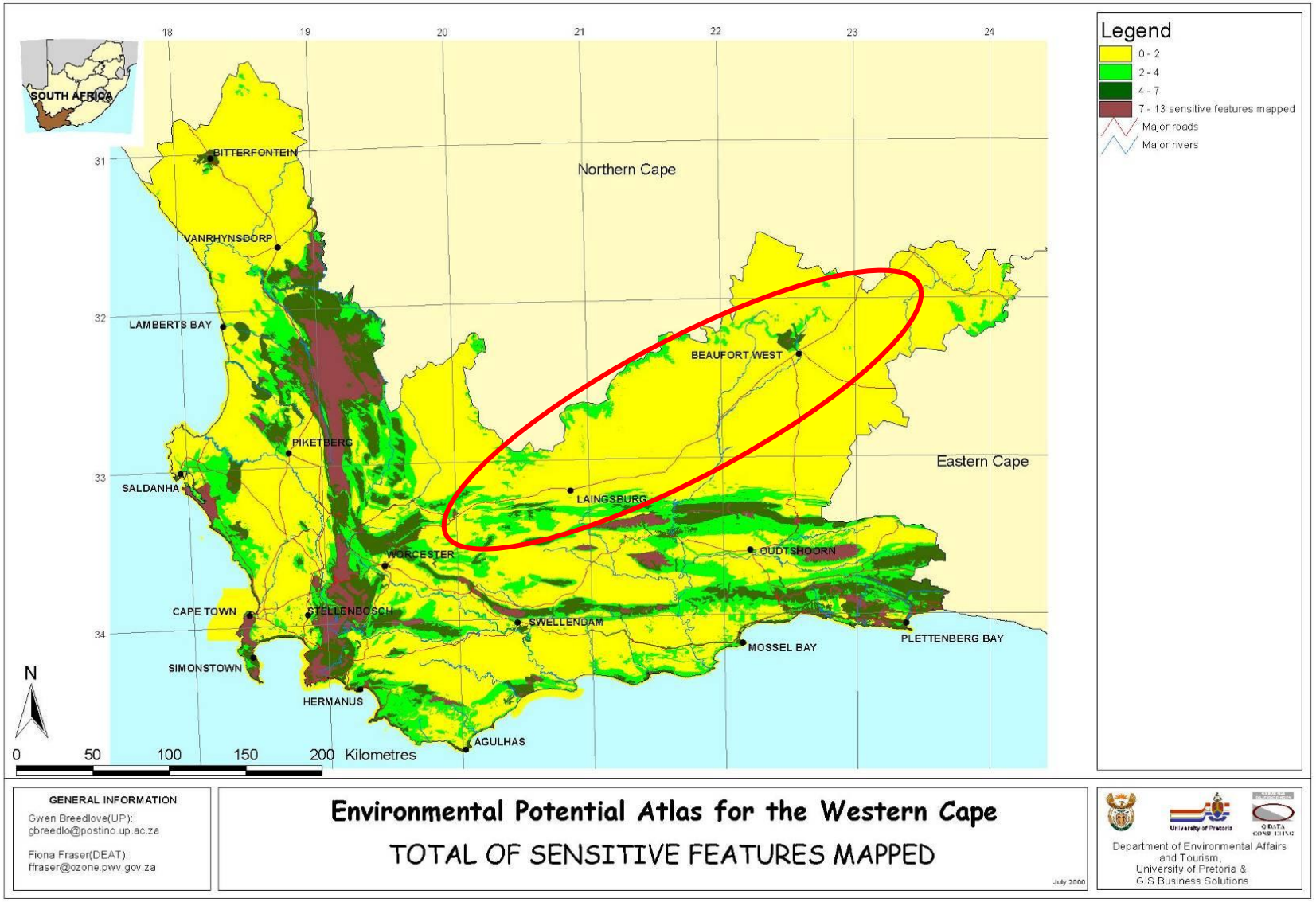

Figure 5: Map of sensitive areas as indicated by www.environment.gov.za; larger area surrounding the locations of the proposed options are indicated with a red circle.

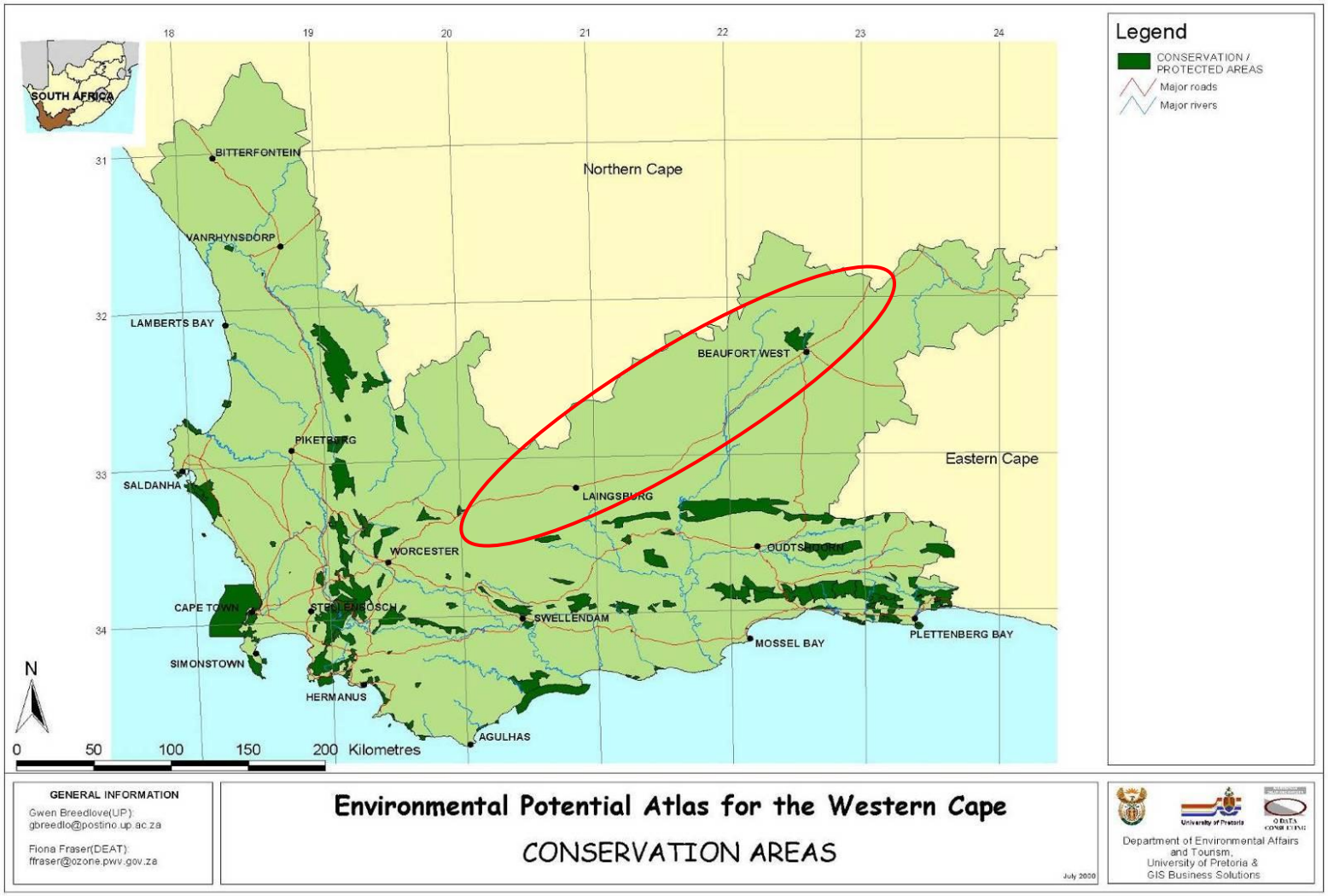

Figure 6: Map of areas with conservation value as indicated by www.environment.gov.za; larger area surrounding the locations of the proposed options are indicated with a red circle.

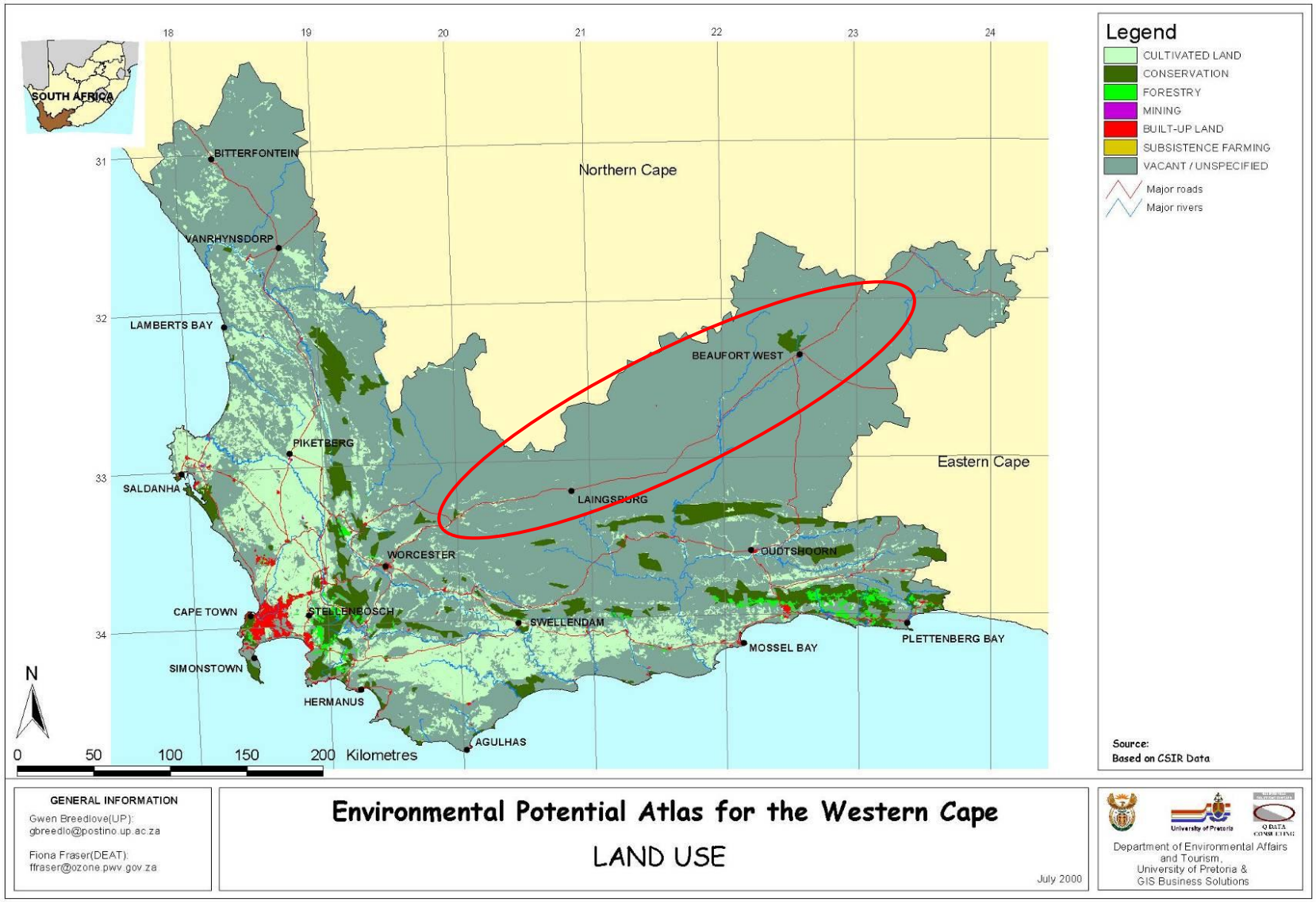

Figure 7: Dominant land use (www.environment.gov.za); larger area surrounding the locations of the proposed options are indicated with a red circle.

3.2 Biodiversity GIS (BGIS)

Although all available resources provided by the BGIS (www.bgis.sanbi.org) were taken into consideration, only the aspects applicable to the study area and surroundings are discussed below. It should be noted that some of the databases have been updated, however to ensure the most accurate conclusions could be drawn from the literature available, all available information is presented.

3.2.1 National Protected Areas Expansion Strategy (NPAES; 2008)

Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large protected areas. The focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the NPAES (2008). However, focus areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. Furthermore, focus areas are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities; fine scale planning is discussed in detail in section 3.4.6 (www.bgis.sanbi.org).

Option 3 traverses the Karoo National Park which is formally protected, option 2 traverses an informal protected area (Steenbokkie Private Nature Reserve) and all options traverse focus areas, refer to
Figure 8 below. However, if the main objective of focus areas is taken into consideration, focus areas adjacent to the Karoo National Park could be considered of higher importance, followed by the grouped focus areas in the centre and western portions of option 2 and 3.

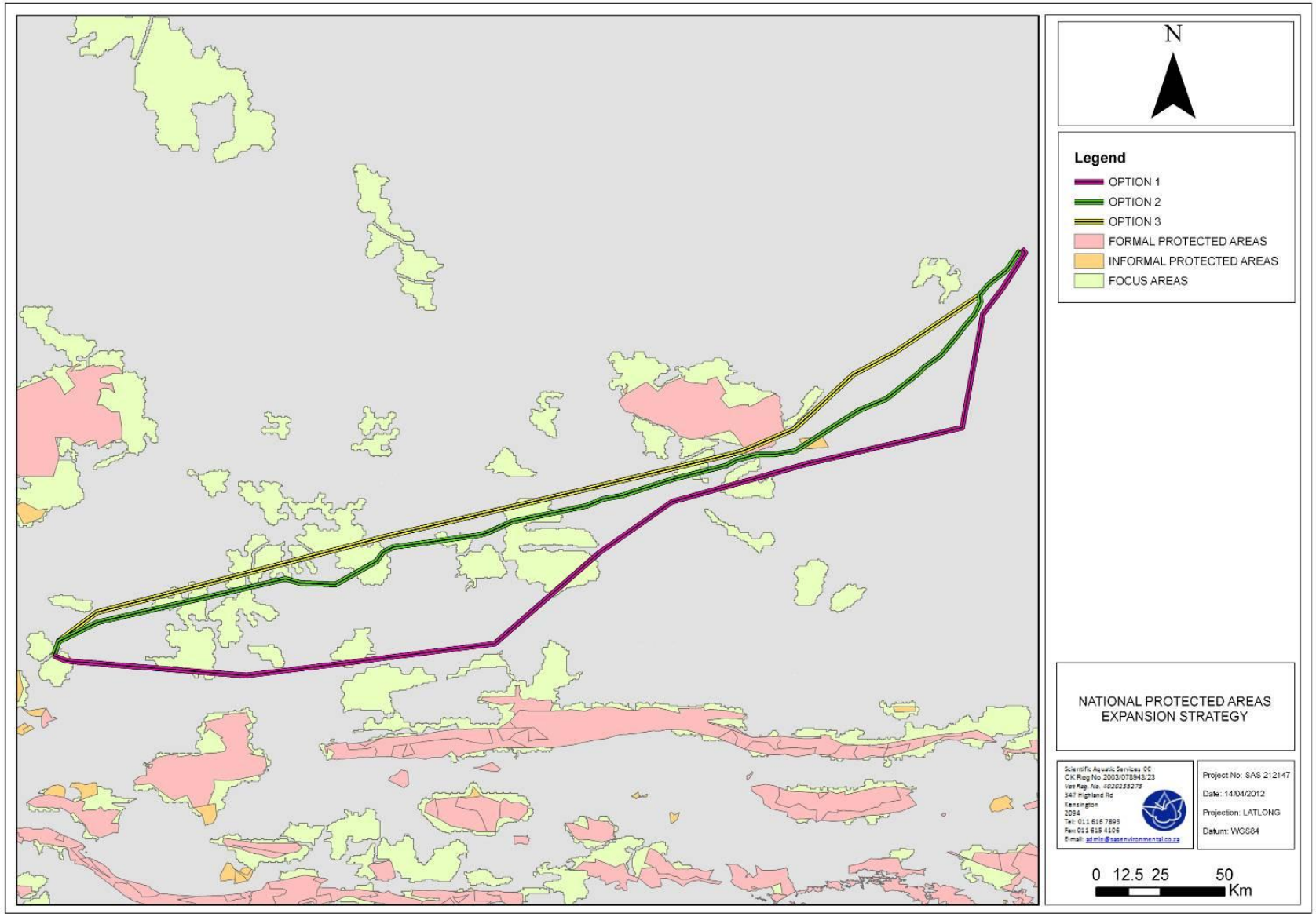

Figure 8: National Protected Areas Expansion Strategy (NPAES; 2008).

3.2.2 National Land Cover (2009)

Land cover and land use changes often indicate major impacts on biodiversity, especially if those changes show the loss of natural habitat due to urban sprawl, cultivation, etc. The land cover along each of the proposed options is depicted in Figure 9 below.

Land use predominately consists of natural veld, with isolated areas indicated as urban built up and cultivated areas. The main land use comprises of livestock or game farming and therefore less habitat transformation is expected than within regions utilised for crop cultivation.

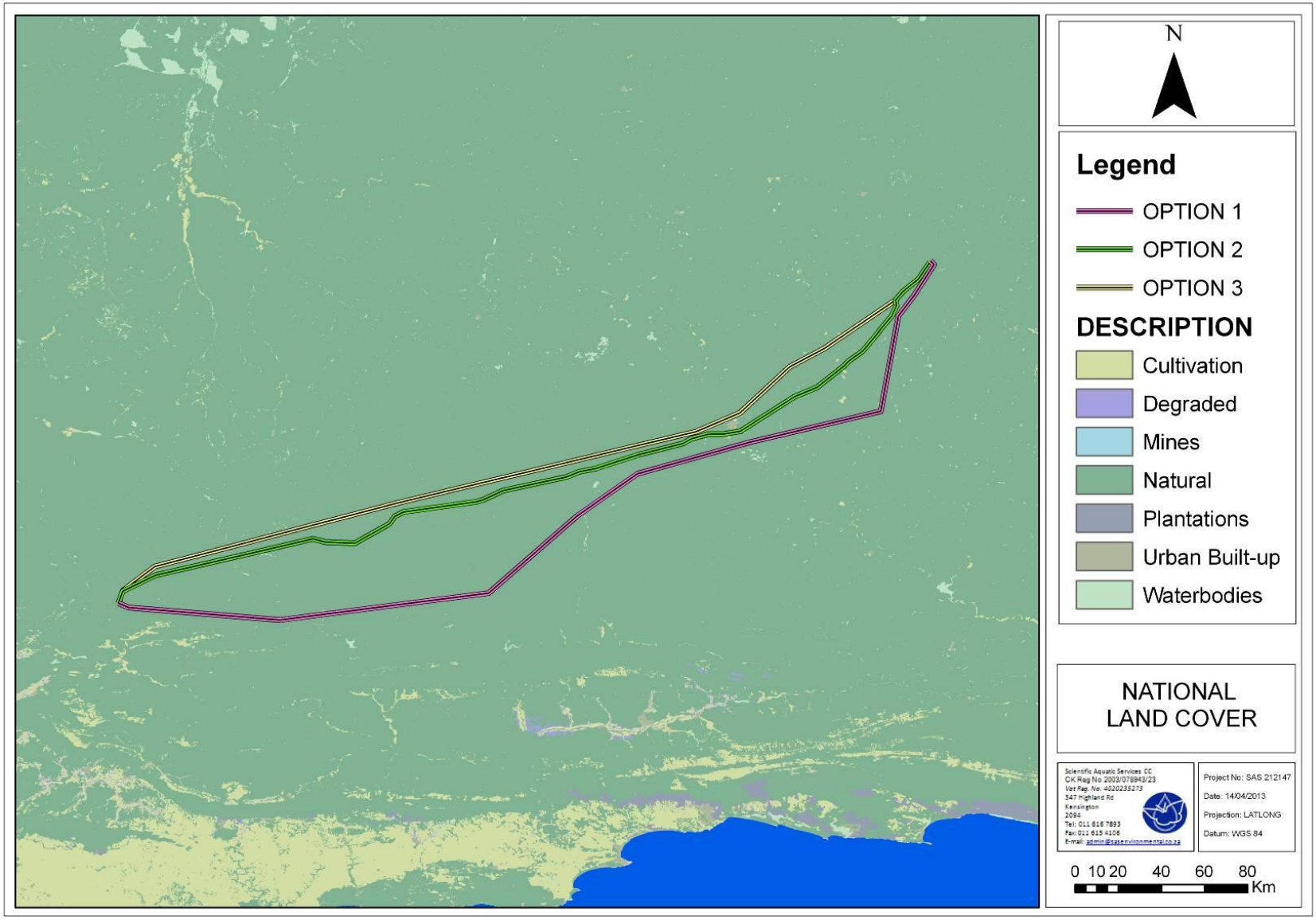

Figure 9: National land cover (2009) in relation to the proposed options.

3.2.3 National Spatial Biodiversity Assessment (NSBA; 2004)

The National List of Threatened Ecosystems (2011) and NBA (2011) follow on from the NSBA (2004) as a result it was not considered necessary to include the NSBA as part of the desktop study.

3.2.4 National Biodiversity Assessment (NBA; 2011)

The NBA (2011) includes a summary of spatial biodiversity priority areas that have been identified through systematic biodiversity plans at national, provincial and local levels (http://bgis.sanbi.org/NBA/project.asp); consisting of three primary aspects namely:

1) Ecosystem protection level (Figure 10): the proportion of each vegetation type protected relative to the biodiversity target;

2) Ecosystem threat status (Figure 11): degree to which ecosystems are still intact or alternatively losing vital aspects of the structure, function and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorized as critically endangered (CR), endangered (EN), vulnerable (VU) or least threatened (LT), based on the criteria listed in Table 3; and

Table 3: Ecosystem threat status criteria.

Criterion	CR	EN	VU
A1: Irreversible loss of natural habitat	Remaining natural habitat ≤ biodiversity target*	Remaining natural habitat ≤ (biodiversity target* + 15%)	Remaining natural habitat ≤ 60% of original area of ecosystem
A2: Ecosystem degradation and loss of integrity	≥ 60% of ecosystem significantly degraded	≥ 40% of ecosystem significantly degraded	≥ 20% of ecosystem significantly degraded
B: Rate of loss of natural habitat			
C: Limited extent and imminent threat	--	Ecosystem extent ≤ 3 000ha, and imminent threat	Ecosystem extent ≤ 6 000ha, and imminent threat
D1: Threatened plant species associations	≥ 80 threatened Red Data List plant species	≥ 60 threatened Red Data List plant species	≥ 40 threatened Red Data List plant species
D2: Threatened animal species associations			
E: Fragmentation			
F: Priority areas for meeting explicit	Very high irreplaceability and high	Very high irreplaceability and	Very high irreplaceability and

Criterion	CR	EN	VU
biodiversity targets as defined in a systematic biodiversity plan	threat	medium threat	low threat

3) Formal protected areas (Figure 12): land-based and marine protected areas that are recognised in terms of the Protected Areas Act (Act 57 of 2003). Formal protected areas are subdivided into either category A or B according to the table below.

Table 4: Formal A and Formal B protected areas.

Formal A Protected Areas	
Forest Act Protected Area	Specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998)
Island Reserve	A sub-set of provincial nature reserves, which are islands administered by provinces in terms of provincial legislation
Marine Protected Area	An area declared as a marine protected area in terms of section 43 of the Marine Living Resources Act, 1998 (Act No. 18 of 1998)
National Park	An area declared in terms of the National Parks Act, 1976 (Act No. 57 of 1976), or in terms of Section 20 of the Protected Areas Amendment Act, 2004 (Act No. 31, 2004), including private areas declared under this legislation
Other national protected area	A nature reserve other than a national park or special nature reserve, managed by a national organ of state or which falls under the jurisdiction of the Minister for any other reason
Provincial Nature Reserve	An area declared in terms of section 23 of Protected Areas Act, 2003 (No. 57 of 2003), or declared in terms of provincial legislation for conservation purposes, and which is managed by a provincial organ of state, including private areas declared under this legislation
Special nature reserve	An area which was a special nature reserve in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), or an area declared in terms of section 18 of Protected Areas Act, 2003 (No. 57 of 2003)

World Heritage Site	A world heritage site declared in terms of the World Heritage Convention Act, 1999 (Act No. 49 of 1999)
MPA	Marine Protected Area, usually associated with an adjacent terrestrial protected area and managed by the same agency.
Formal B Protected Areas	
Mountain Catchment Area	An area declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970)
Local Nature Reserve	A nature reserve which is managed by a municipality, potentially of undefined legal status
National Botanical Garden	A reserve managed by the South African National Botanical Institute

Large portions of all the options fall within vegetation types considered not protected or poorly protected relative to their biodiversity targets. However, all options are located within ecosystems that are still largely intact and therefore considered least threatened. As a result, none of the criteria listed in the table above are applicable. Only one protected area is indicated namely the Karoo National Park which is only traversed by option 3.

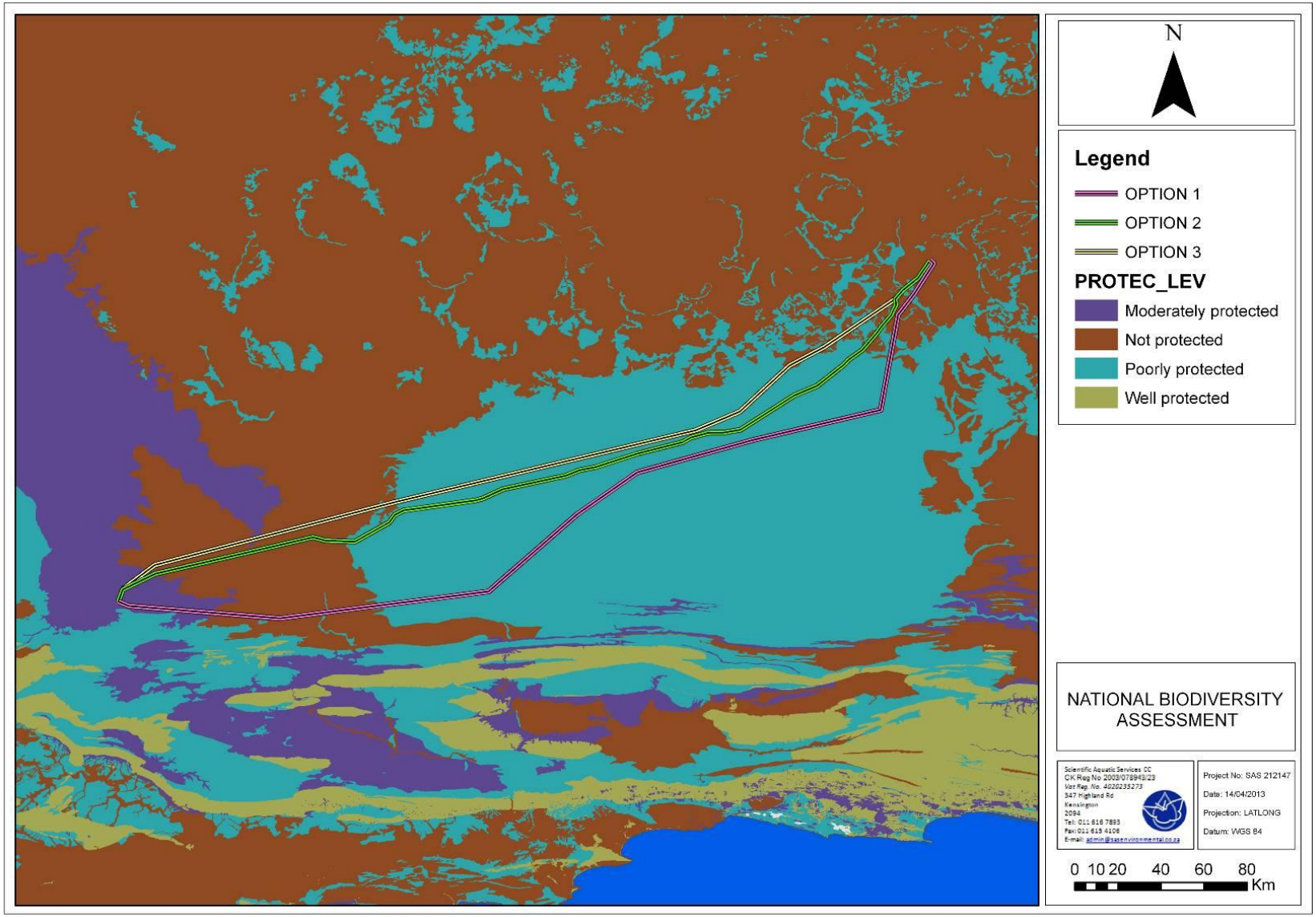

Figure 10: National Biodiversity Assessment (2011): Ecosystem Protection Level.

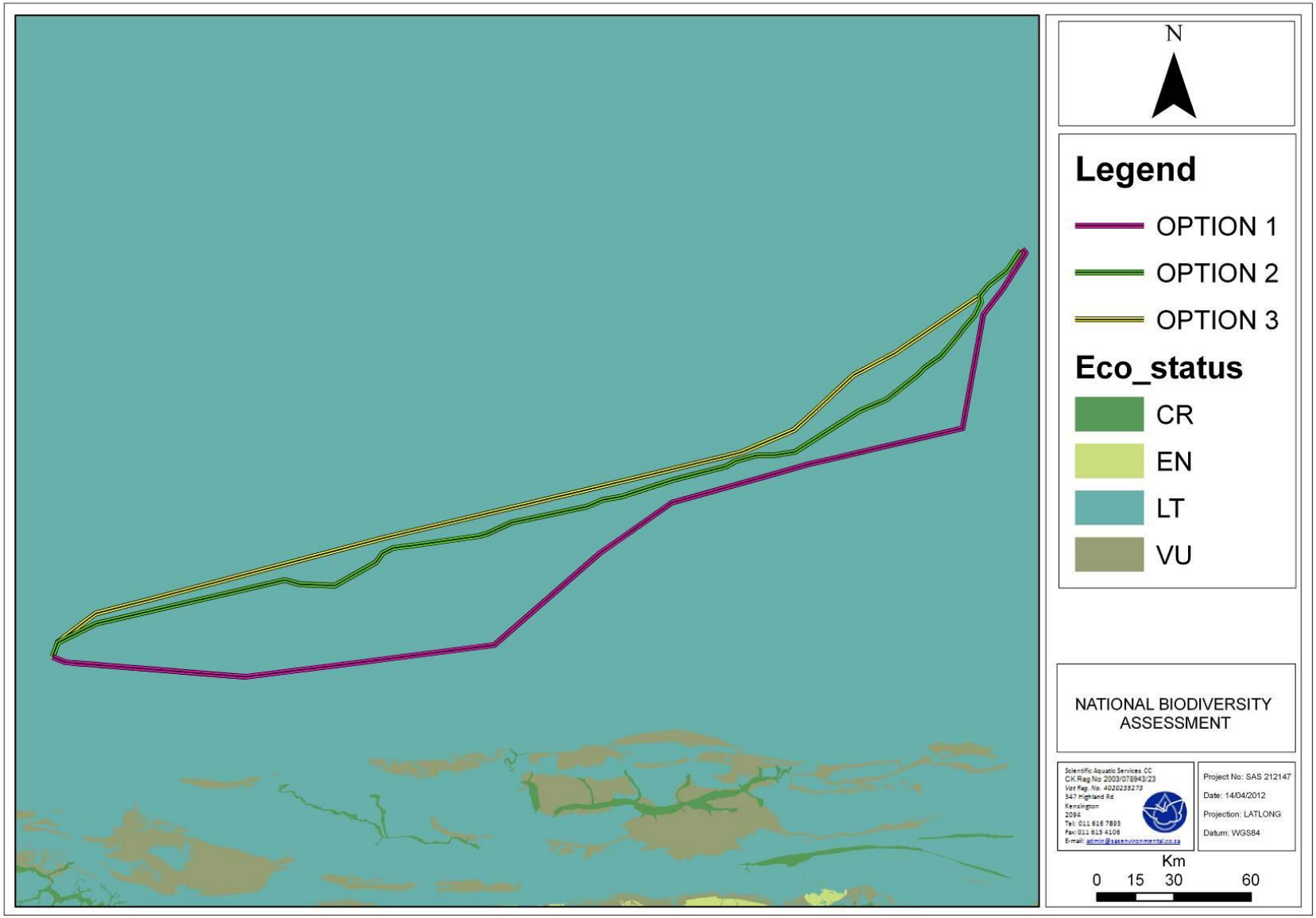

Figure 11: National Biodiversity Assessment (2011): Ecosystem Status.

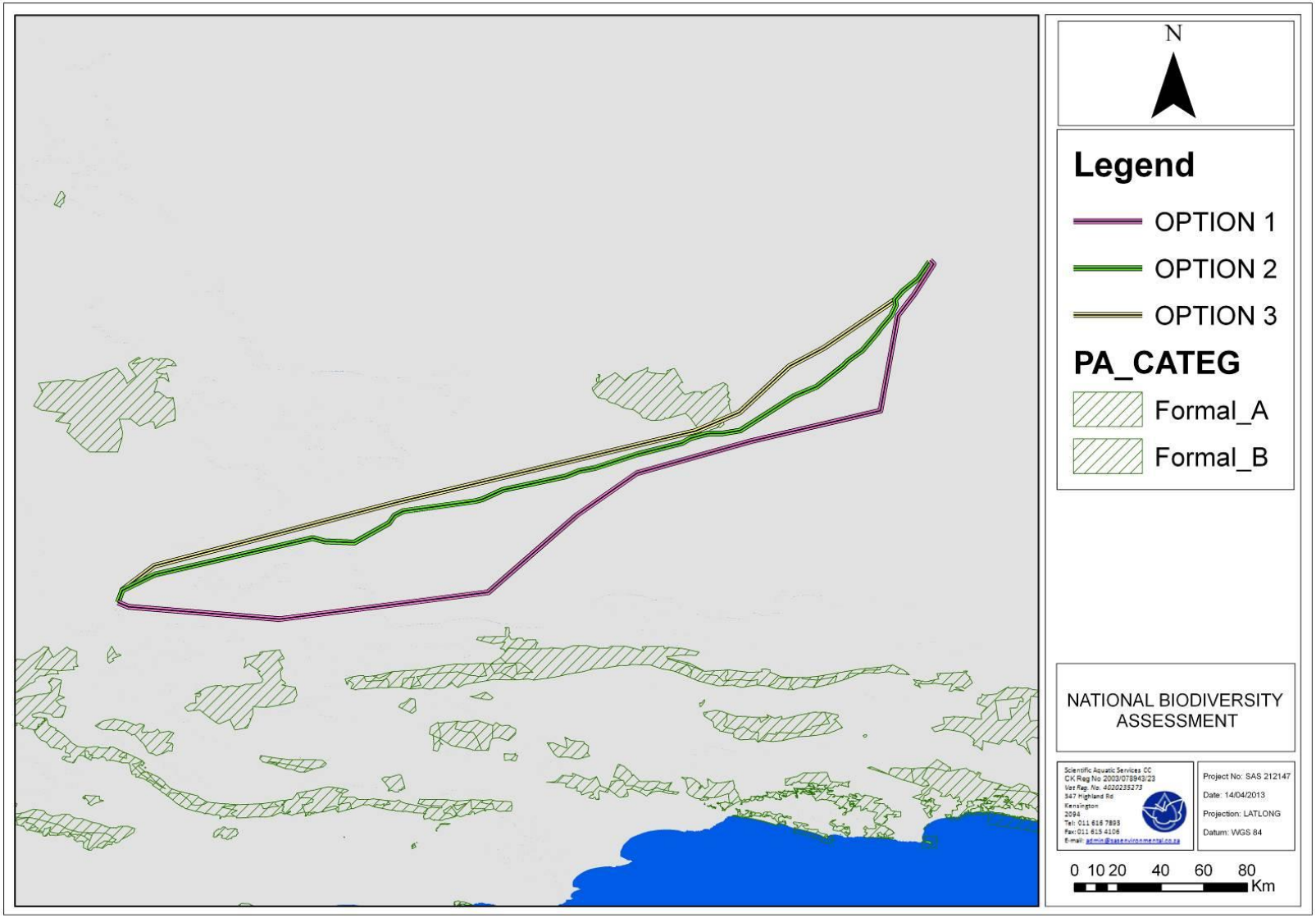

Figure 12: National Biodiversity Assessment (2011): Protected Areas.

3.2.5 National List of Threatened Terrestrial Ecosystems for South Africa (2011)

The Biodiversity Act (Act 10 of 2004) provides for listing of threatened or protected ecosystems. Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI, BGIS). It is important to note that while the original extent of each listed ecosystem has been mapped, a basic assessment report in terms of the EIA regulations is triggered only in remaining natural habitat (refer to Figure 13) within each ecosystem and not in portions of the ecosystem where natural habitat has already been irreversibly lost.

None of the options traverse a terrestrial ecosystem listed as “vulnerable”, “endangered” or “critically endangered”.

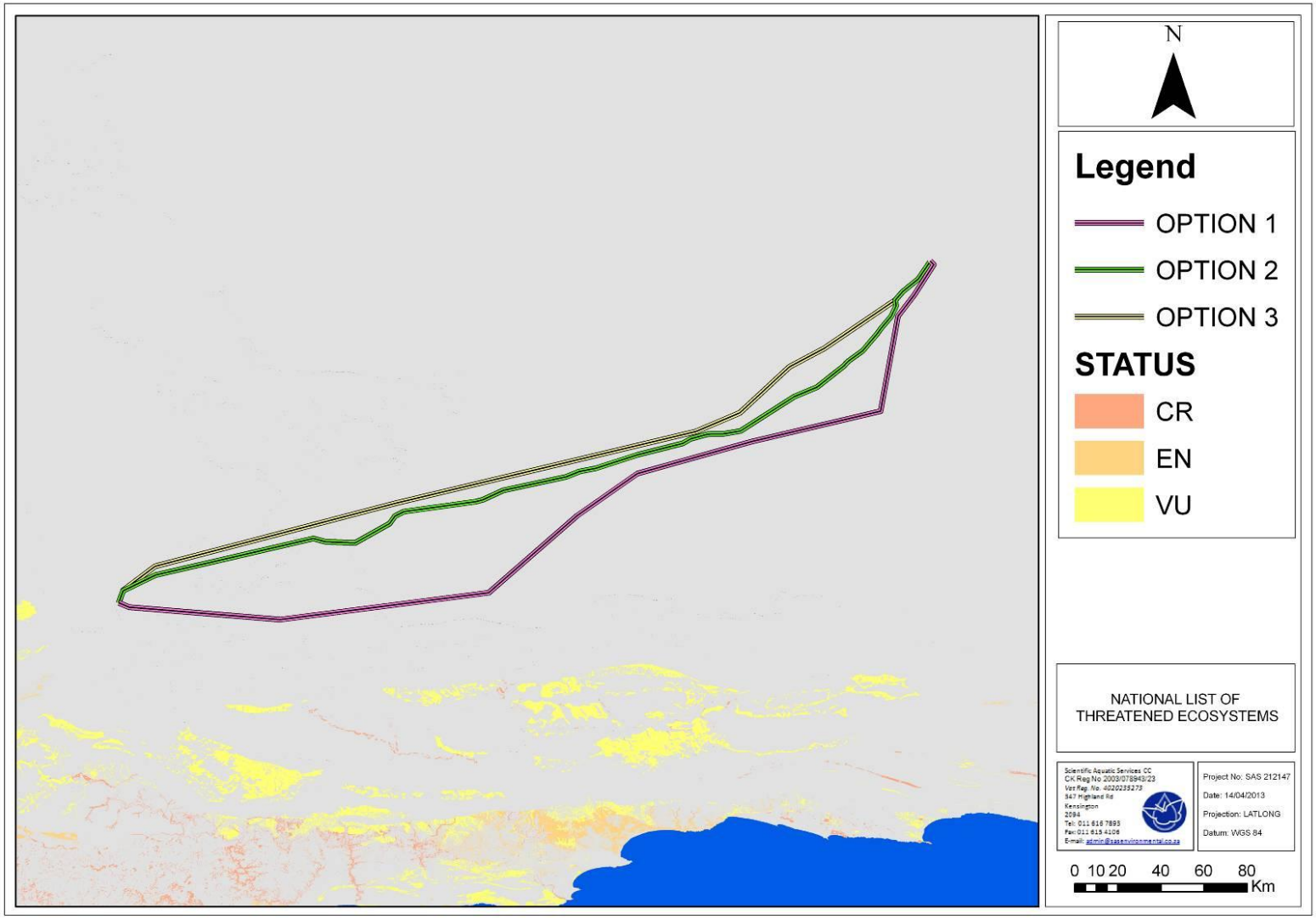

Figure 13: National list of threatened terrestrial ecosystems for South Africa (2011): National Vegetation Remaining.

3.2.6 Fine Scale Plans

The Critical Biodiversity Areas (CBA) map aims to guide sustainable development by providing a synthesis of biodiversity information to decision makers. The main CBA Map categories are CBAs (Terrestrial and Aquatic), Ecological Support Areas (Critical and Other), Other Natural Remaining Areas and No Natural Remaining Areas. The first two mentioned categories represent the biodiversity priority areas which should be maintained in a natural to near natural state. The last two mentioned categories are not considered as priority areas and a loss of biodiversity within these areas may be considered.

CBAs are indicated along all the proposed options, with option 1 traversing the smallest area of CBAs. Due to the number as well as extent of CBAs in the vicinity of the proposed options, it is considered unlikely that any of the options can be re-aligned to avoid areas indicated as CBAs.

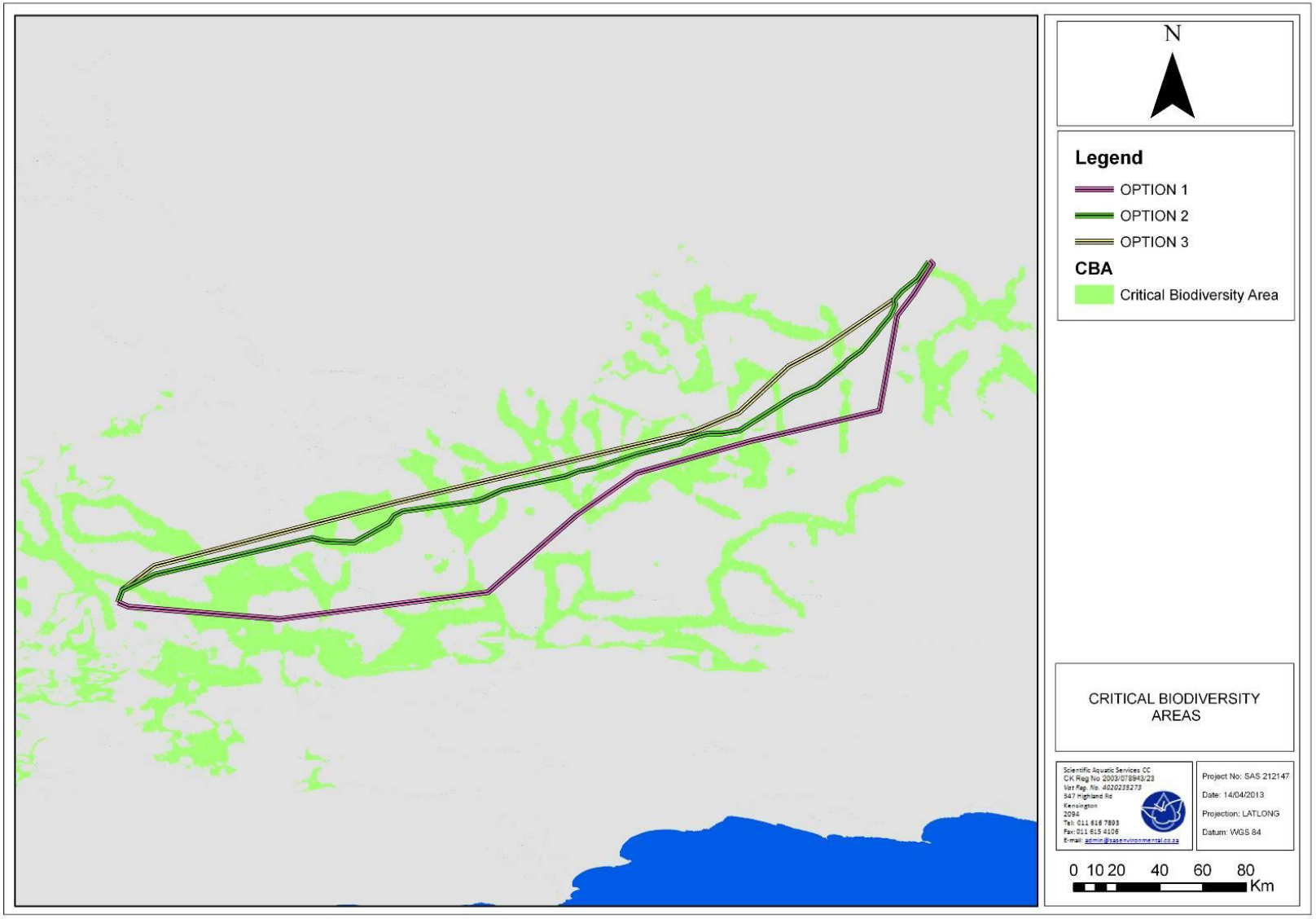

Figure 14: Terrestrial and Aquatic CBAs with buffers traversed by the different options.

4 FLORAL DESCRIPTION

4.1 Biome and Bioregion

Biomes are broad ecological units that represent major life zones extending over large natural areas (Rutherford 1997). The proposed options cross the *Succulent Karoo*, *Fynbo*s and *Nama Karoo Biomes* (Rutherford & Westfall, 1994). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic features, physical features and processes at a regional scale. The study area is situated within the *Upper Karoo, Lower Karoo, Rainshadow Valley Karoo* and *Karoo Renosterveld Bioregions* (Mucina & Rutherford, 2006) refer to Figure 16 below.

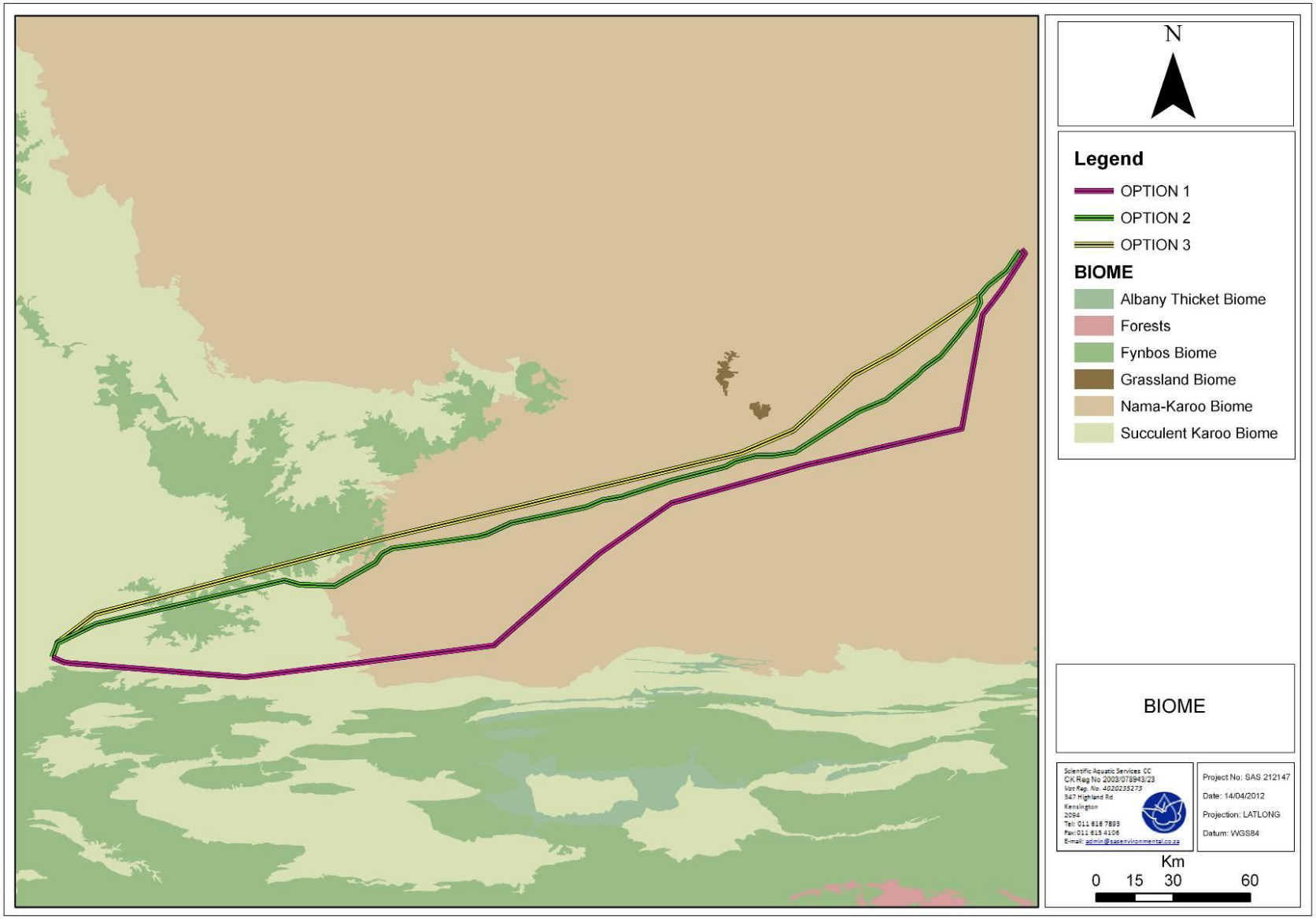

Figure 15: Biomes associated with the study area (Mucina & Rutherford, 2006).

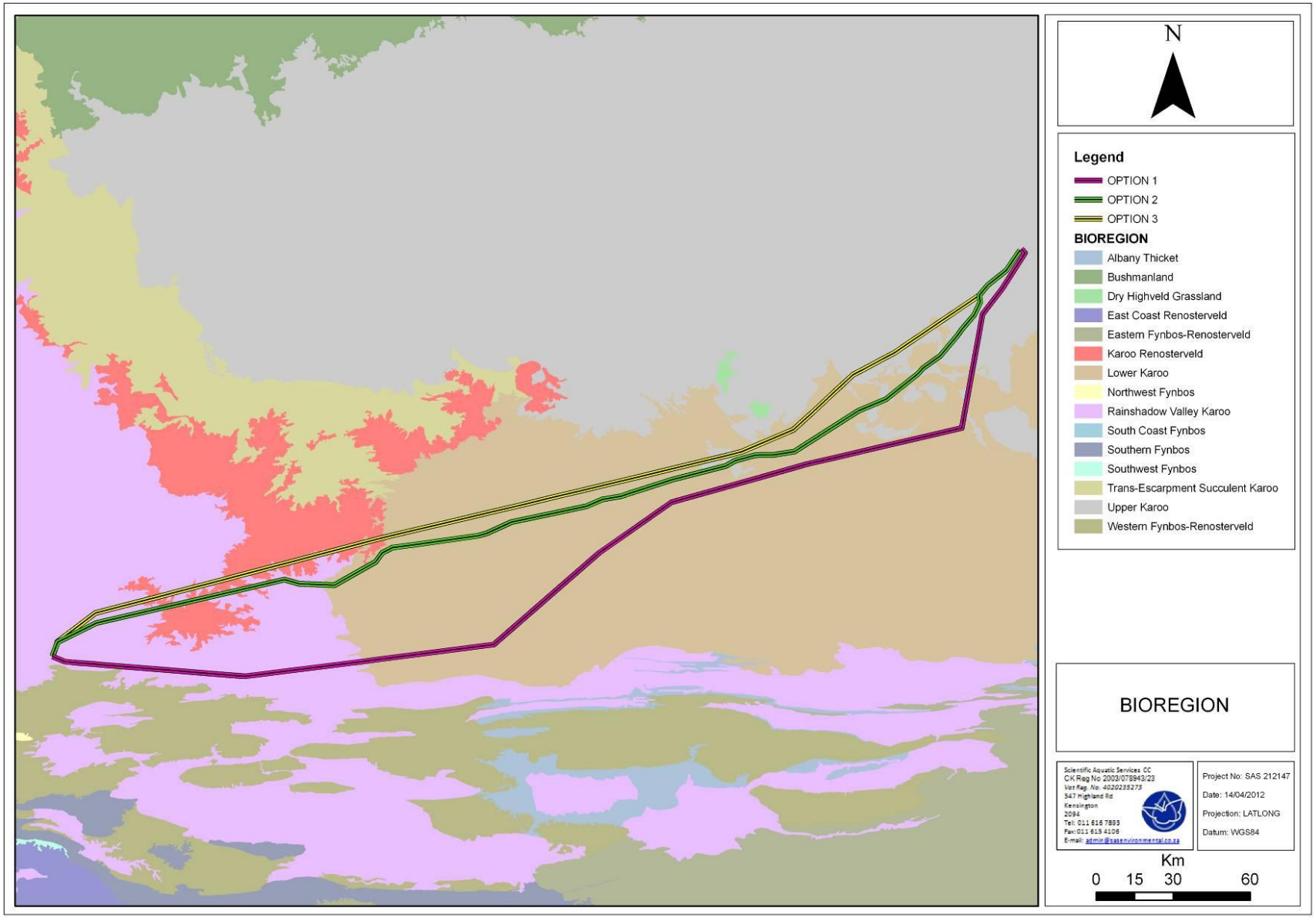

Figure 16: Bioregions associated with the study area (Mucina & Rutherford, 2006).

4.2 Vegetation Type and Landscape Characteristics

While biomes and bioregions are valuable as they describe broad ecological patterns, they provide limited information on the actual species that are expected to be found in an area. Knowing which vegetation type an area belongs to provides an indication of the floral composition that would be found if the assessment site was in a pristine condition. This can then be compared to the observed floral list and so gives an accurate and timely description of the ecological integrity of the proposed options. When the study area is superimposed on the vegetation types of the surrounding area (Figure 17), it is evident that the study area falls within nine vegetation types (Mucina & Rutherford, 2006). General characteristics pertaining to the nine vegetation types as well as the vegetation types traversed by each option are discussed in the sections that follow.

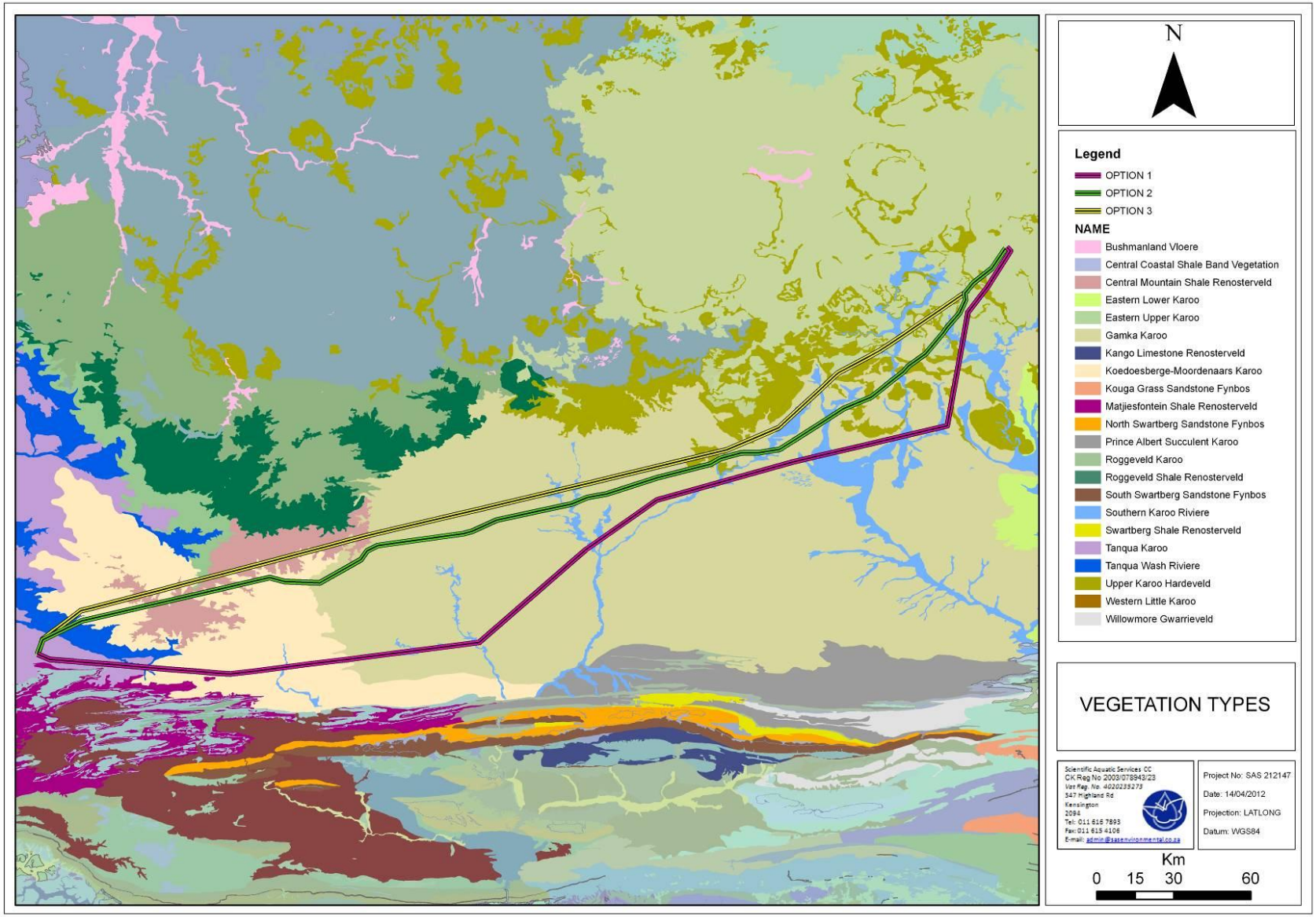

Figure 17: Vegetation types (Mucina & Rutherford, 2006).

Table 5: Vegetation types associated with the proposed transmission line options.

Vegetation Type	Vegetation and landscape features	Conservation	Option
Central Mountain Shale Renosterveld	Slopes and broad ridges of low mountains and escarpments, with tall shrubland dominated by Renosterbos and large suites of mainly non-succulent karoo shrubs and with a rich geophytic flora in the undergrowth or in more open, wetter and rocky habitats.	**Least threatened**. Conservation target of 27%. None conserved in statutory or private conservation areas. Only about 1% transformed. Erosion moderate.	2 3
Eastern Upper Karoo	Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the West, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Schrubland in the southeast), dominated by dwarf microphyllous shrubs, with "white" grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast.	**Least threatened**. Conservation target of 21%. Statutorily conserved in Mountain Zebra and Karoo National Parks as well as in Oviston, Commando drift, Rolfontein and Gariep dam Nature Reserves. About 2% of the unit has been transformed, largely due to building of dams (Gariep, Grassridge, Killowen, Kommandodrift, Kriegerspoort, Lake Arthur, Modderpoort, Schuil Hoek, Vanderkloof, Victoria West, Wonderboom and Zoetvlei). *Medicago laciniata* is a common and widespread alien plant. Erosion is moderate (60%) and high (38%). Veld managers perceive much of the Eastern Upper Karoo to be experiencing changes in species composition requiring high-priority action (Hoffman et al. 1999).	3
Gamka Karoo	Extremely irregular to slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g. *Chrysocoma ciliate, Eriocephalus ericoides*) with rare low trees (e.g. *Euclea undulata*). Dense stands of drought-resistant grasses (*Stipagrostis, Aristida*) cover (especially after abundant rains) broad sandy bottomlands.	**Least threatened**. Conservation target of 16%. About 2% statutorily conserved in the Karoo National Park and some in private reserves, such as Steenbokkie Private Nature Reserve (near Beaufort West). Only small part has undergone transformation. The alien *Salsola kali* is a serious infestation problem locally. Erosion is moderate (78%), low (11%) and high (4%).	1 2 3
Koedoesberge-Moordenaars Karoo	Slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of "white" grass visible on parts, the most conspicuous dominants being dwarf shrubs or *Pteronia, Drosanthemum* and *Galenia.*	**Least threatened**. Conservation target of 19%. Only a very small portion enjoying statutory conservation in the Gamkapoort Nature Reserve. Transformed only to a very small extent. No serious alien plant invasions recorded. Erosion is moderate (88%) and only to lesser extent high or very low.	1 2 3

Vegetation Type	Vegetation and landscape features	Conservation	Option
Southern Karoo Riviere	Narrow riverine flats supporting a complex of *Acacia karroo* or *Tamarix usneoides* thickets (up to 5m tall), and fringed by tall *Salsola*-dominated shrubland (up to 1,5m high), especially on heavier (and salt-laden) soils on very broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region (see Van der Walt 1980) may also contain *Leucosidea sericea, Rhamnus prinoides* and *Ehrharta erecta*.	**Lease threatened**. Conservation target of 24%. Only about 1.5% statutorily conserved in the Karoo National Park as well as in the Aberdeen, Bosberg, Commando drift, Gamkapoort and Karoo Nature Reserves and in about 10 private reserves, mainly set up for game farming. Some 12% transformed for cultivation and building of dams, including Beaufort West, Beervlei, De Hoop, Floriskraal, Kommandodrift, Lake Arthur, Leeu-Gamka, Mentz and Veanryneveldspas Dams. Frequent disturbance (floods, concentrated grazing pressure), and associated input of nutrients, increase vulnerability of these habitats to invasion of alien woody species such as *Agave americana, Opuntia* species, *Prosopis* species, *Salix babylonica* and *Schinus molle,* and forbs including *Atriplex eardleyae, A. lindleyi* subsp. *inflata, Cirsium vulgara, Salsola kali* and *Schkuhria pinnata.*	1 2 3
Tanqua Karoo	Slightly undulating intramountain basin sheltered by steep slopes of mountain ranges. The plain is interrupted by a series of solitary dolerite butts and elevated ridges, extensive, flat sheet washes and deeper incised channels of intermittent rivers (these habitats support vegetation of the Tanqua Wash Riviere). The plains are very sparsely vegetated (low succulent shrubland with *Ruschia, Drosanthemum, Aridaria, Augea, Zygophyllum*), in extreme precipitation-poor years appearing barren, while the slopes of the koppies and adjacent mountain piedmonts support well developed medium tall succulent *Euphorbia mamata - pteronia incana* shrubland. Small quartz patches occur in the southern Tanqua Basin. Annual flora (*Gazania lichtensteinii*, *Euryops annuus*, *Ursinia nana*) becomes conspicuous with sufficient precipitation, while geophytes and grasses play a subordinate role. *Stipagrostis ciliata* and *S. obtusa* can become locally dominant in places.	**Least Threatened.** Conservation target of 19%. About 10% statutorily conserved in the Tankwa Karoo National Park and a further 4% in private reserves, including Inverdoorn, Zwartbosch, Jakkalsfontein, Basjanskloof, Groote Kapelsfontein, Uitjieskraal and Vaalkloof. Only a small portion of this area of low agricultural production has been transformed but due to overgrazing in some places, aliens such as *Atriplex lindleyi* subsp. *inflata* have invaded. Erosion is moderate (47%), high (36%) as well as very low (14%.	1 2 3

Vegetation Type	Vegetation and landscape features	Conservation	Option
Tanqua Wash Riviere	Deeply incised valleys (Sometimes several hundred metres broad) of intermittent rivers supporting a mosaic of succulent shrublands with *Solsola* and *Lycium* alternating with *Acacia karroo* gallery thickets. The broad sheet-wash plains support sparse vegetation of various *Salsola* species, often building phytogenic hillocks interrupting the monotonous barren fact of a sheet wash. Occasional rainfalls in early winter result in localised displays of annuals and early flowering geophytes along washes.	**Lease threatened**. Conservation target of 19%. About 13% statutorily conserved in the Tankwa National Park and in some private reserves (Inverdoorn, Jakkalsfontein, Uintjieskraal, Groote Kapelsfontein, Vaalkloof). About 3% already transformed for cultivation or dam building (Oudebaaskraal Dam and Swartkop se Dam. Alien *Atriplex lindleyi* subsp. *inflata* and *Prosopis* species and become frequent in places.	1 2 3
Upper Karoo Hardeveld	Steep slopes of koppies, butts, mesas and parts of the Great Escarpment covered with large boulders and stones supporting sparse dwarf Karoo scrub with drought tolerant grasses of genera such as *Aristida, Eragrostis* and *Stipagrostis*.	**Least threatened**. Conservation target of 21%. Only about 3% statutorily conserved in Karoo National Park and Karoo Nature Reserve. Small percentage also protected in private reserves such as Rupert Game Farm. Erosion is moderate (64%) and high (2%).	1 2 3

4.3 Species of Conservation Concern (SCC)

An assessment considering the presence of any SCC, as well as suitable habitat to support any such species, was undertaken at representative sites assessed within the pre-selected segments of interest. The complete PRECIS list for the grid references applicable were obtained from SANBI. The total number of plants listed as near threatened, threatened, critically endangered within each QDS as well as alternatives are indicated in the table below.

Table 6: SCC documented within each QDS

QDS	Number	Option
3123CB	0	1 2 3
3123CC	0	1 2
3123CD	0	1 2 3
3223AA	0	1 3
3220CC	3 Rare 1 Data deficient –Taxonomically problematic	1 2
3220DC	3 Vulnerable 2 Rare 1 Data deficient –Taxonomically problematic	
3222AD	1 Vulnerable	1 2
3222BA	1 Vulnerable 6 Rare	2
3222BB	0	1 2
3222BC	1 Vulnerable 1 Near threatened 6 Rare 1 Data deficient – Insufficiently known 1 Data deficient –Taxonomically problematic	1 2 3
3222BD	2 Rare	1 3
3222CA	0	1 3
3222CB	1 Vulnerable	3
3221CB	1 Data deficient – Insufficiently known	1 2
3221CA	2 Rare 1 Data deficient – Insufficiently known	1 2
3221CC	1 Endangered 1 Rare 1 Data deficient –Taxonomically problematic	1
3221BA	1 Vulnerable 1 Near threatened 2 Rare	3
3221BD	0	2
3222AC	0	1

QDS	Number	Option
		2 3
3221DA	1 Vulnerable 1 Data deficient – Insufficiently known 2 Data deficient –Taxonomically problematic	1 2
3221DB	0	1 2 3
3221DC	2 Endangered 2 Vulnerable 1 Near threatened 3 Rare 1 Declining 1 Data deficient – Insufficiently known 1 Data deficient –Taxonomically problematic	3
3221DD	1 Vulnerable	3
3321AA	2 Data deficient –Taxonomically problematic	3
3321AB	1 Data deficient – Insufficiently known	3
3320BA	1 Critically endangered 1 Endangered 7 Vulnerable 5 Near threatened 15 Rare 3 Data deficient – Insufficiently known 7 Data deficient –Taxonomically problematic	3
3320BB	1 Endangered 1 Vulnerable 3 Near threatened 1 Rare 3 Data deficient – Insufficiently known 2 Data deficient –Taxonomically problematic	3
3320AB	3 Endangered 5 Vulnerable 3 Near threatened 2 Rare 2 Data deficient – Insufficiently known	3
3320AA	1 Vulnerable 2 Near threatened 2 Rare 2 Endangered	1 2 3
3220CD	2 Critically endangered 4 Critically rare 3 Declining 11 Endangered 1 Threatened 15 Vulnerable 14 Near threatened 40 Rare 4 Data deficient – Insufficiently known 7 Data deficient –Taxonomically problematic	1 2
3220DD	1 Rare 1 Data deficient – Insufficiently known	1 2

Table 7: South African Red List Categories[8]

Category	Definition
Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died.
Critically endangered – possibly extinct	Taxa on the balance of evidence, likely to be extinct, but for which there is small chance that they may still be extant.
Critically endangered	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five IUCN criteria* for Critically Endangered, and is therefore facing an extremely high risk of extinction in the wild.
Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the five IUCN criteria* for Endangered, and is therefore facing a very high risk of extinction in the wild.
Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five IUCN criteria* for Vulnerable and is therefore facing a high risk of extinction in the wild.
Near threatened	A taxon is Near threatened when available evidence indicates that it nearly meets any of the five IUCN criteria* for Vulnerable, and is therefore likely to qualify for a threatened category in the near future.
Critically rare	A taxon is Critically Rare when it is known to occur only at a single site, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
Rare	A taxon is Rare when it meets any of the South African criteria for rarity, but is not exposed to any direct plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria*.
Declining	A taxon is Declining when it does not meet any of the five IUCN criteria* and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.
Data Deficient- Insufficiently known	A taxon is DDD when there is inadequate information to make an assessment of its risk of extinction, but the taxon is well defined. Data Deficient is not a category of threat, However, listing of taxa in this category indicated that more information is required that future research could show that a threatened classification is appropriate.
Data Deficient – Taxonomically Problematic	A taxon is DDT when taxonomic problems hinder its distribution range and habitat form being well defined, so that an assessment of risk of extinction is not possible.
Threatened	Taxa that is likely to be threatened, but have been brought to the attention of the Threatened Species Programme too late for full assessments to be included in this publication (2009).

*Broadly the five IUCN criteria's can be summarised as species a) with a rapid population reduction in relation to the life history of the taxon b) Small geographic range and decline, population fluctuation or fragmentation c) Small population size and decline d) very small population size or very restricted range e) quantitative analysis.

4.4 Custodian of Rare and Endangered Wildflowers

CREW, the Custodians of Rare and Endangered Wildflowers, is a programme that involves volunteers from the public in the monitoring and conservation of South Africa's threatened plants. The programme is a partnership between the SANBI, Botanical Society of South Africa and the Kwa-Zulu Natal Biodiversity Stewardship Programme. CREW aims to capacitate a network of volunteers from a range of socio-economic backgrounds

[8] Raimondo *et al*., 2009

to monitor and conserve South Africa's threatened plant species. The programme links volunteers with their local conservation agencies and particularly with local land stewardship initiatives to ensure the conservation of key sites for threatened plant species. Since the inception of the CREW programme in 2003, CREW has discovered 24 new species, rediscovered 14 species and collected data on 1030 species of conservation concern. CREW localities are indicated in relation to each of the options (refer to Figure 18). It should however be noted that extensive portions of the options are located within inaccessible areas that have not been surveyed. Therefore, the CREW localities were used to inform the floral study however they are not considered comprehensive.

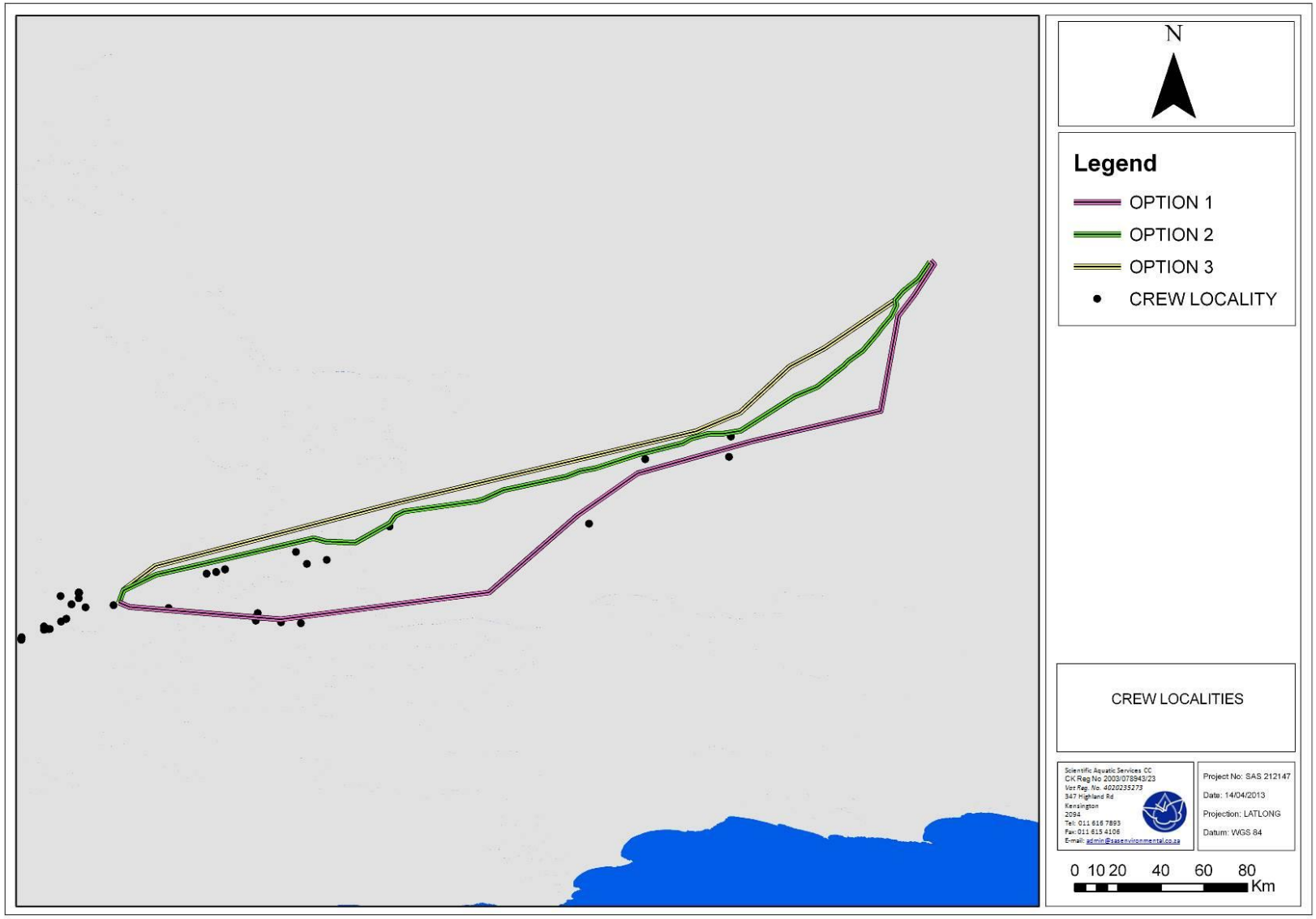

Figure 18: CREW localities along each proposed option.

4.5 Alien Vegetation

Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin but, as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively growing species within the ecosystem. Therefore, they are often the most dominant and noticeable within an area. Disturbances of the ground through trampling, excavations or landscaping often leads to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process, however, takes many years to occur, with the natural vegetation never reaching the balanced, pristine species composition prior to the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively growing exotic counterparts.

Alien vegetation invasion causes degradation of the ecological integrity of an area, causing (Bromilow, 2001):

- A decline in species diversity;
- Local extinction of indigenous species;
- Ecological imbalance;
- Decreased productivity of grazing pastures; and
- Increased agricultural input costs.

It is expected that alien vegetation will proliferate within areas disturbed after construction activities and to a lesser degree after maintenance activities, it is therefore considered of importance that alien vegetation be eradicated and managed during all phases of the proposed transmission line development. Dominant exotic floral species documented for the regions traversed by the proposed options include *Argemone ochroleuca*, *Atriplex lindleyi*, *Atriplex nummularia*, *Cirsium vulgare*, *Datura ferrox*, *Stipa trichotoma*, *Pennisetum setaceum*, *Arundo donax*, *Agave sisalana*, *Cereus jamacaru*, *Opuntia ficus-indica*, *Opuntia imbricata*, *Echinopsis spachiana*, *Harissia martinii*, *Tephrocactus articulatus*, *Acacia mearnsii*, *Eucalyptus camaldulensis*, *Leucaena leucocephala*, *Populus* x *canescens*, *Prosopis* sp., *Schinus molle*, *Tamarix ramosissima*, *Nerium oleander*, and *Nicoteana glauca*.

5 FAUNAL DESCRIPTION

5.1 Western Cape Province

The high diversity of topographic and edaphic characteristics within the Western Cape Province (WCP) resulted in the formation of unique habitat unit's each supporting very high numbers of

endemic faunal species (Western Cape State of Biodiversity, 2012). However, due to habitat diversity being extremely high, the extent of each habitat unit is restricted. Therefore, loss of habitat will inevitably result in loss of endemic species; rationalising the amount of faunal species presently considered threatened within the province. The Fine Scale Maps depicting the extent and locality of aquatic and terrestrial CBAs are one mechanism used to combat excessive loss of habitat, discussed in section 3.4.6 of this document.

5.1.1 Mammals

The WCP has 172 described mammal taxa (species and subspecies). Of these, 19 are Threatened listed in the South African Red Data Book, based on regional assessments. Three are Critically Endangered, four are Endangered, ten are Vulnerable and 18 are Near Threatened (Western Cape State of Biodiversity Report, 2012). Furthermore, an estimated eleven species have already become extinct in the province (State of the Environment, SoER; 2004).

A complete list of mammal taxa known to occur within the WCP with regional and global threat categories is available in Appendix A and species listed as endemic to the WCP are listed in the table below.

Table 8: Mammal species endemic to the WCP (Western Cape State of Biodiversity Report, 2012)

Species endemic to the WCP	
Acomys subspinosus	Cape spiny mouse
Amblysomus corriae devilliersii	Fynbos golden mole (West)
Bathyergus suillus C	ape dune molerat
Cryptochloris zyli	Van Zyl's golden mole
Damaliscus pygargus pygargus	bontebok
Dasymys capensis	Cape water rat
Hippotragus leucophaeus	blue antelope (extinct)
Myosorex longicaudatus boosmani	Boosmansbos long-tailed forest shrew
Tatera afra	Cape gerbil
Species near endemic to the WCP	
Amblysomus corriae corriae	Fynbos golden mole (East)
Bunolagus monticularis	riverine rabbit
Chlorotalpa duthieae	Duthie's golden mole
Chrysochloris asiatica	Cape golden mole
Equus zebra zebra	Cape Mountain zebra
Eremitalpa granti granti	Grant's golden mole
Georychus capensis	Cape molerat
Myomyscus verreauxi	Verreaux's mouse
Myosorex longicaudatus longicaudatus	Knysna long-tailed forest shrew
Raphicerus melanotis	Cape grysbok

The Animal Demography Unit at University of Cape Town and the Mammal Research Institute at the University of Pretoria are collaborating to develop the Mammal Atlas of Africa (MammalMAP). A list of threatened mammal species expected within the full degrees 3123,

3220, 3222, 3221 and 3320 was obtained from the MammalMAP and are listed in the table below, a list all mammal species for the full degrees is included in Appendix A.

Table 9: Expected mammal species considered threatened within the full degrees 3123, 3220, 3222, 3221 and 3320 as supplied by MammalMAP.

Genus	Species	Sub species	Common name	Threat status
Damaliscus	*pygargus*	*pygargus*	Bontebok	Vulnerable
Equus	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable
Acinonyx	*jubatus*		Cheetah	Vulnerable
Panthera	*leo*		Lion	Vulnerable
Hyaena	*brunnea*		Brown Hyaena	Near Threatened
Bunolagus	*monticularis*		Riverine Rabbit	Critically Endangered
Mellivora	*capensis*		Honey Badger	Near Threatened

5.1.2 Amphibians

The WCP has 54 described frog species. Of these, some are critically endangered (*Microbatrachella capensis;* micro frog and *Heleophryne rosei;* Table Mountain Ghost frog; SoER, 2004), four are endangered, one is vulnerable, six are near threatened and at least three remain to be described as new species and have their threat status formally evaluated. More than half of the frogs in the WCP are endemic to this province. The threats to amphibians in the WCP are habitat loss, invasive alien plant species encroachment, too frequent and intense fires and emergent diseases (Western Cape State of Biodiversity, 2012).

A complete list of frog species known to occur in the WCP with South African and IUCN Red List status is available in Appendix A and the endemic species are listed in the table below.

Table 10: Amphibian species endemic to the WCP (Western Cape State of Biodiversity Report, 2012)

Scientific Name	Common Name
Amietia vandijki	Van Dijk's river frog
Arthroleptella bicolor	Bainskloof moss frog
Arthroleptella drewesii	Drewes' moss frog
Arthroleptella landdrosia	Landdros moss frog
Arthroleptella lightfooti	Lightfoot's moss frog
Arthroleptella rugosa	rough moss frog
Arthroleptella subvoce	northern moss frog
Arthroleptella villiersi	De Villiers' moss frog
Breviceps acutirostris	strawberry rain frog
Breviceps gibbosus	Cape rain frog
Breviceps montanus	Cape mountain rain frog
Breviceps rosei	sand rain frog
Vandijkophrynus angusticeps	sand toad
Amietophrynus pantherinus	western leopard toad
Cacosternum capense	Cape caco
Cacosternum karooicum	Karoo caco
Cacosternum platys	flat caco

Scientific Name	Common Name
Capensibufo rosei	Rose's mountain toad
Capensibufo tradouwi	Tradouw mountain toad
Heleophryne orientalis	eastern ghost frog
Heleophryne purcelli	Cape ghost frog
Heleophryne regis	southern ghost frog
Heleophryne rosei	Table Mountain ghost frog
Hyperolius horstockii	arum lily frog
Microbatrachella capensis	micro frog
Poyntonia paludicola	montane marsh frog
Strongylopus bonaespei	banded stream frog
Xenopus gilli	Cape platanna

According to a map of amphibian endemism of the WCP (Western Cape State of Biodiversity Report, 2012), the proposed options fall within QDSs which host a number of endemic amphibian species with the number of amphibians expected decreasing towards the east.

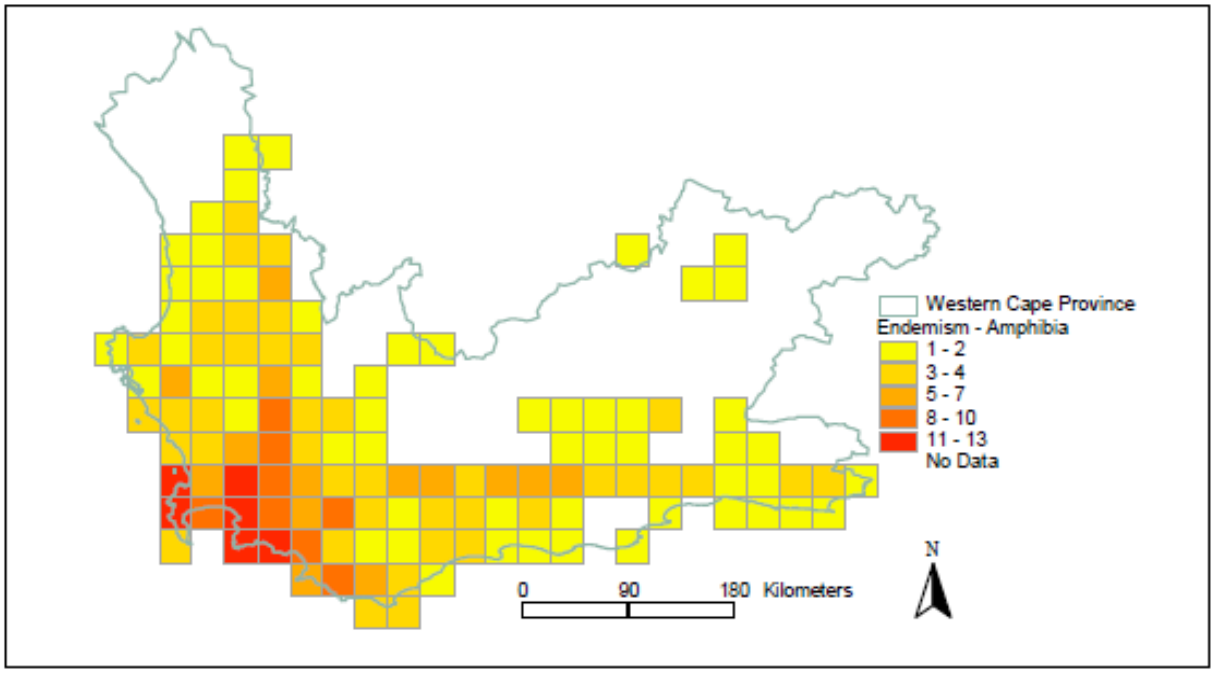

Figure 19: Map indicating amphibian endemism for each quarter degree in the Western Cape Province, (Western Cape State of Biodiversity Report, 2012).

The Southern African Frog Atlas Project (SAFAP) aims to build on the distribution data collected during seven years of fieldwork (1996-2003), as well as earlier data compiled from museum records, private collections, and the literature and conservation agencies. A list of amphibian species expected within the full degrees 3123, 3220, 3222, 3221 and 3320 obtained from SAFAP is included in Appendix A. None of the species listed are considered threatened.

5.1.3 Reptiles

One hundred and fifty-three reptile species and subspecies have been recorded in the WCP. Of these, twenty two are endemic to the WCP and eight species are alien to the WCP. Of the

indigenous species, one is critically endangered, one is endangered, nine are vulnerable, fifteen are near threatened and at least seven remain to be described as new species and have their threat status formally evaluated. Many reptiles do not respond well to human activities and habitat transformation and the number of threatened reptile species is increasing with increasing land transformation and habitat fragmentation in the WCP.

A complete list of reptile species known to occur in the WCP with South African and IUCN Red List status is available in Appendix A and the endemic species are listed in the table below.

Table 11: Reptile species endemic to the WCP (Western Cape State of Biodiversity Report, 2012)

Scientific name	Common name
Afroedura hawequensis Hawequa	flat gecko
Afrogecko swartbergensis	Swartberg African leaf-toed gecko
Australolacerta australis	southern rock lizard
Bitis armata	southern adder
Bitis rubida	red adder
Bradypodion atromontanum	Swartberg dwarf chameleon
Bradypodion damaranum	Knysna dwarf chameleon
Bradypodion gutturale	Robertson dwarf chameleon
Bradypodion pumilum	Cape dwarf chameleon
Cordylus minor	dwarf girdled lizard
Cordylus niger	black girdled lizard
Cordylus oelofseni	Oelofsen's girdled lizard
Goggia braacki	Braack's dwarf leaf-toed gecko
Goggia microlepidota	small-scaled leaf-toed gecko
Hemicordylus capensis	graceful crag lizard
Hemicordylus nebulosus	dwarf crag Lizard
Microacontias lineatus grayi	striped legless skink
Psammobates geometricus	geometric tortoise
Scelotes bipes	silvery dwarf burrowing skink
Scelotes gronovii	Gronovi's dwarf burrowing skink
Scelotes kasneri	Kasner's dwarf burrowing skink
Scelotes montispectus	Tableview dwarf burrowing skink

According to a map of reptile endemism of the WCP (Western Cape State of Biodiversity Report, 2012), the proposed options fall within QDSs that are known to host 1 to 2 endemic reptile species.

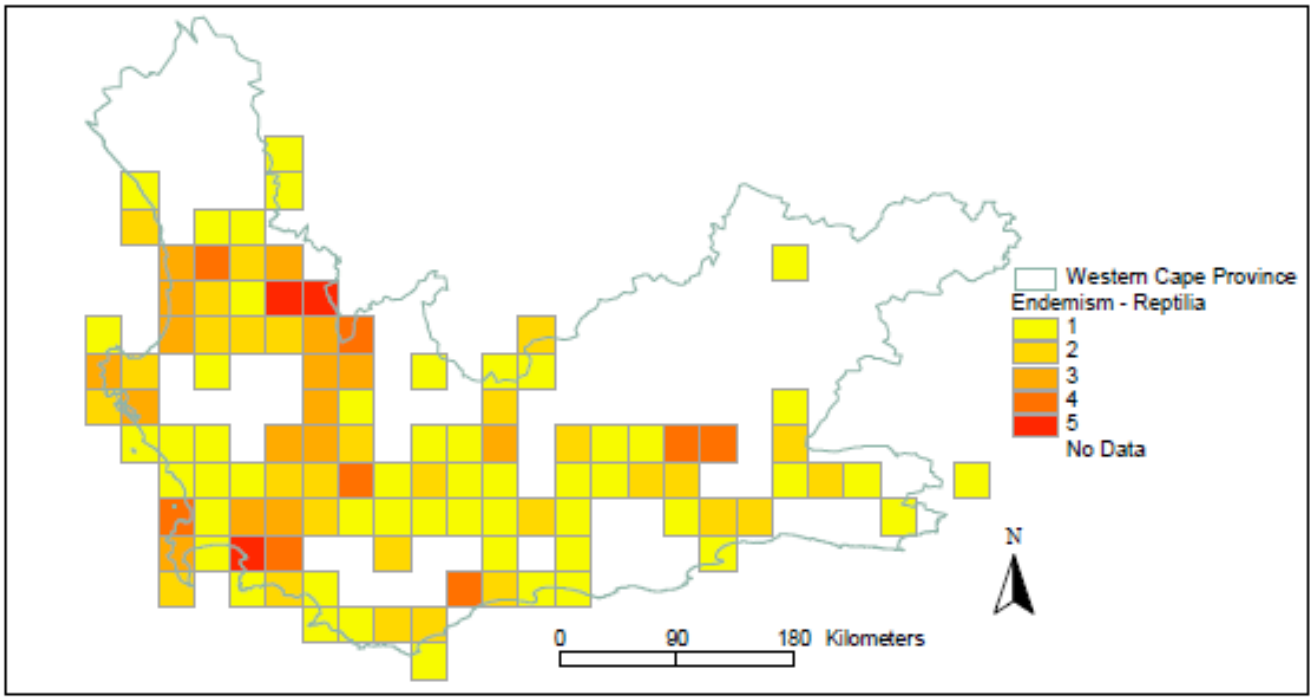

Figure 20: Map indicating reptile endemism for each quarter degree in the Western Cape Province (Western Cape State of Biodiversity Report, 2012).

ReptileMAP is the continuation of the Southern African Reptile Conservation Assessment (SARCA). It aims to improve our understanding of the diversity and distribution of reptiles in South Africa, Lesotho and Swaziland, and thereby making an improvement in the conservation status of these reptiles possible. A list of threatened reptile species expected within the full degrees 3123, 3220, 3222, 3221 and 3320 was obtained from SARCA and is listed in the table below, a list of all SARCA species for the full degrees are included in Appendix A.

Table 12: Expected threatened reptile species list for the full degrees 3123, 3220, 3222, 3221 and 3320 supplied by the SARCA Database.

Genus	Species	Common name	Threat status
Lamprophis	*fiskii*	Fisk's House Snake	Vulnerable
Ouroborus	*cataphractus*	Armadillo Girdled Lizard	Vulnerable
Gerrhosaurus	*typicus*	Karoo Plated Lizard	Lower Risk: Near Threatened
Australolacerta	*australis*	Southern Rock Lizard	Lower Risk: Least Concern

5.1.4 Status of Invertebrates, Scorpions and Spiders

To date, the insect species richness of the WCP has not been adequately established and there have not been any major co-ordinated efforts to carry out Red List assessment of invertebrate taxa in South Africa. Considering the high levels of plant endemism in the Cape Floristic Region (CFR), similar levels of insect endemism might be expected. However, given the incomplete

knowledge of the arthropod diversity in the Western Cape, it is very difficult to establish endemism of the group.

5.1.5 South African Butterfly Conservation Assessment (SABCA)

SABCA is a conservation project aimed at determining the distribution and conservation priorities of all butterfly species in South Africa, Lesotho and Swaziland. A list of butterfly species expected within the full degrees 3123, 3220, 3222, 3221 and 3320 obtained from SABCA is included in Appendix A. None of the species listed are considered threatened.

5.2 Study Area

5.2.1 Mammals

According to Smithers 2000 the study area comprises of the South west arid zone for mammal biota. The study area is situated completely in this arid zone which is subdivided into the Karoo scrub biota in the east and succulent Karoo vegetation towards the west of the study area. Conservation of mammal habitat within the WCP is important as most species are habitat specific.

The WCP is generally regarded as having low mammalian biodiversity values when compared with the rest of South Africa (Lloyd, 2002). However, there are six endemic mammalian species found in the WCP (WCPSB, 2007) namely the Cape spiny mouse (*Acomys subspinosus*), Cape dune molerat (*Bathyergus suillus*), Van Zyl's golden mole (*Cryptochloris zyli*), Cape water rat (*Dasymys capensis*), Bluebuck (*Hippotragus leucophaeus*) which is extinct and the Cape gerbil (*Tatera afra*). Of these mammal species endemic to the WCP, the Van Zyl's golden mole (*Cryptochloris zyli*) is considered Critically Endangered (CE) (WCPSB, 2007) and due to the extent of the proposed options may occur near the study area. Another CE mammal species which may occur within the eastern portions of the options is the Riverine rabbit (*Bunolagus monticularis*).

Two terrestrial mammalian species of the WCP are considered Endangered (EN); the white-tailed mouse (*Mystromys albicaudatus*) and the African wild dog (*Lycaon pictus*) and both may occur within less disturbed areas within the study area. In addition, a further eight terrestrial species in the WCP are considered to be Vulnerable (VU); namely the Lion (*Panthera leo*), the Cheetah (*Acinonyx jubatus*), the Black rhinoceros (*Diceros bicornis*), the Cape subspecies of the mountain zebra (*Equus zebra zebra*), the Bontebok (*Damaliscus pygargus pygargus*), the

Blue duiker (*Philantomba monticola*), Grant's golden mole (*Eremitalpa granti*), De Winton's long-eared bat (*Laephotis wintoni*). Mention must be made that some of these species are already considered locally extinct (WCPSB, 2007).

5.2.2 Amphibians

Karoo (Semi desert) and Fynbos macro habitats for amphibian species have been identified by du Preez and Curruthers (2009). The fynbos habitat has a unique and diverse floral kingdom in the winter rainfall area of the southern and western Cape which includes mountains and coastal lowland areas. Arid stony areas with low, flat topped hills and sparse scrub vegetation make up the semi desert Karoo macro habitat unit (Preez and Curruthers, 2009). Within both these habitat units a high amphibian endemicity and low diversity ratio of adaptive amphibian species are found. As a result, conservation of amphibian species is directly related to effective habitat conservation. Suitable habitat conditions, especially for breeding, are critical to amphibians, thus conservation of habitat is important as most species are habitat specific. Within the study area, habitat considered of importance for amphibian conservation is located along the Cape escarpment where the mountains and river valleys provide very specific habitats.

5.2.3 Reptiles

The study area comprises of three reptile ecoregions; namely the Fynbos, Succulent Karoo and Nama Karoo ecoregions according to Alexander and Marais (2008). The Fynbos ecoregion is limited to the southern and western extremes of South Africa and experiences winter rainfall patterns and extremely high plant species richness endemic to the Western Cape. Reptile abundance in the fynbos area is moderate and most species have small distribution ranges within the Fynbos ecoregion. The Nama Karoo ecoregion is situated to the north east of the study area and reptile species richness is generally low with few endemic species. The Succulent Karoo ecoregion is characterized by species adapted to arid environments and succulent leaf scrubs with reptiles mainly rupicolous (inhabiting rocky areas). Reptile species richness is relatively high with high endemic species in this ecoregion. Therefore, conservation of reptile habitat occurring along the proposed options is important as most species are habitat specific and suitable reptile habitat is likely to change along the options.

5.2.4 Invertebrate, Scorpions and Spiders

Invertebrate distribution patterns have relatively restricted ranges, often associated with a particular habitat and vegetation type. The study area comprises of Karoo and fynbos habitat areas (Picker et al, 2004). The Succulent Karoo area has a unique insect assemblage, with an above average representation of beetles, grasshoppers, flies, wasps and lacewings, many emerging for a brief period in spring. The fynbos region has a unique assemblage of insects of considerable evolutionary interest. Many of these insects have close relatives in New Zealand,

Madagascar, South America and Australia. The invertebrate species richness within the study area is expected to be relatively high with high endemic species in the Karoo and fynbos habitat areas.

6 SEGMENTS OF INCREASED ECOLOGICAL INTEREST OR CONCERN

Due to the extent of the proposed corridor options it was not feasible to assess the entire length of each option during the field survey. Therefore, all background information discussed in the previous sections was used to divide the options according to sensitivity and to determine "segments of interest" along each of the options and an attempt to assess representative points in these segments was made wherever access allowed (Figure 21). Detailed field assessment results are provided in a separate document referred to as Appendix B. A summary of findings considered for the determination of faunal and floral conservation importance at each representative point is listed below. These results were then used to guide the overall sensitivity mapping as discussed in section 8.

Very High Sensitivity (EIS score 5):

- Largely intact vegetation community, with high floral diversity and abundance;
- Continuous open veld that would provide habitat for faunal species that migrate or forage within a large area;
- Very little anthropogenic activity;
- High diversity of intact faunal and floral habitat such as rocky outcrops and riparian habitat; and
- Located within a private or formally protected area where overall biodiversity is expected to be high.

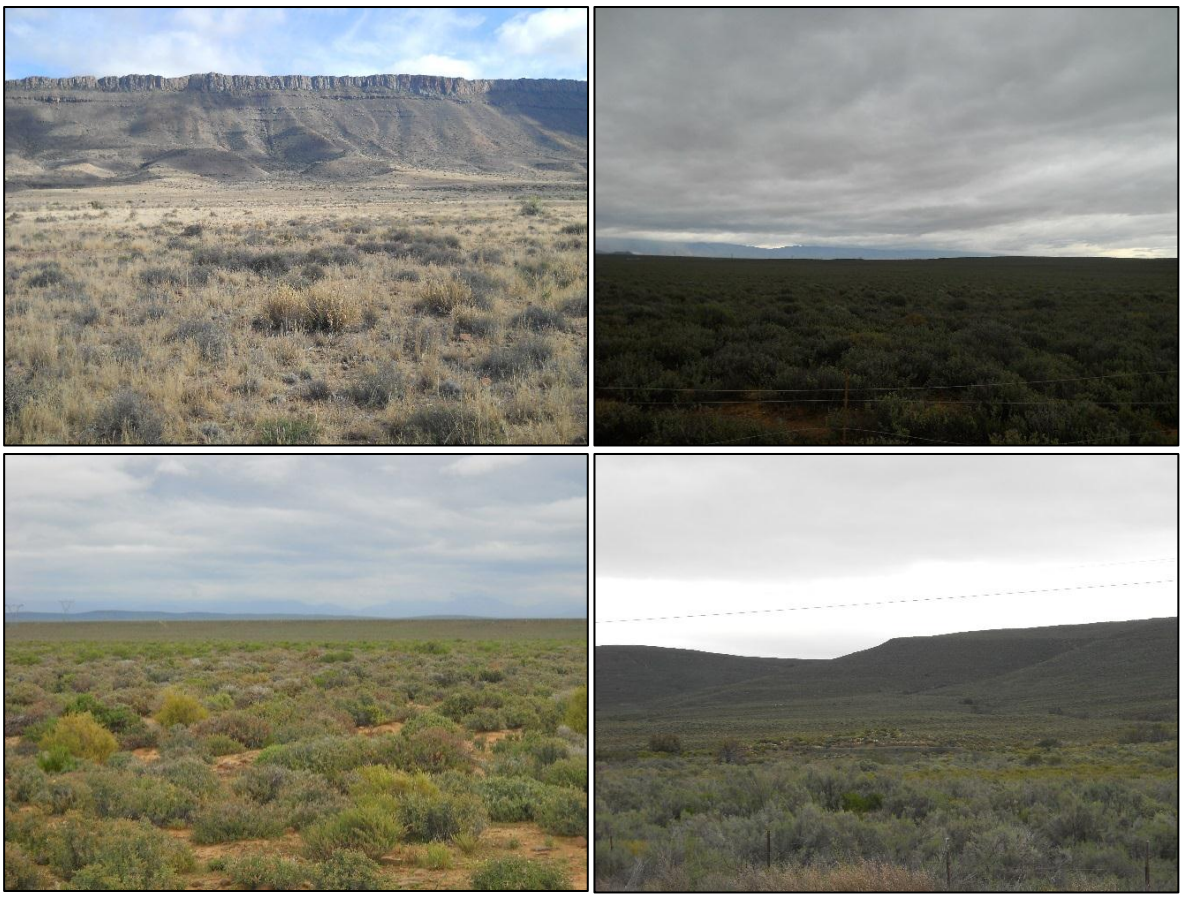

Figure 21: Representative points of segments considered to be of very high sensitivity.

High Sensitivity (EIS score 4):

- Some vegetation transformation encountered, however the larger extent of the area is still considered intact with a high floral diversity and abundance;
- Continuous open veld would provide habitat for faunal species that migrate or forage within a large area. In some areas vermin fences were noted that would restrict movement of medium sized faunal species to some extent;
- High diversity of faunal and floral habitat such as rocky outcrops and riparian habitat; and
- Some anthropogenic activity noted, however can still be considered to be in high ecological condition.

Figure 22: Representative points of segments considered to be of high sensitivity.

Moderate Sensitivity (EIS score 2-3):

- Disturbance has resulted in erosion and vegetation transformation to some degree, however disturbance is restricted to isolated areas within a larger intact vegetation community; and
- May provide foraging habitat after sufficient rain, however fauna will most likely be restricted to surrounding areas with more intact vegetation and less anthropogenic activity;

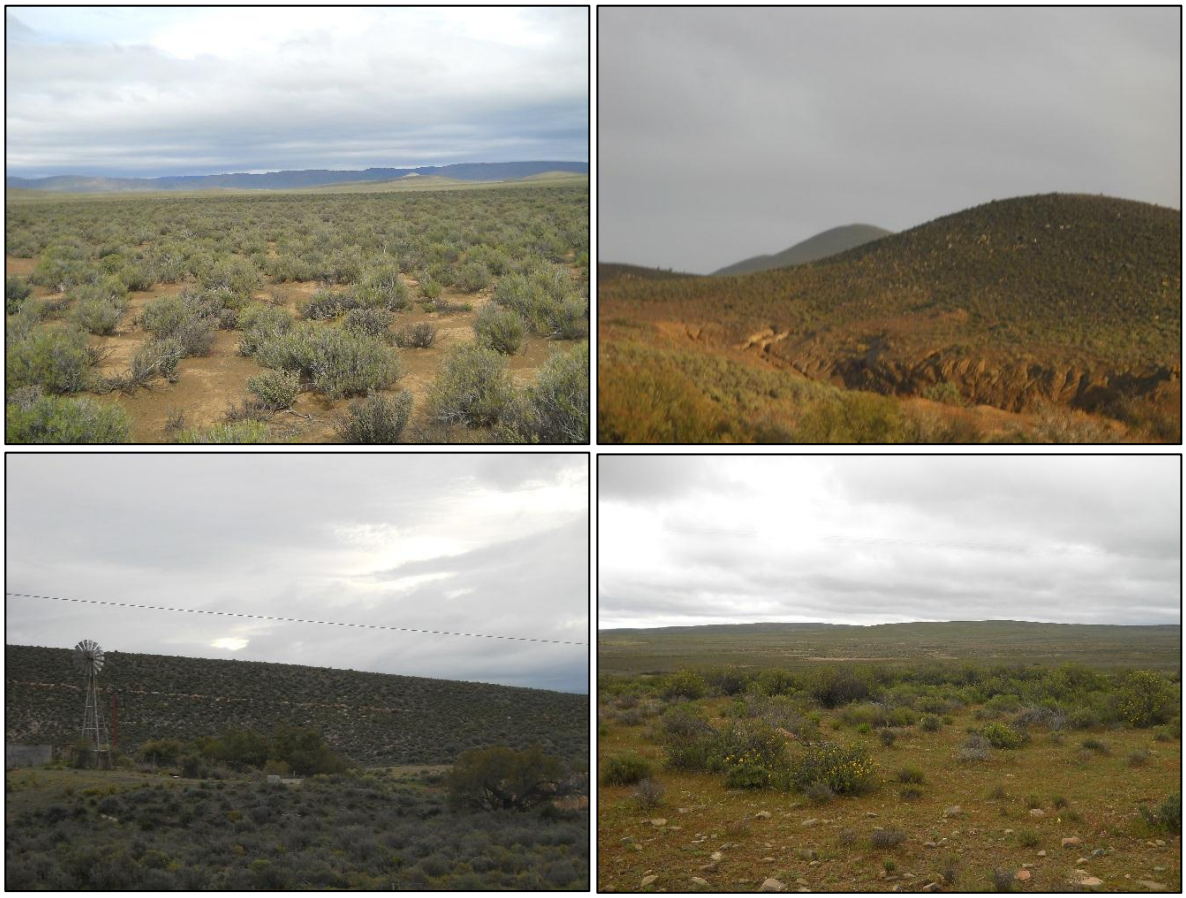

Figure 23: Representative points of segments considered to be of moderate sensitivity.

Low / Very Low Sensitivity (EIS score 0-1):

- Significantly transformed with low floral species diversity and abundance;
- Limited undisturbed faunal habitat available; and
- Ongoing anthropogenic activity would limit the amount of fauna moving through the area.

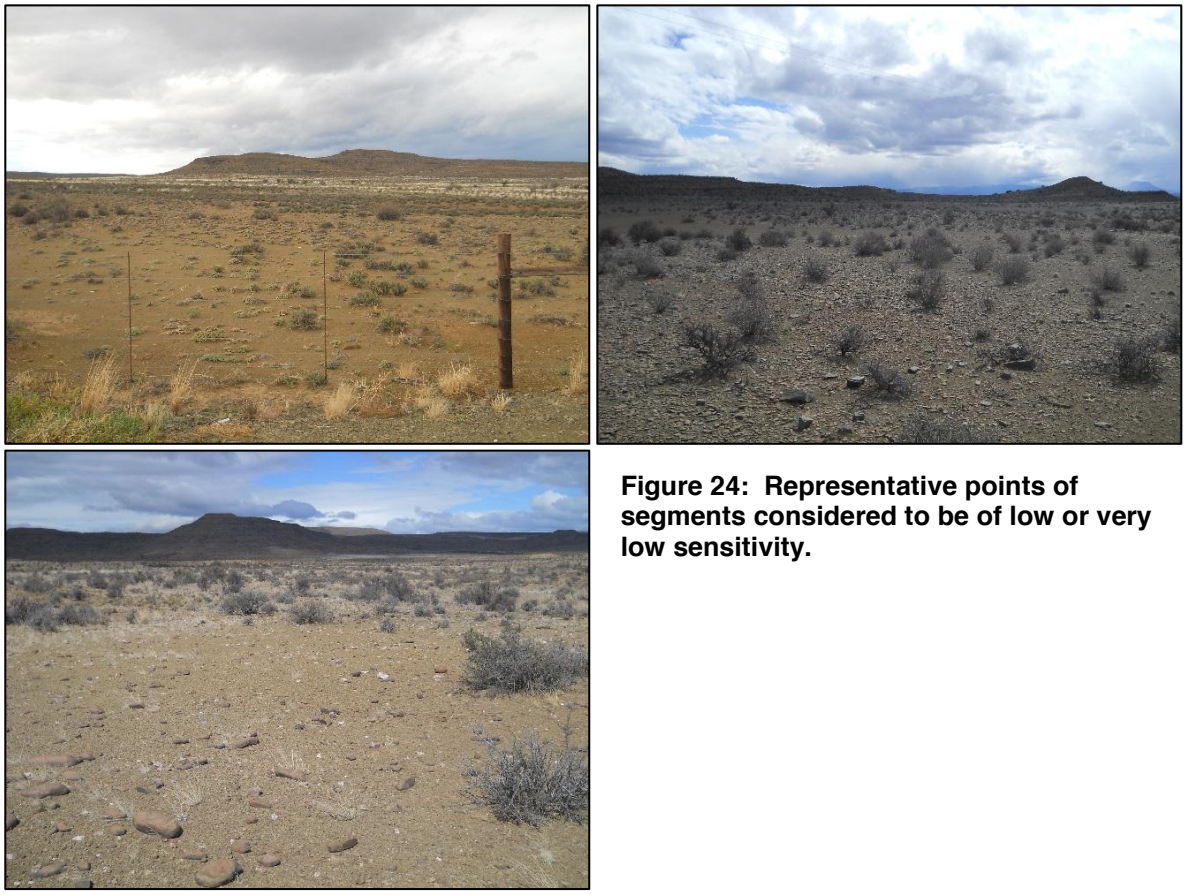

Figure 24: Representative points of segments considered to be of low or very low sensitivity.

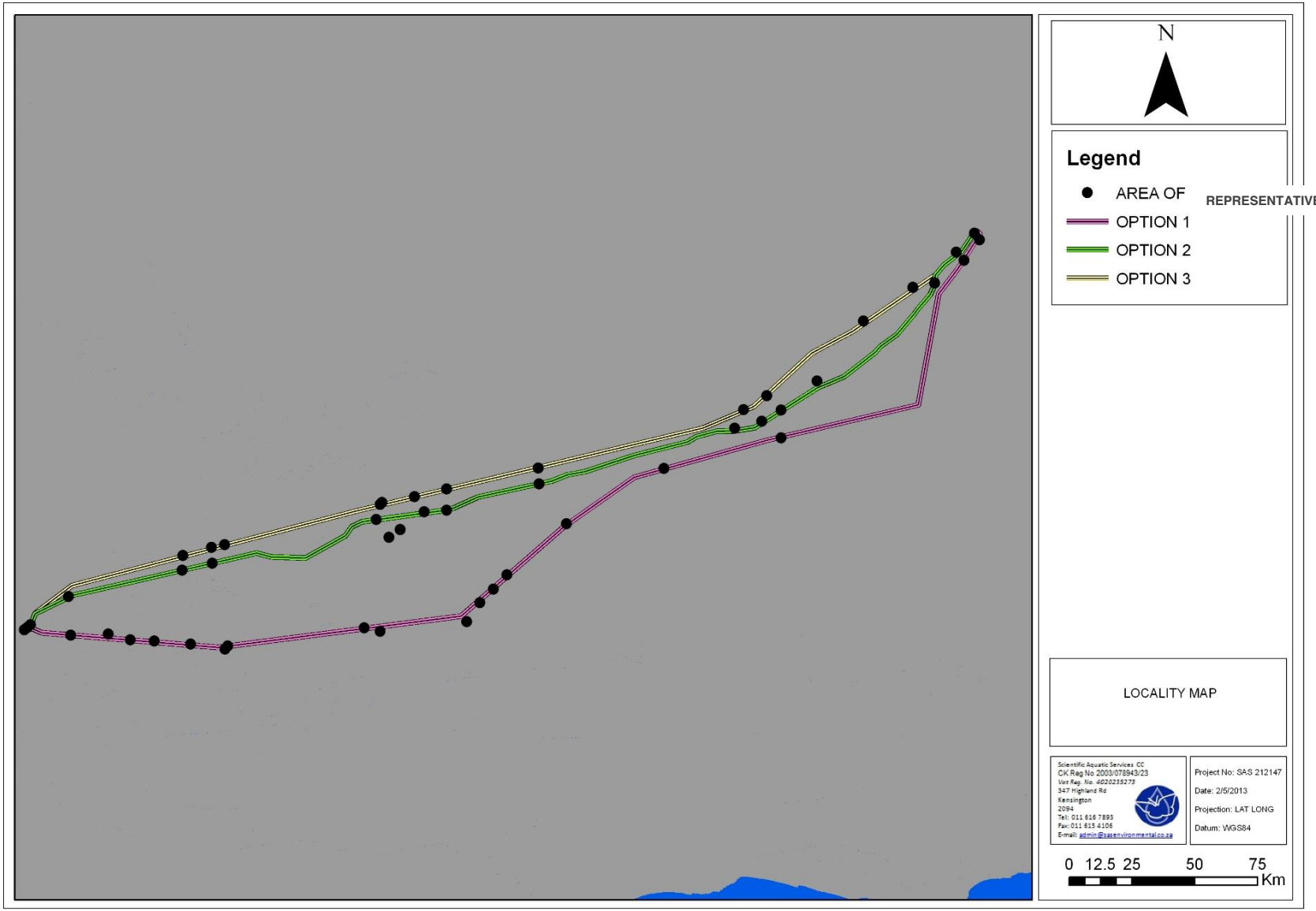

Figure 25: Representative sites ground truthed along the pre-defined segments of interest in relation to the three options.

7 IMPACT ASSESSMENT

All data gathered during the desktop as well as field assessment was used to divide the different options according to sensitivity. Key indicators of degree of sensitivity included formally protected areas and critically endangered ecosystems (Threatened Ecosystem Status) as well as natural habitat and CBAs (Fine Scale Plans). Within areas where several of the previously mentioned areas overlap the area, was demarcated to be of Very High sensitivity. The degree of sensitivity where then lowered as the presence of these areas became less or absent.

The percentage composition of each sensitivity class in relation to the total length of each option was then calculated (refer to Figure 23). This was done in order to determine which option will traverse the longest distance across sensitive areas and would therefore result in the highest impact significance rating. The impact assessment was then based on the areas of sensitivity in relation to the percentage calculated for each option, rather than incorporating all degrees of sensitivity into one assessment for each option. This method of approach was chosen due to the extent of each option, resulting in ground truthing of entire corridors with servitudes not being feasible. The table with percentages for each sensitivity class is presented below. It should be noted that isolated areas along each option for example gravel roads and severely overgrazed vegetation can be considered within a low or very low sensitivity class, however these areas are considered marginal compared to the entire length of each option. It was therefore not deemed feasible to map low and very low sensitivity class areas and the extent of these areas were included in other sensitivity classes. However, it was deemed important to assess the impact significance of areas considered to fall within the low and very low sensitivity classes and these were therefore included within the impact assessment below. From the results it is evident that option 3 crosses the largest extent of areas considered to be of very high sensitivity and option 1 the least amount of very high sensitivity areas.

Table 13: Sensitivity percentages in relation to each option.

Option number	Very High	High	Moderate
1	27%	39%	34%
2	30%	32%	38%
3	32%	42%	26%

The tables below serve to summarise the significance of perceived impacts on the floral and faunal biodiversity within each sensitivity class as listed above. The table presents the impact assessment according to the method described in section 2.5. The table also indicates the required mitigatory measures needed to minimise the impact and presents an

assessment of the significance of the impacts taking into consideration the available mitigatory measures assuming that they are fully implemented.

It must further be noted that for the purposes of the impact assessment it has been assumed that decommissioning would not involve the removal of the transmission line. If no removal takes place and the support structures are left *in situ*, negligible impacts during closure activities are deemed likely to occur and will be similar to impacts occurring in the operational phase of the development.

7.1 Impacts on Floral Ecology

IMPACT 1: LOSS OF INTACT FLORAL HABITAT TO MEET CONSERVATION TARGETS

Proposed development of the transmission line within each sensitivity class that may impact on intact floral communities are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning of infrastructure placement and design leading to overall loss or transformation of floral habitat	Site clearing and the removal of vegetation leading to loss of floral habitat	Disturbance of soils with general operational activities leading to altered floral habitat
	Site clearing and the disturbance of soils leading to increased erosion	Increased introduction and proliferation of alien plant species and further transformation of natural habitat
	Indiscriminate driving of construction vehicles through open veld	Edge effects from maintenance operations impacting on floral species diversity and available habitat
	Movement of construction vehicles and temporary track construction impacting on habitat	
	Dumping of material leading to loss of floral habitat	
	Dumping of material leading to alien plant species proliferation	
	Compaction of soils impacting on habitat and re-establishment of floral communities	
	Movement of construction vehicles will lead to an increase in dust, which may alter floral community structure and composition	
	Indiscriminate fires within vegetation types not prone to fire may result in change of floral composition	

Aspects of floral ecology affected

Construction	Operational
Direct impact on floral habitat	Direct impact on floral habitat
Loss of floral biodiversity	Loss of floral biodiversity
Contamination of soils	Contamination and compaction of soils
Contamination of ground and surface water on which wetland floral species are reliant	Contamination of ground and surface water
Compaction and loss of soils	Changes to the floral communities due to alien invasive vegetation leading to altered habitat conditions
Sedimentation and erosion leading to altered habitat characteristics	
Changes to the floral communities due to alien invasive vegetation leading to altered habitat conditions	

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**5**	**4**	**4**	**3**	**5**	**9**	**12**	**108 High**
High	**5**	**3**	**3**	**2**	**5**	**8**	**10**	**80 Medium High**
Moderate	**5**	**2**	**1**	**2**	**3**	**7**	**6**	**42 Low**
Low	**5**	**1**	**1**	**2**	**1**	**6**	**4**	**24 Very Low**

Essential mitigation measures:

- All footprint areas should remain as small as possible and vegetation removal kept to a minimum. In this regard specific mention is made of the need to avoid site clearing between tower positions in order to minimise the impact footprint of the proposed development. This is particularly important in areas of high and very high ecological sensitivity;
- A sensitivity map has been developed for each option, indicating portions considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases, with special mention of layout design, to aid in the conservation of floral habitat within the WCP;
- Impacts on wetland features should be managed to minimise impacts with special mention of erosion and sedimentation;
- Care should be taken if chemical methods (herbicides) will be utilised for both vegetation clearing prior to construction as well as alien vegetation removal post construction. Spills or indiscriminate use could result in loss of indigenous floral individuals or habitat;
- All areas surrounding construction footprints should be kept off-limits to construction vehicles and personnel;
- Wherever possible, develop crossings of sensitive areas (wetlands, ridges and mountains) at 90 degree angles to the features to prevent the extent of the areas disturbed;
- Wherever possible, the transmission line should follow existing transmission line corridors. Where formal or informal protected areas will be crossed it is recommended that the line be constructed as close to the property boundary as possible;
- Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled as needed based on sound monitoring, to prevent their spread beyond the footprint;
- Prevent run-off from work areas entering floral habitats within surrounding areas;
- Implement waste management as contemplated in the Environmental Management Programme in order to prevent construction related waste from entering the wetland environment;
- Provide a sufficient amount of dustbins near construction camps to ensure no littering takes place;
- Provide appropriate sanitation facilities for the duration of the proposed development and remove all waste to an appropriate facility;
- Service and refuel construction vehicles in a designated area or off site;
- All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project;
- All soils compacted as a result of construction activities falling outside of the construction footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat;

- As far as possible existing roads should be utilised for access roads; where the need is identified for the development of temporary tracks cognisance should be taken of the following:
  - Design tracks to cross open veld at 90 degree angles to avoid as much natural vegetation as possible;
  - Tracks should not traverse wetlands, rivers or outcrops; and
  - Instate a speed limit of 40km/h where tracks cross open veld to reduce the amount of dust.

Recommended mitigation measures

- As far as is practical, implement concurrent rehabilitation in order to limit degradation of soil biota.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**2**	**4**	**3**	**1**	**4**	**8**	**8**	**64 Medium Low**
High	**2**	**3**	**3**	**1**	**3**	**5**	**7**	**35 Low**
Moderate	**3**	**2**	**1**	**1**	**2**	**5**	**4**	**20 Very Low**
Low	**3**	**1**	**1**	**1**	**1**	**4**	**3**	**12 Very Low**

Probable latent impacts

- Proliferation of alien and weed species in the servitude will lead to altered vegetation communities within surrounding areas; and
- Loss of floral habitat may lead to altered floral biodiversity attributes.

IMPACT 2: LOSS OF UNIQUE AND ENDEMIC FLORAL HABITAT

Proposed development of the transmission line within each sensitivity class that may impact on unique and uncommon floral habitat are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning of infrastructure placement and design leading to loss of habitat for floral species such as wetlands, ridges and mountainous areas	Site clearance and removal of vegetation leading to a loss of species diversity within wetlands, ridges and mountainous areas	An increase in alien plant species due to ineffective monitoring/eradication leading to altered plant community structure and composition
	Construction of infrastructure and temporary tracks through sensitive areas leading to a loss of floral habitat	Erosion and sedimentation as a result of operational activities leading to a loss of floral habitat
	Proliferation of alien species may alter plant community structure and invade unique floral habitat	Edge effects from maintenance operations impacting on floral species diversity and available habitat
	Erosion and sedimentation as a result of operational activities leading to a loss of floral habitat	Ongoing or additional vegetation clearing during the operational phase

Aspects of floral ecology affected

Construction	Operational
Construction of support structures and vegetation clearing resulting in loss of floral habitat diversity	Direct impact on floral habitat due to maintenance activities
Contamination of ground and surface water on which wetland floral species are reliant	Loss of floral habitat diversity due to alien vegetation encroachment

Construction	Operational
Sedimentation and erosion leading to loss of floral biodiversity	
Loss of floral habitat diversity due to alien vegetation encroachment	

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**5**	**4**	**3**	**2**	**5**	**9**	**10**	**90 Medium High**
High	**5**	**3**	**3**	**2**	**5**	**8**	**10**	**80 Medium High**
Moderate	**3**	**2**	**2**	**1**	**3**	**5**	**6**	**30 Low**
Low	**1**	**1**	**1**	**1**	**3**	**2**	**5**	**10 Very Low**

Essential mitigation measures:

- All footprint areas should remain as small as possible and vegetation removal kept to a minimum. In this regard specific mention is made of the need to avoid site clearing between tower positions in order to minimise the impact footprint of the proposed development. This is particularly important in areas of high and very high ecological sensitivity;
- A sensitivity map has been developed for each option, indicating portions considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance. It is however recommended that the sensitivity map be refined ones the final alternative is selected by doing a walk down of the areas considered of very high sensitivity, highlighting cryptic floral habitat that could potential be avoided during the planning of the corridor;
- Impacts on wetland features should be managed to minimise impacts with special mention of erosion and sedimentation;
- All areas surrounding construction footprint areas should be kept off-limits to construction vehicles and personnel;
- Planning of temporary tracks and access routes should take the site sensitivity plan into consideration. If possible, such tracks should be constructed a distance from wetlands and rocky outcrops and not directly adjacent thereto;
- Removal of the alien and weed species must take place along the servitude as needed based on sound monitoring;
- Species specific and area specific eradication recommendations:
  - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;
  - Footprint areas should be kept as small as possible when removing alien plant species; and
  - No indiscriminate driving of vehicles through open veld should be allowed during the eradication of alien and weed species.

Recommended mitigation measures

- Rescue and relocation of all SCC individuals that will be disturbed.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**1**	**4**	**2**	**1**	**3**	**5**	**6**	**30 Low**
High	**1**	**3**	**2**	**1**	**3**	**4**	**6**	**24 Very Low**
Moderate	**1**	**2**	**1**	**1**	**1**	**3**	**3**	**9 Very Low**
Low	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**6 Very Low**

Probable latent impacts

- Loss of sensitive floral habitat occurring within wetlands, ridges and mountainous areas along certain portions of the transmission line.

IMPACT 3: FRAGMENTATION OF SENSITIVE HABITAT

Proposed development of the transmission line within each sensitivity class that may result in the fragmentation of sensitive floral habitat are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning leading to the placement of infrastructure within sensitive floral habitat areas with special mention of CBAs, wetlands and mountainous areas	Site clearing and the removal of habitat leading to fragmentation of similar vegetation units	Proliferation of alien species within areas disturbed during construction may result in fragmentation of habitat
	Construction of temporary tracks within sensitive habitat areas	

Aspects of floral habitat affected

Construction	Operational
Fragmentation of habitat may impact on seed dispersal, pollination and gene flow	Fragmentation of habitat may impact on seed dispersal, pollination and gene flow

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	3	4	3	2	5	7	10	70 Medium High
High	3	3	2	2	5	6	9	54 Medium Low
Moderate	2	2	2	2	5	4	9	36 Low
Low	1	1	2	2	5	2	9	18 Very Low

Essential mitigation measures:

- All footprint areas should remain as small as possible and vegetation removal kept to a minimum. In this regard specific mention is made of the need to avoid site clearing between tower positions in order to minimise the impact footprint of the proposed development. This is particularly important in areas of high and very high ecological sensitivity;
- A sensitivity map has been developed for each option, indicating portions considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance. It is however recommended that the sensitivity map be refined ones the final alternative is selected by doing a walk down of the areas considered of very high sensitivity, highlighting cryptic floral habitat that could potential be avoided during the planning of the corridor;
- Planning of temporary tracks and access routes should take the site sensitivity plan into consideration. If possible, such tracks should be constructed a distance from wetlands and rocky outcrops and not directly adjacent thereto; and
- Removal of the alien and weed species must take place along the servitude as needed based on sound monitoring.

Recommended mitigation measures

- The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	1	4	2	1	3	5	6	30 Low
High	1	3	1	1	3	4	5	20 Very Low

Moderate	**1**	**2**	**1**	**1**	**2**	**3**	**4**	**12 Very Low**
Low	**1**	**1**	**1**	**1**	**2**	**2**	**4**	**8 Very Low**

Probable latent impacts
- Permanent fragmentation of floral habitat.

IMPACT 4: LOSS OF HABITAT FOR SCC AND PROTECTED SPECIES

Proposed development of the transmission line within each sensitivity class that may impact on habitat for SCC and protected species are discussed below. It should be noted that many individuals of species considered threatened do occur within partially disturbed areas therefore rescue and relocation of as many SCC and protected floral species as possible is advocated.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning of infrastructure placement and design leading to overall loss of habitat and SCC individuals	Site clearance and removal of vegetation leading to a loss of habitat for SCC	An increase in alien plant species may result in alien species outcompeting SCC communities
	Construction of infrastructure and temporary tracks through sensitive areas leading to a loss of SCC	
	Vehicles accessing site through natural intact open veld	

Aspects of floral ecology affected

Construction	Operational
Direct impact on SCC individuals	An increase in alien species leading to altered SCC floral community structure and composition
Permanent loss of habitat for SCC individuals within construction footprint areas	Edge effects from maintenance operations impacting on SCC diversity and available habitat

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**4**	**4**	**4**	**2**	**5**	**8**	**11**	**88 Medium High**
High	**3**	**3**	**3**	**2**	**5**	**6**	**10**	**60 Medium Low**
Moderate	**2**	**2**	**3**	**2**	**5**	**4**	**10**	**40 Low**
Low	**1**	**1**	**2**	**2**	**3**	**2**	**7**	**14 Very Low**

Essential mitigation measures:
- A sensitivity map has been developed for each option, indicating portions considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance. It is however recommended that the sensitivity map be refined ones the

final option is selected by doing a walk down of the areas considered of very high sensitivity, highlighting cryptic floral habitat that could potential be avoided during the planning of the corridor;
- All SCC and plants listed as protected or considered to be of medicinal value should be marked during the walk down of the preferred corridor prior to commencement of construction activities. Marking of protected and SCC should be undertaken by a suitably qualified and appropriately experienced Botanist;
- Relevant permits should be obtained for rescue and relocation of any SCC or protected floral species;
- All SCC or protected individuals encountered during the walk down or construction phase of the development should be rescued and relocated to the nearest similar habitat to that from which is was removed, by a suitably qualified specialist;
- All footprint areas should remain as small as possible and vegetation removal kept to a minimum; and
- All surrounding areas should be kept off-limits to construction vehicles and personnel.

Recommended mitigation measures
- All sensitive areas are to be demarcated during the construction phase of the development and all material used for demarcation removed upon completion of construction within that area.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**2**	**4**	**3**	**1**	**3**	**6**	**7**	**42 Low**
High	**2**	**3**	**2**	**1**	**3**	**5**	**6**	**30 Low**
Moderate	**1**	**2**	**2**	**1**	**2**	**3**	**5**	**15 Very Low**
Low	**1**	**1**	**2**	**1**	**2**	**2**	**5**	**10 Very Low**

Probable latent impacts
- A decrease in potential SCC diversity and abundance may lead to a loss of species richness over time within the region.

IMPACT 5: LOSS OF HABITAT AND INDIVIDUALS DUE TO VEGETATION CLEARING

During the field assessment, isolated Renosterveld and woody alien vegetation stands were encountered where vegetation has been cleared underneath transmission lines as a mitigation to possible fire damage. These were considered isolated instances, however, in order to determine the significance of possible impact, vegetation clearing was assessed within each area of sensitivity. It should be noted that it was done on a broad scale and does not differentiate between different types or threat status due to the significant number and diversity of vegetation types along each of the options.

Vegetation clearing and subsequent change of the natural fire regimes within the servitudes will result in transformation of vegetation communities. It is therefore recommended that a corridor be chosen within areas where vegetation clearing can be minimised as far as possible.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning resulting in corridors that need to be cleared within remnant vegetation	Vegetation clearing within corridors	Ongoing clearing of vegetation within corridors

Aspects of floral ecology affected

Construction	Operational
Loss of habitat and floral individuals	Gradual loss of indigenous species and increase of alien and invasive winter grass species
	Vegetation transformation due to altered burning regimes

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**5**	**4**	**4**	**3**	**5**	**9**	**12**	**108 High**
High	**5**	**3**	**4**	**3**	**5**	**8**	**12**	**96 Medium High**
Moderate	**4**	**2**	**3**	**2**	**5**	**6**	**10**	**60 Medium Low**
Low	**1**	**1**	**2**	**2**	**3**	**2**	**7**	**14 Very Low**

Essential mitigation measures:

- A sensitivity map has been developed for each option, indicating portions considered to be important to reach conservation targets and portions that are considered to be of increased ecological importance. It is however recommended that the sensitivity map be refined ones the final option is selected by doing a walk down of the areas considered of very high sensitivity, highlighting cryptic floral habitat that could potential be avoided during the planning of the corridor;; and
- All surrounding areas should be kept off-limits to construction vehicles and personnel during the operation phase.

Recommended mitigation measures

- N/A.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**4**	**4**	**4**	**2**	**5**	**8**	**11**	**88 Medium High**
High	**4**	**3**	**4**	**2**	**5**	**7**	**11**	**77 Medium High**
Moderate	**3**	**2**	**3**	**1**	**5**	**5**	**9**	**45 Low**
Low	**1**	**1**	**1**	**1**	**3**	**2**	**5**	**10 Very Low**

Probable latent impacts

- Permanent vegetation transformation.

7.2 Impacts on Faunal Ecology

IMPACT 1: LOSS OF FAUNAL HABITAT

Proposed development of the transmission line within each sensitivity class that may impact on faunal habitat are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning leading to the placement of infrastructure within sensitive faunal habitat areas with special mention of wetland and mountainous areas	Site clearing and the removal of faunal habitat leading to increased habitat loss	On-going disturbance of faunal habitat with general operational activities
	Construction of temporary tracks within sensitive habitat areas	Increase of alien plant species and further transformation of natural faunal habitat
	Indiscriminate driving of construction vehicles through open veld damaging faunal habitat	

Aspects of faunal ecology affected

Construction	Operational
Direct impact on faunal habitat	Direct impact on faunal habitat
A reduced carrying capacity for faunal species	A reduced carrying capacity for faunal species
Changes in the faunal community due to habitat loss and transformation	Changes in the faunal community due to habitat loss and transformation

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**3**	**4**	**3**	**2**	**3**	**7**	**8**	**56 Medium Low**
High	**3**	**3**	**3**	**2**	**3**	**6**	**8**	**48 Low**
Moderate	**2**	**2**	**2**	**2**	**2**	**4**	**6**	**24 Very Low**
Low	**2**	**1**	**2**	**2**	**2**	**3**	**6**	**18 Very Low**

Essential mitigation measures:

- All areas of increased ecological sensitivity identified during the walk down should be marked as such and be off limits to all unauthorised vehicles and personnel;
- It is recommended that a speed limit of 40km/h is implemented on all access roads in order to minimise risk to fauna from vehicles;
- All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project;
- Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled as needed based on sound monitoring, to prevent their spread beyond the construction boundary;
- Areas should be identified outside the construction footprint for the relocation of faunal species;
- No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place;

- Provide a sufficient amount of dustbins near construction camps to ensure no littering takes place;
- Ensure that migratory connectivity is maintained where appropriate, especially where temporary tracks need to cross sensitive faunal habitat; and
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.

Recommended mitigation measures

- The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**1**	**4**	**1**	**1**	**1**	**5**	**3**	**15 Very Low**
High	**1**	**3**	**1**	**1**	**1**	**4**	**3**	**12 Very Low**
Moderate	**1**	**2**	**1**	**1**	**1**	**3**	**3**	**9 Very Low**
Low	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**6 Very Low**

Probable latent impacts

- Loss of faunal habitat may lead to altered regional faunal biodiversity; and
- Decrease in faunal species diversity may occur throughout the study area due to transformation of habitat.

IMPACT 2: LOSS OF FAUNAL DIVERSITY AND COMMUNITY INTEGRITY

Proposed development of the transmission line within each sensitivity class that may impact on faunal diversity and community integrity are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Design of infrastructure through less transformed faunal habitat will result in a decline in faunal diversity	Decline in faunal diversity due to construction related disturbance in study area	Avifaunal collision with earth wire
	Collision of construction vehicles with faunal species	Collision of operational vehicles with faunal species
	Vehicles accessing site through sensitive faunal habitat areas	Vehicles accessing site through sensitive faunal habitat areas
	Poaching due to increased personnel	Poaching due to increased personnel within the study area
	Noise due to construction activities	

Aspects of faunal ecology affected

Construction	Operational
Direct impact on faunal diversity and abundance	Direct impact on faunal diversity and abundance
Loss of faunal diversity	Loss of faunal diversity
Changes to the faunal community	Changes to the faunal community

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**3**	**4**	**3**	**3**	**4**	**7**	**10**	**70 Medium Low**
High	**3**	**3**	**3**	**3**	**4**	**6**	**10**	**60 Medium Low**
Moderate	**2**	**2**	**2**	**2**	**4**	**4**	**8**	**32 Low**
Low	**2**	**1**	**2**	**2**	**4**	**3**	**8**	**24 Very Low**

Essential mitigation measures:

- All mitigation measures as defined by the avifaunal assessment with special mention of:
  - Helicopter inspection for large raptor nests on existing line.
  - Identification of sections of the corridor that would need the application of Bird Flight Diverters to mitigate potential collisions, by a avifaunal specialist;
  - Areas that potentially contains breeding Red Data species that will be crossed by the corridor must be physically inspected by a suitably experienced ornithologist to identify any nests that could be impacted by the construction of the line.
- No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place;
- Rescue and relocate faunal species prior to construction from areas earmarked for support structures as well as temporary tracks. Relocation should be done by a qualified person to ensure individuals are not harmed during the rescue process;
- Ensure that all infrastructure is placed outside of sensitive faunal habitat areas identified during the walk down;
- All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised vehicles and personnel;
- It is recommended that a speed limit of 40km/h is implemented on all roads running through the study area in order to minimise risk to fauna from vehicles; and
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.

Recommended mitigation measures

- N/A

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**2**	**4**	**2**	**1**	**1**	**6**	**4**	**24 Very Low**
High	**1**	**3**	**1**	**1**	**1**	**4**	**3**	**12 Very Low**
Moderate	**1**	**2**	**1**	**1**	**1**	**3**	**3**	**9 Very Low**
Low	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**6 Very Low**

Probable latent impacts

- Decrease in faunal species diversity and species richness.

IMPACT 3: LOSS OF HABITAT FOR THREATENED FAUNAL SPECIES

Proposed development of the transmission line within each sensitivity class that may impact on threatened faunal species are discussed below

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning of infrastructure placement and design leading to overall loss of RDL faunal habitat	Loss of potential RDL faunal biodiversity due to decrease in habitat and food supply	Increased personnel may result in increased poaching and fire hazard which would lead to potential RDL faunal habitat and species loss
	Increased poaching risk due to increased personnel	Vehicles accessing site through sensitive habitat areas
	Vehicles accessing site through sensitive habitat areas	

Aspects of target related impacts on RDL faunal species

Construction	Operational
Direct impact on potential RDL faunal habitat	Direct impact on potential RDL faunal habitat
Loss of potential RDL faunal biodiversity	Loss of potential RDL faunal biodiversity
Changes to the potential RDL faunal community, within the greater region, due to habitat loss and transformation	Changes to the potential RDL faunal community, within the greater region, due to habitat loss and transformation

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**3**	**4**	**3**	**3**	**4**	**7**	**10**	**70 Medium Low**
High	**3**	**3**	**2**	**3**	**4**	**6**	**9**	**54 Medium Low**
Moderate	**2**	**2**	**2**	**2**	**4**	**4**	**8**	**32 Low**
Low	**1**	**1**	**1**	**2**	**4**	**2**	**7**	**14 Very Low**

Essential mitigation measures:

- No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place;
- Ensure that as far as possible all infrastructure is placed outside of sensitive RDL faunal habitat areas identified during the walk down;
- No fire should be allowed during any phase of the development; and
- It is recommended that a speed limit of 40km/h is implemented on all roads running through the study area in order to minimise risk to RDL which may occur on site and other fauna from vehicles.

Recommended mitigation measures

- N/A

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**1**	**4**	**1**	**1**	**1**	**5**	**3**	**15 Very Low**
High	**1**	**3**	**1**	**1**	**1**	**4**	**3**	**12 Very Low**
Moderate	**1**	**2**	**1**	**1**	**1**	**3**	**3**	**9 Very Low**
Low	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**6 Very Low**

Probable latent impacts

- Decrease in potential RDL faunal species diversity may lead to loss of species richness overtime throughout the greater region outside of the study area.

IMPACT 4: LOSS OF MIGRATORY CONNECTIVITY

Proposed development of the transmission line within each sensitivity class that may impact on faunal migratory connectivity are discussed below.

Activities leading to impact

Pre-Construction	Construction	Operational
Poor planning leading to the placement of infrastructure within sensitive faunal habitat areas with special mention of wetland and mountainous areas	Site clearing for infrastructure and temporary tracks leading to fragmentation of habitat	On-going disturbance of faunal habitat with general operational activities

Aspects of target related impacts on migratory connectivity

Construction	Operational
Loss of faunal migratory connectivity	Loss of faunal migratory connectivity

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Unmanaged								
Very High	**2**	**4**	**2**	**2**	**5**	**6**	**9**	**54 Medium Low**
High	**2**	**3**	**2**	**2**	**5**	**5**	**9**	**45 Low**
Moderate	**1**	**2**	**1**	**1**	**4**	**3**	**6**	**18 Very Low**
Low	**1**	**1**	**1**	**1**	**4**	**2**	**6**	**12 Very Low**

Essential mitigation measures:

- Ensure that as far as possible all infrastructure is placed outside of sensitive faunal habitat areas;
- Temporary tracks should allow for the movement of faunal species, in this regard special mention is made of tortoises that struggle to cross gravel roads with continuous heaps of sand on either side;
- Any required bridge upgrades should allow for migration of faunal species; and
- All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project.

Recommended mitigation measures

- N/A

Degree of Sensitivity	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Managed								
Very High	**2**	**4**	**1**	**1**	**1**	**6**	**3**	**18 Very Low**
High	**1**	**3**	**1**	**1**	**1**	**4**	**3**	**12 Very Low**
Moderate	**1**	**2**	**1**	**1**	**1**	**3**	**3**	**9 Very Low**
Low	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**6 Very Low**

Probable latent impacts
- Permanent loss of migratory corridors.

7.3 Impact Assessment Conclusion

Based on the above assessment, it is evident that there are several possible impacts on the floral and faunal ecology within each area of sensitivity. The table below summarises the findings indicating the significance of the impact before management takes place and the likely impact if management and mitigation takes place. In the consideration of mitigation it is assumed that a high level of mitigation takes place in line with best practice protocols, but which does not lead to prohibitive costs.

Table 14: A summary of the results obtained from the assessment of floral and faunal ecological impacts.

Impact	Degree of sensitivity of segment along corridor	Impact significance prior to mitigation	Impact significance post mitigation
Floral Ecology			
LOSS OF INTACT FLORAL HABITAT TO MEET CONSERVATION TARGETS	Very High	High	Medium Low
	High	Medium High	Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF UNIQUE AND ENDEMIC FLORAL HABITAT	Very High	Medium High	Low
	High	Medium High	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
FRAGMENTATION OF SENSITIVE HABITAT	Very High	Medium High	Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT FOR SCC	Very High	Medium High	Low
	High	Medium Low	Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT AND INDIVIDUALS DUE TO VEGETATION CLEARING	Very High	High	Medium High
	High	Medium High	Medium High
	Moderate	Medium Low	Low
	Low	Very Low	Very Low
Faunal Ecology			
LOSS OF FAUNAL HABITAT	Very High	Medium Low	Very Low
	High	Low	Very Low

Impact	Degree of sensitivity of segment along corridor	Impact significance prior to mitigation	Impact significance post mitigation
	Moderate	Very Low	Very Low
	Low	Very Low	Very Low
LOSS OF FAUNAL DIVERSITY AND COMMUNITY INTEGRITY	Very High	Medium Low	Very Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF HABITAT FOR THREATENED FAUNAL SPECIES	Very High	Medium Low	Very Low
	High	Medium Low	Very Low
	Moderate	Low	Very Low
	Low	Very Low	Very Low
LOSS OF MIGRATORY CONNECTIVITY	Very High	Medium Low	Very Low
	High	Low	Very Low
	Moderate	Very Low	Very Low
	Low	Very Low	Very Low

Based on the above assessment it is evident that there are several possible impacts on the faunal and floral ecology within each degree of sensitivity. The most significant impact in terms of floral ecology is loss of habitat during site clearing prior to construction of the support structures that will most likely be lost permanently if impact is not effectively mitigated. However, with adequate planning of the corridor in order to avoid sensitivity areas, impact on floral habitat can be significantly reduced. Many of the floral species in the region are very habitat specific and grow extremely slowly, therefore rescue and relocation may not prove feasible for all species. Therefore, it will be necessary to do a walk down of the proposed support structure locations within areas highlighted to be of very high and high sensitivity in order to identify niche floral habitat that could be avoided during the planning and construction phases.

Impact on faunal ecology would most likely be less significant in comparison to floral ecology. Fauna are more mobile and can therefore move away from areas where construction is taking place. However, many faunal species such as reptiles and amphibians do require specialised habitat such as rocky outcrops and riverine habitat that if impacted upon by the proposed activities could result in loss of individuals as well as long term loss of habitat. As with the walk down of the high sensitivity floral habitat a walk down of high sensitivity faunal habitat would also reduce the impact significance. In addition, faunal species encountered during construction activities should be rescued by a qualified person and released into similar surrounding habitat.

7.4 Impact Assessment Synthesis

In order to determine which alternative would be the most ecologically viable option (refer to Figure 1, 2 and 3 for locality maps), an impact synthesis was generated taking into consideration the sum of determined impact significance ratings for all floral and faunal impacts (refer to Table 15) in relation to percentage calculated for the extent of each sensitivity class within each option (refer to Table 16 and 17).

From the results it is evident that option 3 can be considered the least preferred option, followed by option 1 and option 2 for both floral and faunal aspects prior to mitigation. After mitigation option 3 remains the least preferred option, followed by option 1 and option 2 for flora and fauna, respectively. It should be noted that the difference calculated for the option 1 and option 2 final scores are marginal. It is therefore recommended that option 1 be considered to most preferred option. Option 1, presently, is located the closest to urban development and would therefore have the least possibility of significant impact on intact indigenous floral and faunal assemblages.

Table 15: Impact significance ratings, prior to mitigation as well as after mitigation.

	Flora						Fauna				
Impact	1	2	3	4	5	Sum	1	2	3	4	Sum
Prior to mitigation											
Very High	108 High	90 Medium High	70 Medium High	88 Medium High	108 High	464	56 Medium Low	70 Medium Low	70 Medium Low	54 Medium Low	250
High	80 Medium High	80 Medium High	54 Medium Low	60 Medium Low	96 Medium High	370	48 Low	60 Medium Low	54 Medium Low	45 Low	207
Moderate	42 Low	30 Low	36 Low	40 Low	60 Medium Low	208	24 Very Low	32 Low	32 Low	18 Very Low	106
Low	24 Very Low	10 Very Low	18 Very Low	14 Very Low	14 Very Low	80	18 Very Low	24 Very Low	14 Very Low	12 Very Low	68
After mitigation											
Very High	64 Medium Low	30 Low	30 Low	42 Low	88 Medium High	254	15 Very Low	24 Very Low	15 Very Low	18 Very Low	72
High	35 Low	24 Very Low	20 Very Low	30 Low	77 Medium High	186	12 Very Low	12 Very Low	12 Very Low	12 Very Low	48
Moderate	20 Very Low	9 Very Low	12 Very Low	15 Very Low	45 Low	101	9 Very Low	9 Very Low	9 Very Low	9 Very Low	36
Low	12 Very Low	6 Very Low	8 Very Low	10 Very Low	10 Very Low	46	6 Very Low	6 Very Low	6 Very Low	6 Very Low	24

Table 16: Final scores calculated for floral sensitivity in relation to each option.

Option Number	Sensitivity %	Impact Score	Sensitivity x Impact Score	Final Score
Prior to mitigation				
1	Very High – 27 %	**464**	12 528	34 030
	High – 39 %	**370**	14 430	
	Moderate – 34 %	**208**	7 072	
	Low – N/A	**N/A**	N/A	
2	Very High – 30 %	**464**	13 920	33 664
	High – 32 %	**370**	11 840	
	Moderate – 38 %	**208**	7 904	
	Low – N/A	**N/A**	N/A	
3	Very High – 32 %	**464**	14 848	35 796
	High – 42 %	**370**	15 540	
	Moderate – 26 %	**208**	5 408	
	Low – N/A	**N/A**	N/A	
After mitigation				
1	Very High – 27 %	**254**	6858	17 546
	High – 39 %	**186**	7254	
	Moderate – 34 %	**101**	3434	
	Low – N/A	**N/A**	N/A	
2	Very High – 30 %	**254**	7620	17 410
	High – 32 %	**186**	5952	
	Moderate – 38 %	**101**	3838	
	Low – N/A	**N/A**	N/A	
3	Very High – 32 %	**254**	8128	18 566
	High – 42 %	**186**	7812	
	Moderate – 26 %	**101**	2626	
	Low – N/A	**N/A**	N/A	

Table 17: Final scores calculated for faunal sensitivity in relation to each option

Option Number	Sensitivity %	Impact Score	Sensitivity x Impact Score	Final Score
Prior to mitigation				
1	Very High – 27 %	**250**	6 750	18 427
	High – 39 %	**207**	8 073	
	Moderate – 34 %	**106**	3 604	
	Low – N/A	**N/A**	N/A	
2	Very High – 30 %	**250**	7 500	18 152
	High – 32 %	**207**	6 624	
	Moderate – 38 %	**106**	4 028	
	Low – N/A	**N/A**	N/A	
3	Very High – 32 %	**250**	8 000	19 450
	High – 42 %	**207**	8 694	
	Moderate – 26 %	**106**	2 756	
	Low – N/A	**N/A**	N/A	
After mitigation				
1	Very High – 27 %	**72**	1 944	5 040
	High – 39 %	**48**	1 872	
	Moderate – 34 %	**36**	1 224	
	Low – N/A	**N/A**	N/A	
2	Very High – 30 %	**72**	2 160	5 064
	High – 32 %	**48**	1 536	
	Moderate – 38 %	**36**	1 368	
	Low – N/A	**N/A**	N/A	
3	Very High – 32 %	**72**	2 304	5 256
	High – 42 %	**48**	2 016	

	Moderate – 26 %	**36**	936	
	Low – N/A	**N/A**	N/A	

7.5 No-go Option

Due to the low carrying capacity of the vegetation types within the study area, farms tend to be relatively big and although overgrazing is documented to have had an impact on the integrity of indigenous vegetation (Mucina and Rutherford, 2006), the majority of the region is still considered fairly intact with the exception of urban built up areas and areas utilised for farm infrastructure. Therefore, it is deemed highly unlikely that any change in the impact significance in terms of present ecological state of the areas assessed would occur if the proposed transmission line was not constructed.

7.6 Cumulative Impacts

Floral and faunal habitat within the region are under continued threat due to expansion of urban development, overgrazing and to a lesser extent alien invasive encroachment. Although the footprint area associated with the construction of a transmission line is not deemed significantly big it may add to the cumulative effect of loss of habitat for faunal and floral species. However, the mitigation measures provided in this report, if adhered too, are deemed adequate to reduce impact significance and will reduce the degree of contribution to the overall decline of faunal and floral habitat within the region.

8 SENSITIVITY MAPPING AND CONCLUSION

Three alternative corridors are proposed for the development of the transmission line from the Kappa sub-station near the Breede River to the Gamma sub-station near Victoria West. The estimated length of the options is approximately 400km for option 1, 372km for option 2 and 366km for option 3, with a 2km servitude on either side. Due to the extent of the proposed options it was not feasible to assess the entire length of each option during the field survey. Therefore, all background information discussed in the previous sections was used to divide the options according to sensitivity and to determine “segments of interest” along each of the options and an attempt to assess representative points in these segments was made wherever access allowed. Areas identified as segments of interest, were ground truthed during the field survey, to aid with the identification of the most ecologically viable corridor as well as to aid in the identification of possible impacts on terrestrial biodiversity that may result due to the transmission line development. It should be noted that results obtained during ground truthing are not representative of all faunal and floral habitat types or degrees of transformation present, however they did aid with the identification of areas considered to be of increased ecological concern which need to be safeguarded. A summary of key findings are provided below in relation to each of the proposed options.

During the field assessment an EIS was allocated to each area of interest. This was done taking into consideration present veld condition, available faunal and floral habitat as well as degree of transformation. If the EIS allocated to each area of interest are compared it is evident that option 1 has more areas considered to be in a lower ecological condition (score 0 to 3) in relation to option 2 and option 3. However, option 1 still traverses areas that received high scores (score 4 to 5) similar to option 2 and 3. The majority of the lower scores allocated to option 2 and 3 were within areas near urban development, whereas lower scores allocated to option 1 were within areas impacted by overgrazing. As mentioned above each EIS allocated can be related to floral diversity and abundance as well as faunal habitat diversity. Areas that have undergone less transformation also had a higher floral diversity and abundance. Although vegetation types traversed by the options do not naturally host a significant number of floral species, overgrazing and disturbance result in the dominance of one or two species at the expense of others and furthermore results in a decline in vegetation abundance.

The three proposed options cross nine vegetation types each hosting a unique floral diversity as well as several QDSs wherein SCC or protected species were identified, refer to sections above. None of the vegetation types traversed by any of the options are considered “threatened” with all vegetation types listed as “least concern” (Mucina and Rutherford, 2006). However, the Central Mountain Shale Renosterveld, Koedoesberge – Moordenaars Karoo, Southern Karoo Riviere, Tanqua Escarpment Shrubland and Upper Karoo Hardeveld are all vegetation types either not formally conserved or of which a very small portion are statutorily conserved. Furthermore, it is expected that anthropogenic activity along each of the options will be restricted to more accessible areas, therefore less accessible habitats associated with the vegetation types such as mountains (Central Mountain Shale Renosterveld), rocky ridges (Upper Karoo Hardeveld), larger rivers (Southern Karoo Riviere), may presently still provide suitable undisturbed habitat for various floral communities. Option 2 and 3 traverse all the above mentioned vegetation types and option 1 traverses all of the vegetation types except for Central Mountain Shale Renosterveld.

The collective area of each vegetation type as allocated by Mucina and Rutherford (2006) should also be taken into consideration. Some of the vegetation types are restricted to very specific habitat such as elevated ridges (Upper Karoo Hardeveld) or rivers (Southern Karoo Riviere) and if combined would cover a smaller collective area than other vegetation types such as the Gamka Karoo which is located throughout a large portion of the study area. Smaller vegetation types were incorporated into the overall sensitivity mapping and it is

considered important that support structures be placed outside these smaller vegetation types as far as possible.

The PRECIS database (SANBI) provides an indication of areas along the different options where floral species of concern are more likely to be found. Five QDS's (3222BC; 3221DC; 3320BB; 3320AB; 3220CD) were identified as areas with a high number of SCC. Option 3 traverses four of these QDS's and option 1 and 2, only two.

None of the options are indicated to traverse remnants of endangered ecosystems as indicated in Figure 13. Approximately 20km of option 3 does however cross a formal land based protected area, namely the Karoo National Park. The Protected Areas Act No. 57 of 2003 gives SANParks (South African National Parks), such as the Karoo National Park, its legal mandate. One of the important mandates and provisions of the Karoo National Park is conservation and sustainable use of biodiversity within its property. Option 2 crosses the Steenbokkie Nature Reserve which presently conserves sustainable populations of indigenous faunal and floral species, within an area where vegetation transformation is expected due to urban sprawl and associated infrastructure development. Proper planning and mitigation of impacts will therefore be of upmost importance should option 2 or option 3 be chosen and it is recommended that the preferred option be re-routed around formal protected areas if possible. Although option 1 does not cross a formal protected area, it is expected that the corridor will traverse sensitive habitat such as wetlands, rivers and mountains that have undergone little transformation and therefore could still provide habitat for several SCC. It is deemed important that consideration be afforded to these sensitive habitats and that support structures be placed outside of sensitive habitat where possible. Should these features encroach into any sensitive habitat, construction should be undertaken in an ecological sensitive manner. To aid with the identification of smaller sensitive features such as ridges, quartzite outcrops and rivers it is recommended that each area demarcated for a support structure within very high and high sensitivity areas (refer to sensitivity map) be ground truthed prior to construction. Impact may be significantly reduced by shifting the proposed support structure locations by a couple of meters out of sensitive areas and into areas considered less sensitive.

Habitat diversity was considered very similar along option 2 and 3 and transformation along these options was less evident if compared to option 1 due to these options being more isolated. Extensive portions of option 1 are located near the N1 Highway. It was evident during the site survey that the portions near the N1 Highway are generally more accessible

and therefore more transformed when compared to portions located further from the N1 Highway.

Several areas of interest along all three options are located near existing transmission line corridors. Option 2 traverse the Nature Reserve, which already has several transmission lines crossing through it and although it is recommended that the new line be situated as close as possible to existing lines it would be considered a more ecologically sensitive approach to either re-route around the nature reserve or re-route to construct the line as close to the nature reserve boundary as possible.

The most important aspect of option 3 is the 20km that crosses the Karoo National Park which is a formal land based protected area. Furthermore, importance has been indicated in the same region (Succulent Karoo Ecosystem Program; SKEP) in terms of habitat provision for the *Bunolagus monticularis* (Riverine rabbit). *B. monticularis* is considered Southern Africa's most endangered mammal and is restricted to dense riverine scrub along seasonal rivers. Although the placement of support structures can be arranged so as to avoid rivers and wetlands, the anthropogenic activity associated with construction may still pose a threat to this species and may scare off any individuals nearby. It is therefore recommended that this portion of option 3 be re-routed should option 3 be chosen as the preferred alternative.

Further to avifaunal habitat loss due to vegetation clearing for the construction of support towers, collision of avifauna with earth wire of the transmission line is also considered a significant threat with special mention of *Neotis ludwigii* (Ludwig's Bustard), *Ardeotis kori* (Kori Bustard), *Anthropoides paradiseus* (Blue Crane) and *Sagittarius serpentarius* (Sectretarybird). Although it is expected that birds would be restricted to less transformed areas, certain species such as *A. paradiseus* are adapted to transformed grassland and agricultural lands. Therefore, consideration should also be afforded to these species to ensure any possible impact is effectively mitigated within all habitat units. It is therefore considered important that all mitigation measures specified by the avifaunal study be strictly adhered to.

If all findings are taken into consideration option 1 is considered the least sensitive in terms of faunal and floral conservation followed by option 2 and then option 3. However, all options do traverse sensitive habitat and it is recommended that an option be chosen that follows an existing transmission line corridor. Furthermore, it is recommended that support structure placement be ground truthed by means of a site walk down prior to construction within areas

considered of increased conservational value in order to attempt to avoid the disturbance of smaller unique habitat such as ridges, quartzite outcrops and rivers as far as possible.

Key indicators of degree of sensitivity included formally protected areas and critically endangered ecosystems (Threatened Ecosystem Status) as well as natural habitat and CBAs (Fine Scale Plans). Within areas where several of the previously mentioned areas overlap the area was demarcated to be of Very High sensitivity. The degree of sensitivity where then lowered as the presence of these areas became less or absent. The EIS allocated to the areas of interest were also taken into consideration during the refinement of the sensitivity map. The different areas of sensitivity are conceptually depicted in Figure 27 below, please also refer to the shape files provided.

It should be noted that isolated areas along each option for example gravel roads and severely overgrazed vegetation can be considered within a low or very low sensitivity class, however these areas are considered marginal compared to the entire length of each option. It was therefore not deemed feasible to map low and very low sensitivity class areas and the extent of these areas were included in other sensitivity classes. However, it was deemed important to assess the impact significance of areas considered to fall within the low and very low sensitivity classes and these were therefore included within the impact assessment.

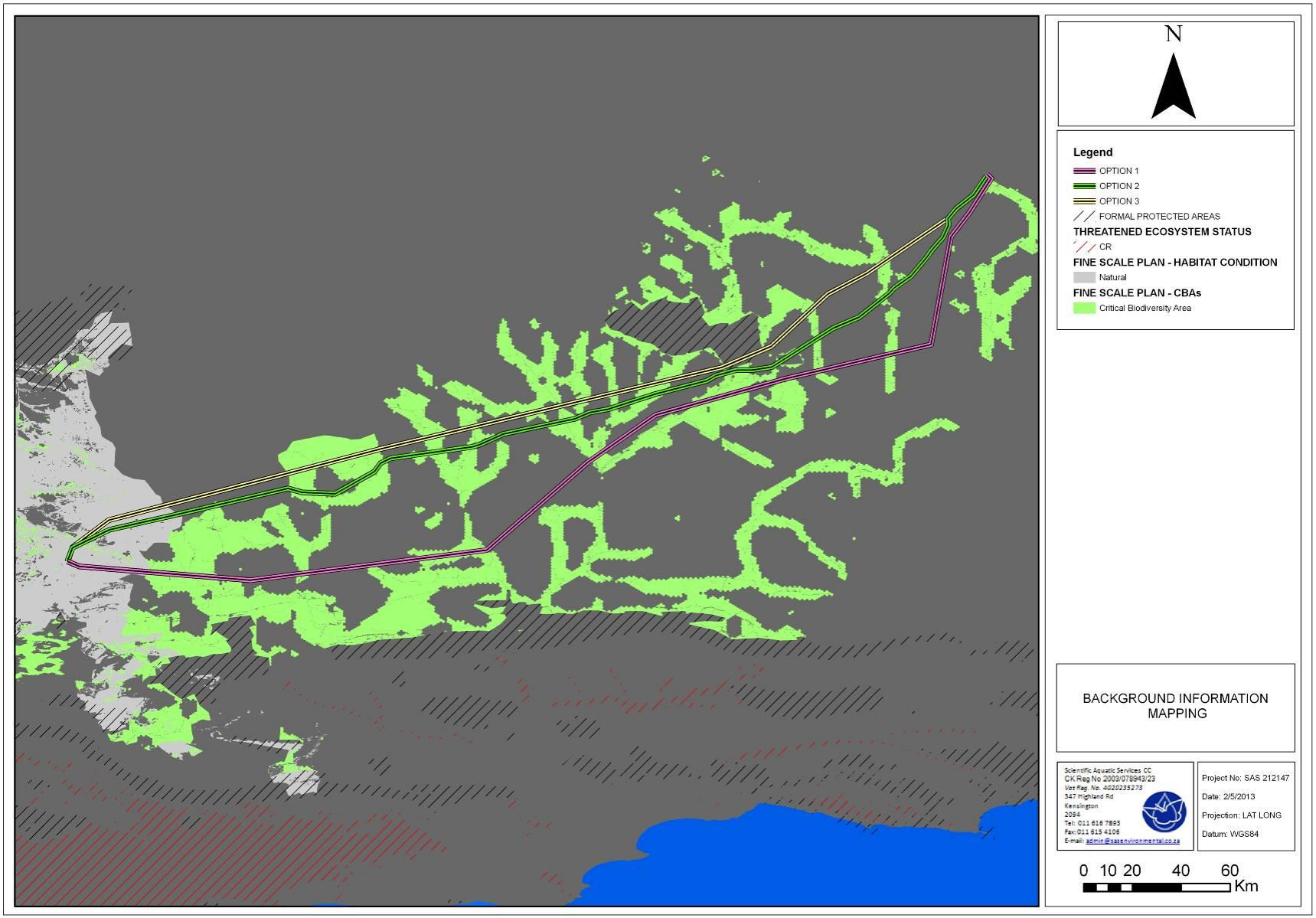

Figure 26: Background information considered during the sensitivity mapping.

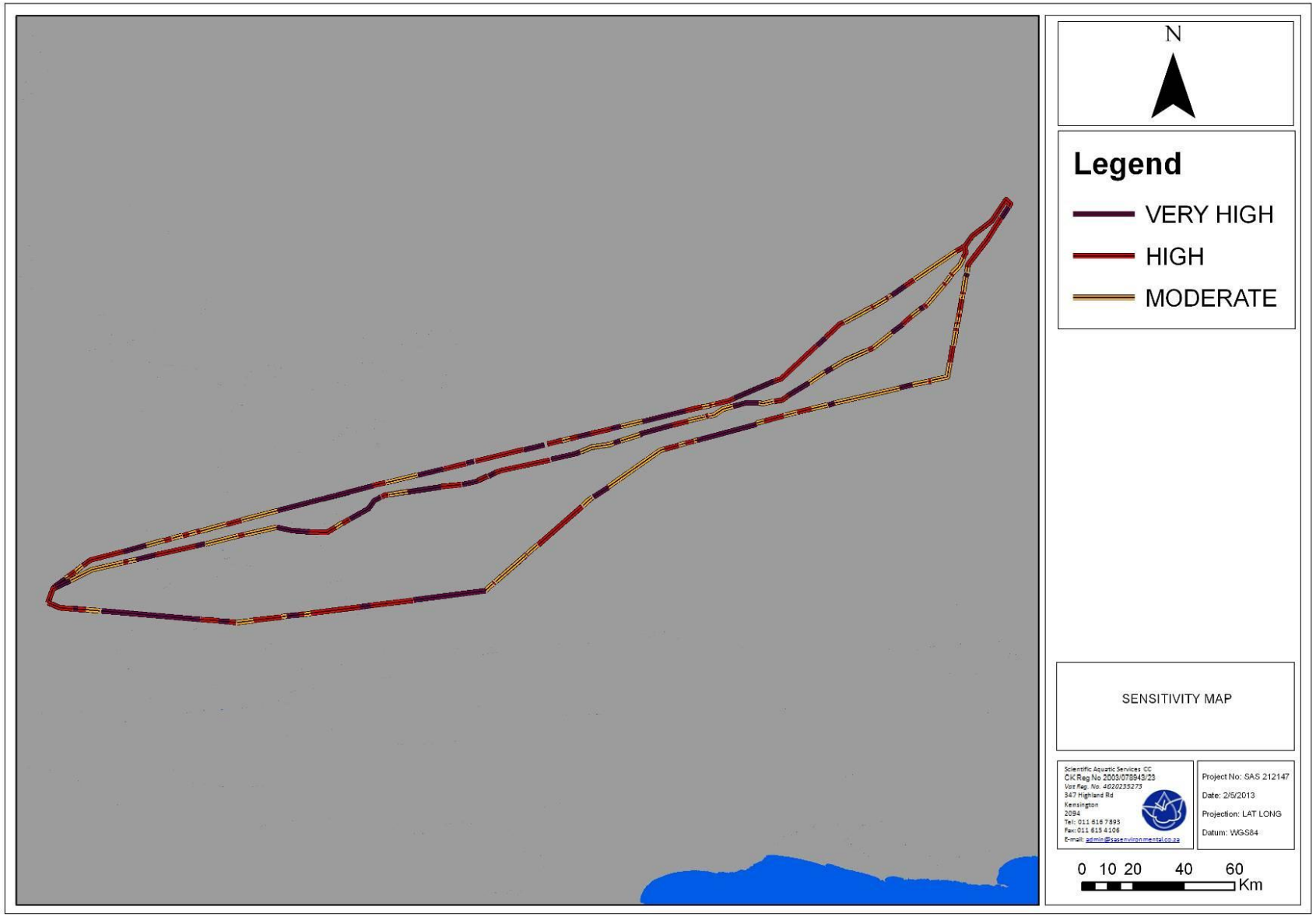

Figure 27: Sensitivity map.

9 REFERENCES

Acocks, J. P. H. 1988 Third Edition. *Veld Types of South Africa.* Memoirs of the Botanical Survey of South Africa No. 57, Botanical Research Institute, RSA

Alexander, G and Marais, J 2008 Second Edition. *A guide to the reptiles of Southern Africa.*Struik Publishers, Cape Town, RSA

Branch, B. 1998 Third Edition. *Field Guide to Snakes and other Reptiles in Southern Africa.* Struik Publishers (Pty) Ltd, Cape Town, RSA

Birss, C. and Palmer, N. G. 2012 Mammals in: Turner, A. A. (ed). Western Cape Province State of Biodiversity 2012. CapeNature Scientific Services, Stellenbosch. ISBN: 978-0-621-41407-3

De Villiers, C., Driver, A., Clark, B., Euston-Brown, D., Day, L., Job, N., Helme, N., Holmes, P., Brownlie, S., Robelo, T. 2005 *Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape*. Fynbos Forum and Botanical Society of South Africa, Kirstenbosch, Cape Town

Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012 ***National Biodiversity Assessment 2011****: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report*. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria

Du Preez, L and Carruthers, V. 2008 A complete guide to the frogs of Southern Africa. Stuiker Nature, Random house, Cape Town, South Africa

Elser, K.J., Milton, S.J., Dean, W.R. 2010 Karooveld Ekologie en Bestuur. Briza Publikasies, Pretoria, RSA

EWT, Endangered Wildlife Trust (Conservation Breeding Specialist Group). 2004 *Red Data Book of the Mammals of South Africa: A conservation Assessment*

Holmes, P, Stipinovich, A. and Purves, A. 2012 *City of Cape Town Biodiversity Network: Methods and Results Technical Report.* Environmental Resource Management Department (ERMD), City of Cape Town

IUCN 2012 *The IUCN Red List of Threatened Species. Version 2012.2*. <http://www.iucnredlist.org>. Downloaded on 17 October 2012

Leroy, A. and Leroy, J. Second Edition. 2003 *Spiders of Southern Africa.* Struik Publishers (Pty) Ltd, Cape Town, RSA

Lloyd, P.H. 2002 State of biodiversity: Western Cape Province, South Africa – mammals. 19 pp. In: Western Cape Nature Conservation Board 2002. Biodiversity of the Western Cape 2002. Western Cape Nature Conservation Board, Cape Town

Low, A.B. & Rebelo, A.G. (Eds) 1998 *Vegetation of South Africa, Lesotho and Swaziland.* Department of Environmental Affairs and Tourism, Pretoria, RSA

Marais, J. 2004 *A complete guide to the Snakes of Southern Africa.* Struik Publishers (Pty) Ltd, Cape Town, RSA

Mucina, L. & Rutherford, M.C. (Eds). 2006 *The Vegetation of South Africa, Lesotho and Swaziland.* Strelitzia 19. South African National Biodiversity Institute, Pretoria, RSA

Picker. M., Griffiths. C. and Weaving. A. 2004 New Edition. *Field Guide to Insects of South Africa.* Struik Publishers (Pty) Ltd, Cape Town, RSA

Raimondo, D., von Staden, L., Foden., W., Victor, JE., Helme, NA., Turner, RC., Kamundi, DA., Manyama, PA. (eds) 2009 **Red List Of South African Plants** Strelitzia 25. South African National Biodiversity Institute, Pretoria, RSA

Rutherford, M.C. & Westfall, R. H. 1994 *Biomes of Southern Africa: An objective categorization.* National Botanical Institute, Pretoria, RSA

Shearing, D. and van Heerden. K. 1997 Karoo South African Wild Flower Guide 6. Botanical Society of South Africa, Claremont, RSA

Sinclair, I., Hockey, P. and Tarboton, W. 2002 Third Edition. *Sasol Birds of Southern Africa.* Struik Publishers, Cape Town, RSA

Smithers, R. H. N. 2000 Third Edition. Edited by Peter Apps. *The Mammals of the Southern African. A Field Guide.* Struik Publishers, Cape Town, RSA

The South African National Biodiversity Institute is thanked for the use of data from the National Herbarium, Pretoria (PRE) Computerised Information System (PRECIS) as well as from the Biodiversity GIS website.

Threatened Species Programme 2005 Red Data List of South African Plant Species. Available online: http://www.redlist.org.

The Animal Demography Unit of the Department of Biological Sciences at the University of Cape Town is thanked for the use of data from their website accessed 30/04/2013

Turner, A. A. (ed.) 2012. Western Cape Province State of Biodiversity 2012. CapeNature Scientific Services, Stellenbosch. ISBN: 978-0-621-41407-3

Van Oudtshoorn, F. 2009 Guide to Grasses of Southern Africa. Briza Publication, Pretoria, RSA

Van der Merwe, H. 2010 Wild flowers of the Roggeveld and Tanqua. Published by H. van der Merwe, Calvinia, RSA

Van Wyk AE. & Smith, GF. 2001 *Regions of Floristic Endemism in Southern Africa*. UMDAUS Press, Hatfield, RSA

Walker, C. 1988 Fourth Edition. *Signs of the Wild.* Struik Publishers (Pty) Ltd, Cape Town, RSA

APPENDIX A

Fauna

Table 18: Expected mammal species documented within the full degrees 3123, 3220, 3222, 3221 and 3320 as supplied by MammalMAP.

Genus	Species	Sub-species	Common name	Threat Status
Alcelaphus	*buselaphus*		Red Hartebeest	Least Concern
Antidorcas	*marsupialis*		Springbok	Least Concern
Connochaetes	*gnou*		Black Wildebeest	Least Concern
Connochaetes	*taurinus*	*taurinus*	Blue Wildebeest	Least Concern
Damaliscus	*pygargus*	*pygargus*	Bontebok	Vulnerable
Oreotragus	*oreotragus*		Klipspringer	Least Concern
Oryx	*gazella*		Gemsbok	Least Concern
Pelea	*capreolus*		Grey Rhebok	Least Concern
Raphicerus	*campestris*		Steenbok	Least Concern
Raphicerus	*melanotis*		Cape Grysbok	Least Concern
Sylvicapra	*grimmia*		Common Duiker	Least Concern
Taurotragus	*oryx*		Eland	Least Concern
Tragelaphus	*strepsiceros*		Kudu	Least Concern
Canis	*mesomelas*		Black-backed Jackal	Least Concern
Papio	*ursinus*		Chacma Baboon	Least Concern
Loxodonta	*africana*		African Elephant	Least Concern
Equus	*burchellii*		Plains Zebra	Least Concern
Equus	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable
Acinonyx	*jubatus*		Cheetah	Vulnerable
Caracal	*caracal*		Caracal	Least Concern
Felis	*silvestris*		African Wild Cat	Least Concern
Panthera	*leo*		Lion	Vulnerable
Panthera	*pardus*		Leopard	Least Concern
Giraffa	*camelopardalis*	*camelopardalis*	Giraffe	Least Concern
Cynictis	*penicillata*		Yellow Mongoose	Least Concern
Galerella	*pulverulenta*		Small Grey Mongoose	Least Concern
Suricata	*suricatta*		Suricate	Least Concern
Hippopotamus	*amphibius*		Hippopotamus	Least Concern
Hyaena	*brunnea*		Brown Hyaena	Near Threatened
Hystrix	*africaeaustralis*		Porcupine	Least Concern
Bunolagus	*monticularis*		Riverine Rabbit	Critically Endangered
Lepus	*saxatilis*		Scrub / Savannah Hare	Least Concern
Pronolagus	*saundersiae*		Hewitt's Red Rock Rabbit	Least Concern
Macroscelides	*proboscideus*		Round-eared Elephant-shrew	Least Concern
Otomys	*unisulcatus*		Karoo Bush Rat	Least Concern
Parotomys	*brantsii*		Brants' Whistling Rat	Least Concern
Rhabdomys	*pumilio*		Striped Mouse	Least Concern
Mellivora	*capensis*		Honey Badger	Near Threatened
Poecilogale	*albinucha*		African Weasel	Data deficient
Orycteropus	*afer*		Aardvark	Least Concern
Procavia	*capensis*		Rock Hyrax	Least Concern
Neoromicia	*capensis*		Cape Serotine Bat	Least Concern

Table 19: Expected reptile species documented for the full degrees 3123, 3220, 3222, 3221 and 3320 supplied by the SARCA Database.

Genus	Species	Sub-species	Common name	Threat Status
Agama	*aculeata*	*aculeata*	Common Ground Agama	Not Evaluated
Agama	*atra*		Southern Rock Agama	Not Evaluated
Agama	*hispida*		Spiny Ground Agama	Not Evaluated
Homoroselaps	*lacteus*		Spotted Harlequin Snake	Not Evaluated
Bradypodion	*damaranum*		Knysna Dwarf Chameleon	Not Evaluated
Bradypodion	*gutturale*		Little Karoo Dwarf Chameleon	Not Evaluated
Bradypodion	*sp. (Grootvadersbosch)*		Dwarf Chameleon sp. 1	Not listed
Bradypodion	*ventrale*		Eastern Cape Dwarf Chameleon	Not Evaluated
Chamaeleo	*namaquensis*		Namaqua Chameleon	Not Evaluated
Amplorhinus	*multimaculatus*		Many-spotted Snake	Not Evaluated
Boaedon	*capensis*		Brown House Snake	Not Evaluated
Crotaphopeltis	*hotamboeia*		Red-lipped Snake	Not Evaluated
Dasypeltis	*scabra*		Rhombic Egg-eater	Not Evaluated
Dipsina	*multimaculata*		Dwarf Beaked Snake	Not Evaluated
Dispholidus	*typus*	*typus*	Boomslang	Not Evaluated
Duberria	*lutrix*	*lutrix*	South African Slug-eater	Not Evaluated
Lamprophis	*aurora*		Aurora House Snake	Not Evaluated
Lamprophis	*fiskii*		Fisk's House Snake	Vulnerable
Lamprophis	*guttatus*		Spotted House Snake	Not Evaluated
Lycodonomorphus	*rufulus*		Brown Water Snake	Not Evaluated
Philothamnus	*natalensis*	*occidentalis*	Western Natal Green Snake	Not Evaluated
Prosymna	*sundevallii*		Sundevall's Shovel-snout	Not Evaluated
Psammophis	*crucifer*		Cross-marked Grass Snake	Not Evaluated
Psammophis	*notostictus*		Karoo Sand Snake	Not Evaluated
Psammophylax	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Not Evaluated
Pseudaspis	*cana*		Mole Snake	Not Evaluated
Telescopus	*beetzii*		Beetz's Tiger Snake	Not Evaluated
Chamaesaura	*anguina*	*anguina*	Cape Grass Lizard	Not Evaluated
Cordylus	*cloetei*		Cloete's Girdled Lizard	Not Evaluated
Cordylus	*cordylus*		Cape Girdled Lizard	Not Evaluated
Cordylus	*minor*		Western Dwarf Girdled Lizard	Not Evaluated
Hemicordylus	*capensis*		Graceful Crag Lizard	Not Evaluated
Karusasaurus	*polyzonus*		Karoo Girdled Lizard	Not Evaluated
Ninurta	*coeruleopunctatus*		Blue-spotted Girdled Lizard	Not Evaluated
Ouroborus	*cataphractus*		Armadillo Girdled Lizard	Vulnerable
Pseudocordylus	*microlepidotus*	*microlepidotus*	Cape Crag Lizard	Not Evaluated
Pseudocordylus	*microlepidotus*	*namaquensis*	Nuweveldberg Crag Lizard	Not Evaluated
Pseudocordylus	*microlepidotus*	*subsp.*	Cape Crag Lizard (subsp. ?)	Not listed
Aspidelaps	*lubricus*	*lubricus*	Coral Shield Cobra	Not listed
Hemachatus	*haemachatus*		Rinkhals	Not Evaluated
Naja	*nigricincta*	*woodi*	Black Spitting Cobra	Not Evaluated
Naja	*nivea*		Cape Cobra	Not Evaluated
Afroedura	*karroica*		Karoo Flat Gecko	Not Evaluated
Afrogecko	*porphyreus*		Marbled Leaf-toed Gecko	Not Evaluated
Chondrodactylus	*angulifer*	*angulifer*	Common Giant Ground Gecko	Not Evaluated
Chondrodactylus	*bibronii*		Bibron's Gecko	Not Evaluated
Goggia	*braacki*		Braack's Pygmy Gecko	Not Evaluated
Goggia	*hewitti*		Hewitt's Pygmy Gecko	Not Evaluated
Goggia	*lineata*		Striped Pygmy Gecko	Not Evaluated
Pachydactylus	*capensis*		Cape Gecko	Not Evaluated
Pachydactylus	*formosus*		Southern Rough Gecko	Not Evaluated
Pachydactylus	*geitje*		Ocellated Gecko	Not Evaluated
Pachydactylus	*kladaroderma*		Thin-skinned Gecko	Not Evaluated

Genus	Species	Sub-species	Common name	Threat Status
Pachydactylus	*latirostris*		Quartz Gecko	Not Evaluated
Pachydactylus	*maculatus*		Spotted Gecko	Not Evaluated
Pachydactylus	*mariquensis*		Marico Gecko	Not Evaluated
Pachydactylus	*oculatus*		Golden Spotted Gecko	Not Evaluated
Pachydactylus	*purcelli*		Purcell's Gecko	Not Evaluated
Pachydactylus	*weberi*		Weber's Gecko	Not Evaluated
Ptenopus	*garrulus*	*maculatus*	Spotted Barking Gecko	Not Evaluated
Cordylosaurus	*subtessellatus*		Dwarf Plated Lizard	Not Evaluated
Gerrhosaurus	*typicus*		Karoo Plated Lizard	Lower Risk: Near Threatened
Tetradactylus	*seps*		Short-legged Seps	Not Evaluated
Tetradactylus	*tetradactylus*		Cape Long-tailed Seps	Not Evaluated
Australolacerta	*australis*		Southern Rock Lizard	Lower Risk: Least Concern
Meroles	*knoxii*		Knox's Desert Lizard	Not Evaluated
Meroles	*suborbitalis*		Spotted Desert Lizard	Not Evaluated
Nucras	*livida*		Karoo Sandveld Lizard	Not Evaluated
Nucras	*tessellata*		Western Sandveld Lizard	Not Evaluated
Pedioplanis	*burchelli*		Burchell's Sand Lizard	Not Evaluated
Pedioplanis	*laticeps*		Karoo Sand Lizard	Not Evaluated
Pedioplanis	*lineoocellata*	*pulchella*	Common Sand Lizard	Not Evaluated
Pedioplanis	*namaquensis*		Namaqua Sand Lizard	Not Evaluated
Tropidosaura	*gularis*		Cape Mountain Lizard	Not Evaluated
Tropidosaura	*montana*	*montana*	Common Mountain Lizard	Not listed
Leptotyphlops	*nigricans*		Black Thread Snake	Not Evaluated
Namibiana	*gracilior*		Slender Thread Snake	Not Evaluated
Pelomedusa	*subrufa*		Marsh Terrapin	Not Evaluated
Acontias	*lineatus*		Striped Dwarf Legless Skink	Not Evaluated
Acontias	*meleagris*		Cape Legless Skink	Not Evaluated
Scelotes	*caffer*		Cape Dwarf Burrowing Skink	Not Evaluated
Trachylepis	*capensis*		Cape Skink	Not Evaluated
Trachylepis	*homalocephala*		Red-sided Skink	Not Evaluated
Trachylepis	*occidentalis*		Western Three-striped Skink	Not Evaluated
Trachylepis	*sulcata*		Western Rock Skink	Not listed
Trachylepis	*sulcata*	*sulcata*	Western Rock Skink	Not Evaluated
Trachylepis	*variegata*		Variegated Skink	Not Evaluated
Trachylepis	*variegata*		Variegated Skink (subsp. ?)	Not listed
Chersina	*angulata*		Angulate Tortoise	Not Evaluated
Homopus	*areolatus*		Parrot-beaked Tortoise	Not Evaluated
Homopus	*boulengeri*		Karoo Padloper	Not Evaluated
Homopus	*femoralis*		Greater Padloper	Not Evaluated
Psammobates	*tentorius*		Tent Tortoise (subsp. ?)	Not Evaluated
Psammobates	*tentorius*	*tentorius*	Karoo Tent Tortoise	Not listed
Psammobates	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed
Stigmochelys	*pardalis*		Leopard Tortoise	Not Evaluated
Rhinotyphlops	*lalandei*		Delalande's Beaked Blind Snake	Not Evaluated
Varanus	*albigularis*	*albigularis*	Rock Monitor	Not Evaluated
Bitis	*arietans*	*arietans*	Puff Adder	Not Evaluated
Bitis	*atropos*		Cape Berg Adder	Not Evaluated
Bitis	*caudalis*		Horned Adder	Not Evaluated
Bitis	*rubida*		Red Adder	Not Evaluated
Causus	*rhombeatus*		Rhombic Night Adder	Not Evaluated

Table 20: Expected amphibian species documented for the full degrees 3123, 3220, 3222, 3221 and 3320 supplied by the SAFAP Database.

Genus	Species	Common name	Threat status
Breviceps	*acutirostris*		Least Concern
Breviceps	*fuscus*		Least Concern
Breviceps	*montanus*		Least Concern
Amietophrynus	*rangeri*		Least Concern
Capensibufo	*tradouwi*		Least Concern
Poyntonophrynus	*vertebralis*		Least Concern
Vandijkophrynus	*gariepensis*		Least Concern
Heleophryne	*orientalis*		Least Concern
Heleophryne	*purcelli*		Least Concern
Kassina	*senegalensis*		Least Concern
Semnodactylus	*wealii*		Least Concern
Xenopus	*laevis*		Least Concern
Amietia	*angolensis*	Common or Angola River Frog	Least Concern
Amietia	*fuscigula*	Cape River Frog	Least Concern
Amietia	*vandijki*	Van Dijk's River Frog	Least Concern
Cacosternum	*boettgeri*		Least Concern
Cacosternum	*karooicum*		Least Concern
Cacosternum	*nanum*		Least Concern
Cacosternum	*platys*		Not Evaluated
Pyxicephalus	*adspersus*		Least Concern
Strongylopus	*bonaespei*		Least Concern
Strongylopus	*fasciatus*		Least Concern
Strongylopus	*grayii*		Least Concern
Tomopterna	*delalandii*		Least Concern
Tomopterna	*tandyi*		Least Concern

Table 21: Expected butterfly species documented for the full degrees 3123, 3220, 3222, 3221 and 3320 supplied by the SABCA Database.

Genus	Species	Sub-species	Common name	Threat status
Alenia	*sandaster*		Karoo dancer	Least Concern
Eagris	*nottoana*	*knysna*	Rufous-winged elfin	Least Concern
Gomalia	*elma*	*elma*	Green-marbled skipper	Least Concern
Metisella	*malgacha*	*malgacha*	Grassveld sylph	Least Concern
Metisella	*metis*	*metis*	Gold-spotted sylph	Least Concern
Spialia	*agylla*	*agylla*	Grassveld sandman	Least Concern
Spialia	*agylla*	*bamptoni*	Grassveld sandman	Least Concern
Spialia	*diomus*	*ferax*	Common sandman	Least Concern
Spialia	*nanus*		Dwarf sandman	Least Concern
Spialia	*spio*		Mountain sandman	Least Concern
Tsitana	*dicksoni*		Dickson's sylph	Data Deficient
Tsitana	*tulbagha*	*kaplani*	Tulbagh sylph	Least Concern
Aloeides	*almeida*		Almeida copper	Least Concern
Aloeides	*apicalis*		Pointed copper	Least Concern
Aloeides	*aranda*		Aranda copper	Least Concern
Aloeides	*arida*		Arid copper	Least Concern
Aloeides	*barklyi*		Barkly's copper	Least Concern
Aloeides	*caledoni*		Caledon copper	Least Concern
Aloeides	*damarensis*	*damarensis*	Damara copper	Least Concern
Aloeides	*depicta*		Depicta copper	Least Concern
Aloeides	*gowani*		Gowan's copper	Least Concern
Aloeides	*juana*		Juana copper	Least Concern

Genus	Species	Sub-species	Common name	Threat status
Aloeides	*kaplani*		Kaplan's copper	Least Concern
Aloeides	*macmasteri*		McMaster's copper	Least Concern
Aloeides	*margaretae*		Marguerite's copper	Least Concern
Aloeides	*pallida*	*grandis*	Giant copper	Least Concern
Aloeides	*pallida*	*pallida*	Giant copper	Least Concern
Aloeides	*pierus*		Dull copper	Least Concern
Aloeides	*quickelbergei*		Quickelberge's copper	Least Concern
Aloeides	*thyra*	*thyra*	Red copper	Least Concern
Aloeides	*vansoni*		Van Son's copper	Least Concern
Anthene	*amarah*	*amarah*	Black striped hairtail	Least Concern
Anthene	*definita*	*definita*	Common hairtail	Least Concern
Anthene	*otacilia*	*otacilia*	Otacilia hairtail	Least Concern
Anthene	*talboti*		Talbot's hairtail	Least Concern
Argyraspodes	*argyraspis*		Warrior silver-spotted copper	Least Concern
Azanus	*jesous*		Topaz babul blue	Least Concern
Azanus	*moriqua*		Black-bordered babul blue	Least Concern
Azanus	*ubaldus*		Velvet-spotted babul blue	Least Concern
Brephidium	*metophis*		Tinktinkie blue	Least Concern
Cacyreus	*dicksoni*		Dickson's geranium bronze	Least Concern
Cacyreus	*fracta*	*fracta*	Water geranium bronze	Least Concern
Cacyreus	*lingeus*		Bush bronze	Least Concern
Cacyreus	*marshalli*		Common geranium bronze	Least Concern
Capys	*alpheus*	*alpheus*	Orange banded protea	Least Concern
Chilades	*trochylus*		Grass jewel	Least Concern
Chrysoritis	*azurius*		Azure opal	Least Concern
Chrysoritis	*beaufortia*	*beaufortia*	Beaufort opal	Least Concern
Chrysoritis	*beaufortia*	*charlesi*	Beaufort opal	Least Concern
Chrysoritis	*beaufortia*	*sutherlandensis*	Beaufort opal	Least Concern
Chrysoritis	*brooksi*	*brooksi*	Brook's opal	Least Concern
Chrysoritis	*chrysantas*		Karoo opal	Least Concern
Chrysoritis	*chrysaor*		Burnished opal	Least Concern
Chrysoritis	*felthami*	*dukei*	Feltham's opal	Least Concern
Chrysoritis	*midas*		Midas opal	Least Concern
Chrysoritis	*palmus*	*palmus*	Water opal	Least Concern
Chrysoritis	*pan*	*henningi*	Henning's opal	Least Concern
Chrysoritis	*pan*	*lysander*	Lysander opal	Least Concern
Chrysoritis	*plutus*		Plutus' opal	Least Concern
Chrysoritis	*pyroeis*	*pyroeis*	Sand-dune opal	Least Concern
Chrysoritis	*swanepoeli*	*swanepoeli*	Swanepoel's opal	Least Concern
Chrysoritis	*turneri*	*turneri*	Turner's opal	Least Concern
Chrysoritis	*turneri*	*wykehami*	Wykeham's opal	Least Concern
Chrysoritis	*uranus*	*uranus*	Uranus opal	Least Concern
Chrysoritis	*violescens*		Violescent opal	Least Concern
Crudaria	*capensis*		Cape grey	Least Concern
Crudaria	*leroma*		Silver spotted grey	Least Concern
Cupidopsis	*jobates*	*jobates*	Tailed meadow blue	Least Concern
Durbaniella	*clarki*	*clarki*	Clark's rocksitter	Least Concern
Durbaniella	*clarki*	*phaea*	Clark's rocksitter	Least Concern
Durbaniopsis	*saga*		Boland rocksitter	Least Concern
Eicochrysops	*messapus*	*messapus*	Cupreous blue	Least Concern
Harpendyreus	*notoba*		Salvia mountain blue	Least Concern
Iolaus	*mimosae*	*mimosae*	Mimosa sapphire	Least Concern
Lampides	*boeticus*		Pea blue	Least Concern
Lepidochrysops	*asteris*		Brilliant blue	Least Concern
Lepidochrysops	*australis*		Southern blue	Least Concern
Lepidochrysops	*bacchus*		Wineland blue	Least Concern

Genus	Species	Sub-species	Common name	Threat status
Lepidochrysops	*braueri*		Brauer's blue	Least Concern
Lepidochrysops	*dukei*		Duke's blue	Least Concern
Lepidochrysops	*jamesi*	*jamesi*	James's blue	Least Concern
Lepidochrysops	*ketsi*	*ketsi*	Ketsi blue	Least Concern
Lepidochrysops	*mcgregori*		McGregor's blue	Least Concern
Lepidochrysops	*methymna*	*methymna*	Monkey blue	Least Concern
Lepidochrysops	*oreas*	*junae*	Peninsula blue	Least Concern
Lepidochrysops	*ortygia*		Koppie blue	Least Concern
Lepidochrysops	*puncticilia*		Mouse blue	Least Concern
Lepidochrysops	*robertsoni*		Robertson's blue	Least Concern
Leptomyrina	*lara*		Cape black-eye	Least Concern
Leptotes	*brevidentatus*		Short-toothed zebra blue	Least Concern
Leptotes	*pirithous*	*pirithous*	Common zebra blue	Least Concern
Lycaena	*clarki*		Eastern sorrel copper	Least Concern
Oraidium	*barberae*		Dwarf blue	Least Concern
Phasis	*braueri*		Brauer's arrowhead	Least Concern
Phasis	*clavum*	*clavum*	Namagua arrowhead	Least Concern
Phasis	*clavum*	*erythema*	Namagua arrowhead	Least Concern
Phasis	*pringlei*		Pringle's arrowhead	Least Concern
Stugeta	*bowkeri*	*bowkeri*	Bowker's marbled sapphire	Least Concern
Tarucus	*thespis*		Vivid dotted blue	Least Concern
Thestor	*brachycerus*	*dukei*	Duke's skolly	Least Concern
Thestor	*braunsi*		Braun's skolly	Least Concern
Thestor	*penningtoni*		Pennington's skolly	Least Concern
Thestor	*petra*	*tempe*	Tempe skolly	Least Concern
Thestor	*pictus*		Langeberg skolly	Least Concern
Thestor	*pringlei*		Pringle's skolly	Least Concern
Thestor	*protumnus*	*aridus*	Boland skolly	Least Concern
Trimenia	*argyroplaga*	*argyroplaga*	Large silver-spotted copper	Least Concern
Trimenia	*macmasteri*	*macmasteri*	McMaster's silver-spotted copper	Least Concern
Trimenia	*wykehami*		Wykeham's silver-spotted copper	Least Concern
Tylopaedia	*sardonyx*	*sardonyx*	King copper	Least Concern
Virachola	*antalus*		Brown playboy	Least Concern
Zizeeria	*knysna*	*knysna*	African grass blue	Least Concern
Acraea	*horta*		Garden acraea	Least Concern
Aeropetes	*tulbaghia*		Table mountain beauty	Least Concern
Cassionympha	*cassius*		Rainforest brown	Least Concern
Cassionympha	*detecta*		Cape brown	Least Concern
Charaxes	*pelias*		Protea charaxes	Least Concern
Charaxes	*xiphares*	*occidentalis*	Forest-king charaxes	Least Concern
Coenyropsis	*bera*		Bera brown	Not listed
Danaus	*chrysippus*	*orientis*	African monarch, Plain tiger	Least Concern
Dira	*clytus*	*clytus*	Cape autumn widow	Least Concern
Hypolimnas	*misippus*		Common diadem	Least Concern
Junonia	*hierta*	*cebrene*	Yellow pansy	Least Concern
Melampias	*huebneri*	*huebneri*	Boland brown	Least Concern
Melanitis	*leda*		Twilight bown	Least Concern
Pseudonympha	*hippia*		Burchell's brown	Least Concern
Pseudonympha	*magus*		Silver-bottom brown	Least Concern
Pseudonympha	*southeyi*	*wykehami*	Southey's brown	Least Concern
Pseudonympha	*trimenii*	*namaquana*	Trimen's brown	Least Concern
Pseudonympha	*trimenii*	*nieuwveldensis*	Trimen's brown	Least Concern
Pseudonympha	*trimenii*	*trimenii*	Trimen's brown	Least Concern
Stygionympha	*irrorata*		Karoo hillside brown	Least Concern
Stygionympha	*robertsoni*		Robertson's hillside brown	Least Concern

Genus	Species	Sub-species	Common name	Threat status
Stygionympha	*vigilans*		Western hillside brown	Least Concern
Tarsocera	*cassus*	*cassus*	Spring widow	Least Concern
Tarsocera	*cassus*	*outeniqua*	Spring widow	Least Concern
Tarsocera	*dicksoni*		Dickson's widow	Least Concern
Tarsocera	*fulvina*		Karoo widow	Least Concern
Tarsocera	*namaquensis*		Namaqua widow	Least Concern
Tarsocera	*southeyae*		Southey's widow	Least Concern
Telchinia	*rahira*	*rahira*	Marsh acraea	Least Concern
Torynesis	*hawequas*		Hawequas widow	Least Concern
Torynesis	*magna*		Large widow	Least Concern
Torynesis	*mintha*	*mintha*	Mintha widow	Least Concern
Vanessa	*cardui*		Painted lady	Least Concern
Ypthima	*asterope*	*hereroica*	African ringlet	Least Concern
Papilio	*demodocus*	*demodocus*	Citrus swallowtail	Least Concern
Papilio	*nireus*	*lyaeus*	Green-banded swallowtail	Least Concern
Belenois	*aurota*		Brown-veined white	Least Concern
Belenois	*gidica*	*abyssinica*	African veined white	Least Concern
Catopsilia	*florella*		African migrant	Least Concern
Colias	*electo*	*electo*	African clouded yellow	Least Concern
Colotis	*antevippe*	*gavisa*	Red tip	Least Concern
Colotis	*euippe*	*omphale*	Smoky orange tip	Least Concern
Mylothris	*agathina*	*agathina*	Common dotted border	Least Concern
Pieris	*brassicae*		Cabbage white	Least Concern
Pontia	*helice*	*helice*	Common meadow white	Least Concern
Teracolus	*agoye*	*bowkeri*	Speckled sulphur tip	Least Concern

Table 22: List of mammal taxa known to occur in the WCP with regional (SARDB) and global (IUCN) threat categories (Western Cape State of Biodiversity Report (2012)

Family	Scientific name	Common name	IUCN threat category	SARDB threat category
BALAENIDAE	*Eubalaena australis*	Southern right whale	Least Concern	Least Concern
BALAENOPTERIDAE	*Balaenoptera acutorostrata subsp.*	Dwarf minke whale	Least Concern	Data Deficient
BALAENOPTERIDAE	*Balaenoptera bonaerensis*	Antarctic minke whale	Data Deficient	Least Concern
BALAENOPTERIDAE	*Balaenoptera borealis*	Sei whale	Endangered (A1ad)	Data Deficient
BALAENOPTERIDAE	*Balaenoptera edeni*	Bryde's whale	Data Deficient	Vulnerable (D1)
BALAENOPTERIDAE	*Balaenoptera musculus brevicauda*	Pygmy blue whale	Data Deficient	Data Deficient
BALAENOPTERIDAE	*Balaenoptera musculus intermedia*	Antarctic true blue whale	Critically Endangered (A1abd)	Endangered (D)
BALAENOPTERIDAE	*Balaenoptera physalus*	Fin whale	Endangered (A1d)	Data Deficient
BATHYERGIDAE	*Bathyergus suillus*	Cape dune molerat	Least Concern	Least Concern
BATHYERGIDAE	*Cryptomys hottentotus*	Common molerat	Least Concern	Least Concern
BATHYERGIDAE	*Georychus capensis*	Cape molerat	Least Concern	Least Concern
BOVIDAE	*Alcelaphus buselaphus*	Red hartebeest	Least Concern	Least Concern
BOVIDAE	*Antidorcas marsupialis*	Springbok	Least Concern	Least Concern
BOVIDAE	*Damaliscus pygargus pygargus*	Bontebok	Near Threatened	Vulnerable (D1)
BOVIDAE	*Hippotragus leucophaeus*	Blue antelope	Extinct	Not Evaluated
BOVIDAE	*Oreotragus oreotragus*	Klipspringer	Least Concern	Least Concern
BOVIDAE	*Oryx gazella*	Gemsbok	Least Concern	Least Concern
BOVIDAE	*Pelea capreolus*	Grey rhebok	Least Concern	Least Concern
BOVIDAE	*Philantomba monticola monticola*	Blue duiker	Least Concern	Vulnerable (C1; C2a(i))
BOVIDAE	*Raphicerus campestris*	Steenbok	Least Concern	Least Concern
BOVIDAE	*Raphicerus melanotis*	Cape grysbok	Least Concern	Least Concern
BOVIDAE	*Redunca fulvorufula*	Mountain reedbuck	Least Concern	Least Concern
BOVIDAE	*Sylvicapra grimmia*	Common duiker	Least Concern	Least Concern
BOVIDAE	*Syncerus caffer*	African buffalo	Least Concern	Least Concern
BOVIDAE	*Tragelaphus oryx*	Eland	Least Concern	Least Concern
BOVIDAE	*Tragelaphus scriptus*	Bushbuck	Least Concern	Least Concern
BOVIDAE	*Tragelaphus strepsiceros*	Kudu	Least Concern	Least Concern
CANIDAE	*Canis mesomelas*	Black-backed jackal	Least Concern	Least Concern
CANIDAE	*Lycaon pictus*	Wild dog	Endangered (C2a(i))	Endangered (D)
CANIDAE	*Otocyon megalotis*	Bat-eared fox	Least Concern	Least Concern
CANIDAE	*Vulpes chama*	Cape fox	Least Concern	Least Concern
CERCOPITHECIDAE	*Cercopithecus pygerythrus*	Vervet monkey	Least Concern	Least Concern
CERCOPITHECIDAE	*Papio ursinus ursinus*	Chacma baboon	Least Concern	Least Concern
CHRYSOCHLORIDAE	*Amblysomus corriae corriae*	Fynbos golden mole (East)	Near Threatened	Near Threatened
CHRYSOCHLORIDAE	*Amblysomus corriae devilliersii*	Fynbos golden mole (West)	Near Threatened	Near Threatened
CHRYSOCHLORIDAE	*Amblysomus hottentotus*	Hottentot golden mole	Least Concern	Data Deficient
CHRYSOCHLORIDAE	*Chlorotalpa duthieae*	Duthie's golden mole	Vulnerable (B1ab(iii))	Least Concern
CHRYSOCHLORIDAE	*Chlorotalpa sclateri*	Sclater's golden mole	Least Concern	Data Deficient
CHRYSOCHLORIDAE	*Chrysochloris asiatica*	Cape golden mole	Least Concern	Data Deficient
CHRYSOCHLORIDAE	*Cryptochloris zyli*	Van Zyl's golden mole	Endangered (B1ab(iii))	Critically Endangered (B1ab(iii)+2ab(iii); D)
CHRYSOCHLORIDAE	*Eremitalpa granti granti*	Grant's golden mole	Least Concern	Vulnerable (B2ab(ii,iii,iv))
DELPHINIDAE	*Cephalorhynchus heavisidii*	Heaviside's dolphin	Data Deficient	Data Deficient
DELPHINIDAE	*Delphinus capensis*	Long-beaked common dolphin	Data Deficient	Least Concern
DELPHINIDAE	*Delphinus delphis*	Short-beaked common dolphin	Least Concern	Least Concern
DELPHINIDAE	*Feresa attenuata*	Pygmy killer whale	Data Deficient	Data Deficient
DELPHINIDAE	*Globicephala macrorhynchus*	Short-finned pilot whale	Data Deficient	Data Deficient
DELPHINIDAE	*Globicephala melas edwardii*	Long-finned pilot whale	Data Deficient	Least Concern
DELPHINIDAE	*Grampus griseus*	Risso's dolphin	Least Concern	Data Deficient
DELPHINIDAE	*Lagenorhynchus obscurus*	Dusky dolphin	Data Deficient	Data Deficient
DELPHINIDAE	*Orcinus orca*	Killer whale	Data Deficient	Data Deficient
DELPHINIDAE	*Peponocephala electra*	Melon-headed whale	Least Concern	Least Concern
DELPHINIDAE	*Pseudorca crassidens*	False killer whale	Data Deficient	Least Concern
DELPHINIDAE	*Sousa chinensis*	Indo-pacific hump-backed dolphin	Near Threatened	Vulnerable (B1ab(ii,iii))
DELPHINIDAE	*Stenella attenuate*	Pantropical spotted dolphin	Least Concern	Data Deficient
DELPHINIDAE	*Stenella coeruleoalba*	Striped dolphin	Least Concern	Least Concern
DELPHINIDAE	*Stenella longirostris longirostris*	Spinner dolphin	Data Deficient	Data Deficient
DELPHINIDAE	*Tursiops aduncus*	Indian Ocean bottlenosed dolphin	Data Deficient	Vulnerable (B2ab(ii,iii,v)C2a(ii))
DELPHINIDAE	*Tursiops truncates*	Atlantic Ocean bottlenosed dolphin	Least Concern	Data Deficient
ELEPHANTIDAE	*Loxodonta africana*	African elephant	Vulnerable (A2a)	Least Concern
EMBALLONURIDAE	*Taphozous mauritianus*	Mauritian tomb bat	Least Concern	Least Concern

Family	Scientific name	Common name	IUCN threat category	SARDB threat category
EQUIDAE	*Equus quagga quagga*	Quagga	Extinct	Extinct
EQUIDAE	*Equus zebra zebra*	Cape Mountain zebra	Vulnerable (C1)	Vulnerable (D1)
FELIDAE	*Acinonyx jubatus*	Cheetah	Vulnerable (A2acd;C1)	Vulnerable (D1)
FELIDAE	*Caracal caracal*	Caracal	Least Concern	Least Concern
FELIDAE	*Felis nigripes*	Black-footed cat	Vulnerable (C2a(i))	Least Concern
FELIDAE	*Felis silvestris*	African Wild Cat	Least Concern	Least Concern
FELIDAE	*Leptailurus serval*	Serval	Least Concern	Near Threatened
FELIDAE	*Panthera leo*	Lion	Vulnerable (A2abcd)	Vulnerable (D1)
FELIDAE	*Panthera pardus*	Leopard	Near Threatened	Least Concern
HERPESTIDAE	*Atilax paludinosus*	Marsh mongoose	Least Concern	Least Concern
HERPESTIDAE	*Cynictis penicillata*	Yellow mongoose	Least Concern	Least Concern
HERPESTIDAE	*Galerella pulverulenta pulverulenta*	Cape grey mongoose	Least Concern	Least Concern
HERPESTIDAE	*Herpestes ichneumon*	Large grey mongoose	Least Concern	Least Concern
HERPESTIDAE	*Suricata suricatta*	Suricate	Least Concern	Least Concern
HIPPOPOTAMIDAE	*Hippopotamus amphibius*	Hippopotamus	Vulnerable (A4cd)	Least Concern
HYAENIDAE	*Crocuta crocuta*	Spotted hyaena	Least Concern	Near Threatened
HYAENIDAE	*Parahyaena brunnea*	Brown hyaena	Near Threatened	Near Threatened
HYAENIDAE	*Proteles cristatus*	Aardwolf	Least Concern	Least Concern
HYSTRICIDAE	*Hystrix africaeaustralis*	Porcupine	Least Concern	Least Concern
KOGIDAE	*Kogia breviceps*	Pygmy sperm whale	Data Deficient	Least Concern
KOGIDAE	*Kogia sima*	Dwarf sperm whale	Data Deficient	Least Concern
LEPORIDAE	*Pronolagus saundersiae*	Hewitt's red rock rabbit	Least Concern	Least Concern
LEPORIDAE	*Bunolagus monticularis*	Riverine rabbit	Critically Endangered (C2a(i))	Critically Endangered (C2a(i))
LEPORIDAE	*Lepus capensis*	Cape hare	Least Concern	Least Concern
LEPORIDAE	*Lepus saxatilis*	Scrub hare	Least Concern	Least Concern
MACROSCELIDIDAE	*Elephantulus edwardii*	Cape rock elephantshrew	Least Concern	Least Concern
MACROSCELIDIDAE	*Elephantulus pilicaudus*	Karoo rock elephantshrew	Data Deficient	Data Deficient
MACROSCELIDIDAE	*Elephantulus rupestris*	Smith's rock elephantshrew	Least Concern	Least Concern
MACROSCELIDIDAE	*Macroscelides proboscideus*	Round-eared elephantshrew	Least Concern	Least Concern
MOLOSSIDAE	*Sauromys petrophilus*	Flat-headed free-tailed bat	Least Concern	Least Concern
MOLOSSIDAE	*Tadarida aegyptiaca*	Egyptian free-tailed bat	Least Concern	Least Concern
MURIDAE	*Acomys subspinosus*	Cape spiny mouse	Least Concern	Least Concern
MURIDAE	*Aethomys granti*	Grant's rock mouse	Least Concern	Least Concern
MURIDAE	*Dasymys capensis*	Cape water rat	Not Evaluated	Not Evaluated
MURIDAE	*Dendromus melanotis*	Grey climbing mouse	Least Concern	Least Concern
MURIDAE	*Dendromus mesomelas*	Brants' climbing mouse	Least Concern	Least Concern
MURIDAE	*Dendromus mystacalis jamesoni*	Chestnut climbing mouse	Least Concern	Least Concern
MURIDAE	*Desmodillus auricularis*	Short-tailed gerbil	Least Concern	Least Concern
MURIDAE	*Gerbillurus paeba*	Hairy-footed gerbil	Least Concern	Least Concern
MURIDAE	*Grammomys dolichurus*	Woodland mouse	Data Deficient	Data Deficient
MURIDAE	*Malacothrix typica*	Large-eared mouse	Least Concern	Least Concern
MURIDAE	*Mastomys coucha*	Multimammate mouse	Least Concern	Least Concern
MURIDAE	*Mastomys natalensis*	Natal multimammate mouse	Least Concern	Least Concern
MURIDAE	*Micaelamys namaquensis*	Namaqua rock mouse	Least Concern	Least Concern
MURIDAE	*Mus minutoides*	Pygmy mouse	Least Concern	Least Concern
MURIDAE	*Myomyscus verreauxi*	Verreaux's mouse	Not Evaluated	Least Concern
MURIDAE	*Mystromys albicaudatus*	White-tailed mouse	Endangered (A3c)	Endangered (A3c)
MURIDAE	*Otomys irroratus*	Vlei rat	Least Concern	Least Concern
MURIDAE	*Otomys laminatus*	Laminate vlei rat	Least Concern	Least Concern
MURIDAE	*Otomys saundersiae*	Saunders' vlei rat	Least Concern	Least Concern
MURIDAE	*Otomys unisulcatus*	Bush vlei rat	Least Concern	Least Concern
MURIDAE	*Parotomys brantsii*	Brants's whistling rat	Least Concern	Least Concern
MURIDAE	*Parotomys littledalei*	Littledale's whistling rat	Least Concern	Near Threatened
MURIDAE	*Petromyscus barbouri*	Barbour's rock mouse	Least Concern	Least Concern
MURIDAE	*Petromyscus collinus*	Pygmy rock mouse	Least Concern	Least Concern
MURIDAE	*Rhabdomys pumilio*	Striped mouse	Least Concern	Least Concern
MURIDAE	*Saccostomus campestris*	Pouched mouse	Least Concern	Least Concern
MURIDAE	*Steatomys krebsii*	Krebs' fat mouse	Least Concern	Least Concern
MURIDAE	*Tatera afra*	Cape gerbil	Least Concern	Least Concern
MUSTELIDAE	*Aonyx capensis*	African clawless otter	Least Concern	Least Concern
MUSTELIDAE	*Ictonyx striatus*	Striped polecat	Least Concern	Least Concern
MUSTELIDAE	*Mellivora capensis*	Honey badger	Least Concern	Near Threatened
MUSTELIDAE	*Poecilogale albinucha*	African striped weasel	Least Concern	Data Deficient
MYOXIDAE	*Graphiurus murinus*	Woodland dormouse	Least Concern	Least Concern
MYOXIDAE	*Graphiurus ocularis*	Spectacled dormouse	Least Concern	Least Concern
NEOBALAENIDAE	*Caperea marginata*	Pygmy right whale	Data Deficient	Least Concern
NEOBALAENIDAE	*Megaptera novaeangliae*	Humpback whale	Least Concern	Near Threatened
NYCTERIDAE	*Nycteris thebaica*	Egyptian slit-faced bat	Least Concern	Least Concern
ORYCTEROPODIDAE	*Orycteropus afer*	Aardvark	Least Concern	Least Concern

Family	Scientific name	Common name	IUCN threat category	SARDB threat category
OTARIIDAE	*Arctocephalus gazella*	Antarctic fur seal	Least Concern	Near Threatened
OTARIIDAE	*Arctocephalus pusillus pussilus*	Cape fur seal	Least Concern	Least Concern
OTARIIDAE	*Arctocephalus tropicalis*	Subantarctic fur seal	Least Concern	Least Concern
PEDETIDAE	*Pedetes capensis*	Springhare	Least Concern	Least Concern
PHOCIDAE	*Hydrurga leptonyx*	Leopard seal	Least Concern	Not Evaluated
PHOCIDAE	*Lobodon carcinophagus*	Crabeater seal	Least Concern	Not Evaluated
PHOCIDAE	*Mirounga leonina*	Southern elephant seal	Least Concern	Endangered (A2b)
PHYSETERIDAE	*Physeter macrocephalus*	Sperm whale	Vulnerable (A1d)	Vulnerable (A2bd)
PROCAVIDAE	*Procavia capensis* R	ock dassie	Least Concern	Least Concern
PTEROPODIDAE	*Epomophorus wahlbergi*	Wahlberg's epauletted fruit bat	Least Concern	Least Concern
PTEROPODIDAE	*Rousettus aegyptiacus*	Egyptian fruit bat	Least Concern	Least Concern
RHINOCEROTIDAE	*Diceros bicornis bicornis*	Black rhinoceros	Vulnerable (D1)	Critically Endangered (D)
RHINOLOPHIDAE	*Rhinolophus capensis*	Cape horseshoe bat	Least Concern	Near Threatened
RHINOLOPHIDAE	*Rhinolophus clivosus*	Geoffroy's horseshoe bat	Least Concern	Near Threatened
SORICIDAE	*Crocidura cyanea*	Reddish-grey musk shrew	Least Concern	Data Deficient
SORICIDAE	*Crocidura flavescens*	Greater red musk shrew	Least Concern	Data Deficient
SORICIDAE	*Crocidura fuscomurina*	Tiny musk shrew	Least Concern	Data Deficient
SORICIDAE	*Crocidura silacea*	Lesser grey-brown musk shrew	Least Concern	Data Deficient
SORICIDAE	*Myosorex longicaudatus boosmani*	Boosmansbos long-tailed forest shrew	Vulnerable (B1ab(iii))	Near Threatened
SORICIDAE	*Myosorex longicaudatus longicaudatus*	Knysna long-tailed forest shrew	Vulnerable (B1ab(iii))	Near Threatened
SORICIDAE	*Myosorex varius*	Forest shrew	Least Concern	Data Deficient
SORICIDAE	*Suncus infinitesimus*	Least dwarf shrew	Least Concern	Data Deficient
SORICIDAE	*Suncus varilla*	Lesser dwarf shrew	Least Concern	Data Deficient
SUIDAE	*larvatus koiropotamus*	Bushpig ssp. Koiropotamus	Least Concern	Least Concern
POTAMOCHOERUS				
VESPERTILIONIDAE	*Cistugo lesueuri*	Lesueur's wing-gland bat	Least Concern	Near Threatened
VESPERTILIONIDAE	*Eptesicus hottentotus*	Long-tailed serotine bat	Least Concern	Least Concern
VESPERTILIONIDAE	*Kerivoula lanosa*	Lesser woolly bat	Least Concern	Near Threatened
VESPERTILIONIDAE	*Laephotis namibensis*	Namibian long-eared bat	Least Concern	Not Evaluated
VESPERTILIONIDAE	*Miniopterus fraterculus*	Lesser long-fingered bat	Least Concern	Near Threatened
VESPERTILIONIDAE	*Miniopterus schreibersii*	Schreiber's long-fingered bat	Near Threatened	Near Threatened
ZIPHIDAE	*Mesoplodon layardii*	Layard's beaked whale	Data Deficient	Data Deficient
ZIPHIDAE	*Mesoplodon mirus*	True's beaked whale	Data Deficient	Data Deficient
ZIPHIDAE	*Ziphius cavirostris*	Cuvier's beaked whale	Least Concern	Data Deficient
VESPERTILIONIDAE	*Myotis tricolor*	Temminck's hairy bat	Least Concern	Near Threatened
VESPERTILIONIDAE	*Neoromicia capensis*	Cape serotine bat	Least Concern	Least Concern
VIVERRIDAE	*Genetta genetta*	Small-spotted genet	Least Concern	Least Concern
VIVERRIDAE	*Genetta tigrina*	Large-spotted genet	Least Concern	Least Concern
ZIPHIDAE	*Berardius arnuxii*	Arnoux's beaked whale	Data Deficient	Data Deficient
ZIPHIDAE	*Hyperoodon planifrons*	Southern bottlenose whale	Least Concern	Least Concern
ZIPHIDAE	*Indopacetus pacificus*	Longman's beaked whale	Data Defient	Data Deficient
ZIPHIDAE	*Mesoplodon densirostris*	Blainville's beaked whale	Data Deficient	Data Deficient
ZIPHIDAE	*Mesoplodon grayi*	Gray's beaked whale	Data Deficient	Data Deficient
ZIPHIDAE	*Mesoplodon hectori*	Hector's beaked whale	Data Deficient	Data Deficient